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Application Number: 17830109 Document Date: 06/01/2022

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Form Revision Date: March 1, 2019

Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/AIA/424 (04-14)

CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)

First Named Inventor:	Ethan Fieldman	Nonprovisional Application Number (if known):	
Title of Invention:	Hand Control Interfaces and Methods		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1) and the prioritized examination fee set forth in 37 CFR 1.17(c) have been filed with the request. The publication fee requirement is met because that fee, set forth in 37 CFR 1.18(d), is currently $0. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.

2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims, and that any request for an extension of time will cause an outstanding Track I request to be dismissed.

3. The applicable box is checked below:

I. ☑ Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)

i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.

---OR---

(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.

ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, **or** the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.

II. ☐ Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)

i. A request for continued examination has been filed with, or prior to, this form.
ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /Eric J. Hanson/	Date 2022-06-01
Name (Print/Typed) Eric J. Hanson	Practitioner Registration Number 44,738

Note: *This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required.**

☑ *Total of 1 forms are submitted.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/14 (01-22)
Approved for use through 05/31/2024. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	114784-729016
	Application Number	
Title of Invention	Hand Control Interfaces and Methods in Virtual Reality Environments	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Ethan		Fieldman	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	Gainesville	State/Province	FL	Country of Residence	US

Mailing Address of Inventor:

Address 1	c/o VR-EDU, Inc.
Address 2	2510 NW 16th Ave

City	Gainesville	State/Province	FL
Postal Code	32605	**Country**	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	27148		
Email Address	patentdocketing@polsinelli.com	Add Email	Remove Email

Application Information:

Title of the Invention	Hand Control Interfaces and Methods in Virtual Reality Environments		
Attorney Docket Number	114784-729016	**Small Entity Status Claimed**	☒
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	1	**Suggested Figure for Publication (if any)**	

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	114784-729016
	Application Number	
Title of Invention	Hand Control Interfaces and Methods in Virtual Reality Environments	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☒ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	27148		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	114784-729016
	Application Number	
Title of Invention	Hand Control Interfaces and Methods in Virtual Reality Environments	

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	114784-729016
	Application Number	
Title of Invention	Hand Control Interfaces and Methods in Virtual Reality Environments	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☒ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☒ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

PTO/AIA/14 (01-22)
Approved for use through 05/31/2024. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	114784-729016
	Application Number	
Title of Invention	Hand Control Interfaces and Methods in Virtual Reality Environments	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	VR-EDU, Inc.		
Mailing Address Information For Applicant:			
Address 1	2510 NW 16th Avenue		
Address 2			
City	Gainesville	**State/Province**	FL
Country	US	Postal Code	32605
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	114784-729016
	Application Number	
Title of Invention	Hand Control Interfaces and Methods in Virtual Reality Environments	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Eric J. Hanson/			Date (YYYY-MM-DD)	2022-06-01
First Name	Eric	Last Name	Hanson	Registration Number	44,738

Additional Signature may be generated within this form by selecting the Add button. Add

PTO/AIA/14 (01-22)
Approved for use through 05/31/2024. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	114784-729016
	Application Number	
Title of Invention	Hand Control Interfaces and Methods in Virtual Reality Environments	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	Hand Control Interfaces and Methods in Virtual Reality Environments
First Named Inventor/Applicant Name:	Ethan Fieldman
Filer:	Eric J. Hanson
Attorney Docket Number:	

Filed as Small Entity

Filing Fees for Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	80	80
UTILITY SEARCH FEE	2111	1	350	350
UTILITY EXAMINATION FEE	2311	1	400	400
REQUEST FOR PRIORITIZED EXAMINATION	2817	1	2100	2100
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	2930

Electronic Acknowledgement Receipt

EFS ID:	45851086
Application Number:	17830109
International Application Number:	
Confirmation Number:	3149
Title of Invention:	Hand Control Interfaces and Methods in Virtual Reality Environments
First Named Inventor/Applicant Name:	Ethan Fieldman
Customer Number:	27148
Filer:	Eric J. Hanson
Filer Authorized By:	
Attorney Docket Number:	
Receipt Date:	01-JUN-2022
Filing Date:	
Time Stamp:	17:43:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$2930
RAM confirmation Number	E202261H43412688
Deposit Account	501662
Authorized User	Eric Hanson
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Specification	NPA_VR_Hand_Control_Interfaces_Specification.pdf	195801 7af253e59cdf198de95f5ed0e65a66b05d1f532c	no	13
Warnings:					
Information:					
2	Track One Request	114784_29016_Track_1_Request_2022_06_01.pdf	74989 adb436e77ba6691df6c5fcc6cd89ee4e64121624	no	2
Warnings:					
Information:					
3	Application Data Sheet	114784_729016_ADS_As_Filed.pdf	2252056 d4f2842621ae837888749445eefd42ebf9754532	no	8
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	46423 045d1542a4fbc8b277d7e05f0991e51578b41481	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2569269		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

HAND CONTROL INTERFACES AND METHODS IN VIRTUAL REALITY ENVIRONMENTS

BACKGROUND OF THE INVENTION

[0001] Virtual reality (VR) environments have grown more realistic and immersive as VR headsets, controllers, interfaces, processor speeds, data storage and data transfer technologies have continued to improve. In electronic VR environments, such as implemented through development tools for the Oculus/Meta Quest platform (Oculus Platform SDK) by Oculus VR (Irvine, CA) (parent company Meta) there are both challenges and opportunities for customizing how users interact with the VR environment depending on whether the user is operating a physical controller device or using their body, typically their hands.

[0002] In conventional VR systems, such as the Meta Quest 2 platform, users can use either a physical controller or their hands to select and activate applications that are typically displayed 2-dimensionally in an application selection interface. In such conventional VR systems, when the user is using a physical controller they move the controller or use buttons, joystick, scrolling or similar input controls on the controller to select and launch an application from an application selection interface in which applications are displayed similar to application icons on mobile operating systems on tablets and phones, e.g. Android and Apple iOS. If a user is using their hands to interact with the application interface in the conventional VR environment, whether by initially using their hands or setting down the physical controller to switch to hands, the VR application selection interface remains the same; however, the user can make a pinch or similar pointing gesture to simulate laser pointing from the fingertips of the hand recognized by the system for selecting an application for launch from the display of the plurality of application icons in the VR application selection interface.

[0003] One of the deficiencies of the VR application selection interface remaining in the same display format between a user's use of a physical controller and hands is that the current "laser pointing" hands experience is that the laser pointing effect can be slow to be recognized or not even recognized, difficult to quickly and accurately

choose an application for launch, and be less intuitive for moving between application selection and applications selection screens as compared to use of the physical controller for which the application selection interface is more compatible.

SUMMARY OF THE INVENTION

[0004] Embodiments of the invention address these challenges by providing methods and systems with improved display and functionality of an application selection interface in a VR environment that changes specifically for use with a user's hands (or other body parts, e.g. arms, feet, etc..) as compared to a separate and different application selection interface that is displayed when physical controllers are used. In embodiments, methods and systems of the invention are implemented through development tools for the Oculus/Meta Quest platform (Oculus Platform SDK) by Oculus VR (Irvine, CA) (parent company Meta). It will be appreciated that the systems and methods, including related displays, user interfaces, controls and functionalities, disclosed herein may be similarly implemented on other VR platforms with other VR SDKs and software development tools known to VR developers.

[0005] In an embodiment of the invention, a first application selection interface is provided in connection with use of a physical controller or controllers in a VR environment. The first selection interface may be the same or similar to conventional VR application selection interfaces, such as implement in the Meta Quest 2 VR system. When a user initially does not use or switches away from using a physical controller, to use a user's hands in the VR environment, a second application selection interface that is better and more intuitively adapted for hand interaction and control is displayed to the user.

[0006] In further embodiments, a second and different application selection interface for use with a user's hands in a VR environment (as compared to a first application selection interface for use with a physical controller) does not require laser pointing functionality of conventional VR platforms, but may be presented to appear to be directly acted upon by the user hands, such as pushing or pulling the selected application with a hand to launch the application.

Meta Platforms, Inc. - Ex. 1002
Page 18

[0007] In embodiments, application icons in the application selection interface used with hands control may be presented as three-dimensional buttons that a user may use their hands to press the "application button" to launch a desired application. In other embodiments application icons may be presented a three-dimensional levers or switches that can be pulled or flipped to launch the desired application.

[0008] In further embodiments, scrolling arrows may also be presented as three-dimensional buttons to a user for navigating the application selection interface by scrolling up and down by selecting the corresponding up or down button, such as by pushing or pulling the scrolling arrow button. It will be appreciated that the application icons in the application selection interface will scroll up or down based on selection of an up or down scrolling arrow.

[0009] In further embodiments, an application selection interface specific for hands control in a VR environment is displayed to appear at a different distance from the user in comparison to the application selection interface displayed for use with a physical controller. For example, a VR platform may calculate, either directly or indirectly based on arm length, relative arm length, user height, relative user height, or from average user arm lengths or height, a preferred distance that VR application selection interface appears closer to the user than an application selection interface displayed when the user is using a physical controller. In one embodiment, such distance for a hands-controlled application selection interface may be about half of an arm length (or relative or average determined arm length) for a user. It will be appreciated that in other embodiments, other distances from the user to the hands-controlled application display interface may be implemented for display, including user-selected distances.

[0010] In embodiments of the invention, an improved hands-control specific interface may be implemented through (i) a software application running on the VR platform operating system, (ii) programming of the hands-control interface as a feature in the VR platform operating system and (iii) other programmed plug-ins and similar control modifications adapted for use in the VR platform operating system. It will be appreciated that Oculus/Meta Quest system software based on Android source code provides one example of a VR platform operating system.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a perspective view of virtual reality application selection interface for control by a user's hands that interact with application icons and scrolling arrows to press and select an application for launch in an embodiment of the invention.

DETAILED DESCRIPTION

[0012] The present invention is directed to methods and interfaces for application selection in virtual reality environments, such as the Meta Quest 2 platform (Irvine, CA).

[0013] Typically, a user in a virtual reality platform wears a headset paired with controllers, such as "touch" controllers, wherein the user interacts with their environment via the tracking and inputs received from one or both controllers to the computerized headset running system or operating software. It will be appreciated that such interaction via controllers includes selection of application icons from an application selection interface when the user desires to launch and activate a desired application appearing in the selection interface.

[0014] A conventional alternative way for users to interact with a virtual reality environment in the Meta Quest 2 platform, includes hand tracking. Hand tracking may be activated when a user puts down physical device controllers or is not using the device controllers when beginning interaction in the VR environment. Hand tracking works by using the inside-out cameras of the VR headset which detects the position and orientation of the user's hands and the configuration of the user's fingers. Once detected, computer vision algorithms track the movement and orientation of the user's hands. Conventionally, the computer vision then recognizes pinching and scrolling gestures from a user's hands that appear and operate like "laser hands" for the user to select, scroll and provide control inputs and interact with the virtual reality environment according to the operating system software for the VR platform.

[0015] The hand tracking feature of the current Meta Quest 2 platform applied to application selection, such as a typical application selection interface resembling

Meta Platforms, Inc. - Ex. 1002
Page 20

application icons on mobile devices and tablets (e.g. IOS and android application selection screens) but in a 3D virtual reality environment can be difficult for users to achieve proper pointing and recognition of the desired control input from the "laser hand" effect as compared to traditional procedures of tapping a button on an application selection interface of the mobile device and tablet platforms.

[0016] Referring to FIG. 1, an embodiment of the invention is illustrated wherein an alternative hand tracking and control interface for selection of an application icon 25 to launch and activate an application is provided in a VR environment to mimic the look and feel and of tapping or pressing a an application icon from an application selection interface of mobile device and tablet environments.

[0017] When a user puts down a VR physical device controller or is not using the VR physical device controller when beginning a VR platform experience, an application selection interface 10 includes a grid of icons of applications 20 displayed for a user's selection by a user's hand 100 that is tracked by the camera and computer vision of a VR headset worn by the user. It will be appreciated that in embodiments of the invention, a hands-control specific interface of the invention may be implemented through (i) a software application running on the VR platform operating system, (ii) programming of the hands-control interface as a feature in the VR platform operating system and (iii) other programmed plug-ins and similar control modifications adapted for use in the VR platform operating system. It will be appreciated that Oculus/Meta Quest system software based on Android source code provides one example of a VR platform operating system that may be modified to add or provide an alternative of the hands-control interface of the invention.

[0018] In a preferred embodiment, scroll buttons or representations are displayed as an up arrow 30 and a down arrow 35. The user's hands 100 can use a finger to push those buttons 30 and 35 to scroll among the application icons 20 of the application selection interface 10 to choose an application for launching. To the user the selection of desired application, such as education application icon 25, mimics pushing a button in the real world, including pushing a scroll button 30 and 35 or an application icon 25.

Meta Platforms, Inc. - Ex. 1002
Page 21

[0019] In some embodiments, if the users returns to use of a physical controller, the scroll buttons up 30 and down 35 may be programmed to disappear as push buttons since they button pushing experience would no longer be relevant.

[0020] Unlike the pinching of fingers to provide a laser-pointing experience in prior art hands tracking of the Meta Quest 2 platform, a user of the present invention for hands control with an application selection interface simply moves their hand 100 and finger over a desired application icon 25 among a plurality of application icons 20 displayed in the application selection interface 10, and simply pushes the desired application icon 25 as a button to launch the application. The camera tracking and computer vision algorithm in the VR platform activates the "pressed' application when detected. To the user, the experience is more similar to pressing application icons in a mobile device or table environment.

[0021] In embodiments of the invention, the application icons 20 could be represented as 2-dimensional (2D) application icons that become 3D buttons. When a user is in the hands-control interface of the present invention, the application icons 20 can lift up from 2D display to being displayed as a 3D button, so that it is clear to a user that they can push the application icon 20 as a button down with the user's finger on the user's hand 100.

[0022] In some embodiments, a user does not need to set down controllers or gesture to activate the hands-control and application selection interface of the invention, but could choose from a settings display, such as at the bottom of the user's VR environment display and select activation of the desired hands-control feature.

[0023] In further embodiments, a user could select menus and settings features that are not necessarily applications in a similar manner of hands-control selecting an icon representing a menu item or setting. For example, a Wi-Fi settings button might change from a 2D to 3D display, so a user knows that the setting can be activated as pressed from the user's hands 100 instead of physical device controllers.

[0024] In some embodiments, pulling and sliding actions from a user's hand 100 might be implemented in the VR platform instead of button pressing depending on

Meta Platforms, Inc. - Ex. 1002
Page 22

the desired action of the user. For example, a user could grab an application icon 20 or between application icons and move the user's hand up or down to cause the application grid to scroll up or down respectively. That is, the user user's their hand 100 to grab something that is displayed to the user and move it up or down, like how someone might grab a huge classroom chalkboard or window to slide it up or down in the real world.

[0025] In further embodiments of the invention, when a user is in the hands-control interface for application selection, the interface applications grid and settings button appears to move toward the user after calculating about how long the user's arms are -- such as (i) based on average American height or; (ii) based on how far away physical controllers were when dangling at the user's side or; (iii) based on a user's height since that dimension can be used determine arm length. It will be appreciated that other methods for calculating a preferred distance for an application selection interface 10 to be displayed relative to the user hands 100 may be utilized, with the intention that the user perceives an ability to reach and press or grab or otherwise interact with the application icons 20 or similar menus and settings feature and buttons as an alternative to controller operation and laser-hands interaction.

[0026] Various embodiments of the invention have been described. It will, however, be evident that various modifications and changes may be made thereto, and additional embodiments may be implemented, without departing from the broader scope of the invention as set forth by the claims. This specification is to be regarded in an illustrative rather than a restrictive sense.

CLAIMS

What is claimed is:

1. An application selection interface comprising:

a plurality of software application icons displayed in a virtual reality environment to a user using a virtual reality hardware device; and

at least one software application icon of the plurality of software icons operatively linked to launch a respective software application when interacted with by a pushing, pulling, tapping, pressing or sliding action of a body part of the user directly on the application icon.

1. The application selection interface of claim 1, wherein the at least one software application icon is displayed as 3-dimensional button that launches a respective software application when pressed by the user's hand or finger.

2. The application selection interface of claim 2, further comprising up and down arrows displayed as buttons adjacent the plurality of software application icons, wherein the up and down arrows are operatively linked to scrolling the plurality of software application icons when directly interacted with by a user's hand or finger.

3. The application selection interface of claim 1, further comprising up and down arrows displayed as buttons adjacent the plurality of software application icons, wherein the up and down arrows are operatively linked to scrolling the plurality of software application icons when directly interacted with by a user's hand or finger.

4. The application selection interface of claim 4, wherein the plurality of software application icons are displayed within an apparent distance of a user's arm length to the user.

5. The application selection interface of claim 1, wherein the plurality of software application icons are displayed within an apparent distance of a user's arm length to the user.

Meta Platforms, Inc. - Ex. 1002
Page 24

6. The application selection interface of claim 2, wherein the plurality of software application icons are displayed within an apparent distance of a user's arm length to the user.

7. The application selection interface of claim 3, wherein the plurality of software application icons are displayed within an apparent distance of a user's arm length to the user.

8. An application selection interface comprising:

a plurality of icons each representing at least one of a software application and a virtual reality platform system setting displayed in a virtual reality environment to a user using a virtual reality hardware device;

a first icon of the plurality of icons representing a virtual reality platform system setting operatively linked to activate a setting when interacted with by a pushing, pulling, tapping, pressing or sliding action of a body part of the user directly on the first icon; and

a second icon of the plurality of icons representing a software application operatively linked to launch a software application when interacted with by a pushing, pulling, tapping, pressing or sliding action of a body part of the user directly on the second icon.

9. The application selection interface of claim 8, wherein the first icon is displayed as a 3-dimensional button that activates a virtual reality platform system setting when pressed by the user's hand or finger and the second icon is displayed as a 3-dimensional button that launches a software application when pressed by the user's hand or finger.

10. The application selection interface of claim 9, wherein the plurality of icons are displayed within an apparent distance of a user's arm length to the user.

11. The application selection interface of claim 8, wherein the plurality of icons are displayed within an apparent distance of a user's arm length to the user.

Meta Platforms, Inc. - Ex. 1002
Page 25

12. A method for providing an interactive control interface in a virtual reality environment comprising:

detecting that a user using a virtual reality environment via a virtual reality hardware device is not using or has discontinued use of a physical device controller used to interact with the virtual reality environment;

displaying to the user a plurality of icons each representing at least one of a software application and a virtual reality platform system setting after said detecting;

receiving a control input selecting a chosen icon from the user that appears as a direct touching body interaction from the user to the icon;

launching, in response to receiving the control input, a respective software application that is linked to the chose icon if the icon represents a software application; and

activating, in response to receiving the control input, a virtual reality platform system setting that is linked to the chosen icon if the icon represents a virtual reality platform system setting.

13. The method of claim 12, wherein the chosen icon is displayed as a 3-dimensional button that (i) activates a virtual reality platform system setting when pressed by the user's hand or finger if the chosen icon represents a virtual reality platform system setting and (ii) launches a software application when pressed by the user's hand or finger if the chosen icon represents a software application.

14. The method of claim 13, further comprising up and down arrows displayed as buttons adjacent the plurality of icons, wherein the up and down arrows are operatively linked to scrolling the plurality of icons when directly interacted with by a user's hand or finger.

15. The method of claim 14, further comprising determining an apparent distance relative to the user that the plurality of icons should be displayed to be within a touching distance of the user.

Meta Platforms, Inc. - Ex. 1002
Page 26

16. The method of claim 15, wherein the apparent distance is determined based on an arm's length of a user.

17. The method of claim 15, wherein the apparent distance is determined based on a height of the user.

18. The method of claim 15, wherein the apparent distance is determined based on a predetermined value representing average arms' length for a predetermined group of persons.

19. The method of claim 12, further comprising determining an apparent distance relative to the user that the plurality of icons should be displayed to be within a touching distance of the user.

20. The method of claim 12, further comprising determining an apparent distance relative to the user that the plurality of icons should be displayed to be within a touching distance of the user.

ABSTRACT

A selection interface and method for a user in a virtual reality environment to select a software application for launch or a virtual reality system setting for activation by directly touching and interacting with an application or setting icon displayed to the user.

Meta Platforms, Inc. - Ex. 1002
Page 28

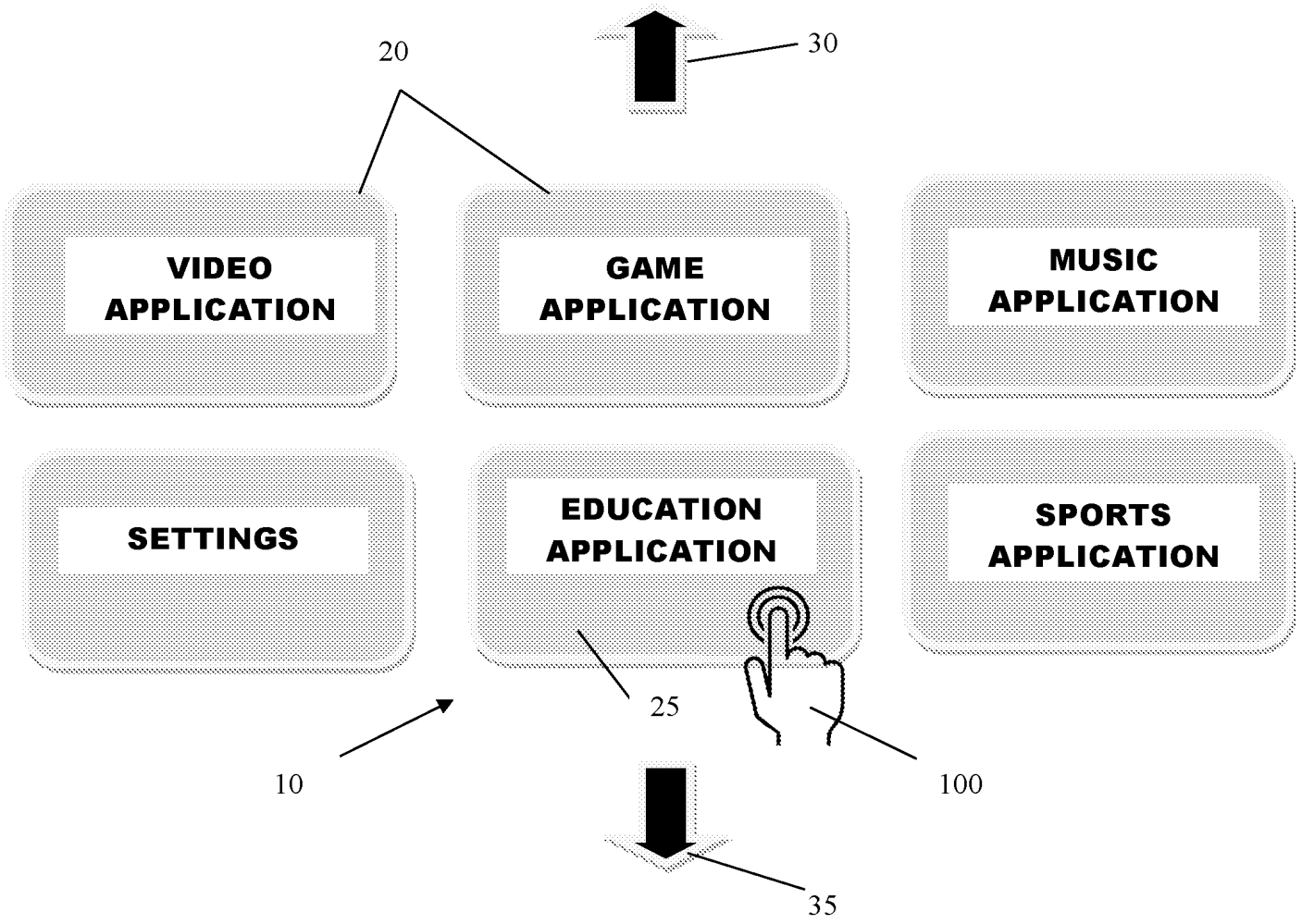


FIG. 1

Meta Platforms, Inc. - Ex. 1002
Page 29

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I202267D57013769	2202	CLAIMS IN EXCESS OF 20	$50.00	Deposit Account
I202267D57013769	2051	LATE FILING FEE FOR OATH OR DECLARATION	$80.00	Deposit Account
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/830,109	06/01/2022	Ethan Fieldman	114784-729016

CONFIRMATION NO. 3149

27148
POLSINELLI PC (Main Customer Number)
PO Box 140310
KANSAS CITY, MO 64114-0310

INFORMAL NOTICE

OC000000134374350

Date Mailed: 06/08/2022

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Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  Ethan Fieldman

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
17/830,109	06/01/2022		960	114784-729016	21	3

CONFIRMATION NO. 3149

27148
POLSINELLI PC (Main Customer Number)
PO Box 140310
KANSAS CITY, MO 64114-0310

FILING RECEIPT

OC000000134374349

Date Mailed: 06/08/2022

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Applicant(s)

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Power of Attorney: None

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

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The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/830,109**

Projected Publication Date: Request for Non-Publication Acknowledged

Non-Publication Request: Yes

Early Publication Request: No
**** SMALL ENTITY ****
Title

Hand Control Interfaces and Methods in Virtual Reality Environments

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 17/830,109

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	80		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	350		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	400		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	21 minus 20 =	* 1	x 50 =	50	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 240 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	880		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/830,109	06/01/2022	Ethan Fieldman	114784-729016	3149

27148 7590 07/01/2022
POLSINELLI PC (Main Customer Number)
PO Box 140310
KANSAS CITY, MO 64114-0310

EXAMINER	
ART UNIT	PAPER NUMBER

NOTIFICATION DATE	DELIVERY MODE
07/01/2022	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocketing@polsinelli.com
uspt@polsinelli.com

Decision Granting Request for Prioritized Examination (Track I)	**Application No.** 17/830,109	**Applicant(s)** Fieldman, Ethan	
	Examiner FIKIRTE A GEREMEW	**Art Unit** OMBL	**AIA (FITF) Status** Yes

1. THE REQUEST FILED 01 June 2022 IS **GRANTED** .

   The above-identified application has met the requirements for prioritized examination
   - A. ☑ for an original nonprovisional application (Track I).
   - B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination**. The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:
   - A. filing a **petition for extension of time** to extend the time period for filing a reply;
   - B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims** , or a multiple dependent claim;
   - C. filing a **request for continued examination** ;
   - D. filing a notice of appeal;
   - E. filing a request for suspension of action;
   - F. mailing of a notice of allowance;
   - G. mailing of a final Office action;
   - H. completion of examination as defined in 37 CFR 41.102; or
   - I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to FIKIRTE GEREMEW at (703) 756-1930. In his/her absence, calls may be directed to Petition Help Desk at (571) 272-3282.

/FIKIRTE A GEREMEW/ PROGRAM SUPPORT ASSISTANT, OMBL	

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/830,109	06/01/2022	Ethan Fieldman	114784-729016	3149

27148 7590 07/26/2022
POLSINELLI PC (Main Customer Number)
PO Box 140310
KANSAS CITY, MO 64114-0310

EXAMINER	
RODRIGUEZ, DANIEL	

ART UNIT	PAPER NUMBER
2175	

NOTIFICATION DATE	DELIVERY MODE
07/26/2022	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocketing@polsinelli.com
uspt@polsinelli.com

Office Action Summary	Application No. 17/830,109	Applicant(s) Fieldman, Ethan	
	Examiner DANIEL RODRIGUEZ	Art Unit 2175	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 01 June 2022.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-20 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-20 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

This action is responsive to the Application filed on 06/01/2022.

- Claims 1-20 are pending in the case.
- Claims 1, 8 and 12 are independent claims.

Claim Rejections - 35 USC § 112

The following is a quotation of 35 U.S.C. 112(b):
(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-7 rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

Claim 1:

There are two instance of claim 1. Examiner suggested cancelling the second instance of claim 1.

Claim 2:

Claim 2 depends on claim 2. Examiner suggests changing the dependency of claim 2.

Claim 3:

Claim 3 depends on claim 1, however, there are two instances of claim 1.

Claim 4:

Claim 4 depends on claim 4. Examiner suggests changing the dependency of claim 2.

Claim 5:

Claim 5 depends on claim 1, however, there are two instances of claim 1.

Claims 6 and 7:

Claims 6 and 7 are rejected for fully incorporating the deficiency of their respective base claims.

Claim Rejections - 35 USC § 102

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention.

Claim(s) 1 is/are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Fukushima et al. (US 6,346,929 B1, published 02/12/2002, hereinafter "Fukushima").

Independent Claim 1:

Fukushima discloses an application selection interface *comprising:*

- *a plurality of software application icons displayed in a virtual reality environment to a user using a virtual reality hardware device* (Fukushima: Fig. 6, column 6 lines 22-42 and column 7 lines 48-59)*; and*
- *at least one software application icon of the plurality of software icons operatively linked to launch a respective software application when interacted with by a pushing, a pulling, tapping, pressing or sliding action of a body part of the user directly on the application icon* (Fukushima: Figs. 7-10B, column 7 lines 60-67, column 8 lines 1-5 and 42-67 and column 9 lines 1-47).

Claim Rejections - 35 USC § 103

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim(s) 1 is/are rejected under 35 U.S.C. 103 as being unpatentable over Fukushima in view of Yu Zhan et al. (WO 2022/047436, published 03/03/2022, hereinafter "Zhan").

Dependent Claim 1:

The rejection of independent claim 1 is incorporated. Fukushima further teaches an interface *where the at least one software application icon is displayed as button that launches a respective software application when pressed by the user's hand or finger* (Fukushima: Figs. 7-10B, column 7 lines 60-67, column 8 lines 1-5 and 42-67 and column 9 lines 1-47).

Fukushima does not appear to expressly teach an interface *wherein the button is a three-dimensional button.*

However, Zhan teaches an interface *wherein the button is a three-dimensional button* (Zhan: ¶ [0077].).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the interface of Fukushima *wherein the button is a three-dimensional button,* as taught by Zhan.

One would have been motivated to make such a combination in order to improve the user's experience by providing a more effective representation for the application (Zhan: ¶ [0077]).

Claim(s) 2 and 3 is/are rejected under 35 U.S.C. 103 as being unpatentable over Fukushima in view of Zhan and further in view of Tome et al. (US 2017/0336882 A1, published 11/23/2017, hereinafter "Tome").

Claims 2 and 3:

The rejections of independent claim 1 and dependent claim 1 are incorporated. Fukushima does not appear to expressly teach an interface *further comprising up and down arrows displayed as buttons adjacent the plurality of software application icons, wherein the up and down arrows are operatively linked to scrolling the plurality of software application icons when directly interacted with by a user's hand or finger.*

However, Zhan teaches a method *wherein the user can provide input to scroll the plurality of software application icons* (The user can provide a swipe gesture to view another page of application icons, Zhan: ¶ [0077].).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the interface of Fukushima *wherein the user can provide input to scroll the plurality of software application icons,* as taught by Zhan.

One would have been motivated to make such a combination in order to improve the user's experience by providing an effective means for accessing a larger set of application icons (Zhan: ¶ [0077]).

Fukushima in view of Zhan does not appear to expressly teach an interface *wherein the scrolling is performed by directly interacting with up and down arrows displayed as buttons adjacent the plurality of software application icons.*

However, Tome teaches an interface *wherein the scrolling is performed by directly interacting with up and down arrows displayed as buttons adjacent the plurality of scrollable objects* (Tome: Fig. 8, ¶ [0076]-[0077]).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the interface of Fukushima in view of Zhan *wherein the scrolling is performed by directly interacting with up and down arrows displayed as buttons adjacent the plurality of scrollable objects,* as taught by Tome.

One would have been motivated to make such a combination in order to improve the user's experience by providing a better visual indication of the scrolling functionality (Tome: Fig. 8, ¶ [0076]-[0077]).

In combination, Fukushima in view of Zhan and further in view of Tome teaches an interface *further comprising up and down arrows displayed as buttons adjacent the*

plurality of software application icons, wherein the up and down arrows are operatively linked to scrolling the plurality of software application icons when directly interacted with by a user's hand or finger (The user can scroll the application icons (scrollable objects), Zhan: ¶ [0077]. A scrolling operation can be performed by selecting up and down arrows that are displayed adjacent to the scrollable objects, Tome: Fig. 8, ¶ [0076]-[0077]. Arrows can be selected by the user directly interacting with the arrows with the user's finger, Fukushima: Fig. 5, column 7 lines 16-39.).

Claim(s) 4 and 5 is/are rejected under 35 U.S.C. 103 as being unpatentable over Fukushima in view of Noda et al. (US 2012/0047465 A1, published 02/23/2012, hereinafter "Noda").

Claims 4 and 5:

The rejection of claim 1 is incorporated. Although, Examiner considers the software application icons of Fukushima to necessarily be within the user's reach since the user needs to place his/her finger within the display area of the application icon in order to select said application icon, for the sake of argument Examiner provides Noda.

Noda teaches an interface *wherein the plurality of icons are displayed within an apparent distance of a user's arm length to the user* (Noda: Fig. 3, ¶ [0057]-[0060]).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the interface of Fukushima *wherein the plurality of icons are displayed within an apparent distance of a user's arm length to the user,* as taught by Noda.

One would have been motivated to make such a combination in order to ensure the user can reach the displayed objects (Noda: Fig. 3, ¶ [0057]-[0060]).

In implementing the arrangement feature of Noda into the invention of Fukushima, the icons arranged within the arm's length of the user (as taught by Noda) would correspond to application icons since the icons arranged in the virtual space of Fukushima correspond to application icons. Accordingly, in combination Fukushima in view of Noda teaches an interface *wherein the plurality of software application icons are displayed within an apparent distance of a user's arm length to the user*.

Claim(s) 6 and 7 is/are rejected under 35 U.S.C. 103 as being unpatentable over Fukushima in view of Zhan, further in view of Tome and further in view of Noda.

Claims 6 and 7:

The rejection of claims 2 and 3 are incorporated. Although, Examiner considers the software application icons of Fukushima to necessarily be within the user's reach since the user needs to place his/her finger within the display area of the application icon in order to select said application icon, for the sake of argument Examiner provides Noda.

Noda teaches an interface *wherein the plurality of icons are displayed within an apparent distance of a user's arm length to the user* (Noda: Fig. 3, ¶ [0057]-[0060]).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the interface of Fukushima in

view of Zhang and further in view of Tome *wherein the plurality of icons are displayed within an apparent distance of a user's arm length to the user,* as taught by Noda.

One would have been motivated to make such a combination in order to ensure the user can reach the displayed objects (Noda: Fig. 3, ¶ [0057]-[0060]).

In implementing the arrangement feature of Noda into the invention of Fukushima in view of Zhang and further in view of Tome, the icons arranged within the arm's length of the user (as taught by Noda) would correspond to application icons since the icons arranged in the virtual space of Fukushima correspond to application icons. Accordingly, in combination Fukushima in view of Zhang, further in view of Tome and further in view of Noda teaches an interface *wherein the plurality of software application icons are displayed within an apparent distance of a user's arm length to the user*.

Claim(s) 8 is/are rejected under 35 U.S.C. 103 as being unpatentable over Fukushima in view of Sztuk et al. (US 11,086,392 B1, published on 08/10/2021, hereinafter "Sztuk").

Independent Claim 8:

Fukushima discloses an application selection interface *comprising:*

- *a plurality of icons each representing at least one of a software application and a virtual reality platform system setting displayed in a virtual reality environment to a user using a virtual reality hardware device* (Fukushima: Fig. 6, column 6 lines 22-42 and column 7 lines 48-59)*; and*

- *a second icon of the plurality of icons representing a software application operatively linked to launch a software application when interacted with by a pushing, pulling, tapping, pressing or sliding action of a body part of the user directly on the second icon* (Fukushima: Figs. 7-10B, column 7 lines 60-67, column 8 lines 1-5 and 42-67 and column 9 lines 1-47).

Fukushima does not appear to expressly teach an interface *comprising:*

- *a first icon of the plurality of icons representing a virtual reality platform system setting operatively linked to activate a setting when interacted with by a pushing, pulling, tapping, pressing or sliding action of a body part of the user directly on the first icon.*

However, Sztuk teaches an interface *comprising:*

- *a first icon of the plurality of icons representing a virtual reality platform system setting operatively linked to activate a setting when interacted with by a pushing, pulling, tapping, pressing or sliding action of a body part of the user directly on the first icon* (The user is presented with selectable setting icons via the virtual reality platform system, Sztuk: Fig. 4, column 5 lines 62-67 and column 6 lines 1-57. The user can select objects by touching the object with the user's fingers, Sztuk: column 3 lines 33-46, column 4 lines 55-67, column 5 lines 1-46 and column 10 lines 21-30.).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the interface of Fukushima to *comprise:*

- *a first icon of the plurality of icons representing a virtual reality platform system setting operatively linked to activate a setting when interacted with by a pushing, pulling, tapping, pressing or sliding action of a body part of the user directly on the first icon,* as taught by Sztuk.

One would have been motivated to make such a combination in order to improve the user's experience by providing the user with greater control over display parameters associated with the virtual images (Sztuk: Fig. 4, column 3 lines 33-46, column 4 lines 55-67, column 5 lines 1-46 and lines 62-67, column 6 lines 1-57and column 10 lines 21-30).

Claim(s) 9 is/are rejected under 35 U.S.C. 103 as being unpatentable over Fukushima in view of Sztuk, further in view of Zhan and further in view of Baic (US 2016/0004300 A1, published 01/07/2016, hereinafter "Baic".

Claim 9:

The rejection of claim 8 is incorporated. Fukushima in view of Sztuk further teaches an interface *wherein the first icon is displayed as a button that activates a virtual reality platform system setting when pressed by the user's hand or finger and the second icon is displayed as a button that launches a software application when pressed by the user's hand or finger* (Fukushima: Figs. 7-10B, column 7 lines 60-67, column 8 lines 1-5 and 42-67 and column 9 lines 1-47; Sztuk: Fig. 4, column 3 lines 33-46, column 4 lines 55-67, column 5 lines 1-46 and lines 62-67, column 6 lines 1-57and column 10 lines 21-30).

However, Zhan teaches an interface *wherein the second icon is displayed as a three-dimensional button* (Zhan: ¶ [0077].).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the interface of Fukushima *wherein the second icon is displayed as a three-dimensional button,* as taught by Zhan.

One would have been motivated to make such a combination in order to improve the user's experience by providing a more effective representation for the application (Zhan: ¶ [0077]).

Fukushima in view of Zhan does not appear to expressly teach an interface *wherein the first icon is displayed as a three-dimensional button*.

However, Baic teaches an interface *wherein the first icon is displayed as a three-dimensional button* (Baic: Fig. 33, ¶ [0126], [0145], [0183]).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the interface of Fukushima *wherein the first icon is displayed as a three-dimensional button,* as taught by Zhan.

One would have been motivated to make such a combination in order to improve the user's experience by providing a more effective representation for the application (Baic: Fig. 33, ¶ [0126], [0145], [0183]).

Claim(s) 10 is/are rejected under 35 U.S.C. 103 as being unpatentable over Fukushima in view of Sztuk, further in view of Zhan, further in view of Baic and further in view of Noda.

Claim 10:

The rejection of claim 9 is incorporated. Although, Examiner considers the software application icons of Fukushima to necessarily be within the user's reach since the user needs to place his/her finger within the display area of the application icon in order to select said application icon, for the sake of argument Examiner provides Noda.

Noda teaches an interface *wherein the plurality of icons are displayed within an apparent distance of a user's arm length to the user* (Noda: Fig. 3, ¶ [0057]-[0060]).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the interface of Fukushima in view of Sztuk, further in view of Zhan and further in view of Baic *wherein the plurality of icons are displayed within an apparent distance of a user's arm length to the user,* as taught by Noda.

One would have been motivated to make such a combination in order to ensure the user can reach the displayed objects (Noda: Fig. 3, ¶ [0057]-[0060]).

In implementing the arrangement feature of Noda into the invention of Fukushima in view of Sztuk, further in view of Zhan and further in view of Baic, the icons arranged within the arm's length of the user (as taught by Noda) would correspond to application icons since the icons arranged in the virtual space of Fukushima correspond to application icons. Accordingly, in combination Fukushima in view of Sztuk, further in view of Zhan, further in view of Baic and further in view of Noda teaches an interface *wherein the plurality of software application icons are displayed within an apparent distance of a user's arm length to the user.*

Claim(s) 11 is/are rejected under 35 U.S.C. 103 as being unpatentable over Fukushima in view of Sztuk and further in view of Noda.

Claim 11:

The rejection of claim 8 is incorporated. Although, Examiner considers the software application icons of Fukushima to necessarily be within the user's reach since the user needs to place his/her finger within the display area of the application icon in order to select said application icon, for the sake of argument Examiner provides Noda.

Noda teaches an interface *wherein the plurality of icons are displayed within an apparent distance of a user's arm length to the user* (Noda: Fig. 3, ¶ [0057]-[0060]).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the interface of Fukushima in view of Sztuk *wherein the plurality of icons are displayed within an apparent distance of a user's arm length to the user,* as taught by Noda.

One would have been motivated to make such a combination in order to ensure the user can reach the displayed objects (Noda: Fig. 3, ¶ [0057]-[0060]).

In implementing the arrangement feature of Noda into the invention of Fukushima in view of Sztuk, the icons arranged within the arm's length of the user (as taught by Noda) would correspond to application icons since the icons arranged in the virtual space of Fukushima correspond to application icons. Accordingly, in combination Fukushima in view of Sztuk and further in view of Noda teaches an interface *wherein the plurality of software application icons are displayed within an apparent distance of a user's arm length to the user.*

Claim(s) 12 is/are rejected under 35 U.S.C. 103 as being unpatentable over Fukushima in view of Ravasz et al. (US 11,086,406 B1, issued 08/10/2021, hereinafter "Ravasz").

Independent Claim 12:

Fukushima discloses method *comprising:*

- *displaying to the user a plurality of icons each representing at least one of a software application and a virtual reality platform system setting* (Fukushima: Fig. 6, column 6 lines 22-42 and column 7 lines 48-59)*; and*
- *receiving a control input selecting a chosen icon from the user that appears as a direct touching body interaction from the user to the icon; launching, in response to receiving the control input, a respective software application that is linked to the chosen icon if the icon represents a software application* (Fukushima: Figs. 7-10B, column 7 lines 60-67, column 8 lines 1-5 and 42-67 and column 9 lines 1-47)*; and*
- *activating, in response to receiving the control input, a virtual reality platform system setting that is linked to the chosen icon if the icon represents a virtual reality platform system setting* (The broadest reasonable interpretation of a method (or process) claim having contingent limitations requires only those steps that must be performed and does not include steps that are not required to be performed because the

condition(s) precedent are not met. Accordingly, this limitation is not required by the broadest reasonable interpretation of the claim limitation.).

Fukushima does not appear to expressly teach a method *comprising:*

- *detecting that a user using a virtual reality environment via a virtual reality hardware device is not using or has discontinued use of a physical device controller used to interact with the virtual reality environment; and*
- *wherein the displaying is performed after the detecting.*

However, Ravasz teaches a method *comprising:*

- *detecting that a user using a virtual reality environment via a virtual reality hardware device is not using or has discontinued use of a physical device controller used to interact with the virtual reality environment* (The artificial reality system can use different input modalities such as both controllers and hand gestures wherein a hand input modality can become the active modality based on current application requirements, Ravasz: column 9 lines 14-33. Examiner considers a determination that the current modality is a hand input modality to be equivalent to detecting that a user is not using a physical device controller used to interact with the virtual reality environment.).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the method of Fukushima to *comprise:*

- *detecting that a user using a virtual reality environment via a virtual reality hardware device is not using or has discontinued use of a physical device*

controller used to interact with the virtual reality environment, as taught by Ravasz.

One would have been motivated to make such a combination in order to provide access to the most useful input modality for a particular usage context (Ravasz: column 9 lines 14-33.).

In combination, Fukushima in view of Ravasz teaches a method *wherein the displaying is performed after the detecting* (Examiner does not interpret the claim to indicate that the detecting causes the displaying, but rather that the displaying can either begin displaying or continue to display after the detecting. The system can detect that the hand modality is active (detecting that a user is not using a physical device controller used to interact with the virtual reality environment) based on the current application requirements, Ravasz: column 9 lines 14-33. The current application requirements (which includes displaying a plurality of icons) requires hand input gestures, Fukushima: Figs. 7-10B, column 7 lines 60-67, column 8 lines 1-5 and 42-67 and column 9 lines 1-47.)

Claim(s) 13 is/are rejected under 35 U.S.C. 103 as being unpatentable over Fukushima in view of Ravasz and further in view of Zhan.

Claim 13:

The rejection of claim 12 is incorporated. Fukushima in view of Ravasz further teaches a method *wherein the chosen icon is displayed as a button that:*

(i) activates a virtual reality platform system setting when pressed by the user's hand or finger if the chosen icon represents a virtual reality platform system setting (The broadest reasonable interpretation of a method (or process) claim having contingent limitations requires only those steps that must be performed and does not include steps that are not required to be performed because the condition(s) precedent are not met. Accordingly, this limitation is not required by the broadest reasonable interpretation of the claim limitation.) *and*

(ii) launches a software application when pressed by the user's hand or finger if the chosen icon represents a software application (Fukushima: Figs. 7-10B, column 7 lines 60-67, column 8 lines 1-5 and 42-67 and column 9 lines 1-47).

Fukushima does not appear to expressly teach a method *wherein the button is a three-dimensional button.*

However, Zhan teaches a method *wherein the button is a three-dimensional button* (Zhan: ¶ [0077].).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the method of Fukushima *wherein the button is a three-dimensional button,* as taught by Zhan.

One would have been motivated to make such a combination in order to improve the user's experience by providing a more effective representation for the application (Zhan: ¶ [0077]).

Claim(s) 14 is/are rejected under 35 U.S.C. 103 as being unpatentable over Fukushima in view of Ravasz, further in view of Zhan and further in view of Tome.

Claim 14:

The rejection of claim 13 is incorporated. Fukushima in view of Ravasz does not appear to expressly teach a method *further comprising up and down arrows displayed as buttons adjacent the plurality of icons, wherein the up and down arrows are operatively linked to scrolling the plurality icons when directly interacted with by a user's hand or finger.*

However, Zhan teaches a method *wherein the user can provide input to scroll the plurality of icons* (The user can provide a swipe gesture to view another page of icons, Zhan: ¶ [0077].).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the method of Fukushima in view of Ravasz *wherein the user can provide input to scroll the plurality of icons,* as taught by Zhan.

One would have been motivated to make such a combination in order to improve the user's experience by providing an effective means for accessing a larger set of icons (Zhan: ¶ [0077]).

Fukushima in view of Ravasz and further in view of Zhan does not appear to expressly teach an method *wherein the scrolling is performed by directly interacting with up and down arrows displayed as buttons adjacent the plurality of icons.*

However, Tome teaches an method *wherein the scrolling is performed by directly interacting with up and down arrows displayed as buttons adjacent the plurality of scrollable objects* (Tome: Fig. 8, ¶ [0076]-[0077]).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the interface of Fukushima in view of Ravasz and further in view of Zhan *wherein the scrolling is performed by directly interacting with up and down arrows displayed as buttons adjacent the plurality of scrollable objects,* as taught by Tome.

One would have been motivated to make such a combination in order to improve the user's experience by providing a better visual indication of the scrolling functionality (Tome: Fig. 8, ¶ [0076]-[0077]).

In combination, Fukushima in view of Ravasz, further in view of Zhan and further in view of Tome teaches an interface *further comprising up and down arrows displayed as buttons adjacent the plurality of icons, wherein the up and down arrows are operatively linked to scrolling the plurality of icons when directly interacted with by a user's hand or finger* (The user can scroll the icons (scrollable objects), Zhan: ¶ [0077]. A scrolling operation can be performed by selecting up and down arrows that are displayed adjacent to the scrollable objects, Tome: Fig. 8, ¶ [0076]-[0077]. Arrows can be selected by the user directly interacting with the arrows with the user's finger, Fukushima: Fig. 5, column 7 lines 16-39.).

Claim(s) 15-17 is/are rejected under 35 U.S.C. 103 as being unpatentable over Fukushima in view of Ravasz, further in view of Zhan, further in view of Tome and further in view of Noda.

Claim 15:

The rejection of claim 14 is incorporated. Fukushima in view of Ravasz, further in view of Zhan and further in view of Tome does not appear to expressly teach method further comprising determining an apparent distance relative to the user that the plurality of icons should be displayed to be within a touch distance of the user.

Noda teaches a method comprising determining an apparent distance relative to the user that the plurality of icons should be displayed to be within a touch distance of the user (Noda: Fig. 3, ¶ [0057]-[0060]).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the method of Fukushima in view of Ravasz, further in view of Zhan and further in view of Tome *to comprise* determining an apparent distance relative to the user that the plurality of icons should be displayed to be within a touch distance of the user, as taught by Noda.

One would have been motivated to make such a combination in order to ensure the user can reach the displayed objects (Noda: Fig. 3, ¶ [0057]-[0060]).

Claim 16:

The rejection of claim 15 is incorporated. Fukushima in view of Ravasz, further in view of Zhan, further in view of Tome and further in view of Noda further teaches a

method *wherein the apparent distance is determined based on an arm's length of a user* (Noda: Fig. 3, ¶ [0057]-[0060]).

Claim 17:

The rejection of claim 15 is incorporated. Fukushima in view of Ravasz, further in view of Zhan, further in view of Tome and further in view of Noda further teaches a method *wherein the apparent distance is determined based on a height of the user* (Noda: ¶ [0075]-[0076]).

Claim(s) 18 is/are rejected under 35 U.S.C. 103 as being unpatentable over Fukushima in view of Ravasz, further in view of Zhan, further in view of Tome, further in view of Noda and further in view of Izumi Kenji (CA 2810307 A1, published 03/15/2012, hereinafter "Kenji").

Claim 18:

The rejection of claim 15 is incorporated. Fukushima in view of Ravasz, further in view of Zhan, further in view of Tome and further in view of Noda does not appear to expressly teach a method *wherein the apparent distance is determined based on a predetermined value representing average arms' length for a predetermined group of persons*.

However, Kenji teaches a method *wherein the apparent distance is determined based on a predetermined value representing average arms' length for a predetermined group of persons* (Kenji: Figs. 4, 8 and 15, ¶ [0068]).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the have been obvious to modify the method of Fukushima in view of Ravasz, further in view of Zhan, further in view of Tome and further in view of Noda *wherein the apparent distance is determined based on a predetermined value representing average arms' length for a predetermined group of persons,* as taught by Kenji.

One would have been motivated to make such a combination in order to better ensure the proper placement of the graphical interface (Kenji: Figs. 4, 8 and 15, ¶ [0068]).

Claim(s) 19 and 20 is/are rejected under 35 U.S.C. 103 as being unpatentable over Fukushima in view of Ravasz and further in view of Noda.

Claim 19 and 20:

The rejection of claim 12 is incorporated. Fukushima in view of Ravasz does not appear to expressly teach method further *comprising determining an apparent distance relative to the user that the plurality of icons should be displayed to be within a touch distance of the user.*

Noda teaches a method *comprising determining an apparent distance relative to the user that the plurality of icons should be displayed to be within a touch distance of the user* (Noda: Fig. 3, ¶ [0057]-[0060]).

Accordingly, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention, to modify the method of Fukushima in

view of Ravasz *to comprise determining an apparent distance relative to the user that the plurality of icons should be displayed to be within a touch distance of the user,* as taught by Noda.

One would have been motivated to make such a combination in order to ensure the user can reach the displayed objects (Noda: Fig. 3, ¶ [0057]-[0060]).

Conclusion

Examiner has cited particular columns and line and/or paragraph numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the examiner.

The examiner requests, in response to this Office action, support be shown for language added to any original claims on amendment and any new claims. That is, indicate support for newly added claim language by specifically pointing to page(s) and line number(s) in the specification and/or drawing figure(s). This will assist the examiner in prosecuting the application.

When responding to this office action, Applicant is advised to clearly point out the patentable novelty which he or she thinks the claims present, in view of the state of the

art disclosed by the references cited or the objections made. He or she must also show how the amendments avoid such references or objections See 37 CFR 1.111(c).

The prior art made of record and not relied upon is considered pertinent to Applicants' disclosure.

Azeyanagi et al., US 2019/0130531 A1 (The user can scroll the icons by selecting up and down arrows, ¶ [0082])

Adams et al. US 2018/0158053 A1 (The user can select a virtual button by pressing the button with the user's finger, Fig. 1, ¶ [0051])

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL RODRIGUEZ whose telephone number is (571)272-3633. The examiner can normally be reached Monday-Friday 5:30 am - 2:00 pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William L Bashore can be reached on 5712724088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/DANIEL RODRIGUEZ/
Primary Examiner, Art Unit 2175

Notice of References Cited	Application/Control No. 17/830,109	Applicant(s)/Patent Under Reexamination Fieldman, Ethan	
	Examiner DANIEL RODRIGUEZ	Art Unit 2175	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
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*	B	US-20190130531-A1	05-2019	Azeyanagi; Miki	G06F3/04817	1/1
*	C	US-20180158053-A1	06-2018	Adams; Amanda J.	G06F3/04886	1/1
*	D	US-20120047465-A1	02-2012	NODA; Takuro	G06F3/0304	715/848
*	E	US-20170336882-A1	11-2017	TOME; Basheer	G06F3/03547	1/1
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*	G	US-6346929-B1	02-2002	Fukushima; Nobuo	G06F3/017	345/9
*	H	US-11086392-B1	08-2021	Sztuk; Sebastian	G06F3/1423	1/1
	I					
	J					
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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
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	O	CA-2810307-A1	03-2012	CA	IZUMI K	A63F13/00
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	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/830,109	Fieldman, Ethan
	Examiner	Art Unit
	DANIEL RODRIGUEZ	2175

CPC - Searched*		
Symbol	**Date**	**Examiner**
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US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
PE2E search - all databases	07/20/2022	DR
inventors search	07/20/2022	DR
ProQuest Dialog NPL search - all databases	07/20/2022	DR

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**

/DANIEL RODRIGUEZ/ Primary Examiner, Art Unit 2175	

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/830,109	Fieldman, Ethan
	Examiner	**Art Unit**
	DANIEL RODRIGUEZ	2175

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant					☐ CPA		☐ T.D.		☐ R.1.47	
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Final	Original	07/20/2022								
	1	✓								
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CONTINUING DATA

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(54) **Title:** 3D LAUNCHER WITH 3D APP ICONS

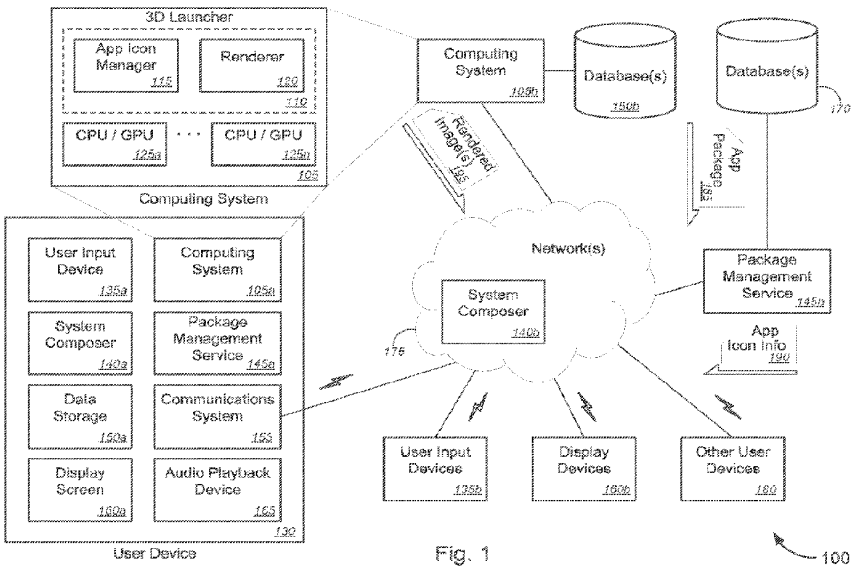


Fig. 1

(57) **Abstract:** Novel tools and techniques are provided for implementing three-dimensional ("3D") launcher with 3D application ("app") icons. In various embodiments, a computing system may receive an application package associated with an application, and may determine whether the application package comprises a 3D profile of an application icon associated with the application. If so, the computing system may load a set of a 3D mesh and a 3D texture, based on the 3D profile of the application icon. If not, the computing system may load a set of a default 3D mesh and a default application icon of the application as texture data. The computing system may render the application icon as a 3D application icon, accordingly. The computing system may cause the 3D application icon to be displayed on a user interface that is displayed within a display screen of a user device.

WO 2022/047436 A1

[Continued on next page]

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— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*
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— *upon request of the applicant, before the expiration of the time limit referred to in Article 21(2)(a)*

3D LAUNCHER WITH 3D APP ICONS

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FIELD

[0002] The present disclosure relates, in general, to methods, systems, and apparatuses for implementing image rendering, and, more particularly, to methods, systems, and apparatuses for implementing three-dimensional ("3D") launcher with 3D application ("app") icons.

BACKGROUND

[0003] Conventional launchers support very limited 3D content. Application icons included in the conventional launchers are mostly static images without any dynamic control. Existing launchers (such as Android and iOS launchers, or the like) only support two-dimensional ("2D") rendering and animation, and it is impossible to add 3D content. The app icons on existing launchers are static images with limited additional control for developers (e.g., an alert number, a pop-up menu, or the like). Dynamically displaying information in existing launchers is very difficult. Although conventional launchers support widgets, they are mostly stand-alone applications and are too heavy weight (i.e., requiring greater memory and/or other system resources, or the like) to be used as application icons.

[0004] Hence, there is a need for more robust and scalable solutions for implementing image rendering, and, more particularly, to methods, systems, and apparatuses for implementing 3D launcher with 3D app icons.

SUMMARY

[0005] The techniques of this disclosure generally relate to tools and techniques for implementing image rendering, and, more particularly, to methods, systems, and apparatuses for implementing 3D launcher with 3D app icons.

[0006] In an aspect, a method may comprise: receiving, using a computing system and via a package management service ("PMS"), a first application package associated with a first application; based on a determination that the first application package comprises a three

dimensional ("3D") profile of a first application icon associated with the first application, loading, using the computing system, a set of a 3D mesh and a 3D texture, based on the 3D profile of the first application icon; and rendering, using the computing system, the first application icon as a 3D first application icon, based at least in part on the set of the 3D mesh and the 3D texture; and causing, using the computing system, the 3D first application icon to be displayed on a user interface that is displayed within a display screen of a user device.

[0007] In another aspect, an apparatus might comprise at least one processor and a non-transitory computer readable medium communicatively coupled to the at least one processor. The non-transitory computer readable medium might have stored thereon computer software comprising a set of instructions that, when executed by the at least one processor, causes the apparatus to: receive, via a package management service ("PMS"), a first application package associated with a first application; based on a determination that the first application package comprises a three dimensional ("3D") profile of a first application icon associated with the first application, load a set of a 3D mesh and a 3D texture, based on the 3D profile of the first application icon; and render the first application icon as a 3D first application icon, based at least in part on the set of the 3D mesh and the 3D texture; and cause the 3D first application icon to be displayed on a user interface that is displayed within a display screen of a user device.

[0008] In yet another aspect, a system might comprise a computing system, which might comprise an application icon manager, a renderer, at least one first processor, and a first non-transitory computer readable medium communicatively coupled to the at least one first processor. The first non-transitory computer readable medium might have stored thereon computer software comprising a first set of instructions that, when executed by the at least one first processor, causes the computing system to: receive, using the application icon manager and via a package management service ("PMS"), a first application package associated with a first application; based on a determination that the first application package comprises a three dimensional ("3D") profile of a first application icon associated with the first application, load a set of a 3D mesh and a 3D texture, based on the 3D profile of the first application icon; and render, using the renderer, the first application icon as a 3D first application icon, based at least in part on the set of the 3D mesh and the 3D texture; and cause the 3D first application icon to be displayed on a user interface that is displayed within a display screen of a user device.

[0009] Various modifications and additions can be made to the embodiments discussed without departing from the scope of the invention. For example, while the embodiments

Meta Platforms, Inc. - Ex. 1002
Page 73

described above refer to particular features, the scope of this invention also includes embodiments having different combination of features and embodiments that do not include all of the above-described features.

[0010] The details of one or more aspects of the disclosure are set forth in the accompanying drawings and the description below. Other features, objects, and advantages of the techniques described in this disclosure will be apparent from the description and drawings, and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] A further understanding of the nature and advantages of particular embodiments may be realized by reference to the remaining portions of the specification and the drawings, in which like reference numerals are used to refer to similar components. In some instances, a sub-label is associated with a reference numeral to denote one of multiple similar components. When reference is made to a reference numeral without specification to an existing sub-label, it is intended to refer to all such multiple similar components.

[0012] Fig. 1 is a schematic diagram illustrating a system for implementing three-dimensional ("3D") launcher with 3D application ("app") icons, in accordance with various embodiments.

[0013] Fig. 2 is a schematic block flow diagram illustrating a non-limiting example of a method for implementing 3D launcher with 3D app icons, in accordance with various embodiments.

[0014] Figs. 3A-3E are schematic diagrams illustrating various non-limiting examples of 3D app icons and 3D app groups that may be rendered during implementation of 3D launcher with 3D app icons, in accordance with various embodiments.

[0015] Figs. 4A-4F are flow diagrams illustrating a method for implementing 3D launcher with 3D app icons, in accordance with various embodiments.

[0016] Fig. 5 is a block diagram illustrating an example of computer or system hardware architecture, in accordance with various embodiments.

[0017] Fig. 6 is a block diagram illustrating a networked system of computers, computing systems, or system hardware architecture, which can be used in accordance with various embodiments.

Meta Platforms, Inc. - Ex. 1002
Page 74

DETAILED DESCRIPTION

[0018] Overview

[0019] Various embodiments provide tools and techniques for implementing image rendering, and, more particularly, to methods, systems, and apparatuses for implementing three-dimensional ("3D") launcher with 3D application ("app") icons.

[0020] In various embodiments, a computing system may receive, via a package management service ("PMS"), a first application package associated with a first application. Based on a determination that the first application package comprises a three dimensional ("3D") profile of a first application icon associated with the first application, the computing system may load a set of a 3D mesh and a 3D texture, based on the 3D profile of the first application icon, and may render the first application icon as a 3D first application icon, based at least in part on the set of the 3D mesh and the 3D texture. The computing system may cause the 3D first application icon to be displayed on a user interface that is displayed within a display screen of a user device.

[0021] According to some embodiments, based on a determination that the first application package does not contain a 3D profile of the first application icon, the computing system may load a set of a default 3D mesh and a default application icon of the first application as texture data, and may render the first application icon as a 3D first application icon, based at least in part on the set of the default 3D mesh and the default application icon.

[0022] In some embodiments, the computing system may comprise at least one of a 3D launcher, a machine learning system, an artificial intelligence ("AI") system, a deep learning system, a neural network, a processor on the user device, one or more graphics processing units ("GPUs"), a server computer over a network, a cloud computing system, or a distributed computing system, and/or the like. Alternatively, or additionally, the computing system may comprise an application icon manager and a renderer. In some cases, the application icon manager may receive the first application package, may determine whether the first application package comprises the 3D profile of the first application icon, and may load the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon to the renderer. In some instances, the renderer may render the first application icon as a 3D first application icon.

[0023] According to some embodiments, the renderer of the computing system may load global render information, the global render information comprising at least one of scene camera pose, lighting condition, or zoom level, and/or the like. In such cases, rendering the first application icon as a 3D first application icon may comprise the renderer of the

Meta Platforms, Inc. - Ex. 1002
Page 75

computing system rendering the first application icon as a 3D first application icon, based at least in part on the loaded global render information and based at least in part on the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon.

[0024] Alternatively, or additionally, a user input processor of the application icon manager may receive one or more user inputs, the one or more user inputs comprising at least one of one or more selection inputs, one or more translation inputs, one or more rotation inputs, one or more tilt inputs, one or more zoom inputs, one or more swipe inputs, one or more dragging inputs, one or more gesture inputs, one or more tracing inputs, one or more camera translation inputs, one or more rotation inputs, one or more accelerometer inputs, or one or more gyroscope inputs, and/or the like. In such cases, rendering the first application icon as a 3D first application icon may comprise the renderer of the computing system rendering the first application icon as a 3D first application icon, based at least in part on the received one or more user inputs and based at least in part on the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon.

[0025] In some embodiments, the 3D profile of the first application icon may further comprise an icon render frequency property based at least in part on different priorities that are based at least in part on one or more conditions. In some cases, the one or more conditions may comprise at least one of power consumption level or level of performance tradeoff, and/or the like. In some instances, the icon render frequency property may comprise one of a static icon, a low frequency rendering icon, a medium frequency rendering icon, or a high frequency rendering icon, and/or the like. The application icon manager of the computing system may determine a rendering frequency of the 3D first application icon based at least in part on the icon render frequency property in the 3D profile of the first application icon and based at least in part on the at least one of power consumption level or level of performance tradeoff. In such cases, rendering the first application icon as a 3D first application icon may comprise the renderer of the computing system controlling one or more rendering threads for rendering the first application icon as the 3D first application icon based on the determined rendering frequency of the 3D first application icon.

[0026] According to some embodiments, the first application icon may be part of a group of application icons. The application icon manager of the computing system may generate a group of 3D-arranged application icons based on the group of application icons. The renderer of the computing system may render the generated group of 3D-arranged application icons.

Meta Platforms, Inc. - Ex. 1002
Page 76

The computing system may cause the rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

[0027] In some cases, the 3D-arranged application icons may comprise one of a group of cascaded 3D application icons with overlapping two or more of the group of application icons in a cascade arrangement or a group of layered 3D application icons with two or more layers of the group of application icons in a layered arrangement. In some embodiments, the application icon manager of the computing system may determine an order of the icons within the group of 3D-arranged application icons based at least in part on one or more of most recent use, existence of new notifications, number of new notifications, or user input to reorder the icons, and/or the like. The application icon manager of the computing system may autonomously reorder the icons within the group of 3D-arranged application icons based on the determination. The renderer of the computing system may re-render the group of 3D-arranged application icons based on the reordered icons within the group of 3D-arranged application icons. The computing system may cause the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

[0028] Alternatively, or additionally, the application icon manager of the computing system may determine one or more animations associated with one or more of the group of 3D-arranged application icons. In some cases, the one or more animations may comprise at least one of rotation, translation, tilting, resizing, transformation, or customized icon behaviors, and/or the like. The renderer of the computing system may re-render the group of 3D-arranged application icons based on the determined one or more animations associated with one or more of the group of 3D-arranged application icons. The computing system may cause the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

[0029] Alternatively, or additionally, a user input processor of the application icon manager may receive one or more navigation user inputs, the one or more navigation user inputs comprising at least one of depth of field navigation inputs, perspective change inputs, orientation change inputs, reordering inputs, sorting inputs, rotation inputs, tilt inputs translation inputs, swiping inputs, dragging inputs, information request inputs, opening inputs, closing inputs, or selection inputs relative to the group of 3D-arranged application icons, and/or the like. The renderer of the computing system may re-render the group of 3D-arranged application icons based on the received one or more navigation user inputs. The

Meta Platforms, Inc. - Ex. 1002
Page 77

computing system may cause the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

[0030] In some embodiments, a user input processor of the application icon manager may receive an application launch request input from a user to launch the first application. The application icon manager of the computing system may determine whether the application launch request input corresponds to a successful selection of the first application icon for launching the first application based on at least one of raytracing, collision determination, or intercept calculation, and/or the like, of the application launch request input relative to the first application icon within the user interface displayed within the display screen of the user device. Based on a determination that the application launch request input corresponds to a successful selection of the first application icon for launching the first application, the computing system may initiate launch of the first application. Based on a determination that the application launch request input corresponds to a failed attempt at selection of the first application icon for launching the first application, the computing system may prevent launch of the first application.

[0031] The various aspects described herein provide 3D launcher that renders 2D app icons into 3D app icons. In this manner, app icons may be dynamically rendered rather than left as static 2D icons as in conventional launchers.

[0032] These and other aspects of the system and method for implementing 3D launcher with 3D app icons are described in greater detail with respect to the figures.

[0033] The following detailed description illustrates a few embodiments in further detail to enable one of skill in the art to practice such embodiments. The described examples are provided for illustrative purposes and are not intended to limit the scope of the invention.

[0034] In the following description, for the purposes of explanation, numerous details are set forth in order to provide a thorough understanding of the described embodiments. It will be apparent to one skilled in the art, however, that other embodiments of the present invention may be practiced without some of these details. In other instances, some structures and devices are shown in block diagram form. Several embodiments are described herein, and while various features are ascribed to different embodiments, it should be appreciated that the features described with respect to one embodiment may be incorporated with other embodiments as well. By the same token, however, no single feature or features of any described embodiment should be considered essential to every embodiment of the invention, as other embodiments of the invention may omit such features.

Meta Platforms, Inc. - Ex. 1002
Page 78

[0035] Unless otherwise indicated, all numbers used herein to express quantities, dimensions, and so forth used should be understood as being modified in all instances by the term "about." In this application, the use of the singular includes the plural unless specifically stated otherwise, and use of the terms "and" and "or" means "and/or" unless otherwise indicated. Moreover, the use of the term "including," as well as other forms, such as "includes" and "included," should be considered non-exclusive. Also, terms such as "element" or "component" encompass both elements and components comprising one unit and elements and components that comprise more than one unit, unless specifically stated otherwise.

[0036] Various embodiments as described herein – while embodying (in some cases) software products, computer-performed methods, and/or computer systems – represent tangible, concrete improvements to existing technological areas, including, without limitation, icon rendering technology, application icon rendering technology, launcher technology, 3D launcher technology, and/or the like. In other aspects, some embodiments can improve the functioning of user equipment or systems themselves (e.g., icon rendering systems, application icon rendering systems, launcher systems, 3D launcher systems, etc.), for example, by receiving, using a computing system and via a package management service ("PMS"), a first application package associated with a first application; determining, using the computing system, whether the first application package comprises a three dimensional ("3D") profile of a first application icon associated with the first application; based on a determination that the first application package comprises a 3D profile of the first application icon, loading, using the computing system, a set of a 3D mesh and a 3D texture, based on the 3D profile of the first application icon; based on a determination that the first application package does not contain a 3D profile of the first application icon, loading, using the computing system, a set of a default 3D mesh and a default application icon of the first application as texture data; rendering, using the computing system, the first application icon as a 3D first application icon, based at least in part on one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon; and causing, using the computing system, the 3D first application icon to be displayed on a user interface that is displayed within a display screen of a user device; and/or the like.

[0037] In particular, to the extent any abstract concepts are present in the various embodiments, those concepts can be implemented as described herein by devices, software, systems, and methods that involve novel functionality (e.g., steps or operations), such as, rendering and displaying application icons as 3D application icons, and/or the like, to name a

Meta Platforms, Inc. - Ex. 1002
Page 79

few examples, that extend beyond mere conventional computer processing operations. These functionalities can produce tangible results outside of the implementing computer system, including, merely by way of example, providing a 3D launcher that renders 2D app icons as 3D app icons, where app icons may be dynamically rendered in 3D rather than left as static 2D icons as in conventional launchers, which may be observed or measured by users, game/content developers, and/or user device manufacturers.

[0038] **Some Embodiments**

[0039] We now turn to the embodiments as illustrated by the drawings. Figs. 1-6 illustrate some of the features of the method, system, and apparatus for implementing image rendering, and, more particularly, to methods, systems, and apparatuses for implementing three-dimensional ("3D") launcher with 3D application ("app") icons, as referred to above. The methods, systems, and apparatuses illustrated by Figs. 1-6 refer to examples of different embodiments that include various components and steps, which can be considered alternatives or which can be used in conjunction with one another in the various embodiments. The description of the illustrated methods, systems, and apparatuses shown in Figs. 1-6 is provided for purposes of illustration and should not be considered to limit the scope of the different embodiments.

[0040] With reference to the figures, Fig. 1 is a schematic diagram illustrating a system 100 for implementing three-dimensional ("3D") launcher with 3D application ("app") icons, in accordance with various embodiments.

[0041] In the non-limiting embodiment of Fig. 1, system 100 may comprise computing system 105, which may include, but is not limited to, a three dimensional ("3D") launcher 110 and one or more central processing units and/or graphics processing units ("CPUs/GPUs") 125a-125n (collectively, "CPUs/GPUs 125" or the like). The 3D launcher 110 may include, without limitation, an application icon manager 115 and/or a renderer 120. The computing system 105 either may be an integrated computing system 105a as part of a user device 130 or may be a remote computing system 105b (in some cases, as part of a network(s) 175, or the like), and/or the like. In some embodiments, the computing system 105 may include, but is not limited to, at least one of a 3D launcher (e.g., 3D launcher 110, or the like), a machine learning system, an artificial intelligence ("AI") system, a deep learning system, a neural network, a processor on the user device (e.g., user device 130, or the like), one or more graphics processing units ("GPUs"), a server computer over a network, a cloud computing system, or a distributed computing system, and/or the like.

Meta Platforms, Inc. - Ex. 1002
Page 80

[0042] In some embodiments, the user device 130 may include, without limitation, at least one of computing system 105a, user input device 135a, system composer 140a, package management service ("PMS") 145a, data storage 150a, communications system 155, display screen 160a, or audio playback device 165, and/or the like. In some cases, system 100 may further comprise database(s) 150b in network(s) 175 that is communicatively coupled to computing system 105b. System 100 may further comprise network-based system composer 140b and network-based PMS 145b (and corresponding database(s) 170) in network(s) 175. System 100 may further comprise at least one of user input devices 135b, display devices 160b, and/or other user devices 180, and/or the like. Each of user device 130, user input devices 135b, display devices 160b, and/or other user devices 180, or the like, may communicatively couple to at least one of computing system 105b, network-based system composer 140b, network-based PMS 145b, and/or each other via network(s) 175 and via wired communications lines and/or via wireless communications lines (as depicted in Fig. 1 by lightning bolt symbols).

[0043] In some embodiments, networks 175 may each include, without limitation, one of a local area network ("LAN"), including, without limitation, a fiber network, an Ethernet network, a Token-Ring™ network, and/or the like; a wide-area network ("WAN"); a wireless wide area network ("WWAN"); a virtual network, such as a virtual private network ("VPN"); the Internet; an intranet; an extranet; a public switched telephone network ("PSTN"); an infra-red network; a wireless network, including, without limitation, a network operating under any of the IEEE 802.11 suite of protocols, the Bluetooth™ protocol known in the art, and/or any other wireless protocol; and/or any combination of these and/or other networks. In a particular embodiment, the network(s) 175 may include an access network of the service provider (e.g., an Internet service provider ("ISP")). In another embodiment, the network(s) 175 may include a core network of the service provider and/or the Internet.

[0044] In operation, computing system 105, 105a, or 105b (collectively, "computing system" or the like) may receive, via a package management service (e.g., PMS 145a or 145b, or the like), a first application package (e.g., application package 185, or the like) associated with a first application. The computing system may determine whether the first application package comprises a 3D profile of a first application icon associated with the first application. Based on a determination that the first application package comprises a 3D profile of the first application icon, the computing system may load a set of a 3D mesh and a 3D texture, based on the 3D profile of the first application icon. Based on a determination that the first application package does not contain a 3D profile of the first application icon, the computing

Meta Platforms, Inc. - Ex. 1002
Page 81

system may load a set of a default 3D mesh and a default application icon of the first application as texture data. The computing system may render the first application icon as a 3D first application icon (e.g., as rendered image(s) 195, or the like), based at least in part on one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon (collectively, "application icon information 190" or the like). The computing system may cause the 3D first application icon to be displayed on a user interface that is displayed within a display screen (e.g., display screen 160a or display devices 160b, or the like) of a user device (e.g., user device 130 or other user devices 180, or the like).

[0045] In some embodiments, an application icon manager (e.g., app icon manager 115, or the like) may receive the first application package, may determine whether the first application package comprises the 3D profile of the first application icon, and may load the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon to the renderer. In some instances, the renderer may render the first application icon as a 3D first application icon.

[0046] According to some embodiments, the renderer (e.g., renderer 120, or the like) of the computing system may load global render information, the global render information including, without limitation, at least one of scene camera pose, lighting condition, or zoom level, and/or the like. In such cases, rendering the first application icon as a 3D first application icon may comprise the renderer of the computing system rendering the first application icon as a 3D first application icon, based at least in part on the loaded global render information and based at least in part on the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon.

[0047] Alternatively, or additionally, a user input processor of the application icon manager may receive one or more user inputs, the one or more user inputs including, but not limited to, at least one of one or more selection inputs, one or more translation inputs, one or more rotation inputs, one or more tilt inputs, one or more zoom inputs (e.g., pinching inputs, i.e., pinching in to zoom in and pinching out to zoom out, or the like), one or more swipe inputs, one or more dragging inputs, one or more gesture inputs, one or more tracing inputs, one or more camera translation inputs, one or more rotation inputs, one or more accelerometer inputs, or one or more gyroscope inputs, and/or the like. In such cases, rendering the first application icon as a 3D first application icon may comprise the renderer of the computing system rendering the first application icon as a 3D first application icon, based at least in part on the received one or more user inputs and based at least in part on the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon.

Meta Platforms, Inc. - Ex. 1002
Page 82

[0048] In some embodiments, the 3D profile of the first application icon may further comprise an icon render frequency property based at least in part on different priorities that are based at least in part on one or more conditions. In some cases, the one or more conditions may include at least one of power consumption level or level of performance tradeoff, and/or the like. In some instances, the icon render frequency property may include one of a static icon, a low frequency rendering icon, a medium frequency rendering icon, or a high frequency rendering icon, and/or the like. The application icon manager of the computing system may determine a rendering frequency of the 3D first application icon based at least in part on the icon render frequency property in the 3D profile of the first application icon and based at least in part on the at least one of power consumption level or level of performance tradeoff. In such cases, rendering the first application icon as a 3D first application icon may comprise the renderer of the computing system controlling one or more rendering threads for rendering the first application icon as the 3D first application icon based on the determined rendering frequency of the 3D first application icon.

[0049] According to some embodiments, the first application icon may be part of a group of application icons. The application icon manager of the computing system may generate a group of 3D-arranged application icons based on the group of application icons. The renderer of the computing system may render the generated group of 3D-arranged application icons. The computing system may cause the rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

[0050] In some cases, the 3D-arranged application icons may include one of a group of cascaded 3D application icons with overlapping two or more of the group of application icons in a cascade arrangement or a group of layered 3D application icons with two or more layers of the group of application icons in a layered arrangement. In some embodiments, the application icon manager of the computing system may determine an order of the icons within the group of 3D-arranged application icons based at least in part on one or more of most recent use, existence of new notifications, number of new notifications, or user input to reorder the icons, and/or the like. The application icon manager of the computing system may autonomously reorder the icons within the group of 3D-arranged application icons based on the determination. The renderer of the computing system may re-render the group of 3D-arranged application icons based on the reordered icons within the group of 3D-arranged application icons. The computing system may cause the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

Meta Platforms, Inc. - Ex. 1002
Page 83

[0051] Alternatively, or additionally, the application icon manager of the computing system may determine one or more animations associated with one or more of the group of 3D-arranged application icons. In some cases, the one or more animations may include, without limitation, at least one of rotation, translation, tilting, resizing, transformation, or customized icon behaviors, and/or the like. The renderer of the computing system may re-render the group of 3D-arranged application icons based on the determined one or more animations associated with one or more of the group of 3D-arranged application icons. The computing system may cause the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

[0052] Alternatively, or additionally, a user input processor of the application icon manager may receive one or more navigation user inputs, the one or more navigation user inputs may include, but are not limited to, at least one of depth of field navigation inputs, perspective change inputs, orientation change inputs, reordering inputs, sorting inputs, rotation inputs, tilt inputs translation inputs, swiping inputs, dragging inputs, information request inputs, opening inputs, closing inputs, or selection inputs relative to the group of 3D-arranged application icons, and/or the like. The renderer of the computing system may re-render the group of 3D-arranged application icons based on the received one or more navigation user inputs. The computing system may cause the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

[0053] In some embodiments, a user input processor of the application icon manager may receive an application launch request input from a user to launch the first application. The application icon manager of the computing system may determine whether the application launch request input corresponds to a successful selection of the first application icon for launching the first application based on at least one of raytracing, collision determination, or intercept calculation, and/or the like, of the application launch request input relative to the first application icon within the user interface displayed within the display screen of the user device. Based on a determination that the application launch request input corresponds to a successful selection of the first application icon for launching the first application, the computing system may initiate launch of the first application. Based on a determination that the application launch request input corresponds to a failed attempt at selection of the first application icon for launching the first application, the computing system may prevent launch of the first application.

Meta Platforms, Inc. - Ex. 1002
Page 84

[0054] These and other functions of the system 100 (and its components) are described in greater detail below with respect to Figs. 2-4.

[0055] Fig. 2 is a schematic block flow diagram illustrating a non-limiting example 200 of a method for implementing 3D launcher with 3D app icons, in accordance with various embodiments.

[0056] With reference to the non-limiting example 200 of Fig. 2, 3D launcher 110 (similar to 3D launcher 110 of Fig. 1, or the like) may include, but is not limited to, application icon manager 115 (similar to application icon manager 115 of Fig. 1, or the like) and renderer 120 (similar to renderer 120 of Fig. 1, or the like). The application icon manager 115 may include, without limitation, at least one of user input processor 215, launch control system 220, or application icon arrangement system 225, and/or the like. The renderer 120 may include, but is not limited to, at least one of scene animation and update system 230, material manager 235, camera control system 240, light control system 245, or thread manager 250, and/or the like.

[0057] In some embodiments, the user input processor 215 may receive and process user inputs from user device 130/180 (similar to user devices 130 and/or 180 of Fig. 1, or the like). In some instances, user inputs may include, but are not limited to, at least one of one or more selection inputs, one or more translation inputs, one or more rotation inputs, one or more tilt inputs, one or more zoom inputs (e.g., pinching inputs, i.e., pinching in to zoom in and pinching out to zoom out, or the like), one or more swipe inputs, one or more dragging inputs, one or more gesture inputs, one or more tracing inputs, one or more camera translation inputs, one or more rotation inputs, one or more accelerometer inputs, or one or more gyroscope inputs, and/or the like.

[0058] The launch control system 220 may send a launch command to at least one applicable application package among the one or more application packages A-N 185a-185n (collectively, "app packages 185" or the like) corresponding to at least one applicable application icon, in some cases, based at least in part on icon selection inputs, icon manipulation inputs, and/or other user inputs, or the like. Package management service system 145 (similar to PMS 145a or 145b of Fig. 1, or the like) may receive application package information (similar to app package 185 of Fig. 1, or the like) from the at least one applicable application package. Each app package 185 may or may not include a 3D profile 205, and may or may not include icon information 210. The package management service system 145 may relay application icon information (similar to app icon information 190 of Fig. 1, or the like) to the application icon manager 115 of 3D launcher 110.

Meta Platforms, Inc. - Ex. 1002
Page 85

[0059] The application icon arrangement system 225 may generate commands for arranging each of the at least one applicable application icon based at least in part on the user inputs and the application icon information, or the like. The application icon manager 115 may send application icon information and updates (based on the generated commands) to renderer 120. Based at least in part on the generated commands, the application icon information and updates, and/or user inputs, or the like, renderer 120 may render each of the at least one applicable application icon as a 3D application icon. In some instances, the scene animation and update system 230 may control rendering of scene animations and any icon change or movement updates for rendering each 3D application icon. The material manager 235 may control rendering of material textures on models of each 3D application icon. The camera control system 240 may control rendering of changes to each 3D application icon based on camera perspective changes (e.g., based on camera pan, tilt, and/or zoom functions, or the like). The light control system 245 may control rendering of each 3D application icon based on lighting control (e.g., based on angle, color/tint, and/or focused/diffuse aspects of the light, or the like).

[0060] The thread manager 250 may control rendering of one or more rendering threads for rendering the first application icon as the 3D first application icon, in some cases, based on rendering frequency of the 3D first application icon that may be based at least in part on the icon render frequency property in the 3D profile of the first application icon and based at least in part on the at least one of power consumption level or level of performance tradeoff. For example, the 3D launcher may read the profiles (e.g., the 3D profiles, or the like) of each application through the package management service 145 and may arrange (using the app icon arrangement system 225, or the like) based on the launcher layout and may refresh priority. The rearranged application icons may be fed into the internal renderer (e.g., renderer 120, or the like) to animate and to update the 3D scene geometry. In some cases, global render information (including, but not limited to, scene camera pose, lighting condition, etc.) may be used by the 3D launcher to control the rendering of each 3D icon. The application may modify a few attributes in the profile in order to customize the rendering behavior. The renderer 120 in the launcher may control one or more threads for rendering app icons at different priorities due to power consumption and performance tradeoff, or the like. Each application may indicate the rendering frequency by setting the icon render frequency property in the profile. In some instances, to save power, the system (and/or the user) may choose to use static icons or low frequency rendering icons, or the like.

Meta Platforms, Inc. - Ex. 1002
Page 86

[0061] According to some embodiments, renderer 120 may render each of the at least one applicable application icon as a 3D first application icon, in some cases, based at least in part on one of the set of the 3D mesh and the 3D texture (in the case that an applicable application package comprises a 3D profile of corresponding application icon, or the like) or the set of the default 3D mesh and the default application icon (in the case that an applicable application package does not contain a 3D profile of corresponding application icon, or the like); based at least in part on the loaded global render information (which may include, without limitation, at least one of scene camera pose, lighting condition, or zoom level, and/or the like) and based at least in part on the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon; based at least in part on the received one or more user inputs and based at least in part on the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon; or based on the determined rendering frequency of the 3D first application icon; and/or the like.

[0062] System composer 140 (similar to system composer 140a and/or 140b, or the like) may send current back buffer data to the renderer 120, and may receive rendered back buffer data from the renderer 120 based on the rendering of each of the at least one applicable application icon as a 3D application icon. The system composer 140 may send display buffer data based on the rendered back buffer data (similar to rendered image(s) 195 of Fig. 1, or the like), and may cause the user device 130/180 to display the rendered 3D application icons on a user interface that is displayed within a display screen of the user device 130/180.

[0063] In some embodiments, each of the at least one applicable application icon may be part of a group of application icons. The application icon manager 115 may generate a group of 3D-arranged application icons based on the group of application icons. The renderer 120 may render the generated group of 3D-arranged application icons. The 3D launcher 110 may cause the rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device 130/180.

[0064] In some cases, the 3D-arranged application icons may include one of a group of cascaded 3D application icons with overlapping two or more of the group of application icons in a cascade arrangement or a group of layered 3D application icons with two or more layers of the group of application icons in a layered arrangement. In some embodiments, the application icon manager 115 may determine an order of the icons within the group of 3D-arranged application icons based at least in part on one or more of most recent use, existence of new notifications, number of new notifications, or user input to reorder the icons, and/or the like. The application icon manager 115 may autonomously reorder the icons within the

Meta Platforms, Inc. - Ex. 1002
Page 87

group of 3D-arranged application icons based on the determination. The renderer 120 may re-render the group of 3D-arranged application icons based on the reordered icons within the group of 3D-arranged application icons. The 3D launcher 110 may cause the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device 130/180.

[0065] Alternatively, or additionally, the application icon manager 115 may determine one or more animations associated with one or more of the group of 3D-arranged application icons. In some cases, the one or more animations may include, without limitation, at least one of rotation, translation, tilting, resizing, transformation, or customized icon behaviors, and/or the like. The renderer 120 may re-render the group of 3D-arranged application icons based on the determined one or more animations associated with one or more of the group of 3D-arranged application icons. The 3D launcher 110 may cause the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device 130/180.

[0066] Alternatively, or additionally, a user input processor 215 of the application icon manager 115 may receive one or more navigation user inputs, the one or more navigation user inputs including, but not limited to, at least one of depth of field navigation inputs, perspective change inputs, orientation change inputs, reordering inputs, sorting inputs, rotation inputs, tilt inputs translation inputs, swiping inputs, dragging inputs, information request inputs, opening inputs, closing inputs, or selection inputs relative to the group of 3D-arranged application icons, and/or the like. The renderer 120 may re-render the group of 3D-arranged application icons based on the received one or more navigation user inputs. The 3D launcher 110 may cause the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device 130/180.

[0067] In some embodiments, user input processor 215 of the application icon manager 115 may receive an application launch request input from a user to launch the first application. The application icon manager 115 may determine whether the application launch request input corresponds to a successful selection of the first application icon for launching the first application based on at least one of raytracing, collision determination, or intercept calculation, and/or the like, of the application launch request input relative to the first application icon within the user interface displayed within the display screen of the user device 130/180. Based on a determination that the application launch request input corresponds to a successful selection of the first application icon for launching the first application, the 3D launcher 110 may initiate launch of the first application. Based on a

Meta Platforms, Inc. - Ex. 1002
Page 88

determination that the application launch request input corresponds to a failed attempt at selection of the first application icon for launching the first application, the 3D launcher 110 may prevent launch of the first application.

[0068] 3D launcher 110, application icon manager 115, renderer 120, user device 130/180, system composer 140, package management service system 145, application package information, application icon information, and rendered back buffer data of system 200 in Fig. 2 may be similar to 3D launcher 110, application icon manager 115, renderer 120, user device 130 and/or 180, system composer 140a and/or 140b, package management service system 145a and/or 145b, app packages 185, app icon information 190, and rendered image(s) 195, respectively, of system 100 in Fig. 1, and the descriptions of these components of system 100 (and their functions) are applicable to the corresponding components of system 200, respectively.

[0069] These and other functions of the system 200 (and its components) are described in greater detail below with respect to Figs. 1, 3, and 4.

[0070] Figs. 3A-3E (collectively, "Fig. 3") are schematic diagrams illustrating various non-limiting examples 300, 300', 300", 300'", and 300"" of 3D app icons and 3D app groups that may be rendered during implementation of 3D launcher with 3D app icons, in accordance with various embodiments.

[0071] With reference to the non-limiting example 300 of Fig. 3A, using a 3D profile 305, which may include, without limitation, references to a model (in this case, "./model.obj" referencing model 310, or the like) and a texture (in this case, "./texture.png" referencing texture 315, or the like). By rendering to apply the texture 315 (in this case, a 2D texture representative of a world map, or the like) to the model 310 (in this case, a 3D object representative of a sphere, or the like), the result 320 may be a globe (in this case, a 3D spherical model of Earth and its countries and territories in map form, or the like).

[0072] According to some embodiments, for developers who want to customize the 3D appearance in a 3D launcher (which may refer to a user interface ("UI"), such as a splash page, a lander page, or a UI with groups of app icons, and/or the like), the developers must include a 3D profile (or 3D launcher profile, or the like), or the like. The 3D profile defines the 3D behavior including, but not limited to, the location of the model file, the texture file, and/or the like. Applications without the 3D profile will fall back to default billboard render using original bitmap icon as the texture, or the like.

[0073] In some embodiments, the 3D profile 305 of an application (such as a 3D profile associated with a particular application package 185 among a plurality of application packages

Meta Platforms, Inc. - Ex. 1002
Page 89

185a-185n, as shown in Fig. 2, or the like) may provide a framework with which to facilitate rendering an icon associated with the application as a 3D icon. In some instances, a computing system may determine whether an application package comprises a 3D profile 305 by reading or scanning the application package to identify the presence or absence of a model object file and a texture file. In some cases, identifying the presence or absence of a model object file and a texture file may be based, e.g., on presence or absence of a filename extension or a file type associated with such files (in this case, ".obj" and ".png," or the like, but not limited to these particular model file types or image file types, or the like). Alternatively, or additionally, identifying the presence or absence of a model object file and a texture file may be based, e.g., on at least one of header information within files contained in the application package or other indications contained in the application package that are indicative of presence or absence of a model object file or a texture file, or the like.

[0074] Referring to the non-limiting example 300' of Fig. 3B, the computing system 105 and/or the 3D launcher 110 of Figs. 1 and 2 may replace conventional icon 325 (in this case, an e-mail icon indicating 5 new messages, or the like) with a rendered one or more 3D icons 330 (in this case, including, but not limited to, a front view 330a depicting a bundle of envelopes denoting e-mail messages, which may be rotated in response to a user rotating a user device (e.g., user device 130 and/or 180 of Figs. 1 and 2, or the like) or tilting its viewing angle; a cascade view 330b depicting the bundle of envelopes slightly spread apart; a sneak peek 330c depicting the slightly spread apart bundle of envelopes with the option for the user to utilize a swipe function or command to cause one or more envelopes to be selected out of the bundle for viewing; and/or the like). In Fig. 3B, the bundle of envelopes may be referred to as being in a cascade arrangement or the like. In some embodiments, 3D launcher 110 may be used in mainstream operating systems (e.g., Android OS, iOS, or the like) to support 3D rendering and animation of application icons in such OS's. Applications can rely on 3D rendering to display more important information dynamically. For example, app icons may rely on gyroscope-based inputs from a user device to cause the 3D launcher 110 to change the viewing angle and/or other human gestures to rotate the 3D app icons, or the like.

[0075] Turning to the non-limiting example 300" of Fig. 3C, instead of a conventional app group 335, in which a box 335a containing a plurality of app icons may be enlarged in response to a click function or command to become a large box 335b containing the same, the computing system 105 and/or the 3D launcher 110 of Figs. 1 and 2 may render one or more 3D app groups 340 (in this case, including, but not limited to, a front view 340a depicting a bundle of application icons, which may be rotated in response to a user rotating a user device

Meta Platforms, Inc. - Ex. 1002
Page 90

(e.g., user device 130 and/or 180 of Figs. 1 and 2, or the like) or tilting its viewing angle; a cascade view 340b depicting the bundle of app icons slightly spread apart with the option for the user to utilize a tap or select function or command to open a selected application; a re-ordering 340c depicting the slightly spread apart bundle of app icons with the option for the user to utilize a swipe function or command to cause one or more envelopes to be selected out of the bundle for re-ordering within the list or bundle of app icons; and/or the like). In Fig. 3C, the bundle of app icons may be referred to as being in a cascade arrangement or the like. According to some embodiments, app icons may be grouped on the z-axis of the 3D space, where 3D movement of the user device may allow hidden layers within the group of cascaded 3D application icons (i.e., with overlapping two or more of the group of application icons in the cascade arrangement, such as shown in the cascade view 340b in Fig. 3C, or the like) to become visible to the user (at least temporarily), enabling a sneak peek of the 3D application icons in the app group.

[0076] In some embodiments, alternative or additional to manual re-ordering as described above (i.e., re-ordering in response to user input, or the like), the computing system 105 and/or the 3D launcher 110 of Figs. 1 and 2 may support automatic re-ordering, in some cases, by moving the most recently used application's icon to the front, or by moving a received notification to the front. Alternatively, or additionally, the computing system 105 and/or the 3D launcher 110 of Figs. 1 and 2 may also support animations, including, but not limited to, automatic rotation, translation, etc. In some instances, the computing system 105 and/or the 3D launcher 110 of Figs. 1 and 2 may also enable customization of icon behaviors, in some cases, by providing scripts or the like. For example, an e-mail app could use the number of mails in the icon to indicate how many new e-mails are there, and may also support swipe gestures or the like to sneak peek e-mails (such as shown in Fig. 3B, or the like).

[0077] With reference to the non-limiting example 300'" of Fig. 3D, a group of layered 3D application icons 345 with two or more layers of the group of application icons 355 in a layered arrangement. The application icons 355 and/or the layered grouping 345 of the application icons 355 may be manipulated or selected using one or more user devices 350 (in this case, a virtual reality system, a smart phone, and/or the like), in a manner as described above with respect to Figs. 1 and 2. In some instances, 3D layout of app icons may also be easily supported, enabling a full 3D browsing of existing apps. For example, instead of using a swipe gesture or the like to view another page of app icons, one could press and move forward on the depth dimension to view another layer of app icons, to quickly access certain apps, or the like.

Meta Platforms, Inc. - Ex. 1002
Page 91

[0078] Referring to the non-limiting example 300"" of Fig. 3E, a group of layered 3D application icons 360 with two or more layers of the group of application icons 355 in a layered arrangement. The application icons 355 and/or the layered grouping 360 of the application icons 355 may be manipulated or selected using one or more user devices 350 (in this case, a smart phone, and/or the like), in a manner as described above with respect to Figs. 1 and 2. For instance, a user input processor of an application icon manager (similar to application icon manager 115 of Figs. 1 and 2, or the like) may receive an application launch request input from a user to launch a first application. The application icon manager may determine whether the application launch request input corresponds to a successful selection of the first application icon for launching the first application based on at least one of raytracing, collision determination, or intercept calculation, and/or the like, of the application launch request input relative to the first application icon within the user interface displayed within the display screen of the user device. Based on a determination that the application launch request input corresponds to a successful selection of the first application icon for launching the first application (depicted in Fig. 3E by the line and circle notation indicating "Hit App Icon," or the like), the computing system or 3D launcher (e.g., computing system 105 or 3D launcher 110 of Figs. 1 and 2, or the like) may initiate launch of the first application. Based on a determination that the application launch request input corresponds to a failed attempt at selection of the first application icon for launching the first application (depicted in Fig. 3E by the line indicating "Miss App Icon," or the like), the computing system or 3D launcher may prevent launch of the first application. In other words, the 3D launcher may capture user inputs by conducting 3D icon picking in the scene and may launch the corresponding apps by sending launch intents to the package management service (such as described above with respect to Fig. 2, or the like).

[0079] Figs. 4A-4F (collectively, "Fig. 4") are flow diagrams illustrating a method 400 for implementing 3D launcher with 3D app icons, in accordance with various embodiments. Method 400 of Fig. 4A either continues onto Fig. 4B following the circular marker denoted, "A," and/or continues onto Fig. 4F following the circular marker denoted, "B." Method 400 of Fig. 4B continues onto at least one of Fig. 4C following the circular marker denoted, "C," Fig. 4D following the circular marker denoted, "D," and/or Fig. 4E following the circular marker denoted, "E."

[0080] While the techniques and procedures are depicted and/or described in a certain order for purposes of illustration, it should be appreciated that certain procedures may be reordered and/or omitted within the scope of various embodiments. Moreover, while the

Meta Platforms, Inc. - Ex. 1002
Page 92

method 400 illustrated by Fig. 4 can be implemented by or with (and, in some cases, are described below with respect to) the systems, examples, or embodiments 100, 200, 300, 300', 300", 300'", and 300"" of Figs. 1, 2, 3A, 3B, 3C, 3D, and 3E, respectively (or components thereof), such methods may also be implemented using any suitable hardware (or software) implementation. Similarly, while each of the systems, examples, or embodiments 100, 200, 300, 300', 300", 300'", and 300"" of Figs. 1, 2, 3A, 3B, 3C, 3D, and 3E, respectively (or components thereof), can operate according to the method 400 illustrated by Fig. 4 (e.g., by executing instructions embodied on a computer readable medium), the systems, examples, or embodiments 100, 200, 300, 300', 300", 300'", and 300"" of Figs. 1, 2, 3A, 3B, 3C, 3D, and 3E can each also operate according to other modes of operation and/or perform other suitable procedures.

[0081] In the non-limiting embodiment of Fig. 4A, method 400, at block 402, may comprise receiving, using a computing system and via a package management service ("PMS"), a first application package associated with a first application. At block 404, method 400 may comprise determining, using the computing system, whether the first application package comprises a three dimensional ("3D") profile of a first application icon associated with the first application. If so, method 400 may continue onto the process at block 406. If not, method 400 may continue onto the process at block 408. Method 400 may further comprise, based on a determination that the first application package comprises a 3D profile of the first application icon, loading, using the computing system, a set of a 3D mesh and a 3D texture, based on the 3D profile of the first application icon (block 406). Method 400 may continue onto the process at block 416.

[0082] Method 400 may further comprise, based on a determination that the first application package does not contain a 3D profile of the first application icon, loading, using the application icon manager of the computing system, a set of a default 3D mesh and a default application icon of the first application as texture data (block 408). Method 400 may continue onto the process at block 416. Method 400 may further comprise at least one of: loading, using the renderer of the computing system, global render information, the global render information including, without limitation, at least one of scene camera pose, lighting condition, or zoom level, and/or the like (block 410); receiving, using a user input processor of the application icon manager, one or more user inputs, the one or more user inputs including, but not limited to, at least one of one or more selection inputs, one or more translation inputs, one or more rotation inputs, one or more tilt inputs, one or more zoom inputs (e.g., pinching inputs, i.e., pinching in to zoom in and pinching out to zoom out, or the

Meta Platforms, Inc. - Ex. 1002
Page 93

like), one or more swipe inputs, one or more dragging inputs, one or more gesture inputs, one or more tracing inputs, one or more camera translation inputs, one or more rotation inputs, one or more accelerometer inputs, or one or more gyroscope inputs, and/or the like (block 412); and/or determining, using the application icon manager of the computing system, a rendering frequency of the 3D first application icon based at least in part on an icon render frequency property in the 3D profile of the first application icon and based at least in part on at least one of power consumption level or level of performance tradeoff (block 414). In some cases, the 3D profile of the first application icon may include, but is not limited to, an icon render frequency property based at least in part on different priorities that are based at least in part on one or more conditions. In some instances, the one or more conditions may include, without limitation, at least one of power consumption level or level of performance tradeoff. In some cases, the icon render frequency property may include, but is not limited to, one of a static icon, a low frequency rendering icon, a medium frequency rendering icon, or a high frequency rendering icon, and/or the like. Method 400 may continue onto the process at block 416.

[0083] At block 416, method 400 may comprise rendering, using the renderer of the computing system, the first application icon as a 3D first application icon, in some cases, based at least in part on one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon, based at least in part on the loaded global render information and based at least in part on the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon, based at least in part on the received one or more user inputs and based at least in part on the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon, or based on the determined rendering frequency of the 3D first application icon, and/or the like.

[0084] Method 400, at block 418, may comprise causing, using the computing system, the 3D first application icon to be displayed on a user interface that is displayed within a display screen of a user device.

[0085] In some embodiments, the computing system may comprise at least one of a 3D launcher, a machine learning system, an artificial intelligence ("AI") system, a deep learning system, a neural network, a processor on the user device, one or more graphics processing units ("GPUs"), a server computer over a network, a cloud computing system, or a distributed computing system, and/or the like.

Meta Platforms, Inc. - Ex. 1002
Page 94

[0086] Method 400 either may continue onto the process at block 420 in Fig. 4B following the circular marker denoted, "A," or may continue onto the process at block 446 in Fig. 4F following the circular marker denoted, "B."

[0087] In some embodiments, the first application icon may be part of a group of application icons. At block 420 in Fig. 4B (following the circular marker denoted, "A"), method 400 may comprise generating, using the application icon manager of the computing system, a group of 3D-arranged application icons based on the group of application icons; rendering, using the renderer of the computing system, the generated group of 3D-arranged application icons (block 422); and causing, using the computing system, the rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device (block 424). According to some embodiments, the 3D-arranged application icons may comprise one of a group of cascaded 3D application icons with overlapping two or more of the group of application icons in a cascade arrangement or a group of layered 3D application icons with two or more layers of the group of application icons in a layered arrangement.

[0088] Method 400 may continue onto the process at block 426 in Fig. 4C following the circular marker denoted, "C," may continue onto the process at block 434 in Fig. 4D following the circular marker denoted, "D," and/or may continue onto the process at block 440 in Fig. 4E following the circular marker denoted, "E."

[0089] At block 426 in Fig. 4C (following the circular marker denoted, "C," in Fig. 4B), method 400 may comprise determining, using the application icon manager of the computing system, an order of the icons within the group of 3D-arranged application icons based at least in part on one or more of most recent use, existence of new notifications, number of new notifications, or user input to reorder the icons, and/or the like; autonomously reordering, using the application icon manager of the computing system, the icons within the group of 3D-arranged application icons based on the determination (block 428); re-rendering, using the renderer of the computing system, the group of 3D-arranged application icons based on the reordered icons within the group of 3D-arranged application icons (block 430); and causing, using the computing system, the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device (block 432).

[0090] At block 434 in Fig. 4D (following the circular marker denoted, "D," in Fig. 4B), method 400 may comprise determining, using the application icon manager of the computing system, one or more animations associated with one or more of the group of 3D-arranged

Meta Platforms, Inc. - Ex. 1002
Page 95

application icons, wherein the one or more animations comprise at least one of rotation, translation, tilting, resizing, transformation, or customized icon behaviors; re-rendering, using the renderer of the computing system, the group of 3D-arranged application icons based on the determined one or more animations associated with one or more of the group of 3D-arranged application icons (block 436); and causing, using the computing system, the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device (block 438).

[0091] At block 440 in Fig. 4E (following the circular marker denoted, "E," in Fig. 4B), method 400 may comprise receiving, using a user input processor of the application icon manager, one or more navigation user inputs, the one or more navigation user inputs comprising at least one of depth of field navigation inputs, perspective change inputs, orientation change inputs, reordering inputs, sorting inputs, rotation inputs, tilt inputs translation inputs, swiping inputs, dragging inputs, information request inputs, opening inputs, closing inputs, or selection inputs relative to the group of 3D-arranged application icons, and/or the like; re-rendering, using the renderer of the computing system, the group of 3D-arranged application icons based on the received one or more navigation user inputs (block 442); and causing, using the computing system, the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device (block 444).

[0092] At block 446 in Fig. 4F (following the circular marker denoted, "F," in Fig. 4A), method 400 may comprise receiving, using a user input processor of the application icon manager, an application launch request input from a user to launch the first application; determining, using the application icon manager of the computing system, whether the application launch request input corresponds to a successful selection of the first application icon for launching the first application based on at least one of raytracing, collision determination, or intercept calculation, and/or the like, of the application launch request input relative to the first application icon within the user interface displayed within the display screen of the user device (block 448); based on a determination that the application launch request input corresponds to a successful selection of the first application icon for launching the first application, initiating, using the computing system, launch of the first application (block 450); and based on a determination that the application launch request input corresponds to a failed attempt at selection of the first application icon for launching the first application, preventing, using the computing system, launch of the first application (block 452).

Meta Platforms, Inc. - Ex. 1002
Page 96

[0093] **Examples of System and Hardware Implementation**

[0094] Fig. 5 is a block diagram illustrating an example of computer or system hardware architecture, in accordance with various embodiments. Fig. 5 provides a schematic illustration of one embodiment of a computer system 500 of the service provider system hardware that can perform the methods provided by various other embodiments, as described herein, and/or can perform the functions of computer or hardware system (i.e., computing systems 105, 105a, and 105b, three-dimensional ("3D") launcher 110, central processing units and/or graphics processing units ("CPUs/GPUs") 125a-125n, user devices 130 and 180, user input devices 135a and 135b, system composers 140, 140a, and 140b, package management services 145, 145a, and 145b, etc.), as described above. It should be noted that Fig. 5 is meant only to provide a generalized illustration of various components, of which one or more (or none) of each may be utilized as appropriate. Fig. 5, therefore, broadly illustrates how individual system elements may be implemented in a relatively separated or relatively more integrated manner.

[0095] The computer or hardware system 500 – which might represent an embodiment of the computer or hardware system (i.e., computing systems 105, 105a, and 105b, 3D launcher 110, CPUs/GPUs 125a-125n, user devices 130 and 180, user input devices 135a and 135b, system composers 140, 140a, and 140b, package management services 145, 145a, and 145b, etc.), described above with respect to Figs. 1-4 – is shown comprising hardware elements that can be electrically coupled via a bus 505 (or may otherwise be in communication, as appropriate). The hardware elements may include one or more processors 510, including, without limitation, one or more general-purpose processors and/or one or more special-purpose processors (such as microprocessors, digital signal processing chips, graphics acceleration processors, and/or the like); one or more input devices 515, which can include, without limitation, a mouse, a keyboard, and/or the like; and one or more output devices 520, which can include, without limitation, a display device, a printer, and/or the like.

[0096] The computer or hardware system 500 may further include (and/or be in communication with) one or more storage devices 525, which can comprise, without limitation, local and/or network accessible storage, and/or can include, without limitation, a disk drive, a drive array, an optical storage device, solid-state storage device such as a random access memory ("RAM") and/or a read-only memory ("ROM"), which can be programmable, flash-updateable, and/or the like. Such storage devices may be configured to implement any appropriate data stores, including, without limitation, various file systems, database structures, and/or the like.

Meta Platforms, Inc. - Ex. 1002
Page 97

[0097] The computer or hardware system 500 might also include a communications subsystem 530, which can include, without limitation, a modem, a network card (wireless or wired), an infra-red communication device, a wireless communication device and/or chipset (such as a Bluetooth™ device, an 802.11 device, a WiFi device, a WiMax device, a WWAN device, cellular communication facilities, etc.), and/or the like. The communications subsystem 530 may permit data to be exchanged with a network (such as the network described below, to name one example), with other computer or hardware systems, and/or with any other devices described herein. In many embodiments, the computer or hardware system 500 will further comprise a working memory 535, which can include a RAM or ROM device, as described above.

[0098] The computer or hardware system 500 also may comprise software elements, shown as being currently located within the working memory 535, including an operating system 540, device drivers, executable libraries, and/or other code, such as one or more application programs 545, which may comprise computer programs provided by various embodiments (including, without limitation, hypervisors, VMs, and the like), and/or may be designed to implement methods, and/or configure systems, provided by other embodiments, as described herein. Merely by way of example, one or more procedures described with respect to the method(s) discussed above might be implemented as code and/or instructions executable by a computer (and/or a processor within a computer); in an aspect, then, such code and/or instructions can be used to configure and/or adapt a general purpose computer (or other device) to perform one or more operations in accordance with the described methods.

[0099] A set of these instructions and/or code might be encoded and/or stored on a non-transitory computer readable storage medium, such as the storage device(s) 525 described above. In some cases, the storage medium might be incorporated within a computer system, such as the system 500. In other embodiments, the storage medium might be separate from a computer system (i.e., a removable medium, such as a compact disc, etc.), and/or provided in an installation package, such that the storage medium can be used to program, configure, and/or adapt a general purpose computer with the instructions/code stored thereon. These instructions might take the form of executable code, which is executable by the computer or hardware system 500 and/or might take the form of source and/or installable code, which, upon compilation and/or installation on the computer or hardware system 500 (e.g., using any of a variety of generally available compilers, installation programs, compression/decompression utilities, etc.) then takes the form of executable code.

Meta Platforms, Inc. - Ex. 1002
Page 98

[0100] It will be apparent to those skilled in the art that substantial variations may be made in accordance with particular requirements. For example, customized hardware (such as programmable logic controllers, field-programmable gate arrays, application-specific integrated circuits, and/or the like) might also be used, and/or particular elements might be implemented in hardware, software (including portable software, such as applets, etc.), or both. Further, connection to other computing devices such as network input/output devices may be employed.

[0101] As mentioned above, in one aspect, some embodiments may employ a computer or hardware system (such as the computer or hardware system 500) to perform methods in accordance with various embodiments of the invention. According to a set of embodiments, some or all of the procedures of such methods are performed by the computer or hardware system 500 in response to processor 510 executing one or more sequences of one or more instructions (which might be incorporated into the operating system 540 and/or other code, such as an application program 545) contained in the working memory 535. Such instructions may be read into the working memory 535 from another computer readable medium, such as one or more of the storage device(s) 525. Merely by way of example, execution of the sequences of instructions contained in the working memory 535 might cause the processor(s) 510 to perform one or more procedures of the methods described herein.

[0102] The terms "machine readable medium" and "computer readable medium," as used herein, refer to any medium that participates in providing data that causes a machine to operate in some fashion. In an embodiment implemented using the computer or hardware system 500, various computer readable media might be involved in providing instructions/code to processor(s) 510 for execution and/or might be used to store and/or carry such instructions/code (e.g., as signals). In many implementations, a computer readable medium is a non-transitory, physical, and/or tangible storage medium. In some embodiments, a computer readable medium may take many forms, including, but not limited to, non-volatile media, volatile media, or the like. Non-volatile media includes, for example, optical and/or magnetic disks, such as the storage device(s) 525. Volatile media includes, without limitation, dynamic memory, such as the working memory 535. In some alternative embodiments, a computer readable medium may take the form of transmission media, which includes, without limitation, coaxial cables, copper wire, and fiber optics, including the wires that comprise the bus 505, as well as the various components of the communication subsystem 530 (and/or the media by which the communications subsystem 530 provides communication with other devices). In an alternative set of embodiments, transmission media can also take the form of

Meta Platforms, Inc. - Ex. 1002
Page 99

waves (including without limitation radio, acoustic, and/or light waves, such as those generated during radio-wave and infra-red data communications).

[0103] Common forms of physical and/or tangible computer readable media include, for example, a floppy disk, a flexible disk, a hard disk, magnetic tape, or any other magnetic medium, a CD-ROM, any other optical medium, punch cards, paper tape, any other physical medium with patterns of holes, a RAM, a PROM, and EPROM, a FLASH-EPROM, any other memory chip or cartridge, a carrier wave as described hereinafter, or any other medium from which a computer can read instructions and/or code.

[0104] Various forms of computer readable media may be involved in carrying one or more sequences of one or more instructions to the processor(s) 510 for execution. Merely by way of example, the instructions may initially be carried on a magnetic disk and/or optical disc of a remote computer. A remote computer might load the instructions into its dynamic memory and send the instructions as signals over a transmission medium to be received and/or executed by the computer or hardware system 500. These signals, which might be in the form of electromagnetic signals, acoustic signals, optical signals, and/or the like, are all examples of carrier waves on which instructions can be encoded, in accordance with various embodiments of the invention.

[0105] The communications subsystem 530 (and/or components thereof) generally will receive the signals, and the bus 505 then might carry the signals (and/or the data, instructions, etc. carried by the signals) to the working memory 535, from which the processor(s) 505 retrieves and executes the instructions. The instructions received by the working memory 535 may optionally be stored on a storage device 525 either before or after execution by the processor(s) 510.

[0106] As noted above, a set of embodiments comprises methods and systems for implementing image rendering, and, more particularly, to methods, systems, and apparatuses for implementing three-dimensional ("3D") launcher with 3D application ("app") icons. Fig. 6 illustrates a schematic diagram of a system 600 that can be used in accordance with one set of embodiments. The system 600 can include one or more user computers, user devices, or customer devices 605. A user computer, user device, or customer device 605 can be a general purpose personal computer (including, merely by way of example, desktop computers, tablet computers, laptop computers, handheld computers, and the like, running any appropriate operating system, several of which are available from vendors such as Apple, Microsoft Corp., and the like), cloud computing devices, a server(s), and/or a workstation computer(s) running any of a variety of commercially-available UNIX™ or UNIX-like operating systems.

Meta Platforms, Inc. - Ex. 1002
Page 100

A user computer, user device, or customer device 605 can also have any of a variety of applications, including one or more applications configured to perform methods provided by various embodiments (as described above, for example), as well as one or more office applications, database client and/or server applications, and/or web browser applications. Alternatively, a user computer, user device, or customer device 605 can be any other electronic device, such as a thin-client computer, Internet-enabled mobile telephone, and/or personal digital assistant, capable of communicating via a network (*e.g.*, the network(s) 610 described below) and/or of displaying and navigating web pages or other types of electronic documents. Although the system 600 is shown with two user computers, user devices, or customer devices 605, any number of user computers, user devices, or customer devices can be supported.

[0107] Some embodiments operate in a networked environment, which can include a network(s) 610. The network(s) 610 can be any type of network familiar to those skilled in the art that can support data communications using any of a variety of commercially-available (and/or free or proprietary) protocols, including, without limitation, TCP/IP, SNA™, IPX™, AppleTalk™, and the like. Merely by way of example, the network(s) 610 (similar to network(s) 175 of Fig. 1, or the like) can each include a local area network ("LAN"), including, without limitation, a fiber network, an Ethernet network, a Token-Ring™ network, and/or the like; a wide-area network ("WAN"); a wireless wide area network ("WWAN"); a virtual network, such as a virtual private network ("VPN"); the Internet; an intranet; an extranet; a public switched telephone network ("PSTN"); an infra-red network; a wireless network, including, without limitation, a network operating under any of the IEEE 802.11 suite of protocols, the Bluetooth™ protocol known in the art, and/or any other wireless protocol; and/or any combination of these and/or other networks. In a particular embodiment, the network might include an access network of the service provider (e.g., an Internet service provider ("ISP")). In another embodiment, the network might include a core network of the service provider, and/or the Internet.

[0108] Embodiments can also include one or more server computers 615. Each of the server computers 615 may be configured with an operating system, including, without limitation, any of those discussed above, as well as any commercially (or freely) available server operating systems. Each of the servers 615 may also be running one or more applications, which can be configured to provide services to one or more clients 605 and/or other servers 615.

Meta Platforms, Inc. - Ex. 1002
Page 101

[0109] Merely by way of example, one of the servers 615 might be a data server, a web server, a cloud computing device(s), or the like, as described above. The data server might include (or be in communication with) a web server, which can be used, merely by way of example, to process requests for web pages or other electronic documents from user computers 605. The web server can also run a variety of server applications, including HTTP servers, FTP servers, CGI servers, database servers, Java servers, and the like. In some embodiments of the invention, the web server may be configured to serve web pages that can be operated within a web browser on one or more of the user computers 605 to perform methods of the invention.

[0110] The server computers 615, in some embodiments, might include one or more application servers, which can be configured with one or more applications accessible by a client running on one or more of the client computers 605 and/or other servers 615. Merely by way of example, the server(s) 615 can be one or more general purpose computers capable of executing programs or scripts in response to the user computers 605 and/or other servers 615, including, without limitation, web applications (which might, in some cases, be configured to perform methods provided by various embodiments). Merely by way of example, a web application can be implemented as one or more scripts or programs written in any suitable programming language, such as Java™, C, C#™ or C++, and/or any scripting language, such as Perl, Python, or TCL, as well as combinations of any programming and/or scripting languages. The application server(s) can also include database servers, including, without limitation, those commercially available from Oracle™, Microsoft™, Sybase™, IBM™, and the like, which can process requests from clients (including, depending on the configuration, dedicated database clients, API clients, web browsers, etc.) running on a user computer, user device, or customer device 605 and/or another server 615. In some embodiments, an application server can perform one or more of the processes for implementing image rendering, and, more particularly, to methods, systems, and apparatuses for implementing 3D launcher with 3D app icons, as described in detail above. Data provided by an application server may be formatted as one or more web pages (comprising HTML, JavaScript, etc., for example) and/or may be forwarded to a user computer 605 via a web server (as described above, for example). Similarly, a web server might receive web page requests and/or input data from a user computer 605 and/or forward the web page requests and/or input data to an application server. In some cases, a web server may be integrated with an application server.

Meta Platforms, Inc. - Ex. 1002
Page 102

[0111] In accordance with further embodiments, one or more servers 615 can function as a file server and/or can include one or more of the files (e.g., application code, data files, etc.) necessary to implement various disclosed methods, incorporated by an application running on a user computer 605 and/or another server 615. Alternatively, as those skilled in the art will appreciate, a file server can include all necessary files, allowing such an application to be invoked remotely by a user computer, user device, or customer device 605 and/or server 615.

[0112] It should be noted that the functions described with respect to various servers herein (e.g., application server, database server, web server, file server, etc.) can be performed by a single server and/or a plurality of specialized servers, depending on implementation-specific needs and parameters.

[0113] In some embodiments, the system can include one or more databases 620a-620n (collectively, "databases 620"). The location of each of the databases 620 is discretionary: merely by way of example, a database 620a might reside on a storage medium local to (and/or resident in) a server 615a (and/or a user computer, user device, or customer device 605). Alternatively, a database 620n can be remote from any or all of the computers 605, 615, so long as it can be in communication (*e.g.*, via the network 610) with one or more of these. In a particular set of embodiments, a database 620 can reside in a storage-area network ("SAN") familiar to those skilled in the art. (Likewise, any necessary files for performing the functions attributed to the computers 605, 615 can be stored locally on the respective computer and/or remotely, as appropriate.) In one set of embodiments, the database 620 can be a relational database, such as an Oracle database, that is adapted to store, update, and retrieve data in response to SQL-formatted commands. The database might be controlled and/or maintained by a database server, as described above, for example.

[0114] According to some embodiments, system 600 may further comprise computing system 625 and corresponding database(s) 650 (similar to computing systems 105, 105a, and 105b and corresponding database(s) 150a and 150b of Fig. 1, or the like). Computing system 625 may comprise three-dimensional ("3D") launcher 630 (similar to 3D launcher 110 of Figs. 1 and 2, or the like), which may include application icon manager 635 (similar to application icon manager 115 of Figs. 1 and 2, or the like) and renderer 640 (similar to renderer 120 of Figs. 1 and 2, or the like), or the like, and one or more central processing units and/or graphics processing units ("CPUs/GPUs") 645a-645n (similar to CPUs/GPUs 125a-125n of Fig. 1, or the like). System 600 may further comprise system composer 655 (similar to system composers 140, 140a, and 140b of Figs. 1 and 2, or the like), and package management

Meta Platforms, Inc. - Ex. 1002
Page 103

service 660 (similar to package management services 145, 145a, and 145b of Figs. 1 and 2, or the like) and corresponding database(s) 665 (similar to database(s) 170 of Fig. 1, or the like).

[0115] In operation, computing system 625 (also referred to simply as "computing system" or the like) may receive, via a package management service (e.g., package management service 660, or the like), a first application package (e.g., application package 670, or the like) associated with a first application. The computing system may determine whether the first application package comprises a 3D profile of a first application icon associated with the first application. Based on a determination that the first application package comprises a 3D profile of the first application icon, the computing system may load a set of a 3D mesh and a 3D texture, based on the 3D profile of the first application icon. Based on a determination that the first application package does not contain a 3D profile of the first application icon, the computing system may load a set of a default 3D mesh and a default application icon of the first application as texture data. The computing system may render the first application icon as a 3D first application icon (e.g., as rendered image(s) 680, or the like), based at least in part on one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon (collectively, "application icon information 675" or the like). The computing system may cause the 3D first application icon to be displayed on a user interface that is displayed within a display screen of a user device.

[0116] In some embodiments, the application icon manager (e.g., app icon manager 635, or the like) may receive the first application package, may determine whether the first application package comprises the 3D profile of the first application icon, and may load the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon to the renderer. In some instances, the renderer may render the first application icon as a 3D first application icon.

[0117] According to some embodiments, the renderer (e.g., renderer 640, or the like) of the computing system may load global render information, the global render information comprising at least one of scene camera pose, lighting condition, or zoom level, and/or the like. In such cases, rendering the first application icon as a 3D first application icon may comprise the renderer of the computing system rendering the first application icon as a 3D first application icon, based at least in part on the loaded global render information and based at least in part on the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon.

[0118] Alternatively, or additionally, a user input processor of the application icon manager may receive one or more user inputs, the one or more user inputs comprising at least

Meta Platforms, Inc. - Ex. 1002
Page 104

one of one or more selection inputs, one or more translation inputs, one or more rotation inputs, one or more tilt inputs, one or more zoom inputs, one or more swipe inputs, one or more dragging inputs, one or more gesture inputs, one or more tracing inputs, one or more camera translation inputs, one or more rotation inputs, one or more accelerometer inputs, or one or more gyroscope inputs, and/or the like. In such cases, rendering the first application icon as a 3D first application icon may comprise the renderer of the computing system rendering the first application icon as a 3D first application icon, based at least in part on the received one or more user inputs and based at least in part on the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon.

[0119] In some embodiments, the 3D profile of the first application icon may further comprise an icon render frequency property based at least in part on different priorities that are based at least in part on one or more conditions. In some cases, the one or more conditions may comprise at least one of power consumption level or level of performance tradeoff, and/or the like. In some instances, the icon render frequency property may comprise one of a static icon, a low frequency rendering icon, a medium frequency rendering icon, or a high frequency rendering icon, and/or the like. The application icon manager of the computing system may determine a rendering frequency of the 3D first application icon based at least in part on the icon render frequency property in the 3D profile of the first application icon and based at least in part on the at least one of power consumption level or level of performance tradeoff. In such cases, rendering the first application icon as a 3D first application icon may comprise the renderer of the computing system controlling one or more rendering threads for rendering the first application icon as the 3D first application icon based on the determined rendering frequency of the 3D first application icon.

[0120] According to some embodiments, the first application icon may be part of a group of application icons. The application icon manager of the computing system may generate a group of 3D-arranged application icons based on the group of application icons. The renderer of the computing system may render the generated group of 3D-arranged application icons. The computing system may cause the rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

[0121] In some cases, the 3D-arranged application icons may comprise one of a group of cascaded 3D application icons with overlapping two or more of the group of application icons in a cascade arrangement or a group of layered 3D application icons with two or more layers of the group of application icons in a layered arrangement. In some embodiments, the application icon manager of the computing system may determine an order of the icons within

Meta Platforms, Inc. - Ex. 1002
Page 105

the group of 3D-arranged application icons based at least in part on one or more of most recent use, existence of new notifications, number of new notifications, or user input to reorder the icons, and/or the like. The application icon manager of the computing system may autonomously reorder the icons within the group of 3D-arranged application icons based on the determination. The renderer of the computing system may re-render the group of 3D-arranged application icons based on the reordered icons within the group of 3D-arranged application icons. The computing system may cause the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

[0122] Alternatively, or additionally, the application icon manager of the computing system may determine one or more animations associated with one or more of the group of 3D-arranged application icons. In some cases, the one or more animations may comprise at least one of rotation, translation, tilting, resizing, transformation, or customized icon behaviors, and/or the like. The renderer of the computing system may re-render the group of 3D-arranged application icons based on the determined one or more animations associated with one or more of the group of 3D-arranged application icons. The computing system may cause the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

[0123] Alternatively, or additionally, a user input processor of the application icon manager may receive one or more navigation user inputs, the one or more navigation user inputs comprising at least one of depth of field navigation inputs, perspective change inputs, orientation change inputs, reordering inputs, sorting inputs, rotation inputs, tilt inputs translation inputs, swiping inputs, dragging inputs, information request inputs, opening inputs, closing inputs, or selection inputs relative to the group of 3D-arranged application icons, and/or the like. The renderer of the computing system may re-render the group of 3D-arranged application icons based on the received one or more navigation user inputs. The computing system may cause the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

[0124] In some embodiments, a user input processor of the application icon manager may receive an application launch request input from a user to launch the first application. The application icon manager of the computing system may determine whether the application launch request input corresponds to a successful selection of the first application icon for launching the first application based on at least one of raytracing, collision determination, or intercept calculation, and/or the like, of the application launch request input relative to the

Meta Platforms, Inc. - Ex. 1002
Page 106

first application icon within the user interface displayed within the display screen of the user device. Based on a determination that the application launch request input corresponds to a successful selection of the first application icon for launching the first application, the computing system may initiate launch of the first application. Based on a determination that the application launch request input corresponds to a failed attempt at selection of the first application icon for launching the first application, the computing system may prevent launch of the first application.

[0125] These and other functions of the system 600 (and its components) are described in greater detail above with respect to Figs. 1-4.

[0126] While particular features and aspects have been described with respect to some embodiments, one skilled in the art will recognize that numerous modifications are possible. For example, the methods and processes described herein may be implemented using hardware components, software components, and/or any combination thereof. Further, while various methods and processes described herein may be described with respect to particular structural and/or functional components for ease of description, methods provided by various embodiments are not limited to any particular structural and/or functional architecture but instead can be implemented on any suitable hardware, firmware and/or software configuration. Similarly, while particular functionality is ascribed to particular system components, unless the context dictates otherwise, this functionality need not be limited to such and can be distributed among various other system components in accordance with the several embodiments.

[0127] Moreover, while the procedures of the methods and processes described herein are described in a particular order for ease of description, unless the context dictates otherwise, various procedures may be reordered, added, and/or omitted in accordance with various embodiments. Moreover, the procedures described with respect to one method or process may be incorporated within other described methods or processes; likewise, system components described according to a particular structural architecture and/or with respect to one system may be organized in alternative structural architectures and/or incorporated within other described systems. Hence, while various embodiments are described with—or without—particular features for ease of description and to illustrate some aspects of those embodiments, the various components and/or features described herein with respect to a particular embodiment can be substituted, added and/or subtracted from among other described embodiments, unless the context dictates otherwise. Consequently, although

Meta Platforms, Inc. - Ex. 1002
Page 107

several embodiments are described above, it will be appreciated that the invention is intended to cover all modifications and equivalents within the scope of the following claims.

Meta Platforms, Inc. - Ex. 1002
Page 108

WHAT IS CLAIMED IS:

1. A method, comprising:

receiving, using a computing system and via a package management service ("PMS"), a first application package associated with a first application;

based on a determination that the first application package comprises a three dimensional ("3D") profile of a first application icon associated with the first application,

loading, using the computing system, a set of a 3D mesh and a 3D texture, based on the 3D profile of the first application icon; and

rendering, using the computing system, the first application icon as a 3D first application icon, based at least in part on the set of the 3D mesh and the 3D texture; and

causing, using the computing system, the 3D first application icon to be displayed on a user interface that is displayed within a display screen of a user device.

2. The method of claim 1, further comprising:

based on a determination that the first application package does not contain a 3D profile of the first application icon,

loading, using the computing system, a set of a default 3D mesh and a default application icon of the first application as texture data; and

rendering, using the computing system, the first application icon as a 3D first application icon, based at least in part on the set of the default 3D mesh and the default application icon.

3. The method of claim 1 or 2, wherein the computing system comprises at least one of a 3D launcher, a machine learning system, an artificial intelligence ("AI") system, a deep learning system, a neural network, a processor on the user device, one or more graphics processing units ("GPUs"), a server computer over a network, a cloud computing system, or a distributed computing system.

4. The method of any of claims 1-3, wherein the computing system comprises an application icon manager and a renderer, wherein the application icon manager receives the first application package, determines whether the first application package comprises the 3D

Meta Platforms, Inc. - Ex. 1002
Page 109

profile of the first application icon, and loads the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon to the renderer, wherein the renderer renders the first application icon as a 3D first application icon.

5. The method of any of claims 1-4, further comprising:

loading, using the renderer of the computing system, global render information, the global render information comprising at least one of scene camera pose, lighting condition, or zoom level;

wherein rendering the first application icon as a 3D first application icon comprises rendering, using the renderer of the computing system, the first application icon as a 3D first application icon, based at least in part on the loaded global render information and based at least in part on the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon.

6. The method of any of claims 1-5, further comprising:

receiving, using a user input processor of an application icon manager of the computing system, one or more user inputs, the one or more user inputs comprising at least one of one or more selection inputs, one or more translation inputs, one or more rotation inputs, one or more tilt inputs, one or more zoom inputs, one or more swipe inputs, one or more dragging inputs, one or more gesture inputs, one or more tracing inputs, one or more camera translation inputs, one or more rotation inputs, one or more accelerometer inputs, or one or more gyroscope inputs;

wherein rendering the first application icon as a 3D first application icon comprises rendering, using the renderer of the computing system, the first application icon as a 3D first application icon, based at least in part on the received one or more user inputs and based at least in part on the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon.

7. The method of any of claims 1-6, wherein the 3D profile of the first application icon further comprises an icon render frequency property based at least in part on different priorities that are based at least in part on one or more conditions, wherein the one or more conditions comprise at least one of power consumption level or level of performance tradeoff, wherein the icon render frequency property comprises one of a static icon, a low frequency

Meta Platforms, Inc. - Ex. 1002
Page 110

rendering icon, a medium frequency rendering icon, or a high frequency rendering icon, wherein the method further comprises:

determining, using the application icon manager of the computing system, a rendering frequency of the 3D first application icon based at least in part on the icon render frequency property in the 3D profile of the first application icon and based at least in part on the at least one of power consumption level or level of performance tradeoff;

wherein rendering the first application icon as a 3D first application icon comprises controlling, using the renderer of the computing system, one or more rendering threads for rendering the first application icon as the 3D first application icon based on the determined rendering frequency of the 3D first application icon.

8. The method of any of claims 1-7, wherein the first application icon is part of a group of application icons, wherein the method further comprises:

generating, using the application icon manager of the computing system, a group of 3D-arranged application icons based on the group of application icons;

rendering, using the renderer of the computing system, the generated group of 3D-arranged application icons; and

causing, using the computing system, the rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

9. The method of claim 8, wherein the 3D-arranged application icons comprise one of a group of cascaded 3D application icons with overlapping two or more of the group of application icons in a cascade arrangement or a group of layered 3D application icons with two or more layers of the group of application icons in a layered arrangement.

10. The method of claim 8, further comprising:

determining, using the application icon manager of the computing system, an order of the icons within the group of 3D-arranged application icons based at least in part on one or more of most recent use, existence of new notifications, number of new notifications, or user input to reorder the icons;

Meta Platforms, Inc. - Ex. 1002
Page 111

autonomously reordering, using the application icon manager of the computing system, the icons within the group of 3D-arranged application icons based on the determination;

re-rendering, using the renderer of the computing system, the group of 3D-arranged application icons based on the reordered icons within the group of 3D-arranged application icons; and

causing, using the computing system, the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

11. The method of claim 8, further comprising:

determining, using the application icon manager of the computing system, one or more animations associated with one or more of the group of 3D-arranged application icons, wherein the one or more animations comprise at least one of rotation, translation, tilting, resizing, transformation, or customized icon behaviors;

re-rendering, using the renderer of the computing system, the group of 3D-arranged application icons based on the determined one or more animations associated with one or more of the group of 3D-arranged application icons; and

causing, using the computing system, the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

12. The method of claim 8, further comprising:

receiving, using a user input processor of the application icon manager, one or more navigation user inputs, the one or more navigation user inputs comprising at least one of depth of field navigation inputs, perspective change inputs, orientation change inputs, reordering inputs, sorting inputs, rotation inputs, tilt inputs translation inputs, swiping inputs, dragging inputs, information request inputs, opening inputs, closing inputs, or selection inputs relative to the group of 3D-arranged application icons;

re-rendering, using the renderer of the computing system, the group of 3D-arranged application icons based on the received one or more navigation user inputs; and

Meta Platforms, Inc. - Ex. 1002
Page 112

causing, using the computing system, the re-rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

13. The method of any of claims 1-12, further comprising:

receiving, using a user input processor of the application icon manager, an application launch request input from a user to launch the first application;

determining, using the application icon manager of the computing system, whether the application launch request input corresponds to a successful selection of the first application icon for launching the first application based on at least one of raytracing, collision determination, or intercept calculation of the application launch request input relative to the first application icon within the user interface displayed within the display screen of the user device;

based on a determination that the application launch request input corresponds to a successful selection of the first application icon for launching the first application, initiating, using the computing system, launch of the first application; and

based on a determination that the application launch request input corresponds to a failed attempt at selection of the first application icon for launching the first application, preventing, using the computing system, launch of the first application.

14. An apparatus, comprising:

at least one processor; and

a non-transitory computer readable medium communicatively coupled to the at least one processor, the non-transitory computer readable medium having stored thereon computer software comprising a set of instructions that, when executed by the at least one processor, causes the apparatus to:

receive, via a package management service ("PMS"), a first application package associated with a first application;

based on a determination that the first application package comprises a three dimensional ("3D") profile of a first application icon associated with the first application,

load a set of a 3D mesh and a 3D texture, based on the 3D profile of the first application icon; and

render the first application icon as a 3D first application icon, based at least in part on the set of the 3D mesh and the 3D texture; and

cause the 3D first application icon to be displayed on a user interface that is displayed within a display screen of a user device.

15. The apparatus of claim 14, wherein the apparatus comprises at least one of a 3D launcher, a machine learning system, an artificial intelligence ("AI") system, a deep learning system, a neural network, a processor on the user device, one or more graphics processing units ("GPUs"), a server computer over a network, a cloud computing system, or a distributed computing system.

16. The apparatus of claim 14 or 15, wherein the apparatus comprises an application icon manager and a renderer, wherein the application icon manager receives the first application package, determines whether the first application package comprises the 3D profile of the first application icon, and loads the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon to the renderer, wherein the renderer renders the first application icon as a 3D first application icon.

17. A system, comprising:

a computing system, comprising:

an application icon manager;

a renderer;

at least one first processor; and

a first non-transitory computer readable medium communicatively coupled to the at least one first processor, the first non-transitory computer readable medium having stored thereon computer software comprising a first set of instructions that, when executed by the at least one first processor, causes the computing system to:

receive, using the application icon manager and via a package management service ("PMS"), a first application package associated with a first application;

based on a determination that the first application package comprises a three dimensional ("3D") profile of a first application icon associated with the first application,

load a set of a 3D mesh and a 3D texture, based on the 3D profile of the first application icon; and

render, using the renderer, the first application icon as a 3D first application icon, based at least in part on the set of the 3D mesh and the 3D texture; and

cause the 3D first application icon to be displayed on a user interface that is displayed within a display screen of a user device.

18. The system of claim 17, wherein the first set of instructions, when executed by the at least one first processor, further causes the computing system to:

based on a determination that the first application package does not contain a 3D profile of the first application icon,

load a set of a default 3D mesh and a default application icon of the first application as texture data; and

render, using the renderer, the first application icon as a 3D first application icon, based at least in part on the set of the default 3D mesh and the default application icon.

19. The system of claim 17 or 18, wherein the computing system comprises at least one of a 3D launcher, a machine learning system, an artificial intelligence ("AI") system, a deep learning system, a neural network, a processor on the user device, one or more graphics processing units ("GPUs"), a server computer over a network, a cloud computing system, or a distributed computing system.

20. The system of any of claims 17-19, wherein the first set of instructions, when executed by the at least one first processor, further causes the computing system to:

receive, using a user input processor of the application icon manager, one or more user inputs, the one or more user inputs comprising at least one of one or more selection inputs, one or more translation inputs, one or more rotation inputs, one or more tilt inputs, one or more zoom inputs, one or more swipe inputs, one or more dragging inputs, one or more gesture inputs, one or more tracing inputs, one or more camera translation inputs, one or more rotation inputs, one or more accelerometer inputs, or one or more gyroscope inputs;

wherein rendering the first application icon as a 3D first application icon comprises rendering the first application icon as a 3D first application icon, based at least in part on the received one or more user inputs and based at least in part on the one of the set of the 3D mesh and the 3D texture or the set of the default 3D mesh and the default application icon.

21. The system of any of claims 17-20, wherein the first application icon is part of a group of application icons, wherein the first set of instructions, when executed by the at least one first processor, further causes the computing system to:

generate, using the application icon manager, a group of 3D-arranged application icons;

render, using the renderer, the generated group of 3D-arranged application icons; and

cause, using the computing system, the rendered group of 3D-arranged application icons to be displayed on the user interface that is displayed within the display screen of the user device.

22. The system of claim 21, wherein the 3D-arranged application icons comprise one of a group of cascaded 3D application icons with overlapping two or more of the group of application icons in a cascade arrangement or a group of layered 3D application icons with two or more layers of the group of application icons in a layered arrangement

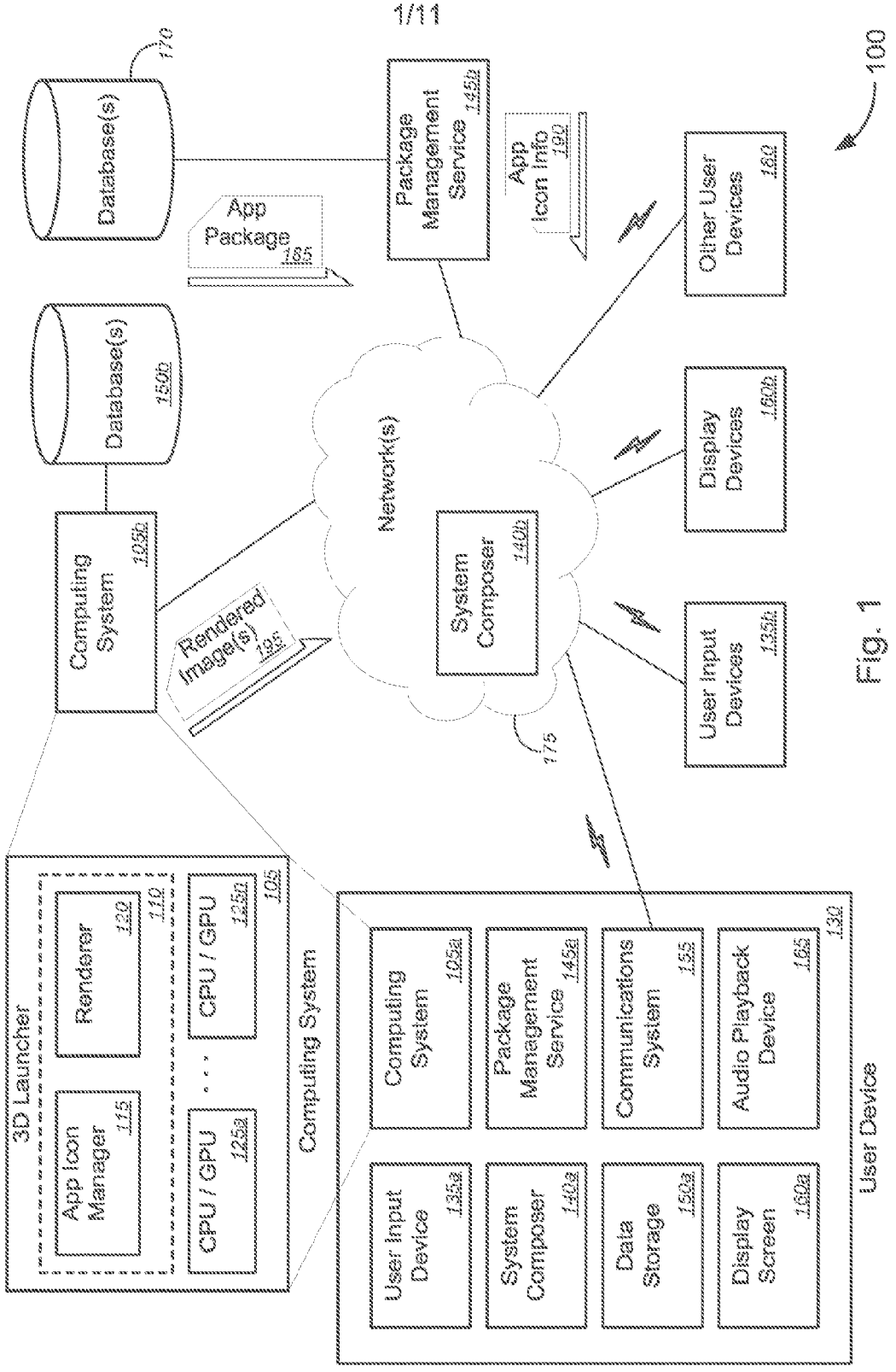

100
Database(s)
170
App Package
185
Package Management Service
145b
App Icon Info
190
Other User Devices
180
Database(s)
150b
Network(s)
Display Devices
160b
Computing System
105b
Rendered Image(s)
195
System Composer
140b
User Input Devices
135b
175
3D Launcher
App Icon Manager
115
Renderer
120
110
CPU / GPU
125a
CPU / GPU
125b
105
Computing System
Computing System
105a
Package Management Service
145a
Communications System
155
Audio Playback Device
165
130
User Input Device
135a
System Composer
140a
Data Storage
150a
Display Screen
160a
User Device

Fig. 1

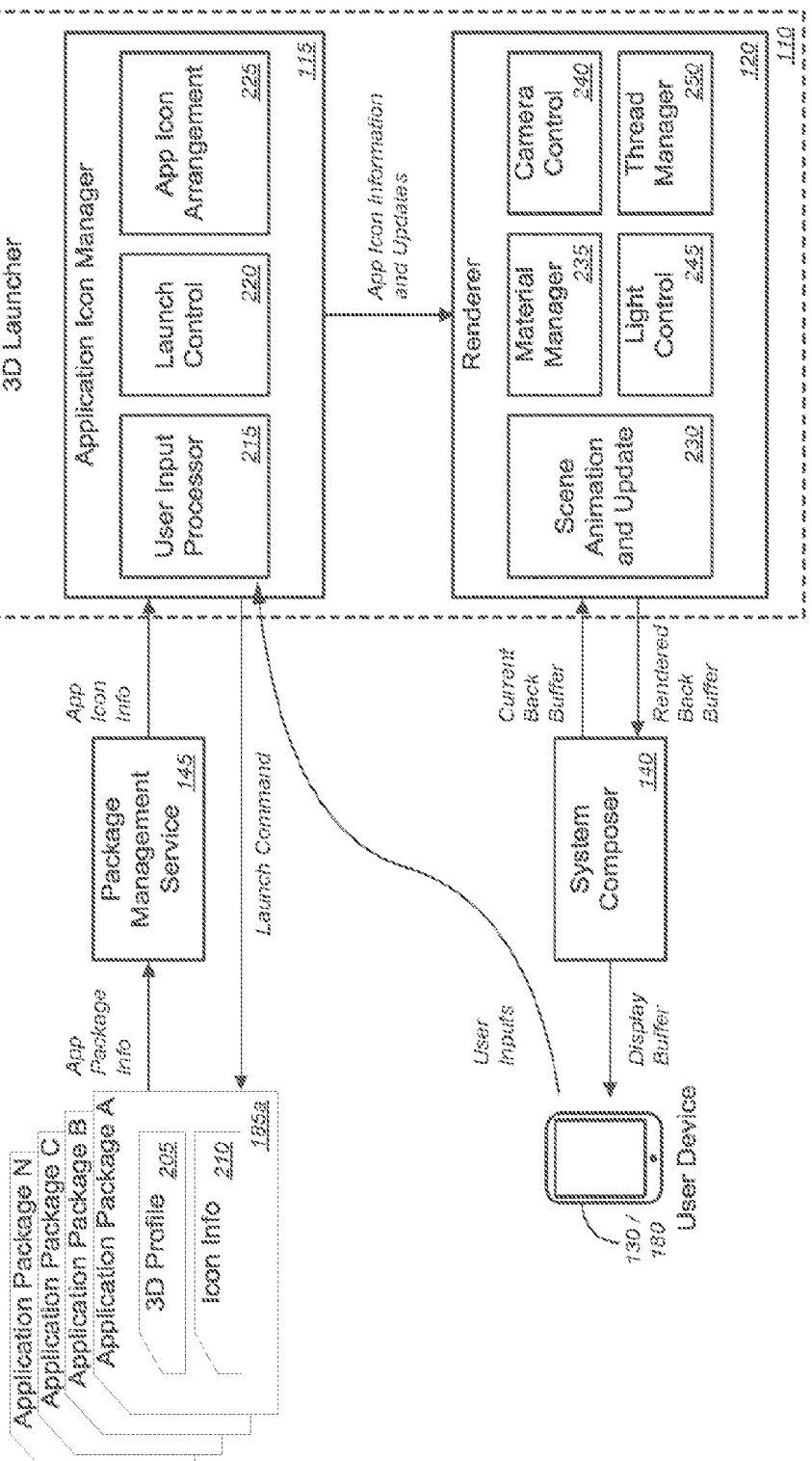

3D Launcher
110
Application Icon Manager
115
User Input Processor
215
Launch Control
220
App Icon Arrangement
225
App Icon Information and Updates
Renderer
120
Scene Animation and Update
230
Material Manager
235
Light Control
245
Camera Control
240
Thread Manager
250
App Icon Info
Package Management Service
145
Launch Command
Current Back Buffer
Rendered Back Buffer
System Composer
140
App Package Info
User Inputs
Display Buffer
Application Package N
Application Package C
Application Package B
Application Package A
3D Profile
205
Icon Info
210
195a
130 / 180
User Device
200

Fig. 2

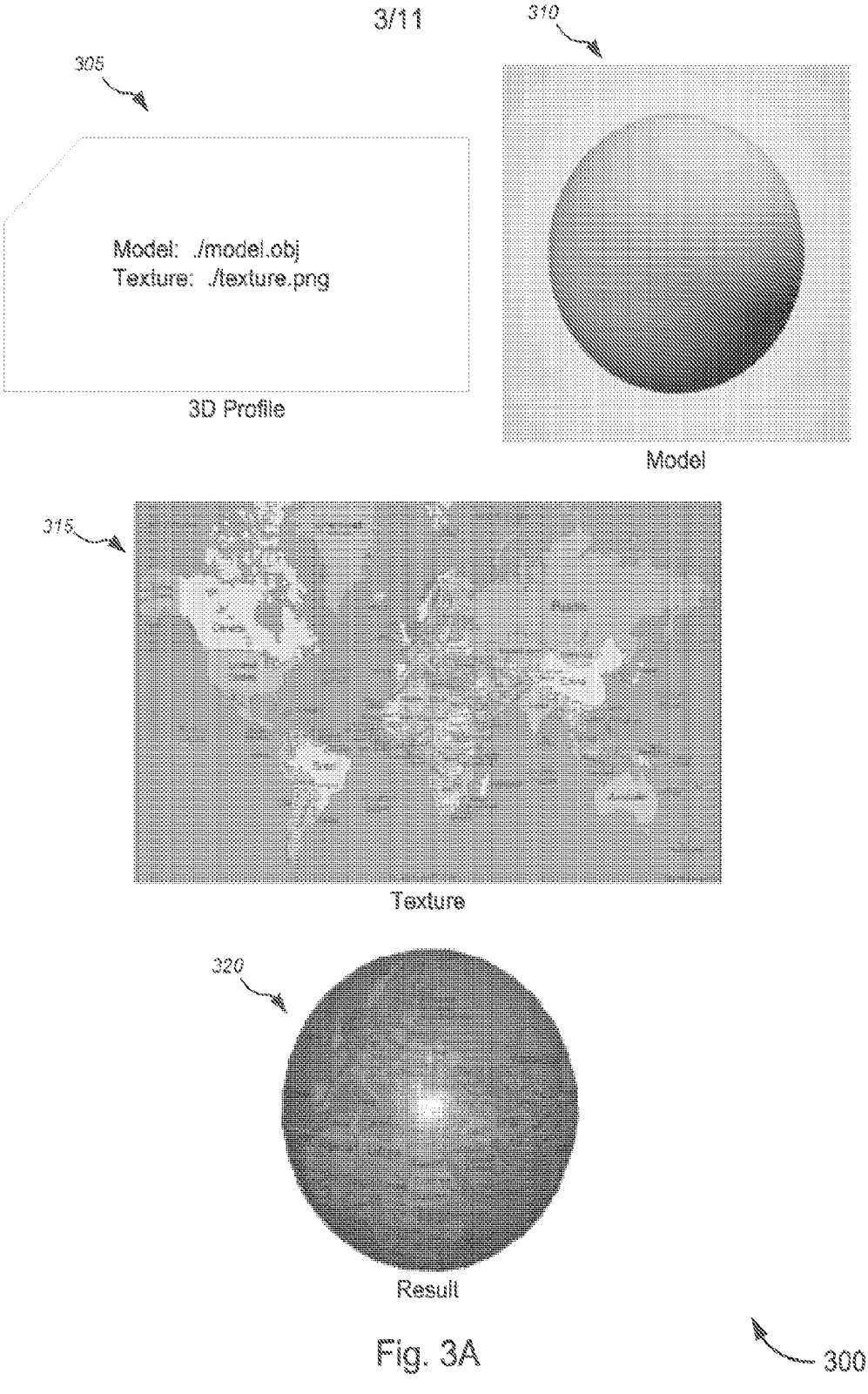
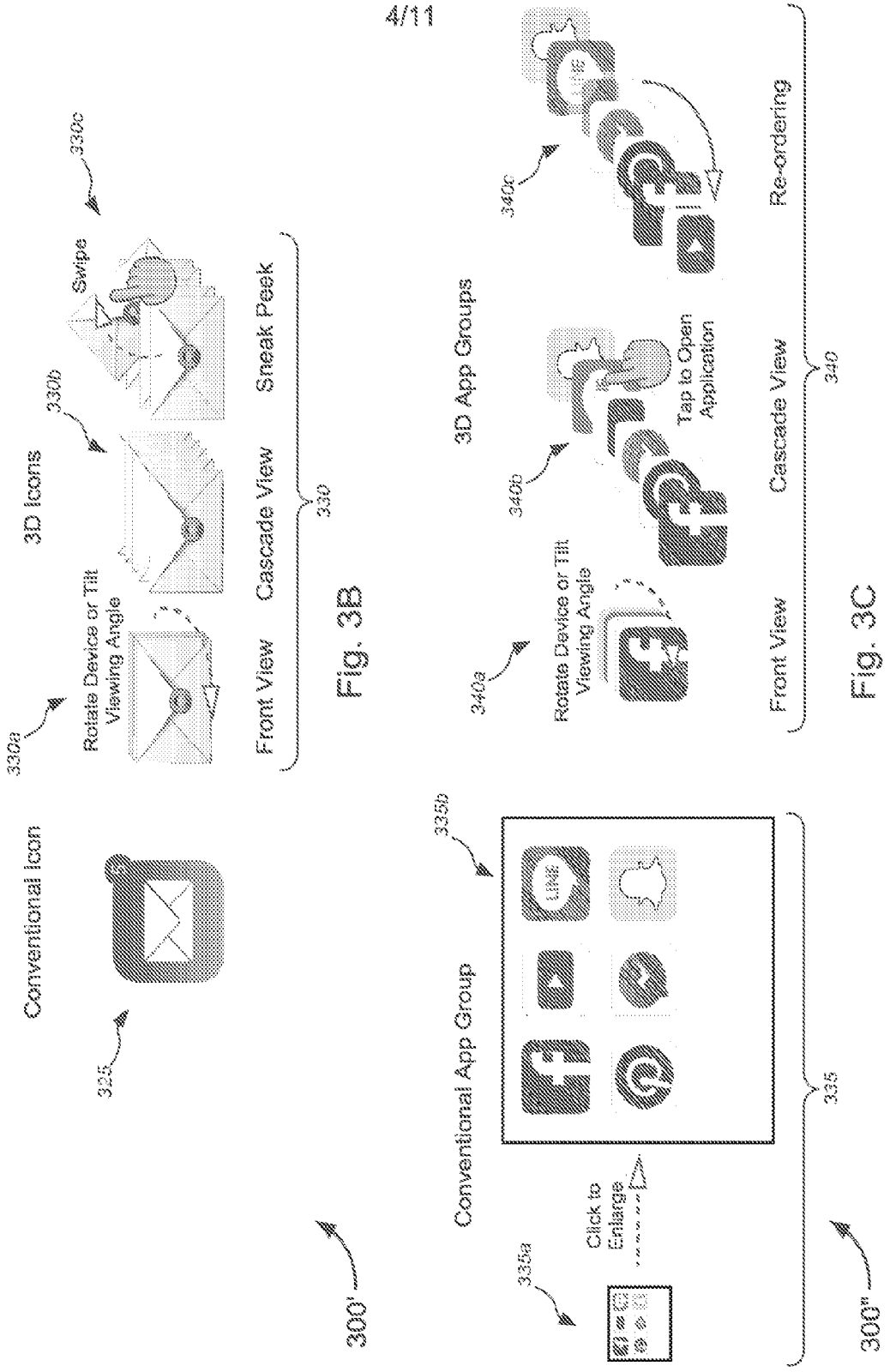

305
Model: ./model.obj
Texture: ./texture.png
3D Profile
310
Model
315
Texture
320
Result
300

Fig. 3A


Conventional Icon
3D Icons
330a
330b
330c
Rotate Device or Tilt Viewing Angle
Swipe
325
Front View
Cascade View
Sneak Peek
330
300'
Fig. 3B
3D App Groups
340a
340b
340c
Rotate Device or Tilt Viewing Angle
Tap to Open Application
Front View
Cascade View
Re-ordering
340
Fig. 3C
Conventional App Group
335b
335a
Click to Enlarge
335
300"

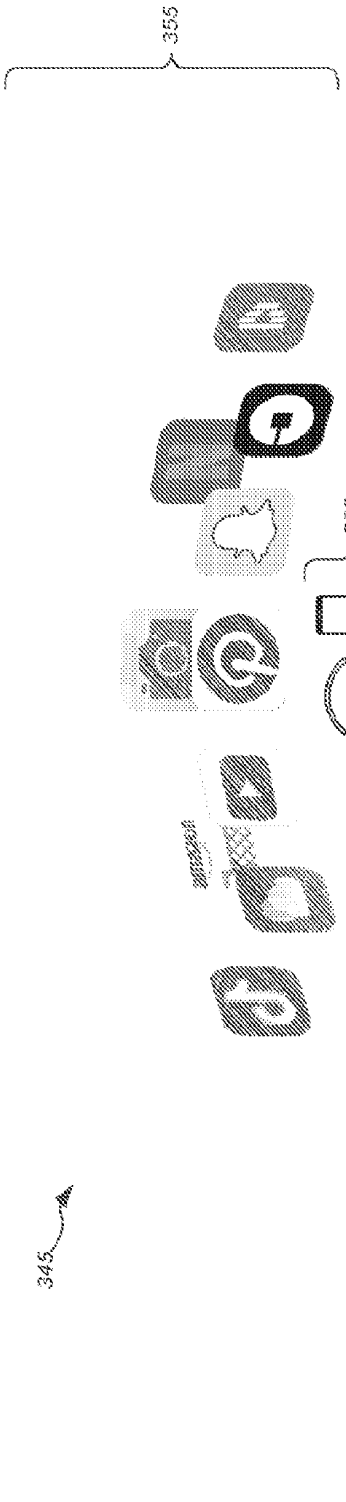


Fig. 3D

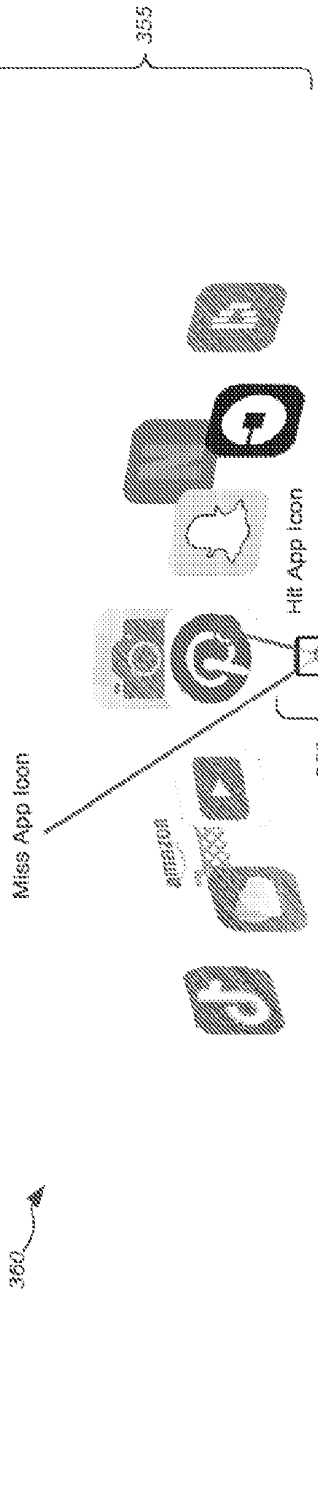


Fig. 3E

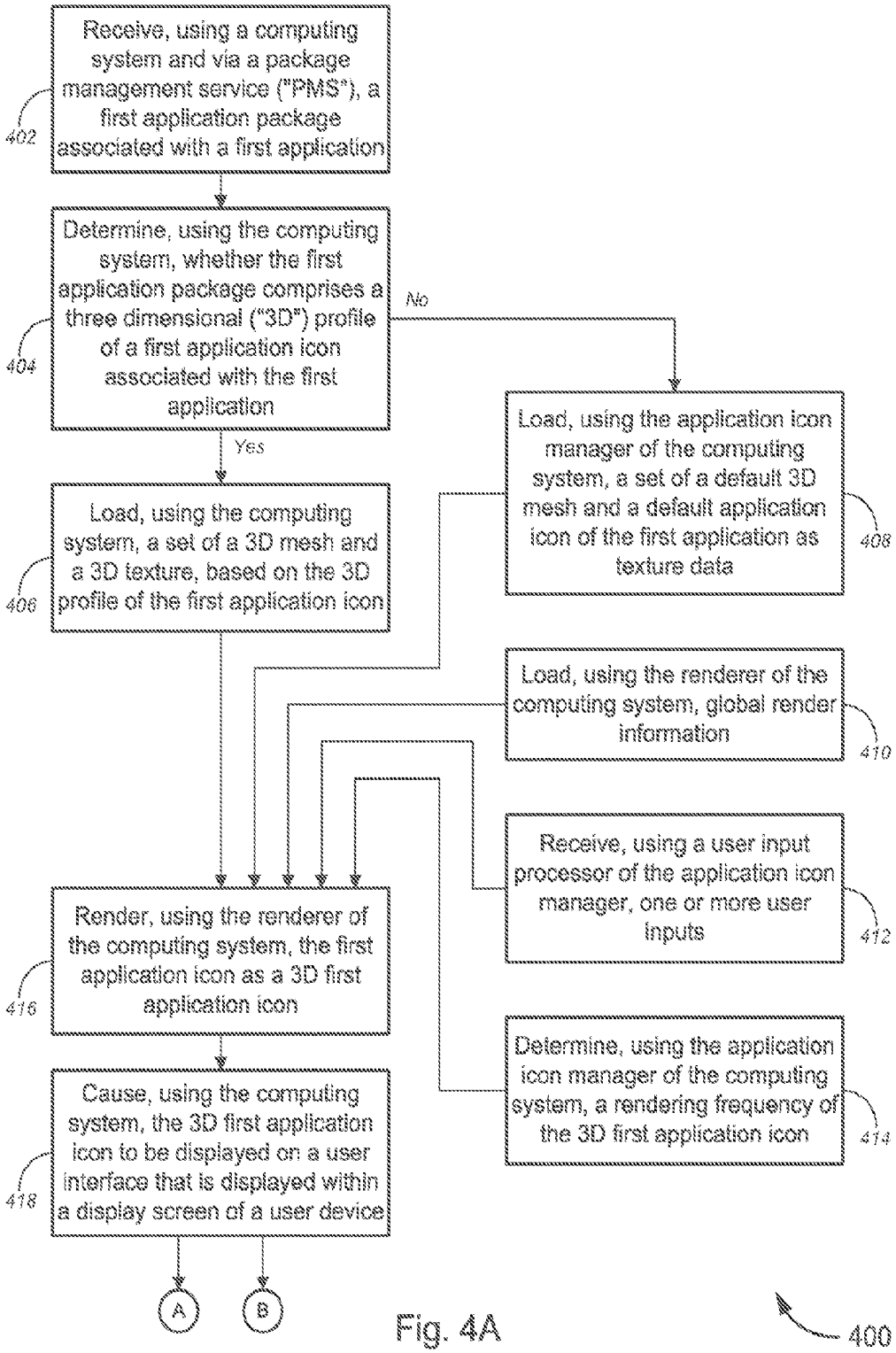
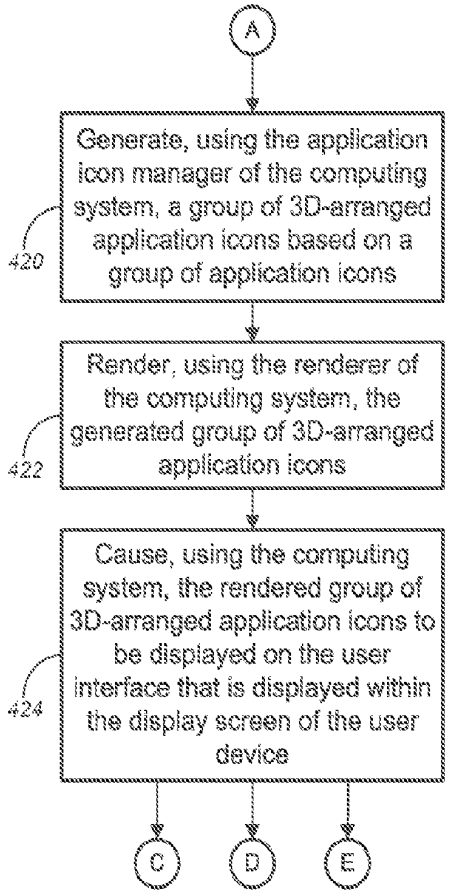
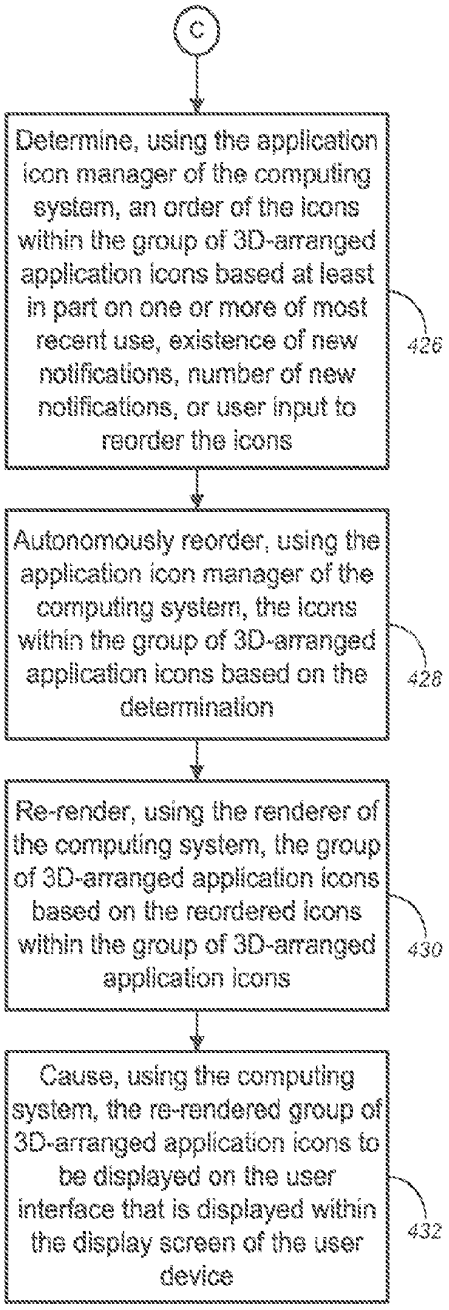

Receive, using a computing system and via a package management service ("PMS"), a first application package associated with a first application
402
Determine, using the computing system, whether the first application package comprises a three dimensional ("3D") profile of a first application icon associated with the first application
404
No
Yes
Load, using the computing system, a set of a 3D mesh and a 3D texture, based on the 3D profile of the first application icon
406
Load, using the application icon manager of the computing system, a set of a default 3D mesh and a default application icon of the first application as texture data
408
Load, using the renderer of the computing system, global render information
410
Receive, using a user input processor of the application icon manager, one or more user inputs
412
Determine, using the application icon manager of the computing system, a rendering frequency of the 3D first application icon
414
Render, using the renderer of the computing system, the first application icon as a 3D first application icon
416
Cause, using the computing system, the 3D first application icon to be displayed on a user interface that is displayed within a display screen of a user device
418
A
B
400

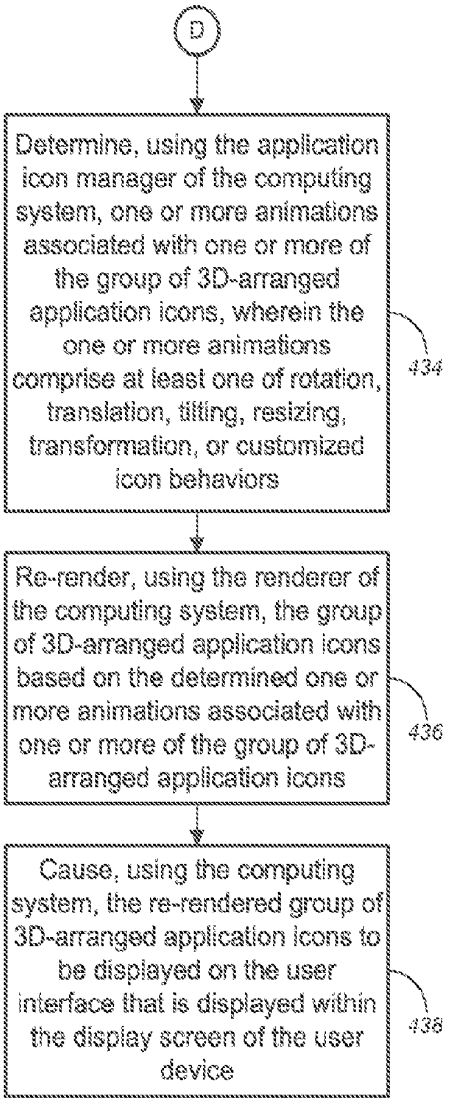
Fig. 4A



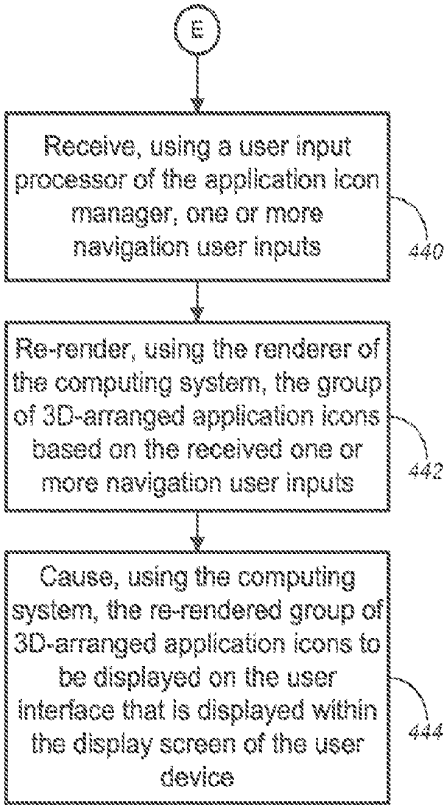
400 Fig. 4B



400 Fig. 4C



400 Fig. 4D



400 Fig. 4E

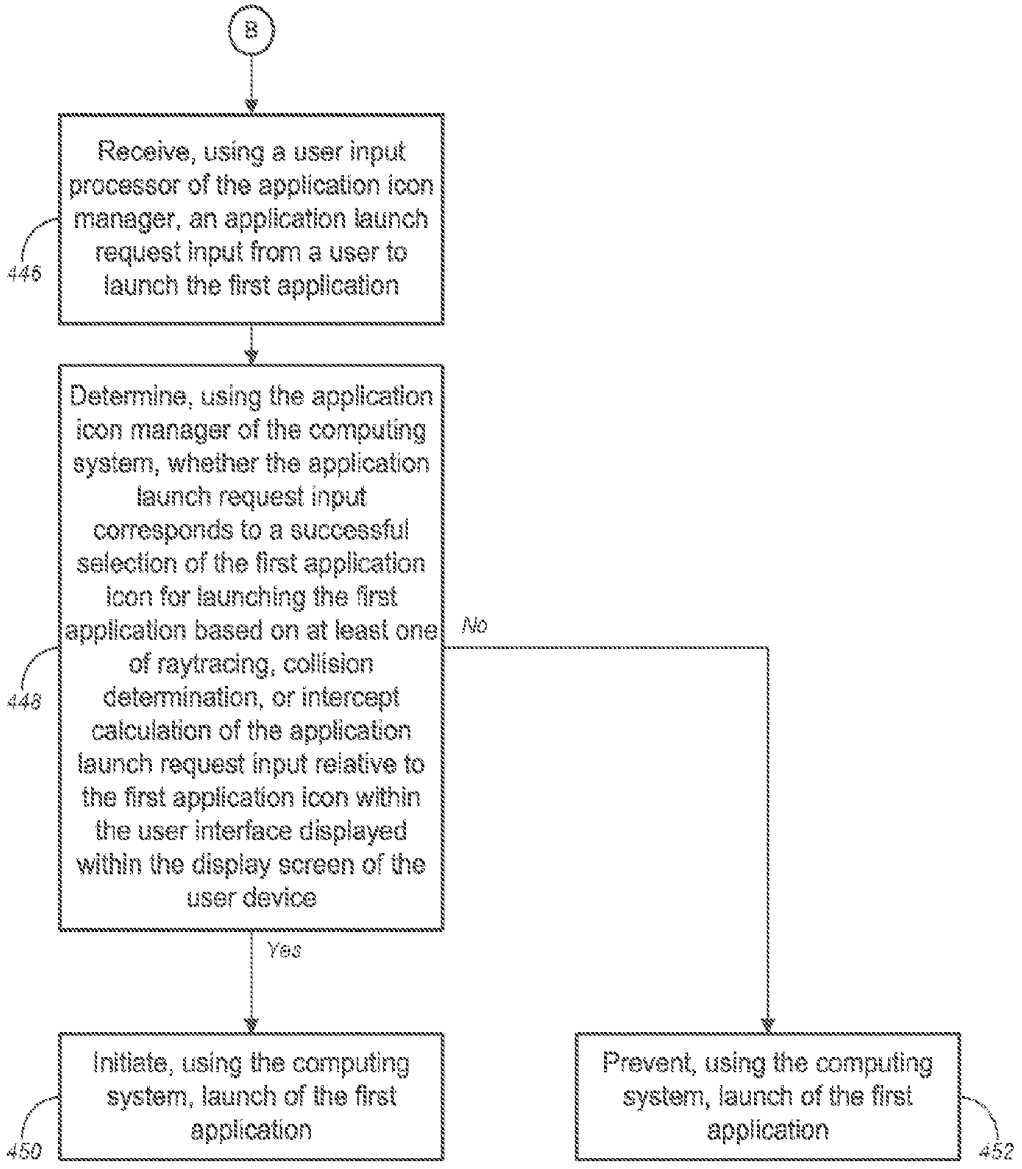

B
Receive, using a user input processor of the application icon manager, an application launch request input from a user to launch the first application
446
Determine, using the application icon manager of the computing system, whether the application launch request input corresponds to a successful selection of the first application icon for launching the first application based on at least one of raytracing, collision determination, or intercept calculation of the application launch request input relative to the first application icon within the user interface displayed within the display screen of the user device
448
No
Yes
Initiate, using the computing system, launch of the first application
450
Prevent, using the computing system, launch of the first application
452

Fig. 4F

400

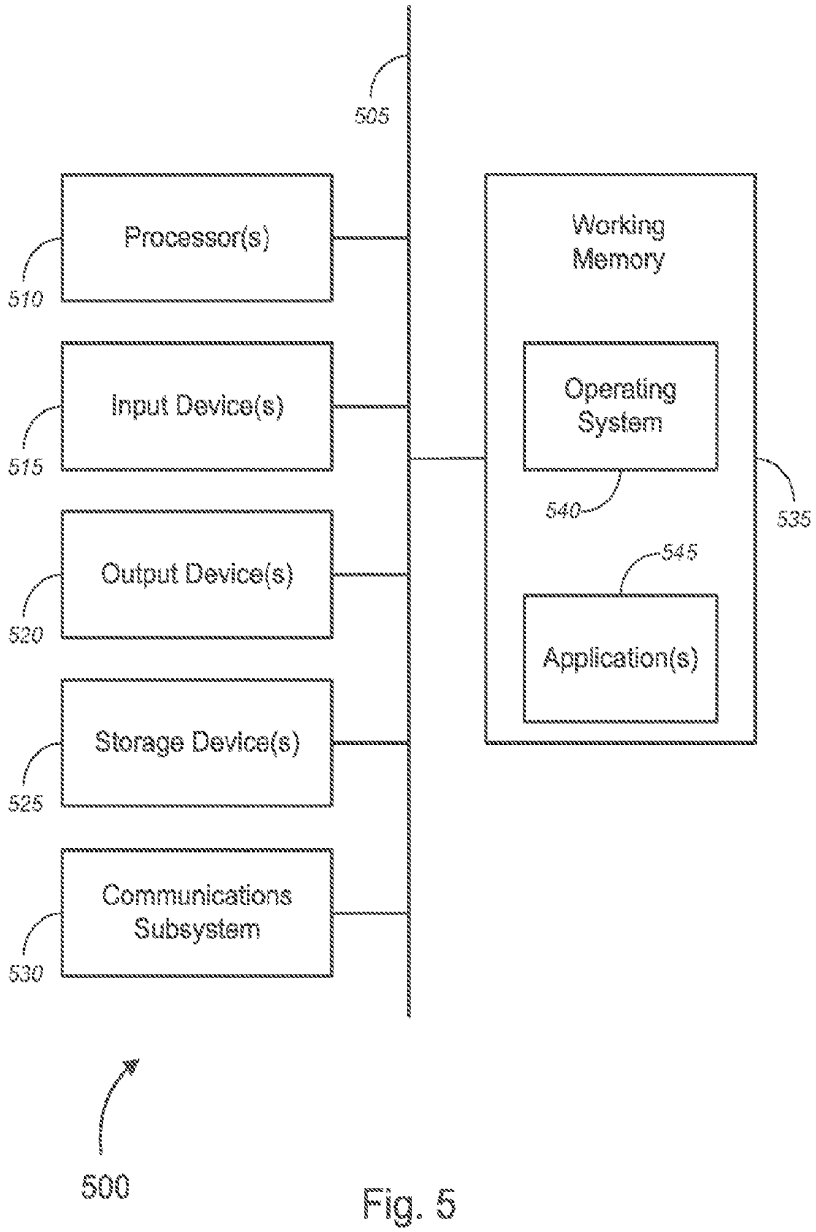

505
Processor(s)
510
Input Device(s)
515
Output Device(s)
520
Storage Device(s)
525
Communications Subsystem
530
Working Memory
Operating System
540
535
545
Application(s)
500

Fig. 5

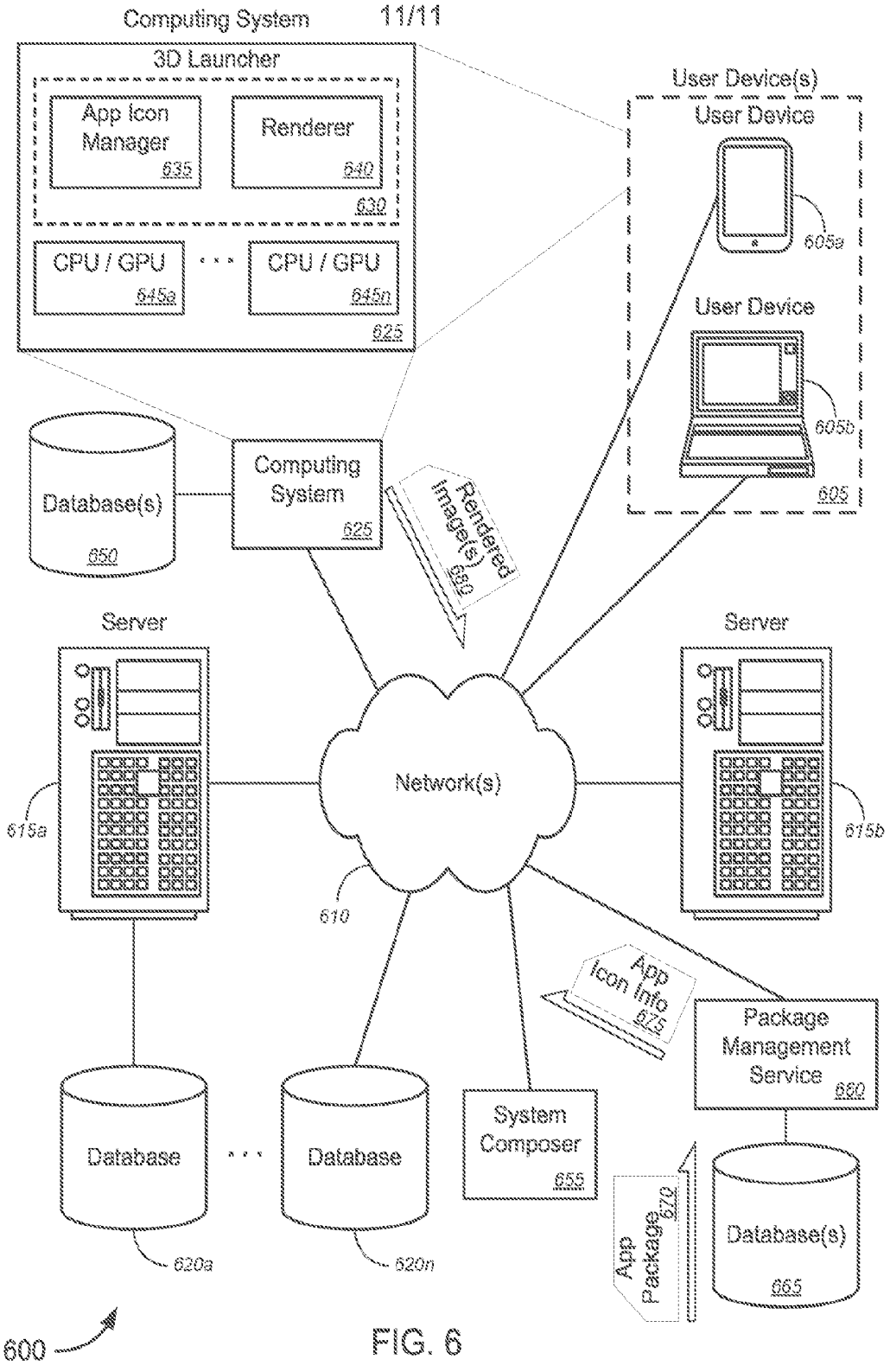

Computing System
11/11
3D Launcher
App Icon Manager
635
Renderer
640
630
CPU / GPU
645a
CPU / GPU
645n
625
User Device(s)
User Device
605a
User Device
605b
605
Database(s)
650
Computing System
625
Rendered Image(s)
680
Server
Server
Network(s)
615a
615b
610
App Icon Info
675
Package Management Service
660
Database
Database
620a
620n
System Composer
655
App Package
670
Database(s)
665
600

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 21/54836

A. CLASSIFICATION OF SUBJECT MATTER

IPC - G06T 15/00 (2021.01)

CPC - G06T 19/00, G06T 17/20, G06T 17/00, G06T 15/10, G06T 15/00, G06T 15/04, G06T 11/001, G06T 15/005, G06T 1/60, G09G 5/363, G09G 5/14, G09G 2340/10, G09G 2340/125, G06T 11/60, G06T 15/503

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)
See Search History document

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2019/0273707 A1 (Deac) 05 September 2019 (05.09.2019), entire document especially Fig. 9, 11C, 12A; para [0018], [0070], [0092], [0114]-[0124], [0139]-[0141], [0152], [0224], [0297], [0316], [0318], [0334], [0336]	1-3, 14-19
Y	US 2009/0213121 A1 (Lee et al.) 27 August 2009 (27.08.2009), entire document especially abstract; Fig. 3; para [0034], [0049]	1-3, 14-19
A	US 2017/0220226 A1 (Visual Supply Company) 03 August 2017 (03.08.2017), entire document	1-3, 14-19

☐ 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
"D" document cited by the applicant in the international application
"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	Date of mailing of the international search report
15 December 2021 (15.12.2021)	JAN 24 2022
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer Kari Rodriquez Telephone No. PCT Helpdesk: 571-272-4300

Form PCT/ISA/210 (second sheet) (July 2019)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 21/54836

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.: 4-13, 20-22
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:

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 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.

Search Strategy from ProQuest

July 20 2022 12:29

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SEARCH STRATEGY

Set No.	Searched for	Databases	Results
S1	(virtual pre/0 (reality OR world OR environment OR space))	Coronavirus Research Database, Ebook Central, GeoRef, ProQuest Central, ProQuest Dissertations & Theses Global, ProQuest Learning: Literature	966344
S2	(virtual pre/0 (reality OR world OR environment OR space)) and ((app OR application) pre/0 icons)	Coronavirus Research Database, Ebook Central, GeoRef, ProQuest Central, ProQuest Dissertations & Theses Global, ProQuest Learning: Literature	466
S3	(virtual pre/0 (reality OR world OR environment OR space)) and ((app OR application) pre/0 icons) near/5 (touch* OR press* OR pull* OR tap* OR slid*)	Coronavirus Research Database, Ebook Central, GeoRef, ProQuest Central, ProQuest Dissertations & Theses Global, ProQuest Learning: Literature	57
S4	(virtual pre/0 (reality OR world OR environment OR space)) and ((app OR application) pre/0 icons) near/5 (touch* OR press* OR pull* OR tap* OR slid*) near/5 (finger OR hand OR body)	Coronavirus Research Database, Ebook Central, GeoRef, ProQuest Central, ProQuest Dissertations & Theses Global, ProQuest Learning: Literature	3
S5	(virtual pre/0 (reality OR world OR environment OR space)) and ((app OR application) pre/0 icons) near/5 (finger OR hand OR body)	Coronavirus Research Database, Ebook Central, GeoRef, ProQuest Central, ProQuest Dissertations & Theses Global, ProQuest Learning: Literature	22

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(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

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(87) Date publication PCT/PCT Publication Date: 2012/03/15
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(87) N° publication PCT/PCT Publication No.: 2012/032687
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(71) Demandeur/Applicant:
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(72) Inventeur/Inventor:
IZUMI, KENJI, JP

(74) Agent: SMART & BIGGAR

(54) Titre : APPAREIL DE RECONNAISSANCE D'IMAGE, PROCEDE D'EVALUATION D'OPERATION, ET PROGRAMME

(54) Title: IMAGE RECOGNITION APPARATUS, OPERATION EVALUATION METHOD, AND PROGRAM

(57) Abrégé/Abstract:
An object is to enable an accurate determination of an operation. An operator uses a relative relation between a virtual operation screen determined from an image or a position of an operator photographed by the aforementioned video camera and the operator to determine that the operation starts when a part of the operator comes on this side of the operation screen as viewed from the video camera, and from a configuration or a movement of each portion, it is determined which out of operations in advance estimated the configuration or the movement corresponds to.

ABSTRACT

An object is to enable an accurate determination of an operation. An operator uses a relative relation between a virtual operation screen determined from an image or a position of an operator photographed by the aforementioned video camera and the operator to determine that the operation starts when a part of the operator comes on this side of the operation screen as viewed from the video camera, and from a configuration or a movement of each portion, it is determined which out of operations in advance estimated the configuration or the movement corresponds to.

IMAGE RECOGNITION APPARATUS, OPERATION EVALUATION METHOD, AND PROGRAM

Technical Field

[0001]

The present invention relates to an image recognition apparatus and an operation determining method, and in more detail, to an image recognition apparatus and an operation determining method for determining a movement of a measurement target from an image photographed by a video camera or the like.

Background Art

[0002]

In recent years there are proposed various devices and processes as interfaces between computers or electronic devices and human beings, that is, machine interfaces, and particularly in a game machine or an operation guide device, there is proposed a technology in which an entirety or a part of an operator is photographed by a camera and an intention of the operator is determined in accordance with the photographed image to operate the game machine or the operation guide device. For example, Patent Literature 1 proposes a technology in which there are provided a host computer for recognizing a configuration and a movement of an object in an image photographed by a CCD camera and a display device for displaying the configuration and the movement of the object recognized by the host computer, wherein,

Meta Platforms, Inc. - Ex. 1002
Page 135

when a user faces the CCD camera and gives an instruction by hand waving, the given hand waving is displayed on a display screen of the display device, a virtual switch and the like displayed on the display screen can be selected with an icon of an arrow mark cursor by the hand waving, and a very simple operation of the device is possible without necessity of an input device such as a mouse.

[0003]

In recent years, there is further proposed an input system in which a movement or a configuration of a hand-finger is recognized as some kind of gesture from an image in which the movement or the configuration is photographed, thereby perform an operation input. For example, in the presentation by a screen operation by a gesture or in an input device which can be used in a non-contact kiosk terminal not requiring a touch panel, an operator facing a large screen performs various operations toward a camera usually installed in a position of a screen lower part, the content is mirrored on the large screen. The configuration and the movement of the operator are extracted from the image photographed in this manner by a method known in the present technology field, which are compared with, for example, a pattern predetermined and stored in a data base. Thereby the meaning of the configuration or the movement of the operator is determined, that is, it is determined what operation the operator intends to perform by the movement, which is used for control of the device.

[0004]

Meta Platforms, Inc. - Ex. 1002
Page 136

On the other hand, a technology of reading an image of an operator, as shown in Fig. 13, makes it possible to photograph an operator with a camera adapted for a three-dimensional or stereoscopic photography to reproduce a stereoscopic image, which is used in an application for security check or the like. By reproducing the stereoscopic image, the movement of the operator can be figured out stereoscopically, for example, the movement of the operator, particularly the movement of a hand of the operator can be recognized also in the forward and backward directions. Therefore, a variety of gestures increase as compared to a technology using a two-dimensional image. In addition, even if a plurality of operators are extracted as images, in a case of many people, the forward and backward relation between the operators can be comprehended because of the stereoscopic image. Therefore, only the movement of the headmost operator can be extracted to be used for input of an operation.

[0005]

Further, in recent years there are proposed various types of display devices capable of performing a three-dimensional (3D) or stereoscopic display, and an application field of such a display device has been spreading not only to a limited field such as a conventional movie theater but also to fields from a display device in an event site to a household television. In regard to 3D display technologies also, various types of technologies are proposed, which include technologies of not only a color display, but also a process in which a color taste

Meta Platforms, Inc. - Ex. 1002
Page 137

is not spoiled and a process in which exclusive glasses are unnecessary (for example, refer to Patent Literature 2).

Citation List

Patent Literature

[0006]

PTL 1: Japanese Patent Laid-Open No. 2004-78977

PTL 2: Japanese Patent Laid-Open No. 2005-266116

Summary of Invention

Technical Problem

[0007]

However, in the conventional gesture operation, any standardized gesture such as a de facto standard is not established and a user can not intuitively recognize what can be done with what movement except for a pointing operation of XY ordinates by a forefinger. There are some cases where an instruction is made by fixing a click operation such as "click", "double clicks" or "drag" to the ordinate during a waiting time of a couple of seconds, but there are not a few cases where a comfortable operation is hampered by the event that the set waiting time is too long. Therefore, there is a problem that there does not exist a practical technique of making the operation such as "click" or "determination" (double clicks or the like) comprehensible and comfortable.

[0008]

The conventional gesture detecting apparatus is different from an input apparatus such as a touch panel which an operator

can touch directly and is difficult to figure out a clear intention of the operator. That is, even if the operator performs some movement, there occurs a problem that it is not easy to determine whether the movement expresses an intention of input or occurs simply as the result of the operator's habit. As a result, there occurs a problem that a simple gesture can not be recognized unless it is performed in an unnaturally distinct manner, it is necessary to work out a prior arrangement of the gesture or complicate gestures can not be used.

[0009]

Embodiments of the present invention provide an image recognition apparatus and an operation determining method for enabling an accurate determination of an operation by performing a movement of an operator to an apparatus based upon the operator's recognition of a state where the operation relating to some input is being performed. As a result, the operator does not need to be familiar with the operation of the apparatus or learn particular gestures, and by moving an entirety or a part of the body, it is possible to determine the movement as an operation expressing accurately an intention of the operator.

Solution to Problem

[0010]

According to an embodiment an image recognition apparatus comprises three-dimensional photography means for reading an image of an operator to produce stereoscopic image data,

operation screen forming means for forming a virtual operation screen in a configuration and a position based upon the image and the position of the operator read by the three-dimensional photography means, operation determining means for, by reading a movement of an image of at least a part of the operator to the formed virtual operation screen by the three-dimensional photography means, determining whether or not the movement is an operation based upon a position relation between the part of the operator and the virtual operation screen, and signal output means for outputting a predetermined signal when it is determined that the movement is the operation.

[0011]

In an embodiment, the three-dimensional photography means reads a plurality of operation candidates, it is determined that an operation candidate performing a predetermined particular movement is the operator.

[0012]

In another embodiment, an image recognition apparatus further includes operator display means for displaying a position relation of the operation candidate determined as the operator to the present operator and the other candidate shown in the image of the plurality of the candidates read by the three-dimensional photography means.

[0013]

In another embodiment, an image recognition apparatus further includes a position determining face arranged in a

Meta Platforms, Inc. - Ex. 1002
Page 140

predetermined position in a side of the operator of the virtual operation screen for determining an operation position on the virtual operation screen, wherein the operation determining means, at the time of crossing the virtual operation screen in a series of movements in which a part of the operator moves from the position determining face to the virtual operation screen, determines an operation of the operator as a movement that the part of the operator crosses a position on the virtual operation screen corresponding to a position on the position determining face which the part of the operator crosses.

[0014]

In another embodiment, positions of an arm and a face of the operator are extracted from the read image of the operator, wherein the configuration and the position of the virtual operation screen are determined based upon the extracted positions of the arm and the face.

[0015]

In another embodiment, the position of the virtual operation screen is between the operator and the three-dimensional photography means.

[0016]

In another embodiment, the operation screen forming means forms the virtual operation screen in a configuration and a position defined based upon the image of the operator and a predetermined particular movement of the operator which are read by the three-dimensional photography means.

Meta Platforms, Inc. - Ex. 1002
Page 141

[0017]

In another embodiment, the operation screen forming means forms the virtual operation screen at an angle defined based upon the image of the operator and a predetermined particular movement of the operator which are read by the three-dimensional photography means.

[0018]

In another embodiment, the operation screen forming means forms the virtual operation screen at an angle defined based upon the image and the position of the operator read by the three-dimensional photography means.

[0019]

In another embodiment, an image recognition apparatus further includes operation screen stereoscopic display means for displaying a stereoscopic image showing the formed virtual operation screen.

[0020]

In another embodiment, the stereoscopic image is formed by a binocular parallax.

[0021]

In another embodiment, a distance between the part of the operator and the virtual operation screen is calculated from a position relation therebetween to stereoscopically display a predetermined index showing the position relation of the part

Meta Platforms, Inc. - Ex. 1002
Page 142

of the operator to the virtual operation screen at a position corresponding to the distance.

[0022]

In another embodiment, an image recognition apparatus further includes three-dimensional photography means for reading an image of an operator to produce stereoscopic image data, operation screen forming means for forming a virtual operation screen in a configuration and a position based upon a predetermined particular movement of the operator read by the three-dimensional photography means, operation determining means for, by reading a movement of an image of at least a part of the operator to the formed virtual operation screen by the three-dimensional photography means, determining whether or not the movement is an operation based upon a position relation between the part of the operator and the virtual operation screen, and signal output means for outputting a predetermined signal when it is determined that the movement is the operation.

[0023]

In another embodiment, an operation determining method further includes a three-dimensional photography step for reading an image of an operator to produce stereoscopic image data, an operation screen forming step for forming a virtual operation screen in a configuration and a position based upon the image and the position of the operator read by the three-dimensional photography step, an operation determining step for, by reading a movement of an image of at least a part of

Meta Platforms, Inc. - Ex. 1002
Page 143

the operator to the formed virtual operation screen by the three-dimensional photography step, determining whether or not the movement is an operation based upon a position relation between the part of the operator and the virtual operation screen, and a signal output step for outputting a predetermined signal when it is determined that the movement is the operation.

[0024]

In another embodiment, the operation determining step, at the time of crossing the virtual operation screen in a series of movements in which a part of the operator moves from a position determining face arranged in a predetermined position in a side of the operator of the virtual operation screen for determining an operation position on the virtual operation screen to the virtual operation screen, determines an operation of the operator as a movement that the part of the operator crosses a position on the virtual operation screen corresponding to a position on the position determining face which the part of the operator crosses.

[0025]

In another embodiment, an operation determining method further includes an operation screen stereoscopic display step for displaying a stereoscopic image showing the formed virtual operation screen.

[0026]

Meta Platforms, Inc. - Ex. 1002
Page 144

In another embodiment, there is provided a computer readable medium storing program for executing an operation determining method for recognizing an image of an operator to determine an operation content by an image recognition apparatus. The operation determining method comprises a three-dimensional photography step for reading an image of an operator to produce stereoscopic image data, an operation screen forming step for forming a virtual operation screen in a configuration and a position based upon the image and the position of the operator read by the three-dimensional photography step, an operation determining step for, by reading a movement of an image of at least a part of the operator to the formed virtual operation screen by the three-dimensional photography step, determining whether or not the movement is an operation based upon a position relation between the part of the operator and the virtual operation screen, and a signal output step for outputting a predetermined signal when it is determined that the movement is the operation.

[0027]

In another embodiment, the operation determining step, at the time of crossing the virtual operation screen in a series of movements in which a part of the operator moves from a position determining face arranged in a predetermined position in a side of the operator of the virtual operation screen for determining an operation position on the virtual operation screen to the virtual operation screen, determines an operation of the operator as a movement that the part of the operator crosses a position on the virtual operation screen

Meta Platforms, Inc. - Ex. 1002
Page 145

corresponding to a position on the position determining face which the part of the operator crosses.

[0028]

In another embodiment, a computer readable medium further includes an operation screen stereoscopic display step for displaying a stereoscopic image showing the formed virtual operation screen.

Advantageous Effects of Invention

[0029]

As explained above, an image recognition apparatus according to the present invention comprises three-dimensional

Meta Platforms, Inc. - Ex. 1002
Page 146

photography means for reading an image of an operator to produce stereoscopic image data, operation screen forming means for forming a virtual operation screen in a configuration and a position based upon the image and the position of the operator read by the three-dimensional photography means, operation determining means for, by reading a movement of an image of at least a part of the operator to the formed virtual operation screen by the three-dimensional photography means, determining whether or not the movement is an operation based upon a position relation between the part of the operator and the virtual operation screen, and signal output means for outputting a predetermined signal when it is determined that the movement is the operation. Therefore, the operator does not need to be familiar with the operation of the apparatus or learn particular gestures, and by moving an entirety or a part of the body, it is possible to determine the movement as an operation accurately expressing an intention of the operator.

Brief Description of Drawings

[0030]

[Fig. 1] Fig. 1 is a diagram showing an example of an operation input system according to the present embodiment;

[Fig. 2] Fig. 2 is a block diagram schematically showing a relation between the operation input system according to the present embodiment and a computer;

Meta Platforms, Inc. - Ex. 1002
Page 147

[Fig. 3] Fig. 3 is a block diagram showing an example of a function module of a program processed in a CPU of the computer according to the present embodiment;

[Fig. 4] Fig. 4 is a flow chart of the process according to the present embodiment;

[Fig. 5] Fig. 5 is a diagram explaining a virtual operation screen stereoscopically displayed according to an embodiment in the present invention;

[Fig. 6] Fig. 6 is a diagram showing a state of a virtual operation screen according to an embodiment in the present invention;

[Fig. 7] Fig. 7 is a diagram showing a state of a virtual operation screen in a television display apparatus as a use example of an embodiment in the present invention;

[Fig. 8] Fig. 8 is a diagram showing a position of the virtual operation screen in the television display apparatus as a use example of an embodiment in the present invention;

[Fig. 9] Fig. 9 is a diagram showing a state of a virtual operation screen formed by an operation screen forming reference according to an embodiment in the present invention;

[Fig. 10] Fig. 10 is a diagram showing an example of an image in a case of taking in the image by a plurality of operators using the conventional three-dimensional camera;

[Fig. 11] Fig. 11 is a diagram showing an example of setting an operation region of operation input support according to an embodiment in the present invention;

Meta Platforms, Inc. - Ex. 1002
Page 148

[Fig. 12] Fig. 12 is a diagram showing an example of adjusting an operation region by a position of a screen or a camera according to an embodiment in the present invention;

[Fig. 13] Fig. 13 is a diagram showing a different example of adjusting an operation region by a position of a screen or a camera according to an embodiment in the present invention;

[Fig. 14] Fig. 14 is a diagram showing a different example of adjusting an operation region by a screen or a position of a camera according to an embodiment in the present invention;

[Fig. 15] Fig. 15 is a diagram explaining a method for adjusting an operation region by a position of a screen or a camera according to an embodiment in the present invention;

[Fig. 16] Fig. 16 is a diagram showing an example of adjusting an operation region by a position of a screen or a camera according to an embodiment in the present invention;

[Fig. 17] Fig. 17 is a diagram showing a method for taking in an image of an operator using the conventional three-dimensional camera;

[Fig. 18] Fig. 18 is a diagram explaining operation input using a stereoscopic display icon according to an embodiment in the present invention;

[Fig. 19] Fig. 19 is a diagram showing an example of a special display of operation input support according to an embodiment in the present invention;

[Fig. 20] Fig. 20 is a diagram showing a state of a virtual operation screen and an operation region according to an embodiment in the present invention;

Meta Platforms, Inc. - Ex. 1002
Page 149

[Fig. 21] Fig. 21 is a diagram showing a relation between a movement of an operator and an icon displayed on a screen according to an embodiment in the present invention;

[Fig. 22] Fig. 22 is a diagram showing an example of a special display of an operation input screen according to an embodiment in the present invention;

[Fig. 23] Fig. 23 is a diagram showing an example of various icons usable in an operation input screen according to an embodiment in the present invention;

[Fig. 24] Fig. 24 is a diagram showing a relation between a movement of an operator and an icon displayed on a screen according to an embodiment in the present invention;

[Fig. 25] Fig. 25 is a diagram showing a display screen of an example of inputting an instruction for moving a figure displayed on a screen by the present embodiment;

[Fig. 26] Fig. 26 is a diagram showing a relation between a movement of an operator and a menu displayed on a screen according to an embodiment in the present invention;

[Fig. 27] Fig. 27 is a diagram showing a relation between a movement of an operator and a menu displayed on a screen according to a different embodiment in the present invention;

[Fig. 28] Fig. 28 is a diagram showing a relation between a movement of an operator and a menu displayed on a screen according to a further different embodiment in the present invention;

[Fig. 29] Fig. 29 is a diagram showing a state of a virtual operation screen and an operation screen forming reference according to an embodiment in the present invention;

Meta Platforms, Inc. - Ex. 1002
Page 150

[Fig. 30] Fig. 30 is a diagram showing an example of adjusting an operation region by a screen by a projector or a position of a camera according to an embodiment in the present invention;

[Fig. 31] Fig. 31 is a diagram showing a relation between a movement of an operator and a menu displayed on a screen according to an embodiment in the present invention;

[Fig. 32] Fig. 32 is a diagram showing an image photographed for determining a region setting a position of an operation screen by a gesture of an operator according to an embodiment in the present invention;

[Fig. 33] Fig. 33 is a diagram explaining extraction of a position of an operation screen pointed out according to an embodiment in the present invention;

[Fig. 34] Fig. 34 is a diagram showing a distance data image obtained by a camera for extraction of a position of an operation screen pointed out according to an embodiment in the present invention;

[Fig. 35] Fig. 35 is a flow chart showing the process of setting a position of an operation screen by a gesture of an operator according to an embodiment in the present invention;

[Fig. 36] Fig. 36 is a flow chart showing the process of extracting a position of an operation screen pointed out according to an embodiment in the present invention;

[Fig. 37A] Fig. 37A is a diagram showing a variation of an operation screen setting gesture of an operator according to an embodiment in the present invention;

Meta Platforms, Inc. - Ex. 1002
Page 151

[Fig. 37B] Fig. 37B is a diagram showing a variation of an operation screen setting gesture of an operator according to an embodiment in the present invention;

[Fig. 37C] Fig. 37C is a diagram showing a variation of an operation screen setting gesture of an operator according to an embodiment in the present invention;

[Fig. 37D] Fig. 37D is a diagram showing a variation of an operation screen setting gesture of an operator according to an embodiment in the present invention;

[Fig. 37E] Fig. 37E is a diagram showing a variation of an operation screen setting gesture of an operator according to an embodiment in the present invention;

[Fig. 37F] Fig. 37F is a diagram showing a variation of an operation screen setting gesture of an operator according to an embodiment in the present invention;

[Fig. 38] Fig. 38 is a diagram showing an example of a target screen used in a grid snapping process according to an embodiment in the present invention;

[Fig. 39] Fig. 39 is a diagram showing a setting example of a grid used in a grid snapping process according to an embodiment in the present invention;

[Fig. 40] Fig. 40 is a diagram explaining a grid snapping process according to an embodiment in the present invention;

[Fig. 41] Fig. 41 is a diagram showing an example of displaying an icon in a lower part of a stereoscopic display device for specifying the current operator in the present embodiment;

Meta Platforms, Inc. - Ex. 1002
Page 152

[Fig. 42] Fig. 42 is a diagram showing a relation between Fig. 42A and Fig. 42B;

[Fig. 42A] Fig. 42A is a diagram showing a different example of displaying an icon in a lower part of a stereoscopic display device for specifying the current operator in the present embodiment;

[Fig. 42B] Fig. 42B is a diagram showing a different example of displaying an icon in a lower part of a stereoscopic display device for specifying the current operator in the present embodiment;

[Fig. 43A] Fig. 43A is a diagram showing an example of various variations for displaying operators in the present embodiment;

[Fig. 43B] Fig. 43B is a diagram showing an example of various variations displaying operators in the present embodiment; and

[Fig. 43C] Fig. 43C is a diagram showing an example of various variations for displaying operators in the present embodiment.

Description of Embodiments

[0031]

Hereinafter, embodiments in the present invention will be in detail explained with reference to the accompanying drawings.

[0032] (First Embodiment)

Fig. 1 is a diagram showing an example of an operation input system in the present embodiment. A stereoscopic display

Meta Platforms, Inc. - Ex. 1002
Page 153

three-dimensional display device 111 in the present embodiment is arranged in front of an operator 102, and the operator 102 can perform an operation to a virtual operation screen stereoscopically displayed in a constant position between the operator 102 and the three-dimensional display device 111 in recognition of the event that a configuration of a finger or the like becomes a target of an operation determination. Various screen images for various applications at which the present system aims are displayed in the three-dimensional display device 111, but in addition to it, as described later, it is possible to support the operation input. That is, for example, a portion of the operator 102 as the target and the like are displayed in a corner of a screen to make the operator 102 recognize a movement which can be determined as an operation at the current point.

[0033]

Here, in the present embodiment, the three-dimensional display device is used as an audiovisual monitor for an operator, but since any three-dimensional display device known in the present technical field can be used in the present embodiment, the three-dimensional display device itself will be briefly explained. The three-dimensional display device means a display device which can provide a stereoscopic screen image having a depth feeling or a protruding feeling to viewers, and is of various types. The three-dimensional display device can basically provide different images to both eyes of an operator for the operator to view an object stereoscopically. In general,

Meta Platforms, Inc. - Ex. 1002
Page 154

in order for the operator to stereoscopically recognize some object as if it existed in the same space as he, since, by using a convergence function of human beings, it is necessary to provide a screen image having a parallax between right and left eyes (binocular parallax) and change a view way of the screen image in conjunction with a head movement of the operator (called motion parallax), the stereoscopic view is compatible with elements of correction, tracking and the like by human body dimension measurement by the three-dimensional camera of the present embodiment. For example, the position of the three-dimensional eye of the operator is captured, the captured position is corrected in real time, and thus it is possible to further improve the realistic sensations.

[0034]

The three-dimensional display device is roughly categorized into two types, one in which an observer wears a pair of glasses having a specific optical characteristic to create an image having a binocular parallax, and the other of not using a pair of glasses. The display device of not using a pair of glasses is particularly called a bare eye stereoscopic display device.

[0035]

In the type of wearing the glasses, "an anaglyph type", which is inexpensive but has a problem of losses in color taste and a fatigue feeling, has been famous from the past. In recent years, a polarized glass type or a crystal shutter by which a user can browse in full color without almost losing a color tone

Meta Platforms, Inc. - Ex. 1002
Page 155

of a material is sold on the market, and the protruding feeling and the realistic sensations are significantly improved along with an improvement of the photography technology or the expression technology, so that this type of display device is close to full scale practical use.

[0036]

As to the system of the three-dimensional display device of the type wearing the glasses, the anaglyph type, the polarized glass type and the crystal shutter are general as described above.

[0037]

The anaglyph type is constructed such that right and left screen images are projected to overlap with light in red and blue, which are separated by glasses having color filters in red and blue. The anaglyph type is technically produced in the simplest manner and at a low cost, but was limited to the monochromatic screen image before. At present, it is possible to produce a screen image with the color information being left. However, at viewing, since the screen image has to pass through the color filters in red and blue, the color balance is damaged without fail.

[0038]

The polarized glass type projects the right and left screen images in such a manner as to overlap by applying straight polarization intersecting therewith and separates them by a polarized filter to provide different images to both eyes. A silver screen or the like is usually used for preserving the polarized state. There are some polarized glasses in which a

Meta Platforms, Inc. - Ex. 1002
Page 156

circular polarization is used instead of the straight polarization. There are some cases where the polarized glasses using the circular polarization maintains a cross stroke of the right and left screen images to be small even if an observer inclines his face, but since a light shielding characteristic of the circular polarization essentially has wave dependency, colors such as thick purple or yellow are visible in some cases.

[0039]

The crystal shutter glasses are adapted to enable a stereoscopic view by providing different images to the right and left eyes by using glasses driven by the crystal shutter in such a manner that the right and left screen images are alternately shielded. The crystal shutter glasses are, because of alternately projecting the image having the parallax between right and left eyes at a rate twice as the frame rate of the source, excellent in reproduction of colors, but increase in cost, and further, need the facility for transmitting signals to the glasses by radio. The frame rate depends on a response frequency of the crystal shutter.

[0040]

The movement of the operator 102 is photographed by the video camera 201, the photographed screen image is processed by a computer 110, and positions and sizes of an optimal virtual operation screen and an operation region including the optimal virtual operation screen are set based upon a position, a height, and a length of an arm of the operator 102 or body dimension information of a height, a shoulder width and the like, thus

Meta Platforms, Inc. - Ex. 1002
Page 157

determining what operation a gesture of a portion protruding in a side of the three-dimensional display device 111 from the virtual operation screen means. That is, the computer 110 produces a stereoscopic image of the operator 102 from data obtained from the video camera 201 and calculates an optimal position of the virtual operation screen to the operator from the produced stereoscopic image, further adjusts the position and the size of the virtual operation screen from positions and arrangement states of the video camera 201 and the three-dimensional display device 111 to be described later, and determines whether or not hands and fingers of the operator 102 protrude into the side of the video camera 201 based upon the virtual operation screen, determining an operation content by estimating the protruding portion as a target of the operation.

[0041]

Meanwhile, the three-dimensional display device 111 displays the virtual operation screen in such a manner that the virtual operation screen is viewed as existing in the set or adjusted position from the operator 102. In consequence, the operator 102 recognizes the virtual operation screen as the stereoscopic screen image as if the virtual operation screen existed there and can perform an operation to the recognized stereoscopic screen image by using hands or fingers. This respect will be explained with reference to Fig. 5 and Fig. 6.

[0042]

Fig. 5 is a diagram explaining a virtual operation screen stereoscopically displayed according to the present embodiment.

Meta Platforms, Inc. - Ex. 1002
Page 158

The operator 102 views an image 502 and a virtual operation screen image 501 displayed on the three-dimensional display device 111 with the right eye 504 and the left eye 503, but the virtual operation screen image 501, for stereoscopic display, is formed of, for example, two images including parallax. When the virtual operation screen image 501 is viewed with the right eye 504 and the left eye 503, as shown in Fig. 5, it is possible to form a virtual operation screen which is stereoscopically displayed in such a manner as to be in front of the operator from the three-dimensional display device 111. The position where the virtual operation screen image 501 is displayed stereoscopically is determined from the image and the position of the operator photographed by the above-mentioned video camera 201, and the virtual operation screen image 501 is adjusted to have a convergence angle θ_1 to the three-dimensional display device 111 for display. Here, the image 502 is usually displayed in a two-dimensional manner, and therefore is displayed in a position of the display device 111 and is adjusted to have the convergence angle θ_2, but if the convergence angle θ_2 is defined depending on the use situation, the stereoscopic screen image with a depth sense can be provided. It should be noted that the position of the virtual operation screen image 501 shown in Fig. 5 is a position for displaying the virtual operation screen stereoscopically, but in some cases, the virtual operation screen image 501 is displayed in a position more or less different from a position where the virtual operation screen is actually formed as the operation feeling of the operator. The formation

Meta Platforms, Inc. - Ex. 1002
Page 159

position of the virtual operation screen is not necessarily required to be in agreement with the stereoscopic display position of the virtual operation screen image.

[0043]

In this manner, the virtual operation screen image 501 is adjusted to have the convergence angle θ_1 to be displayed stereoscopically, but further, as shown in Fig. 18, an icon 1801 is adjusted to have a convergence angle θ_3 to be displayed stereoscopically, thus making it possible to guide a pawn and a fingertip. Concretely, the icon 1801 can be displayed stereoscopically to come to a position of the pawn or the like, thus facilitating to acquire a distance feeling to the virtual operation screen in the z direction or a position relation to the virtual operation screen in the xy directions. Other than that, the icon can be displayed stereoscopically in various modes and configurations. For example, except for displaying the icon at the same position as the finger tip, the icon may be displayed with more or less distances in the depth direction from the finger tip. There are some cases where by doing this, the position relation between the virtual screen and the icon tends to be visually recognized more easily than a method of looking at the finger tip, and in a case where a protruding distance to the front side of the virtual screen is too short, it can be compensated with this display. Because since the protruding to the front side of the eyes is generally difficult to be pint-adjusted in any case, in a case where the icon is displayed in a more or less deep position, the operator more easily operates it.

Meta Platforms, Inc. - Ex. 1002
Page 160

Further, such a stereoscopic display icon can be displayed in any configuration and mode of a focus icon, which will be in detail explained in a second embodiment. For example, the icon is displayed near the finger tip as the stereoscopic display icon, while a size or a color of the icon is changed, thus making it possible for the operator to figure out a distance feeling to the virtual operation screen.

[0044]

Fig. 6 is a diagram showing a state of a virtual operation screen according to the present embodiment where the virtual operation screen image 501 including icons for operation is displayed, but since the virtual operation screen 501 is stereoscopically displayed in an actual system, the virtual operation screen 501 is displayed such that it is seen from the operator in such a manner as to be in a position where if the operator extends his hand forward of the three-dimensional display device 111, the operator can touch the screen 501. Therefore, the operator can perform an operation to the virtual operation screen as if a touch panel or an operation panel existed there. Herein, the virtual operation screen 501 once displayed stereoscopically can change in position or configuration such that the operation is more naturally performed in accordance with the movement of the arm or body of the operator 102.

[0045] (Process of Plural Operation Candidates)

In addition, Fig. 7 and Fig. 8 are diagrams showing states of virtual operation screens in a television display apparatus as a use example of the present embodiment. A virtual operation

Meta Platforms, Inc. - Ex. 1002
Page 161

screen can be produced to each of a plurality of viewers as shown in Fig. 7 and Fig. 8 to be operated individually or accept an instruction of any of the viewers with priority, thus performing various settings. However, for avoiding confusion due to respective different operations by the plurality of the viewers, one viewer is usually determined by any method and an operation input is allowed for only the viewer. Here, since the plurality of the viewers are candidates as operators each having authority of an operation to the apparatus, the viewers are called operation candidates. Hereinafter, a determination of an operator and the process after determining the operator in a case of a plurality of operation candidates will be explained. Therefore, the operation candidate may include the viewers as shown in Fig. 7 and Fig. 8, and candidates of an operator as a target in the present invention, for example, a plurality of players in a game machine, a presenter of the presentation and the like. It should be noted that in the system of the present embodiment, since a person as the target of the operator is limited to a person whom the system can recognize as the target, the operation candidate is limited to a person existing in a photography range of the video camera 201, for example.

[0046]

A setting on who will be an operator among the plurality of the viewers and a setting of the virtual operation screen can be made using the process in the second embodiment to be described later, that is, at the time of setting the virtual operation screen in the second embodiment, first, a determination

Meta Platforms, Inc. - Ex. 1002
Page 162

on who will be an operator among the operation candidates is made and then the determined operator can set the virtual operation screen, but in addition thereto, any method known in the present technological field can be used. For example, in an example in Fig. 7, immediately after starting a view of television, it is determined who will be an operator by any gesture (the operator is a viewer 702 in Fig. 7 and Fig. 8) or in the middle of the viewing, a setting mode can be made by a constant gesture or an operation of a remote controller to set the virtual operation screen. When the operator is determined, the virtual operation screen image 501 is displayed stereoscopically in such a manner as to match the operator 702. It should be noted that in a constant stereoscopic display system, the virtual operation screens are displayed stereoscopically respectively to the other viewers other than the operator 702 as shown in Fig. 7 and Fig. 8 by the characteristic of the stereoscopic display. However, as shown in the figure, a position where the virtual operation screen is formed is actually just in front of the operator 702, and it is substantially difficult for the other viewer to perform the operation. In this manner, in the regular stereoscopic display system, in a case where there is a possibility that a plurality of persons perform operations, there are not a few cases where one operator is first determined, a virtual operation screen adapted for the operator is formed, and it is necessary to make a stereoscopic display thereof.

[0047]

Meta Platforms, Inc. - Ex. 1002
Page 163

Here, in a case where such plural operation candidates exist and it is not clear who is the current operator, there is a possibility that an erroneous operation is caused by the event that a person who is not the operator tries to perform an operation or the operator performs an inadvertent movement in reverse. Therefore, the present embodiment is constructed such that, by displaying who is currently the operator on the screen, all the operation candidates can recognize who is currently the operator. Fig. 41 is a diagram showing an example of displaying icons 4202 to 4204 at a lower part of the three-dimensional display device 111 for specifying the current operator. By referring to Fig. 41, three persons viewing the television 111 become operation candidates. When one person in the middle of them is assumed as an operator 702, in an operation screen example 4201, three boxes 4202 to 4204 showing three candidates are displayed at a lower part of the screen, and the middle box 4203 is colored to show the operator 702 as a priority user, which is thus displayed in an emphasis manner. Such a display, since the video camera 201 can read the position of the operation candidate as described above, can be made by extracting the positions and the line-up order of the respective operation candidates from the read image.

[0048]

Fig. 42A and Fig. 42B are diagrams each showing a different example displaying icons 4302 to 4304 at a lower part of the three-dimensional display device 111. By referring to Fig. 42A and Fig. 42B, as compared to the example displaying the above

Meta Platforms, Inc. - Ex. 1002
Page 164

boxes 4202 to 4204, since the icons 4302 to 4304 of persons are used in this example to be displayed in a region 4301 at the lower part of the monitor screen 111 and the distance feeling is also expressed by its size, recognition on who is the operator can be made more intuitively. Various displays are considered as a variation of the display showing such an operator, and, for example, methods as shown in Fig. 43A to Fig. 43C may be adopted. That is, in a case of two operation candidates, the candidates may be more simply displayed as shown in Fig. 43B. In addition, in a case of more operation candidates, boxes ("user 1" to "user 5") in number corresponding to the number of the operation candidates are displayed as shown in Fig. 43C.

[0049]

Further, for showing three or more persons using humanoid icons, icons showing operation candidates may be displayed within an icon display region in consideration of positions and a line order thereof as shown in Fig. 43A. In this case, since the three-dimensional display device is used in the present embodiment, each icon is displayed in a depth based upon an actual position of the corresponding operation candidate, and the operator as the current priority user can be more intuitively recognized. That is, it goes without saying that the display of the operator explained by referring to Fig. 41 and Fig. 42 is effective also in the system using the regular two-dimensional display device, that is, even in a case of setting a virtual operation screen in the form to be explained in the second

Meta Platforms, Inc. - Ex. 1002
Page 165

embodiment to be described later without using three-dimensional icons.

[0050]

In Fig. 1, for obtaining an image, the video camera 201 is attached to an upper part of the three-dimensional display device 111 to produce the photography, but if a necessary image is obtained as shown in Fig. 11 to Fig. 15, the photography means is not limited thereto, and any photography means known in the present technological field, such as an infrared ray camera may be used, and any place near the monitor may be selected as the installation site. Here, in the present embodiment, the stereoscopic image including the operator can be produced by using a three dimensional (3D) camera as the video camera 201.

[0051]

Further, an audio output apparatus such as a speaker (not shown) is attached in the system of the present embodiment, information on the display content and the operation can be conveyed to the operator by audio. By providing such a function, since the virtual operation screen is comprehended by not only displaying the operation content on the display device by the image but also simultaneously providing the instruction matter and result by audio, even an operator with visual disability can perform the operation.

[0052]

Fig. 9 and Fig. 10 are diagrams each explaining a special role of the virtual operation screen. A virtual operation screen 701 in the present embodiment is set based upon a length of a

Meta Platforms, Inc. - Ex. 1002
Page 166

height or an arm or body dimension information of a height, a shoulder or the like of the operator 102, and the operator 102 assumes that the operation screen 701 exists virtually as the stereoscopic image. In a case where the operator 102 has an attempt of performing various operations, the operator 102 can show a gesture by extending a hand 601 forward on a basis of the operation screen 701. In addition, the operation screen 701 can be used as a judgment reference of the movement, for example, after a user in an operation region including the virtual operation screen takes any pose, an action can be determined by a pushing-out (determination) movement forward of the virtual operation screen or the pushing-out is made after determination of the operation. Therefore, a user tends to easily recognize it and the operability is close to the conventional touch panel. On the other hand, the operation variations increase overwhelmingly as compared to the conventional touch panel (operations by both hands, a behavior, plural fingers, and the like).

[0053]

In the present embodiment, the virtual operation screen 701 as shown in Fig. 9 and Fig. 10 is adapted to be formed in real time when the camera 201 captures an image of the operator 102, but since a standing position of the operator is not constant until the operator starts to perform the operation, the virtual operation screen is not defined and the operation determination is also not easy to make. Therefore, in the present embodiment, the setting process of the virtual operation screen may start

Meta Platforms, Inc. - Ex. 1002
Page 167

at timing where the body of the operator has stopped for a constant time within a photography range of the three-dimensional camera.

[0054]

In this manner, the formation of the virtual operation screen in the present embodiment can be made in real time, but also in this case, the operation determination can be more accurately made by limiting the standing position of the operator within a constant range optimal to the system by any method. For example, although not shown, the operator can be guided in movement by drawing footprints showing a standing position of the operator on a floor surface, by making the operator recognize existence in a constant limit range by a monitor or an arrangement of the system, or by placing a screen, thus performing the operation within a constant range. A position or a size of the virtual operation screen which the operator can naturally recognize depends greatly on a position relation between the operator and the display device, and there are some cases where it is preferable that positions of the display device, the camera, and the operator, and the like are in advance estimated in the entire system.

[0055]

Fig. 2 is a block diagram schematically showing the structure of the computer 110 in the image recognition apparatus of the present embodiment. The video camera 201 attached to the monitor 701 for photographing the operator 102 and the like is connected to the computer 110, and the photographed image is taken in the computer 110. In regard to the image obtained

Meta Platforms, Inc. - Ex. 1002
Page 168

by the photographing, extraction, calculation of a position, and the like of the image as the feature in the present embodiment are carried out in the CPU 210, and it is determined whether or not a part of the body extends to a side of the video camera from the operation screen, based upon the calculated position. The computer 110 is generally provided with the CPU 210 and executes programs stored in a ROM 211 or the like on a RAM 212 to output the process result based upon the image inputted from the image recognition apparatus to the three-dimensional display device 111 or the like. In the present embodiment, the three-dimensional display device 111 can output the above-mentioned virtual operation screen and in addition thereto, various screen images provided from various applications which the operator tries to experience, and also display the information which will become support of the operation input to be described later.

[0056]

Fig. 3 a block diagram showing an example of functional modules of the program processed in the CPU 210 of the computer 110 in the present embodiment. As shown in Fig. 3, the processes in the present system is executed by an image reading unit 301, an image extracting unit 302, an image position calculating unit 303, an operation determining unit 304 and a stereoscopic image display unit 305. It should be noted that in the present embodiment, the process of receiving the image from the video camera 201 to the process of performing output of data are executed by five modules, but the processes are not limited thereto, and

Meta Platforms, Inc. - Ex. 1002
Page 169

may be executed by use of other modules or by the less number of the modules.

[0057] (Process of the Present Embodiment)

In the present embodiment, as shown in Fig. 10, the virtual operation screen is formed as a stereoscopic image based upon the image of the operator 102 photographed by the video camera 201, likewise positions of hands or fingers as a part of the operator 102 photographed are defined and the process of calculating a position relation between the virtual operation screen 701 and a hand-finger 601 of the operator 102 is executed. In the present embodiment, when initial settings known in the present technological field are assumed as a pre-condition for executing such a process, for example, assuming a case where the image recognition apparatus in the present embodiment is newly installed, it is necessary to input information such as a distortion of use lens of the video camera 201 to be used, and a distance between the three-dimensional display device 111 and the lens, as the preliminary preparation. Further, a threshold value and the like are in advance adjusted. When the initial settings in the system are competed, the process in the present embodiment is supposed to be executed, which will be hereinafter explained with reference to Fig. 4.

[0058]

Fig. 4 is a flow chart of the process in the present embodiment. First, the image reading unit 301 reads data photographed by the video camera 201 (S401), and the image

Meta Platforms, Inc. - Ex. 1002
Page 170

extracting unit 302 extracts an image of an operator from the data (S402).

[0059]

As a result of this preparation, a virtual operation screen and an operation region are determined based upon the extracted image of the operator 102 (S403). Here, a configuration of the operation screen is formed as a rectangular shape rising perpendicularly from the floor surface by referring to Fig. 11 and the like, but is not limited thereto, and the operation screen may be formed to have various configurations (including a size and an angle to the display device) depending on an operation mode of the operator. Concretely, as in the case of setting the virtual operation screen in the second embodiment to be described later, the body shape and the position of the operator are photographed as a stereoscopic screen image by the three-dimensional camera to determine the optimal configuration and position of the virtual operation screen from the position, the size and the like of each portion in the operator. For example, the formation position of the virtual operation screen can be defined to a position where a stroke of an arm at an operation time is optimal based upon a length of the arm from a position of the eye of the operator, but the distance from the operator may be determined based upon a length and a size of the other portion of the operator, and the starting point for measurement may be defined as not the eye but the shoulder. In addition, if it is difficult to extract the position of the eye, a position of the head may be defined as the starting point. Further, in

Meta Platforms, Inc. - Ex. 1002
Page 171

the present embodiment, since the operator usually wears polarized glasses or shutter glasses for viewing a stereoscopic image, the formation position determination of the virtual operation screen can be facilitated by attaching a marker assisting in extracting the position from a screen image of the three-dimensional camera on the front surfaces of the glasses and the like.

[0060]

Here, the operation region includes the virtual operation screen as the feature in the present embodiment and is a region where hands and fingers as a main body of the operation in the operator are primarily moved. As explained in the support to the virtual operation screen to be described later, a given region exceeding the virtual operation screen from the body of the operator is used for operation recognition of the present invention. For example, in regard to an adult operator 810 as shown in Fig. 11, the operation region can be formed as an operation region 811 in consideration of a height (view position) and a length of the arm. In a case of a child operator 820, since the height is lower and the arm is shorter, an operation region 821 can be set in accordance with it. If the virtual operation screen is set within this operation region, when the operator naturally moves his hands and fingers, the operation which the operator intends to perform can be determined based upon the movement of the hand or the finger.

[0061]

Meta Platforms, Inc. - Ex. 1002
Page 172

More concretely, for example, a range of the depth can be made to a fingertip when the operator extends his hand forward, a range of the horizontal width can be made to a length of the right and left wrists when the operator extends his hands right horizontally, and a range of the height can be made from a position of a head of the operator to a position of a waist thereof. In addition, in a case where target persons of the system in the present embodiment are defined as from low graders in an elementary school to adults, a width of the height is in a range of about 100cm to about 195cm and a correction width of the upper and lower positions of the operation region or the virtual operation screen requires about 100cm as the height difference. It should be noted that the virtual operation screen and the operation region may be formed at each time or may be formed under a given condition, or these setting timings may be selected in advance or at each time.

[0062]

In this manner, when the configuration and the position of the virtual operation screen are determined, the stereoscopic image forming the virtual operation screen in the configuration (including a size and an angle to the display device) determined in a position determined as viewed from the operator is produced by the stereoscopic image display unit 305 with any method known in the present technological field and is displayed in the three-dimensional display device 111 (S410). Therefore, since the operator can accurately touch the virtual operation screen displayed stereoscopically with hands or fingers, operations

Meta Platforms, Inc. - Ex. 1002
Page 173

such as touching icons displayed on the virtual operation screen can be performed. Here, in the present embodiment, the sequential flow to a point of performing the stereoscopic display of the virtual operation screen is explained, but basically in a case where the operator moves as a whole and the operation is difficult to be performed on the initially set virtual operation screen, the optimal configuration and position are calculated to once more carry out the stereoscopic display based upon the calculation, and the similar process is also repeated depending on contents to be displayed as the virtual operation screen. For example, in a case of displaying icons as the virtual operation screen, for facilitating the designating process of the icon by the operator, the virtual operation screen can be re-displayed with the optimal position and configuration in response to movements of hands or fingers.

[0063]

The operation determining unit 304 uses a relative relation between the virtual operation screen displayed stereoscopically in the operation input system and the operator 102 (S404) to determine that the operation has started when a part of the operator 102 comes on this side of the operation screen as viewed from the video camera 201 (S405), and determines to which operation a configuration or a movement of each portion corresponds, from the configuration and the movement of each portion (the hand is open, two fingers are raised or the like) (S406). Here, which configuration and movement correspond to which operation can be determined by the system independently

Meta Platforms, Inc. - Ex. 1002
Page 174

or can be determined by taking any of methods known in the present technological field, or it can be determined that the position is simply touched by an operator, for example, an icon is selected or a button is pressed. The determined result is executed by the computer 110 assuming that such input is made (S407), and in a case where the hand does not extend to this side from the virtual operation screen, it is determined that the operation is not performed, and the process ends (S408). The determination of the operation content is not limited to the process explained herein, but any of methods known in the present embodiment can be used. In addition, the special determination method is also omitted, but in general, the configuration and the movement of the body of an operator such as a gesture and the operation content which it means are stored in a data base or the like, and after the image extraction, access to the data base is made to determine the operation content. In this case also, the determination accuracy can be improved by using the image recognition technology or artificial intelligence based upon the method known in the present technological field.

[0064]

Here, it is understood that the position and the size in which the virtual operation screen is formed changes depending on a case where the operator is a child or an adult. Further, it is necessary to adjust the virtual operation screen depending on a position of the camera 201 or a position or a mounting angle of the three-dimensional display device 111 in addition to a difference of the body shape such as a height of the operator.

Meta Platforms, Inc. - Ex. 1002
Page 175

The three-dimensional camera can usually perform a distance measurement to a target object in parallel with or in a concentric shape with a CCD or a lens face. In a case where a monitor is installed in a height of eyes of an operator, a camera is in a close position, and each of them is installed perpendicularly to the floor surface, if the operator is in a standing position, it can be said that there is no necessity of particularly adjusting or correcting the position relation of each other and the like for producing an appropriate operation region. However, in a case of using a ceiling hanging type monitor or a super jumbo type monitor or projector, the position relation between the camera installing position or the monitor and the operator is assumed in various situations.

[0065]

In general, even if the virtual operation screen is displayed stereoscopically, since an operator performs an input operation while viewing an operation target screen, unless the virtual operation screen is always arranged perpendicularly to a straight line connecting a sight line of the operator and an operation target screen to produce an operation region along the virtual operation screen, an angle of a pushing stroke of the operator in the z direction causes non-agreement. Therefore, even if the operator performs a pushing operation to a point targeted, the pushing operation shifts along any of the stroke angles following the pushing operation, and there is a possibility that a normal operation can not be performed. Therefore, in a case of forming the virtual operation screen,

Meta Platforms, Inc. - Ex. 1002
Page 176

it is preferable to adjust an angle, a size or a position in some cases to be formed in accordance with positions and arrangement states of the monitor, the camera and the operator.

[0066]

By referring to Fig. 12, an operation region 821 and a virtual operation screen 601 are defined to match an operator 820 as shown in Fig. 11, but in a case where the camera 201 is arranged in the upper part of the three-dimensional display device 111 as in the case of an example shown in Fig. 12, unless the virtual operation screen 601 is perpendicular to a direction 910 where the operator 820 extends his arm, the operator 820 can not obtain a good operation feeling to the virtual operation screen. Therefore, it is preferable that the virtual operation screen 601 is not a plane perpendicular to a sight line direction of the camera 201.

[0067]

In addition, by referring to Fig. 13, since the three-dimensional display device 111 itself is installed upward and is attached at some degrees, the virtual operation screen 701 becomes a plane perpendicular to a direction 1010 having an upward inclination such that the operator 820 can perform an operation while looking up at the three-dimensional display device 111. In this case also, since a viewing field 1011 of the camera 201 is inclined at a constant angle to the sight line direction 1010 as similar to the example shown in Fig. 12, it is preferable to correct the information read by the camera 201 to match the inclined virtual operation screen 701. Further,

Meta Platforms, Inc. - Ex. 1002
Page 177

by referring to Fig. 14, the camera 201 is disposed away from the three-dimensional display device 111 and near the floor, and a larger angle is formed between the sight line 1010 of the operator 820 and the viewing filed of the camera 201. Therefore, it is preferable to make the correction corresponding to that angle.

[0068]

Fig. 15 is a diagram for explaining an example of defining the virtual operation screen 701 and the operation region 821. In the present embodiment, for determining the configuration and the position of the virtual operation screen, information of positions and arrangement methods (for example, at which angle it is installed) of the three-dimensional display device 111 and the camera 201, a standing position and a height of the operator 820, and the like is used. That is, as an example, first, the virtual operation screen 701 perpendicular to a sight line of the operator is calculated from a height of eyes (body height) of the operator 820 to the three-dimensional display device 111 and from a standing position of the operator 820. Next, an angle between line A-B connecting a head and a body of the operator 820 and a center line 1201 of the viewing filed of the camera 201 is measured to correct each inclination of the virtual operation screen and the operation region. A stroke of the arm may be extracted from an image of the operator or may be defined based upon information of an average length of the arm for each height separately from the obtained information of the height.

[0069]

Meta Platforms, Inc. - Ex. 1002
Page 178

The virtual operation screen and the operation region in the present embodiment are defined in such a manner that the determination on the natural operation and the easier operation is possible based upon the positions and the arrangement states of the camera, the monitor and the operator as described above, and an actual movement of the operator is detected to determine which operation is performed. However, the process necessary for putting the present embodiment into practice, that is, the special process not explained herein, for example, the process on how the position or the configuration is specified from the image of the three-dimensional display device 111 or the determination process on whether or not a part of the operator passes through the virtual operation screen can be achieved also by using any of methods known in the present technological field.

[0070] (Support of Operation input)

As explained above, by stereoscopically displaying the virtual operation screen by the three-dimensional video camera, the operator can recognize it as if an operation screen such as a touch panel existed on a space, and performs various operations to the operation screen, thus making it possible to perform the operation input by using the entirety or a part of the body. Further, by supporting the operation input such as displaying the screen image of operator to the virtual operation screen on the three-dimensional display device 111, the system in the present embodiment can be more easily used.

[0071]

Meta Platforms, Inc. - Ex. 1002
Page 179

Fig. 19 is a diagram showing an example of displaying guidance as the support of such operation input on the display device 111. For example, in a case of pointing out somewhere of an image displayed in the center portion of the display device111 by a pointer, an operator can point a desired spot by extending a hand-finger into the image formed as the virtual operation screen itself, but by displaying the state of the pointing as a pointer 901 shown in Fig. 19, the operator can perform the next operation while recognizing and confirming the operation having been currently performed. According to this example, for example, the pointer 901 is adapted to be displayed on a screen at the time a hand-finger protrudes from the operation screen and disappear at the time of pulling in from the operation screen or be displayed in dark and light coloring. Therefore, the operator can execute the input method of the present embodiment in a natural manner from the movement of the hand and the state of the pointer displayed on the display device 111. Likewise, by displaying an operation screen 902 having expressed the state of the operator himself in the form as shown in Fig. 9 and Fig. 10 on the top right corner of the three-dimensional display device 111 to be small, how the operator behaves at present and the movement is determined as what kind of the operation in the system can be displayed. In addition, a polygonal graph 903 having graphed the movement of a hand is shown to make the operator himself be conscious of the forward and backward movements of the hand, thereby expecting a more accurate operation. Further, although not shown, the

Meta Platforms, Inc. - Ex. 1002
Page 180

support can be made in such a manner that a gesture usable in the system can be displayed to the guidance to prompt the operator to perform the operation input according to the display.

[0072](Operation In Deep Side of Virtual Operation Screen - Virtual Operation Layer)

The present embodiment is designed such that an operator performs an operation on a basis of a virtual operation screen stereoscopically displayed virtually on a space as if an input device such as a touch panel existed therein, thus certainly determining the operation content, but the content of the operation thus determined is determined based upon a position relation between the virtual operation screen in the deep direction from the virtual operation screen and in a direction away from the operator and a part of the body such as a hand of the operator or an object worn by the operator. For example, the two-layered or three-layered operation region is set as a virtual operation layer in the z axis direction which is a direction away from the operator, and the kind of the operation is determined based upon into which layer the hand of the operator enters, thus determining the operation content from the hand behavior within the layer. At this time, when the hand of the operator, the kind of the operation and the like are displayed on the display screen which the operator virtually recognizes, the operator can further facilitate the recognition of the operation. It should be noted that a distance in the z axis direction between the part of the operator and each of the faces dividing the respective layers can be obtained by the method

Meta Platforms, Inc. - Ex. 1002
Page 181

for calculating a distance between the formed virtual operation screen and the part of the operator as described above.

[0073]

As will be explained more concretely, a trigger face 701 shown in Fig. 27 is a virtual operation screen in the present embodiment. According to any of the aforementioned embodiments, the finger 601 enters in the z axis direction from the trigger face 701, it is determined that the operation is performed. Further, the operation region ahead of the trigger face 701 is divided into three layers of layer A to layer C at a screen 4501 and at a screen 4502, to each of which a different kind of the operation is assigned. In an example in Fig. 27, an operation of rotation of an object is assigned to layer A, an operation of scaling is assigned to layer B, and an operation of transfer of an object is assigned to layer C. The determined operation is performed by the movement of the finger 601 in each layer. For example, in layer A, at the time when the finger 601 passes the trigger face 701, the object pointed around a position shown in an icon showing the finger 601, for example, in a rotating icon 4503 is rotated in response to the movement of the finger 601. In layer B, for example, a scaling icon 4504 is displayed on the three-dimensional display device 111, wherein when the finger 601 is moved in the z direction, the object can be enlarged, and when moved in the opposite direction, the object can be reduced.

[0074]

Meta Platforms, Inc. - Ex. 1002
Page 182

Likewise, in layer C, a movement icon 4505 is displayed in a position of the finger 601 on the target displayed and pointed on the three-dimensional display device 111, thereby making it possible to move the object in accordance with the movement of the finger 601. Here, the face 4501 and the face 4502 partitioning the respective layers may be arranged such that each layer has the same thickness or may be arranged such that each layer has a different thickness in accordance with the operation kind assigned to each layer. For example, in the example in Fig. 27, the operation of scaling is assigned to layer B, but the movement in the z direction is usually larger as compared to that of layer A or layer C because the scaling is required to be expressed by the forward and backward movements. Therefore, the operation can be facilitated by furthermore thickening layer B.

[0075]

The layers as explained above can be used in a natural touch feeling of the operator by determining the interval of each layer based upon a standardized stroke, but in the present embodiment, the face 4501, the face 4502 and the like partitioning the respective layers are stereoscopically displayed in positions set appropriately as similar to the virtual operation screen 701, and thereby the operator can certainly recognize the boundary between the layers. Alternatively, any or all of layers A, B and C are stereoscopically displayed with gradation corresponding to a depth of the layer, and thereby the operator can recognize the existence and the depth of the layer, and further,

Meta Platforms, Inc. - Ex. 1002
Page 183

the layer can be more effectively expressed by any of the display methods known in the present technological field.

[0076]

Fig. 28 is a diagram showing an example of a different icon in the present embodiment. In an example shown in Fig. 28, an operation for specifying an operation position on the three-dimensional display device 111 is assigned to layer A, an operation for "grabbing" an object in the specified position is assigned to layer B, and an operation for throwing or moving the grabbed object is assigned to layer C. It should be noted that the above icons may be used in a two-dimensional display and may be displayed stereoscopically by adjusting the icon in use for stereoscopic display.

[0077]

As explained above, at the time of the determining of the operation content having been determined as the operation by the virtual operation screen, the kind of the operation can be specified in accordance with not only the movement of the hand or the finger but also the position thereof in the z direction, that is, the virtual operation layer. Therefore, as compared to the determination of the operation where in a case of specifying the operation only by the movement of the finger or the hand, it is required to prepare many various gestures and for the operator to learn them, the operator can perform complicate movements as needed only by a simple movement.

[0078]

Meta Platforms, Inc. - Ex. 1002
Page 184

It should be noted that in the aforementioned examples, particularly in the example shown in Fig. 27, the operations for being capable of sequentially carrying out a series of movements of hands, fingers or the like between the respective layers are arranged. However, In a case of being not capable of sequentially performing the operations (example shown in Fig. 28), there occurs a problem of two points as follows. That is, (1) a hand-finger passes the other layer before the hand-finger reaches the virtual operation layer as a target and an instruction which the operator does not desire is given, and (2) in a case of pulling in the hand out of the operation region after the targeted operation is finished, the hand-finger passes the other virtual operation layer, and an instruction which the operator does not desire is given. For avoiding the above problem, for example, the following method and the like will be considered. That is, a multi-sensing state of inserting a hand opposite to a hand for an operation into an operation region (for example, in a state where, in a case where the operation is performed with a right hand, a left hand is inserted into the operation region) is set as a state of absence of an operation (or in reverse, as a state of presence of an operation). Thus it is determined whether or not the operation of each layer is performed, based upon the in and out operation of the hand opposite to the hand for the operation (in this example, the operation determination is made by the operations of both hands, but there are considered various methods such as a method for providing a passing area on an XY plane).

[0079]

As the present embodiment is used as above, the operator can perform the operation of the system in response to the movement of the operator without in advance learning or arrange gestures, and further, the posture or each part of the operator, for example, the movement of the hand can be comprehended. Therefore, when the present embodiment is applied to a game using an entire body of an operator, a so-called mixed reality (MR) can be realized.

[0080] (Second Embodiment)

The present embodiment differs in a point where the virtual operation screen stereoscopically displayed in the aforementioned first embodiment is in advance specified by the operator for setting, from the first embodiment, but is the same as the first embodiment in terms of the system construction, the process of how the movement which the operator performs to the virtual operation screen is recognized as the operation, and the like. That is, in the present embodiment, as described later, in a case where the operator performs an operation, first, where to set the virtual operation screen is instructed by a constant operation and the virtual operation screen is formed according to the instruction. Therefore, since the operator can in advance recognize where and what operation screen exists without stereoscopically displaying the virtual operation screen by the three-dimensional display device as in the case of the system in the first embodiment, it is not necessarily required to stereoscopically display the virtual operation screen, and the regular two-dimensional display device can be

Meta Platforms, Inc. - Ex. 1002
Page 186

used. However, for furthermore securing the recognition of the virtual operation screen, the virtual operation screen may be stereoscopically displayed also by using the three-dimensional display device. As described above, since the process after forming the virtual operation screen in response to the instruction of the operator in the present embodiment is basically the same as in the first embodiment, hereinafter the setting process of the virtual operation screen will be primarily explained.

[0081] (Setting of Virtual Operation Screen)

Fig. 32 are diagrams each showing an image photographed for determining a region for setting a position of an operation screen from a gesture of an operator according to the present embodiment. As in an example shown in Fig. 32, a configuration of the operation screen (including a size and an angle to the display device) is determined by hands 3202 and 3203 of the operator in the image 3201 photographed by the three-dimensional camera 201, and a position of the virtual operation screen 3201 is determined from a distance to the hands 3202 and 3203 from the display of a distance data image 3211in the z direction and a distance to a body 3204 from the display. Concretely, the depth can be comprehended from image data of the operator photographed by the three-dimensional camera 201. Fig. 33 is a diagram explaining extraction of a position in a pointed operation screen according to the present embodiment and shows an image of the operator in the depth direction (z direction). By referring to Fig. 33, it is understood that the operation

Meta Platforms, Inc. - Ex. 1002
Page 187

screen 3201 should be formed in a position which the operator indicates with the hand 3202.

[0082]

In the present embodiment, this setting process of the virtual operation screen starts after power input of the system or by a particular operation, for example, by an instruction of a remote controller, but is not limited thereto, and may start by any of methods or timings known in the present technological field. Fig. 35 is a flow chart showing the process for setting a position of an operation screen by a gesture of an operator according to the present embodiment. Here, as shown in Fig. 7, in a case of a plurality of operation candidates explained in the aforementioned first embodiment, a person for setting a virtual operation screen may be determined as an operator, and the virtual operation screen set at this time is used by the determined operator. As a result, when the virtual operation screen to be explained in the present embodiment is set, by displaying icons or boxes of operators as shown in Fig. 41 and Fig. 42 on a screen, operator candidates including the determined operator can recognize who is the operator, thus preventing an erroneous operation.

[0083]

First, a system program starts by power input thereto (S3501), and a device management of various settings of devices used in the system is executed (S3502). Herein a frame obtaining process of a virtual operation screen starts (S3503), and the system is in a state of waiting for instruction input from an

Meta Platforms, Inc. - Ex. 1002
Page 188

operator (S3504). When the instruction is inputted to obtain image data (S3505), after an operation screen extracting process to be described later is executed (S3506), a device post-process is executed and the setting of the virtual operation screen ends (S3509).

[0084]

Next, by referring to Fig. 34 and Fig. 36, the operation screen extracting process will be explained. Fig. 34 are diagrams showing distance data images obtained from a camera for extracting a position of a pointed operation screen according to the present embodiment, and Fig. 36 is a flow chart showing the process for extracting the position of the pointed operation screen according to the present embodiment. First, when data, that is, stereoscopic image data of an operator is inputted (S3601), a configuration of a hand and a head of the operator are recognized (S3602, S3603) to determine whether or not a virtual operation screen is formed (S3604). Concretely, for example, when the hand maintains a given, predetermined gesture for a constant time, it is determined that it points out the setting process of a virtual operation screen, a virtual operation screen of the configuration including a position and a size pointed out by the hand of the operator is extracted from the distance data image as shown in Fig. 34 to form the virtual operation screen (S3605), and an operation region is set based upon a measurement value of a body of the operator, for example, a length of an arm and a position of a body or a head (S3606) to output the data, thus ending the process (S3609). Here, in

Meta Platforms, Inc. - Ex. 1002
Page 189

the present embodiment, it is determined that the setting instruction of the virtual operation screen is made by stopping the movement of the hand and the like for a constant time, but the setting instruction is not limited thereto, and the setting instruction may be determined by any of the methods known in the present technological field, such as various gestures and an instruction by a remote controller operation. It should be noted that in the present embodiment, the virtual operation screen is basically formed in the configuration and the position shaped by the hand, but may be adjusted in accordance with the body feature of the operator, the position and the use state of the display device, and the like.

[0085]

When it is determined that the movement does not point out the setting process of the virtual operation screen from the recognition of the head or the gesture of the hand, it is determined whether or not the virtual operation screen is in a state of being already set (S3607). In a case where the virtual operation screen is set, the position of the hand within the operation region is obtained based upon determination of a regular operation (S3608). As described above, the setting process of the virtual operation screen based upon the instruction of the operator is executed, but in the present embodiment, since the operator instructs the virtual operation screen by himself, the recognition of the virtual operation screen can be made without separately showing the position of the virtual operation screen to the operator with some different

method. It should be noted that since various gestures can be considered as the gesture instructing the configuration and the position of the virtual operation screen by using ordinary knowledge in the present technological field, any of them can be used in the present embodiment. Examples of such variations will be shown in Fig. 37A to Fig. 37F.

[0086] (Operation Support On This Side of Virtual Operation Screen)

The present embodiment is designed such that an operator performs an operation on a basis of a virtual operation screen stereoscopically displayed virtually on a space as if an input device such as a touch panel existed therein, thus certainly determining the operation content. However, particularly in a case of not stereoscopically displaying the virtual operation screen, which is different from the case of the aforementioned first embodiment, the operation support is made until a hand or a finger as a part of the operator reaches the virtual operation screen, that is, in a period from a point where the operator starts to move a hand or a finger for execution of some operation to a point where the operator presses down the virtual operation screen, and thereby, the operation input can be performed more easily and more accurately.

[0087]

Basically this principle of the operation support is designed such that by visually displaying on the three-dimensional display device 111 what kind of operation the operator will perform in accordance with movements of positions

Meta Platforms, Inc. - Ex. 1002
Page 191

in portions of the operator, for example, a hand or a finger, the operator is guided to enable the accurate operation input.

[0088]

As this respect is explained with reference to Fig. 20 and Fig. 12, in the present embodiment, in a case where the operator can in advance perform an operation in a constant standing position, the virtual operation screen 701 is stereoscopically displayed in a position suitable for an operation to the virtual operation screen at the standing position in advance set or in an appropriate position as needed in accordance with the standing position of the operator. Likewise, as shown in Fig. 20, an operation region 821 suitable for the operator 820 is in advance set. As described above, by showing what kind of operation will be currently performed on the three-dimensional display device 111 with various forms, the operator can recognize his own operation.

[0089]

As one of these forms is explained with reference to Fig. 21, in a case where an operator performs some operation to the system, a position of a hand or a finger 601 changes by moving an arm 2401 forward and backward to the three-dimensional display device 111 in the present example. Therefore, when the state is displayed in the three-dimensional display device 111, as the protruding finger 601 reaches a constant position, a constant process as the system is executed at this time, for example, the item instructed on a screen of the three-dimensional display device 111 is executed. In the example in Fig. 21, a size of

Meta Platforms, Inc. - Ex. 1002
Page 192

the icon changes depending on a position (depth) of the finger 601 to the virtual operation screen 701, and as the finger 601 approaches the virtual operation screen, the icon becomes the smaller, and therefore, the operator can recognize that the finger is focused on a constant spot by his own operation. In a position where the icon is changed to the smallest, the operation is fixed and the process corresponding to it is executed.

[0090]

As a result of the above operation, Fig. 22 shows how the icon changes on a screen 2501 of the three-dimensional display device 111. By referring to Fig. 22, for example, a television program table is stereoscopically displayed on the screen 2501 of the three-dimensional display device 111, wherein an operation in regard to some program will be performed. In this state, for example, when an operator selects a menu button of "Setting Change", the operator extends the finger 601 toward the three-dimensional display device 111 as described above to select the menu button. In the present embodiment, when the finger 601 approaches the television program table as the virtual operation screen by a given distance, an icon 2503 is displayed on the screen 2501. In regard to icons, since the position of the finger is still at a distance, a relative large icon in the right side among icons shown in Fig. 22 is displayed. When the operator further extends his arm 2401, this icon approaches "Setting Change" of a selection item as a target to be smaller, and becomes a particular icon at the time of an icon 2502 having a constant size. When the finger crosses the virtual operation

Meta Platforms, Inc. - Ex. 1002
Page 193

screen, it is determined that the item of the pointed position is selected. Here, the television program table is stereoscopically displayed in the position of the virtual operation screen for the operator, but the icon is not necessarily displayed in the same position and may be display two-dimensionally or may be arranged in a more appropriate position by a 3D display.

[0091]

In this manner, in the example in Fig. 22, by changing the size of the icon displayed on the screen 2501 according to the position of the finger 601, the operator can comprehend how his own movement is recognize in the system and the position of the virtual operation screen can be more easily recognized for the operator to perform the operation such as selection of the menu. Here, the positions and the sizes of the entire operator including the finger 601 and the arm 2401 and each portion can be extracted by using the three-dimensional camera in the same way as an entire image of the operator. In consequence, since the object within the screen can be figured out including the depth, it is possible to calculate the distance and the position relation to the virtual operation screen based upon these pieces of information. However, in regard to the three-dimensional camera used in the present embodiment, the extraction of the position, the calculation of the distance and the like, any of methods known in the present technological field can be used, and therefore, the explanation is herein omitted.

[0092]

Meta Platforms, Inc. - Ex. 1002
Page 194

Herein the icon displayed on the screen is formed in a circular shape and changes in size in accordance with the movement of the operator, but is not limited thereto, and icons having various forms as shown in Fig. 23 can be used for various changes. That is, by referring to Fig. 23, Example (1) shows icons regarding a form of a finger, wherein the icon is smaller as the finger approaches the virtual operation screen in the same way as in the example in Fig. 22. Example (2) shows that an icon is circular and is gradually smaller, but when the input or selection is fixed, the icon changes into a particular configuration for determination of the operation. In a case of this icon or other icons, a color of the icon can be changed instead of the change of the configuration (including a size and an angle to the display device) or in agreement therewith. For example, the operator can intuitively recognize that the operation is focused and fixed by changing the color from a cold group to a warm group, such as in the order of blue, green, yellow, and red. Example (3) shows that an icon is formed in an X shape, wherein in a case where the icon is at a distance, the icon is not only large but also is shown with gradation, and as the icon is nearer, a size of the icon is smaller and is formed in a sharp shape with the gradation disappearing. Example (4) shows that there is recognized a state where an entire icon does not change in size, and a figure drawn inside it changes in configuration to be focused. In this case, a color of the figure can be also changed. Example (5) shown in Fig. 23 also shows an example of changing a configuration of an icon. In Fig. 23, a configuration and a

Meta Platforms, Inc. - Ex. 1002
Page 195

color of the icon change in response to the movement of the finger, and by changing it into various configurations or colors or repeatedly turning on and off the icon as shown in column 2601 in a moment when the finger is over the virtual operation screen, the operator may recognize that the movement is determined as the operation. In addition, although not shown, in regard to other changes of the icon, a change that at first, the icon is transparent and becomes less transparent as the finger is closer to the virtual operation screen is also effective. Further, although not shown, as the focus of an icon is advanced using a stereoscopic display function of the three-dimensional display device, an image which looks like the icon protruding from the screen can be produced, thus let the operator know a situation of the focus.

[0093]

Here, among variations of the icon, particularly in a case of changing a color or a density of an icon without changing a configuration thereof so much, as the finger 601 is closer without moving the icon so much as shown in Fig. 24, the color of the icon becomes a color in a warm color group or dense, thus making it possible to fix the input.

[0094]

In addition, in the example as described above, for confirming the determination situation of the operation, the icon is displayed in the position of the virtual operation screen and the color or the configuration of the icon is changed in accordance with the movement of the operator, but, for example,

Meta Platforms, Inc. - Ex. 1002
Page 196

in a case where the position to be pointed is in advance fixed from the beginning as in the case of the menu, without bothering to display the icon, the operation is determined based upon which item button of the stereoscopically displayed menu the position pointed out by the finger is the closest to, wherein by changing a color or a density for filling the pointed item button in accordance with the movement of the finger, particularly a distance from the virtual operation screen, the position of the virtual operation screen is more easily comprehended, making it possible to facilitate the operation input.

[0095]

As a selection example of the similar menu, there is an example as shown in Fig. 26, which therefore will be explained. For example, as the finger 601 in Fig. 21 enters into a constant region on this side of the virtual operation screen 701, a menu 4301 is stereoscopically displayed in a position of the virtual operation screen on the screen and when the finger 601 is closer to the virtual operation screen 701, a large icon 2601 is displayed on an item 4302 of the menu shown in Fig. 26, for example. Thereafter, when the finger 601 reaches to the virtual operation screen 701, the selection of the item 4302 is fixed and a small icon 2611 is displayed, thereby notifying the selection fixation. Thereafter, by moving the finger 601 right, left, upward or downward, when the selection item of the menu moves and stops in a desired item for a constant time, the process in agreement with the selected item can be executed. In addition, when the finger 601 is moved backward of a constant region on this side

Meta Platforms, Inc. - Ex. 1002
Page 197

from the virtual operation screen 701 before the selection is performed, the menu can be deleted. Fig. 31 also stereoscopically displays the menu in a position of the virtual operation screen when the finger 601 enters into a constant region on this side of the virtual operation screen 701 in the same way as in Fig. 26, which is herein an example of video screen image control. In this example, in the same way as the example in Fig. 26, an operation of the menu is possible by a large icon 3110 and a small icon 3111.

[0096]

Further, an example of a different input operation will be explained with reference to Fig. 25. Fig. 25 is diagrams each showing a display screen of an example of inputting an instruction for moving a figure displayed on a screen by the present embodiment. Herein the display screen is stereoscopically displayed in a position of the virtual operation screen, and the instruction is made by touching a hand or a finger of the operator on the virtual operation screen and moving it. First, as the finger and the like are closer to the screen, an icon 4201 on a screen 4211 is changed to an icon 4202 on a screen 4212 to reduce the icon, which shows that the finger is approaching the virtual operation screen. Thereafter, when the finger touches the virtual operation screen, the icon is changed in color as in the case of an icon 4203 on a screen 4213 to be left therein. In that state, when the finger and the like move upwards, a rubber band 4204 on a screen 4214 is displayed to show the movement direction, and thereby the operator can confirm his

Meta Platforms, Inc. - Ex. 1002
Page 198

own operation. In addition, when the finger moves in the right direction, a rubber band 4205 on a screen 4215 can be displayed. The rubber band (arrow mark in the above figure) expanding in accordance with a drag distance of the finger in the upward, downward, right or left direction after the finger reaches the virtual operation screen appears (position of the icon 4203 is fixed until the finger is out of the virtual operation screen), and the moving speed can be changed in accordance with the expanding distance and a moving direction of the icon within a 3D space can be changed in accordance with an expanding angle (tip end of the arrow mark follows the movement of the arm front or finger front).

[0097]

As described above, in a case where the operator is positioned in the substantially same height with the monitor as shown in Fig. 20, that is, in a case where the virtual operation screen is formed to be substantially perpendicular to the front face of the operator in the horizontal direction, the principle of the present embodiment is explained, but this principle is not affected by the position relation between the operator and the display device or the configuration of the display device, and various arrangements or various constructions of the display device are possible. For example, the principle can be applied to the arrangement of the system as shown in each of Fig. 13 to Fig. 15. In this case, since the three-dimensional camera 201 and the three-dimensional display device 111 both are inclined, the arrangement does not basically have a large

Meta Platforms, Inc. - Ex. 1002
Page 199

difference from the aforementioned arrangement in the horizontal direction, but even if the camera is installed in a different position, the position correction is made by any of the methods known in the present technological field, and thereby the position relation between the portion of the operator and the virtual operation screen can be calculated to determine the operation.

[0098]

As described above, since the present embodiment is adapted to set the virtual operation screen itself with an intention of an operator before processing the operation input based upon the virtual operation screen explained in the first embodiment, the setting process only is explained, but once the virtual operation screen is set, even if combined with any of the functions in the first embodiment, the operation input process can be executed.

[0099] (Third Embodiment)

The present embodiment can be basically used in common with the first embodiment and the second embodiment, and is therefore similar in terms of the system construction and the process of setting the virtual operation screen and the like, but has an improvement on the determination process of the operation. That is, the present embodiment basically has the process similar to that of each of the first embodiment and the second embodiment, but is adapted in such a manner that, for example, at the time of selecting an icon by using a virtual operation screen, particularly when a pressing direction of a

Meta Platforms, Inc. - Ex. 1002
Page 200

finger is made by mistake in a case of a small icon, since there is a possibility that the icon can not be appropriately pointed out or a different icon is pointed out, a grid is set around the icon to cause grid snapping, thus more easily pointing out the desired icon. In a case where as in the case of the present invention, the operation screen is virtually set which is used as a reference of the operation, even if the various processes for ascertaining the recognition of the operation screen are provided as in the case of the first and the second embodiment, the operator can not always point out the accurate position. In the present embodiment, in a case where the operator points out an icon in a more or less erroneous position or direction, for example, in a case of the example as shown in Fig. 15, a desired icon can be accurately selected even if the inclination or the position of the operation screen is not adjusted.

[0100]

Fig. 38 is a diagram showing an example of a target screen used in the grid snapping process according to the present embodiment. Fig. 39 is a diagram showing a setting example of grids used in the grid snapping process according to the present embodiment. As shown in Fig. 39, for example, a grid 4001 is set larger than each icon to surround an icon 3902. Therefore, even in a case where an operator tries to press the icon 3902 but does not accurately press the icon 3902, if the finger enters into the range of the grid 4001 surrounding the icon 3902, the grid snapping can be caused to determine that the icon 3902 is pointed out. Further, by adjusting a division position between

Meta Platforms, Inc. - Ex. 1002
Page 201

the grids or the like, when pointed out between the icons, it can be determined that the icon which is the closest to the pointed position is pointed out.

[0101]

Concretely, the focus is snapped to a center position of the icon or the link on an operation target display device toward a target (icon or link) center from the circumference of a constant area by means of an exclusive browser, a content production tool or the like. In consequence, the selection operation can be facilitated, and even if the virtual operation screen is inclined, no problem occurs in a plane pointing movement of the operator. After obtaining stability of the focus movement on the XY plane in some degrees by the above process, in a case where a pressing stroke (touch operation to the touch panel in the air) in the Z axis direction is performed from the virtual operation screen, the guide continues to be made in such a manner that the focus is not shifted from the target (fixing the XY focus) also after the pressing movement, only the pressing stroke in the Z direction is determined, that is, even if the finger is out of the icon region by the pressing from the virtual operation screen, only the pressing is recognized to ignore the movement of the finger on the XY plane, and a series of touch strokes after that are processed as stable ones.

[0102]

In addition, as to the correction other than the above, in a case where a mount position or an angle of the camera or the like is very different from that of the operation target

Meta Platforms, Inc. - Ex. 1002
Page 202

display device, the grid snapping can be more effective by expanding and enlarging the snapping area defined arbitrarily on the XY plane, in the depth direction of the Z axis (area corresponding to an angle amount of "shift" due to a difference in the mount angle of the camera or display device).

[0103]

By referring to Fig. 40, in a case where the operation entrance is made from a two-dimensional icon area "D", even in a case where a pressing stroke of a tip end of a hand is deviated, the erroneous movement due to blurring (due to trembling of a hand or difficulty of stable movement) or "shift" (due to camera, display device, and height difference) can be prevented by making the snapping determination of the pressing stroke of the Z axis within the area "E" as it is by a stereoscopic area "E" developed in the depth direction.

[0104]

As described above, the present embodiment is constructed such that at the time of processing the operation determination based upon the virtual operation screen explained in the first and second embodiments, particularly when an icon operator performs a movement for pointing out a constant region such as an icon, in a case where an accurate pointing can not be made due to various causes, an appropriate operation is determined by the process called grid snapping. Therefore, the special grid snapping process only is explained, but the operation input process can be executed even by combining the grid snapping process with any of functions such as the process other than

Meta Platforms, Inc. - Ex. 1002
Page 203

the above and the setting of the virtual operation screen explained in the first embodiment and the second embodiment.

Meta Platforms, Inc. - Ex. 1002
Page 204

CLAIMS

1. An image recognition apparatus comprising:

three-dimensional photography means for reading an image of an operator to produce stereoscopic image data;

operation screen forming means for forming a virtual operation screen in a configuration and a position based upon the image and the position of the operator read by the three-dimensional photography means;

operation determining means for, by reading a movement of an image of at least a part of the operator to the formed virtual operation screen by the three-dimensional photography means, determining whether or not the movement is an operation based upon a position relation between the part of the operator and the virtual operation screen; and

signal output means for outputting a predetermined signal when it is determined that the movement is the operation.

2. An image recognition apparatus according to claim 1, wherein

in a case where the three-dimensional photography means reads a plurality of operation candidates, it is determined that an operation candidate performing a predetermined particular movement is the operator.

Meta Platforms, Inc. - Ex. 1002
Page 205

3. An image recognition apparatus according to claim 1 or 2, further comprising:

operator display means for displaying a position relation between the operation candidate determined as the operator, and the present operator and the other candidate shown in the image of the plurality of the candidates read by the three-dimensional photography means.

4. An image recognition apparatus according to any one of claims 1 to 3, further comprising:

a position determining face arranged in a predetermined position in a side of the operator of the virtual operation screen for determining an operation position on the virtual operation screen, wherein

the operation determining means, at the time of crossing the virtual operation screen in a series of movements in which a part of the operator moves from the position determining face to the virtual operation screen, determines an operation of the operator as a movement that the part of the operator crosses a position on the virtual operation screen corresponding to a position on the position determining face which the part of the operator crosses.

5. An image recognition apparatus according to any one of claims 1 to 4, wherein

Meta Platforms, Inc. - Ex. 1002
Page 206

positions of an arm and a face of the operator are extracted from the read image of the operator, and

a configuration and a position of the virtual operation screen are determined based upon the extracted positions of the arm and the face.

6. An image recognition apparatus according to any one of claims 1 to 5, wherein

the position of the virtual operation screen is between the operator and the three-dimensional photography means.

7. An image recognition apparatus according to any one of claims 1 to 6, wherein

the operation screen forming means forms the virtual operation screen in a configuration and a position defined based upon the image of the operator and a predetermined particular movement of the operator which are read by the three-dimensional photography means.

8. An image recognition apparatus according to any one of claims 1 to 7, wherein

the operation screen forming means forms the virtual operation screen at an angle defined based upon the image of the operator and a predetermined particular movement of the operator which are read by the three-dimensional photography means.

Meta Platforms, Inc. - Ex. 1002
Page 207

9. An image recognition apparatus according to any one of claims 1 to 7, wherein

the operation screen forming means forms the virtual operation screen at an angle defined based upon the image and the position of the operator read by the three-dimensional photography means.

10. An image recognition apparatus according to any one of claims 1 to 9, further comprising:

operation screen stereoscopic display means for displaying a stereoscopic image showing the formed virtual operation screen.

11. An image recognition apparatus according to claim 10, wherein

the stereoscopic image is formed by a binocular parallax.

12. An image recognition apparatus according to claim 10 or 11, wherein

a distance between the part of the operator and the virtual operation screen is calculated from the position relation therebetween to stereoscopically display a predetermined index showing the position relation of the part of the operator to the virtual operation screen at a position corresponding to the distance.

13. An image recognition apparatus comprising:

Meta Platforms, Inc. - Ex. 1002
Page 208

three-dimensional photography means for reading an image of an operator to produce stereoscopic image data;

operation screen forming means for forming a virtual operation screen in a configuration and a position based upon a predetermined particular movement of the operator read by the three-dimensional photography means;

operation determining means for, by reading a movement of an image of at least a part of the operator to the formed virtual operation screen by the three-dimensional photography means, determining whether or not the movement is an operation based upon a position relation between the part of the operator and the virtual operation screen; and

signal output means for outputting a predetermined signal when it is determined that the movement is the operation.

14. An operation determining method comprising:

a three-dimensional photography step for reading an image of an operator to produce stereoscopic image data;

an operation screen forming step for forming a virtual operation screen in a configuration and a position based upon the image and the position of the operator read by the three-dimensional photography step;

an operation determining step for, by reading a movement of an image of at least a part of the operator to the formed virtual operation screen by the three-dimensional photography step,

Meta Platforms, Inc. - Ex. 1002
Page 209

determining whether or not the movement is an operation based upon a position relation between the part of the operator and the virtual operation screen; and

a signal output step for outputting a predetermined signal when it is determined that the movement is the operation.

15. An operation determining method according to claim 14, wherein

the operation determining step, at the time of crossing the virtual operation screen in a series of movements in which a part of the operator moves from a position determining face arranged in a predetermined position in a side of the operator of the virtual operation screen for determining an operation position on the virtual operation screen to the virtual operation screen, determines an operation of the operator as a movement that the part of the operator crosses a position on the virtual operation screen corresponding to a position on the position determining face which the part of the operator crosses.

16. An operation determining method according to claim 14 or 15, further comprising:

an operation screen stereoscopic display step for displaying a stereoscopic image showing the formed virtual operation screen.

17. A computer readable medium storing program for executing an operation determining method for recognizing an image of an operator

Meta Platforms, Inc. - Ex. 1002
Page 210

to determine an operation content by an image recognition apparatus, the operation determining method comprising:

a three-dimensional photography step for reading an image of an operator to produce stereoscopic image data;

an operation screen forming step for forming a virtual operation screen in a configuration and a position based upon the image and the position of the operator read by the three-dimensional photography step;

an operation determining step for, by reading a movement of an image of at least a part of the operator to the formed virtual operation screen by the three-dimensional photography step, determining whether or not the movement is an operation based upon a position relation between the part of the operator and the virtual operation screen; and

a signal output step for outputting a predetermined signal when it is determined that the movement is the operation.

18. A computer readable medium according to claim 17, wherein

the operation determining step, at the time of crossing the virtual operation screen in a series of movements in which a part of the operator moves from a position determining face arranged in a predetermined position in a side of the operator of the virtual operation screen for determining an operation position on the virtual operation screen to the virtual operation screen, determines an operation of the operator as a movement that the

part of the operator crosses a position on the virtual operation screen corresponding to a position on the position determining face which the part of the operator crosses.

19. A computer readable medium according to claim 17 or 18, further comprising:

an operation screen stereoscopic display step for displaying a stereoscopic image showing the formed virtual operation screen.


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PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	76	(virtual ADJ (reality environment world)) SAME (app application) ADJ icons!	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:00 AM
L2	7	(virtual ADJ (reality environment world)) SAME (app application) ADJ icons! SAME (arm)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:00 AM
L3	35	(virtual ADJ (reality environment world)) SAME (app application) ADJ icons! SAME (select$3)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:02 AM
L4	0	(virtual ADJ (reality environment world)) SAME icons WITH (arm) near3 (length	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU,	OR	ON	ON	2022/07/18 11:14 AM

		distance)	CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L5	9	(virtual ADJ (reality environment world)) AND icons WITH (arm) near3 (length distance)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:14 AM
L6	0	(virtual ADJ (reality environment world)) AND icons near3 (position arrang$5 layout) WITH (arm) near3 (length distance)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:15 AM
L7	0	(virtual ADJ (reality environment world)) AND icons WITH (position arrang$5 layout) WITH (arm) near3 (length distance)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA,	OR	ON	ON	2022/07/18 11:15 AM

			VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L8	9	((augmented mixed virtual) ADJ (reality environment world)) AND icons WITH (arm) near3 (length distance)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:17 AM
L9	293	((augmented mixed virtual) ADJ (reality environment world)) AND (arrang$5 layout) WITH (arm) near3 (length distance)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:17 AM
L10	13	((augmented mixed virtual) ADJ (reality environment world)) AND (arrang$5 layout) WITH (arm) near3 (length distance) WITH (objects! items! icons!)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:17 AM
L11	338	(display$3 present$3 arrang$5) near3 (objects! items!) WITH (arm) near3 (length distance)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB,	OR	ON	ON	2022/07/18 11:23 AM

			HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L12	18	(display$3 present$3 arrang$5) near3 (objects! items!) WITH (arm) near3 (length distance) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:23 AM
L13	1557	(arm "arm's") near3 (average) near3 (length)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:37 AM
L14	137	(arm "arm's") near3 (average) near3 (length) WITH (child$3 adult)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2022/07/18 11:38 AM

			IBM_TDB)				
L15	8	(arm "arm's") near3 (average) near3 (length) WITH (child$3) WITH (adult)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:38 AM
L16	15	(arm "arm's") near3 (average) near3 (length) WITH (child$3 adult) AND (715.clas. g06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:40 AM
L17	8043	((augmented mixed virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped) near3 (icon button object)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:47 AM
L18	1182	((augmented mixed virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) WITH gesture	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV,	OR	ON	ON	2022/07/18 11:47 AM

			MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L19	254	((augmented mixed virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) near3 (graphical virtual) WITH gesture	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:47 AM
L20	97	((augmented mixed virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) near3 (graphical virtual) WITH gesture AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:47 AM
L21	46	((augmented mixed virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) near3 (graphical virtual) WITH gesture WITH (hand finger) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:48 AM
L22	41	((augmented mixed	(US-PGPUB; USPAT;	OR	ON	ON	2022/07/18

		virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) near3 (graphical virtual) WITH gesture WITH (hand finger) WITH user AND (715.clas. G06f3/048-05.cpc.)	USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				11:48 AM
L23	30	((augmented mixed virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) near3 (graphical virtual) WITH gesture WITH (hand finger) WITH user SAME (headset head googles HMD) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:48 AM
L24	30	((virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) near3 (graphical virtual) WITH gesture WITH (hand finger) WITH user SAME (headset head googles HMD) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:48 AM
L25	39	((virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) near3 (graphical virtual) WITH (push$3 pull$3 tap tapping tapped press$3 slid$3) near3 (hand	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL,	OR	ON	ON	2022/07/18 11:54 AM

		finger body) AND (715.clas. G06f3/048-05.cpc.)	PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L26	19	((virtual) ADJ (reality environment world)) SAME (icons! buttons!) near3 (virtual graphical) WITH (settings) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:03 PM
L27	0	((virtual) ADJ (reality environment world)) SAME (icons! buttons!) near3 (virtual graphical) WITH (settings) SAME (app application) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:04 PM
L28	19	((virtual) ADJ (reality environment world)) SAME (icons! buttons!) near3 (virtual graphical) WITH (settings) AND (app application) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:04 PM
L29	0	((virtual) ADJ (reality environment world)) SAME (icons! buttons!	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY,	OR	ON	ON	2022/07/18 12:04 PM

		shortcuts!) near3 (virtual graphical) WITH (settings) AND (app application) ADJ (icons! buttons! shortcuts!) AND (715.clas. G06f3/048-05.cpc.)	CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L30	3	((virtual) ADJ (reality environment world)) SAME (icons! buttons! shortcuts!) near3 (virtual graphical) WITH (settings) AND (app application) WITH (icons! buttons! shortcuts!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:04 PM
L31	11	((virtual) ADJ (reality environment world)) SAME (icons! buttons! shortcuts!) near3 (virtual graphical) SAME (settings) AND (app application) WITH (icons! buttons! shortcuts!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:05 PM
L32	33	((virtual) ADJ (reality environment world)) SAME (icons! buttons! shortcuts!) near3 (virtual graphical) SAME (settings) AND (app application) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH,	OR	ON	ON	2022/07/18 12:05 PM

			TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L33	12	((virtual) ADJ (reality environment world)) SAME (icons! buttons! shortcuts!) near3 (virtual graphical) SAME (settings) SAME (app application) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:05 PM
L34	17	((virtual) ADJ (reality environment world)) SAME scroll$3 adj2 (buttons icon) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:14 PM
L35	0	((virtual) ADJ (reality environment world)) SAME scroll$3 adj2 (arrows) WITH (icons!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:18 PM
L36	0	((virtual) ADJ (reality environment world)) SAME scroll$3 adj2 (arrows) WITH (icons! shortcuts!) AND	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2022/07/18 12:18 PM

		(715.clas. G06f3/048-05.cpc.)	EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L37	0	((virtual) ADJ (reality environment world)) SAME scroll$3 adj2 (arrows) SAME (app application) ADJ (icons! shortcuts! buttons! pages!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:18 PM
L38	0	((virtual) ADJ (reality environment world)) SAME scroll$3 WITH (arrows) SAME (app application) ADJ (icons! shortcuts! buttons! pages!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:18 PM
L39	0	((virtual) ADJ (reality environment world)) SAME scroll$3 WITH (arrows) SAME (app application) adj2 (icons! shortcuts! buttons! pages!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO;	OR	ON	ON	2022/07/18 12:19 PM

Meta Platforms, Inc. - Ex. 1002
Page 260

			JPO; DERWENT; IBM_TDB)				
L40	5	((virtual) ADJ (reality environment world)) AND scroll$3 WITH (arrows) SAME (app application) adj2 (icons! shortcuts! buttons! pages!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:19 PM
L41	4	((virtual) ADJ (reality environment world)) AND (up down) ADJ (arrows) SAME (app application) adj2 (icons! shortcuts! buttons! pages!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:20 PM
L42	46	((virtual) ADJ (reality environment world)) AND (up down) ADJ (arrows) WITH (icons! shortcuts! buttons! pages!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:24 PM
L43	43	((virtual) ADJ (reality environment world)) AND (up down) ADJ (arrows) WITH (icons! shortcuts! buttons! homescreen ADJ pages) AND (715.clas.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS,	OR	ON	ON	2022/07/18 12:24 PM

		G06f3/048-05.cpc.)	IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L44	330	((virtual) ADJ (reality environment world)) AND scroll$3 near3 (icons! shortcuts!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:31 PM
L45	0	((virtual) ADJ (reality environment world)) AND scroll$3 near3 (icons! shortcuts!) WITH (up down) ADJ arrows AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:32 PM
L46	22	((virtual) ADJ (reality environment world)) AND scroll$3 near3 (icons! shortcuts!) WITH arrows AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:32 PM

L47	0	((virtual) ADJ (reality environment world)) AND scroll$3 near3 (homescreen home ADJ screen) WITH arrows AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:37 PM
L48	0	((virtual) ADJ (reality environment world)) AND scroll$3 WITH (homescreen home ADJ screen) WITH arrows AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:37 PM
L49	11	((virtual) ADJ (reality environment world)) AND (homescreen home ADJ screen) WITH arrows AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:37 PM
L50	0	((virtual) ADJ (reality environment world)) AND (homescreen home ADJ screen) WITH arrows WITH (pages) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL,	OR	ON	ON	2022/07/18 12:37 PM

			NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L51	390	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:13 AM
L52	18	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon near3 (app application)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:14 AM
L53	390	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:17 AM
L54	195	(virtual ADJ (reality environment world)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP,	OR	ON	ON	2022/07/19 10:17 AM

		HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon AND (715.clas. G06f3/048-05.cpc.)	AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L55	90	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon AND (715.clas. G06f3/04815.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:17 AM
L56	24	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon WITH gesture AND (715.clas. G06f3/04815.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:18 AM
L57	2	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon WITH (camera space) AND (715.clas. G06f3/04815.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO,	OR	ON	ON	2022/07/19 10:19 AM

			RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L58	90	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon AND (715.clas. G06f3/04815.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:20 AM
L59	14	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 press$3 tap tapping tapped slid$3) near3 icon WITH finger	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:23 AM
L60	783850	canon.as.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:33 AM
L61	1378	canon.as. AND (HMD)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU,	OR	ON	ON	2022/07/19 10:34 AM

			CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L62	18	canon.as. AND (HMD) SAME finger	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:34 AM
L63	2	canon.as. AND (HMD) SAME finger WITH icon	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:34 AM
L64	276	(3d three ADJ dimension$4) near3 (app application) near3 button	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA,	OR	ON	ON	2022/07/19 10:59 AM

			VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L65	2	(3d three ADJ dimension$4) near3 (app application) near3 button SAME (virtual ADJ (reality environment world))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:59 AM
L66	97	(3d three ADJ dimension$4) near3 (app application) near3 button AND (virtual ADJ (reality environment world))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 11:00 AM
L67	8	(3d three ADJ dimension$4) near3 (app application) ADJ button AND (virtual ADJ (reality environment world))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 11:00 AM
L68	48	(3d three ADJ dimension$4) near3 (app application) ADJ icon AND (virtual ADJ (reality environment world))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB,	OR	ON	ON	2022/07/19 11:00 AM

			HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L69	12	(3d three ADJ dimension$4) near3 (app application) ADJ icon SAME (virtual ADJ (reality environment world))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 11:00 AM
L70	3	(setting) ADJ (icons!) SAME (virtual ADJ (reality environment world))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 12:11 PM
L71	142	(virtual ADJ (reality world environment)) SAME (controller) SAME (finger hands) near3 (mode)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2022/07/19 01:15 PM

			IBM_TDB)				
L72	22	(virtual ADJ (reality world environment)) SAME (controller) near3 mode SAME (finger hands) near3 (mode)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:15 PM
L73	0	(virtual ADJ (reality world environment)) SAME (controller) near3 mode SAME (motion) near3 gesture near3 (mode)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:19 PM
L74	1	(virtual ADJ (reality world environment)) SAME (controller) near3 mode SAME (motion) near3 gesture	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:19 PM
L75	231	(virtual ADJ (reality world environment)) SAME (controller) WITH (motion) near3 gesture	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV,	OR	ON	ON	2022/07/19 01:20 PM

			MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L76	50	(virtual ADJ (reality world environment)) SAME (controller) WITH (motion) near3 gesture WITH (hand fingers)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:20 PM
L77	1	(virtual ADJ (reality world environment)) SAME (controller) WITH (motion) near3 gesture WITH (hand fingers) WITH (modality mode)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:20 PM
L78	5354	(virtual ADJ (reality world environment)) SAME detect$3 WITH (controller)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:20 PM
L79	0	(virtual ADJ (reality	(US-PGPUB; USPAT;	OR	ON	ON	2022/07/19

		world environment)) SAME detect$3 WITH (controller) near3 ("not using")	USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				01:21 PM
L80	6	(virtual ADJ (reality world environment)) SAME detect$3 WITH (controller) near3 ((off))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:21 PM
L81	643	(virtual ADJ (reality world environment)) SAME controller WITH (hand finger) near3 gesture	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:22 PM
L82	100	(virtual ADJ (reality world environment)) SAME controller WITH (hand finger) near3 gesture WITH (mode modality)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL,	OR	ON	ON	2022/07/19 01:22 PM

			PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L83	2	(virtual ADJ (reality world environment)) SAME controller WITH (hand finger) near3 gesture WITH (mode modality) SAME point$3	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:22 PM
L84	0	(virtual ADJ (reality world environment)) SAME remote ADJ controller WITH (hand finger) near3 gesture WITH (mode modality)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:24 PM
L85	82	(virtual ADJ (reality world environment)) SAME controller WITH (hand finger) near3 gesture WITH (mode modality)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 01:24 PM
L86	157	(virtual ADJ (reality world environment)) AND controller WITH (hand finger) near3 gesture WITH (mode modality)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 01:29 PM
L87	0	(virtual ADJ (reality world environment)) AND remote ADJ controller WITH (hand finger) near3 gesture WITH (mode modality)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 01:29 PM

L88	157	(virtual ADJ (reality world environment)) AND controller WITH (hand finger) near3 gesture WITH (mode modality)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 01:29 PM
L89	4	(virtual ADJ (reality world environment)) AND controller WITH (hand finger) near3 gesture WITH (modality)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 01:29 PM
L90	0	("not using") near3 controller	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 05:22 PM
L91	0	("not" ADJ (using holding)) near3 controller	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 05:22 PM
L92	0	("not" ADJ (using holding)) near3 remote	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 05:22 PM
L93	0	("not" ADJ (using holding)) near3 input ADJ device	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 05:22 PM
L94	0	("not" ADJ (using holding used)) near3 input ADJ device	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 05:22 PM
L95	0	("not" ADJ (using holding used)) near3 input	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 05:23 PM
L96	13	("not" ADJ (using holding used))	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 05:23 PM
L97	71	("not" ADJ (using holding used))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 05:24 PM
L98	0	("not" ADJ (using holding used)) near3 (input)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL,	OR	ON	ON	2022/07/19 05:24 PM

			NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L99	0	("not" ADJ (using holding used)) near3 (input controller)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 05:24 PM
L100	852	average near3 ("arm length")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 05:58 PM
L101	24	average near3 ("arm length") WITH reach$3	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 05:58 PM
L102	2	average near3 ("arm	(US-PGPUB; USPAT;	OR	ON	ON	2022/07/19

		length") WITH reach$3 AND (715.clas. G06f3/048-05.cpc.)	USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				05:58 PM
L103	9	average near3 ("arm length") WITH within AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 05:59 PM
L104	0	average near3 (lenght) near3 arm WITH within AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:00 PM
L105	17	average near3 (length) near3 arm WITH within AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL,	OR	ON	ON	2022/07/19 06:00 PM

			PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L106	4	average near3 (length) near3 arm WITH reach$3 AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:01 PM
L107	15	average near3 (length) near3 arm WITH (child$3 adult) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:01 PM
L108	15	average near3 (length) near3 arm SAME (child$3 adult) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:02 PM
L109	2	average near3 (length) near3 arm SAME (virtual ADJ (reality	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY,	OR	ON	ON	2022/07/19 06:02 PM

		world environment space)) AND (715.clas. G06f3/048-05.cpc.)	CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L110	2	average near3 (length) near3 arm SAME (virtual ADJ (reality world environment space))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:04 PM
L111	2	average near3 (length measurement) near3 arm SAME (virtual ADJ (reality world environment space))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:04 PM
L112	4	average near3 (length measurement distance) near3 arm SAME (virtual ADJ (reality world environment space))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH,	OR	ON	ON	2022/07/19 06:04 PM

			TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L113	4	average near3 (length measurement distance) near3 arm SAME ((mixed augmented virtual) ADJ (reality world environment space))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:05 PM
L114	4	(median average) near3 (length measurement distance) near3 arm SAME ((mixed augmented virtual) ADJ (reality world environment space))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:05 PM
L115	143	(median average) near3 (length measurement distance) near3 arm AND ((mixed augmented virtual) ADJ (reality world environment space))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:06 PM
L116	2	(median average) near3 (length measurement distance) near3 arm SAME icons! AND ((mixed augmented	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2022/07/19 06:06 PM

		virtual) ADJ (reality world environment space))	EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L117	19	"2012032687"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:11 PM
L118	0	((("VR-EDU") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2022/07/20 08:24 AM
L119	34	((("FIELDMAN") near3 ("Ethan"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/07/20 08:25 AM
L120	1	((("FIELDMAN") near3 ("Ethan"))).INV. AND (virtual ADJ reality).clm.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/07/20 08:25 AM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 17/830,109	Filing Date 06/01/2022	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $240 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	10/18/2022	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 21	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $240 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/FREDERICK E BRISCOE/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

I hereby certify that this correspondence is being filed via EFS-Web with the United States Patent and Trademark Office on October 18, 2022.

POLSINELLI PC

By: /Sarah Calzia/
Sarah Calzia

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	17/830,109	Confirmation No. 3149
Inventor(s)	:	Ethan Fieldman	
Filed	:	June 1, 2022	
Art Unit	:	2175	
Examiner	:	DANIEL RODRIGUEZ	
Atty Docket No.		114784-729016	
Title	:	Hand Control Interfaces and Methods in Virtual Reality Environments	

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT

Commissioner:

In response to the Office Action mailed July 26, 2022, please enter the following amendments and consider the following remarks:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 3 of this paper.

Remarks/Arguments begin on page 8 of this paper.

AMENDMENTS TO THE SPECIFICATION

Please replace paragraph [0005] with the following amended paragraph:

[0005] In an embodiment of the invention, a first application selection interface is provided in connection with use of a physical controller or controllers in a VR environment. The first selection interface may be the same or similar to conventional VR application selection interfaces, such as ~~implement~~ implemented in the Meta Quest 2 VR system. When a user initially does not use or switches away from using a physical controller, to use a user's hands in the VR environment, a second application selection interface that is better and more intuitively adapted for hand interaction and control is displayed to the user.

Please replace paragraph [0019] with the following amended paragraph:

[0019] In some embodiments, if the users returns to use of a physical controller, the scroll buttons up 30 and down 35 may be programmed to disappear as push buttons since ~~they~~ the button pushing experience would no longer be relevant.

Please replace paragraph [20] with the following amended paragraph:

[0020] Unlike the pinching of fingers to provide a laser-pointing experience in prior art hands tracking of the Meta Quest 2 platform, a user of the present invention for hands control with an application selection interface simply moves their hand 100 and finger over a desired application icon 25 among a plurality of application icons 20 displayed in the application selection interface 10, and simply pushes the desired application icon 25 as a button to launch the application. The camera tracking and computer vision algorithm in the VR platform activates the ~~'pressed'~~ "pressed" application when detected. To the user, the experience is more similar to pressing application icons in a mobile device or table environment.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings of claims in the application.

Listing of Claims:

1. (Currently Amended) An application selection interface comprising:

a first grouping of a plurality of software application icons displayed in a virtual reality environment to a user using a virtual reality hardware device, wherein the first grouping appears closer to a body part of the user that is tracked by a camera of the virtual hardware device to interact with the first grouping than another second grouping of software application icons that is displayed to the user when the user is using a physical controller in the virtual reality environment; and

at least one software application icon of the first grouping of the plurality of software icons operatively linked to launch a respective software application when interacted with by a pushing, pulling, tapping, pressing or sliding action of [[a]] the body part of the user directly on the application icon.

~~1.~~ 2. (Currently Amended) The application selection interface of claim 1, wherein the at least one software application icon is displayed as 3-dimensional button that launches a respective software application when pressed by the user's hand or finger.

~~2.~~ 3. (Currently Amended) The application selection interface of claim 2, further comprising up and down arrows displayed as buttons adjacent the plurality of software application icons, wherein the up and down arrows are operatively linked to scrolling the plurality of software application icons when directly interacted with by a user's hand or finger.

~~3.~~ 4. (Currently Amended) The application selection interface of claim 1, further comprising up and down arrows displayed as buttons adjacent the plurality of software application icons, wherein the up and down arrows are operatively linked to scrolling the

plurality of software application icons when directly interacted with by a user's hand or finger.

~~4.~~ 5. (Currently Amended) The application selection interface of claim 4, wherein the plurality of software application icons are displayed within an apparent distance of a user's arm length to the user.

~~5.~~ 6. (Currently Amended) The application selection interface of claim 1, wherein the plurality of software application icons are displayed within an apparent distance of a user's arm length to the user.

~~6.~~ 7. (Currently Amended) The application selection interface of claim 2, wherein the plurality of software application icons are displayed within an apparent distance of a user's arm length to the user.

~~7.~~ (Cancelled)

8. (Currently Amended) An application selection interface comprising:

a first grouping of a plurality of icons each representing at least one of a software application and a virtual reality platform system setting displayed in a virtual reality environment to a user using a virtual reality hardware device, wherein the first grouping appears closer to a body part of the user that is tracked by a camera of the virtual hardware device to interact with the first grouping than another second grouping of software application and setting icons that is displayed to the user when the user is using a physical controller in the virtual reality environment;

a first icon of the first grouping of the plurality of icons representing a virtual reality platform system setting operatively linked to activate a setting when interacted with by a pushing, pulling, tapping, pressing or sliding action of [[a]] the body part of the user directly on the first icon; and

a second icon of the first grouping of the plurality of icons representing a software application operatively linked to launch a software application when interacted with by a pushing, pulling, tapping, pressing or sliding action of [[a]] the body part of the user directly on the second icon.

9. (Original) The application selection interface of claim 8, wherein the first icon is displayed as a 3-dimensional button that activates a virtual reality platform system setting when pressed by the user's hand or finger and the second icon is displayed as a 3-dimensional button that launches a software application when pressed by the user's hand or finger.

10. (Currently Amended) The application selection interface of claim 9, wherein the first grouping of the plurality of icons are displayed within an apparent distance of a user's arm length to the user.

11. (Currently Amended) The application selection interface of claim 8, wherein the first grouping of the plurality of icons are displayed within an apparent distance of a user's arm length to the user.

12. (Currently Amended) A method for providing an interactive control interface in a virtual reality environment comprising:

detecting that a user using a virtual reality environment via a virtual reality hardware device is not using or has discontinued use of a physical device controller used to interact with the virtual reality environment;

displaying to the user a first grouping of a plurality of icons each representing at least one of a software application and a virtual reality platform system setting after said detecting, wherein the first grouping is displayed to appear closer to a body part of the user that is tracked by a camera to interact with the first grouping than another second grouping of software application and setting icons displayed to the user when the user was using the physical device controller in the virtual reality environment;

receiving a control input selecting a chosen icon of the first grouping from the user that appears as a direct touching body interaction from the user to the icon;

launching, in response to receiving the control input, a respective software application that is linked to the chosen icon if the icon represents a software application; and

activating, in response to receiving the control input, a virtual reality platform system setting that is linked to the chosen icon if the icon represents a virtual reality platform system setting.

13. (Currently Amended) The method of claim 12, wherein the chosen icon of the first grouping is displayed as a 3-dimensional button that (i) activates a virtual reality platform system setting when pressed by the user's hand or finger if the chosen icon represents a virtual reality platform system setting and (ii) launches a software application when pressed by the user's hand or finger if the chosen icon represents a software application.

14. (Currently Amended) The method of claim 13, further comprising up and down arrows displayed as buttons adjacent the first grouping of the plurality of icons, wherein the up and down arrows are operatively linked to scrolling the plurality of icons when directly interacted with by a user's hand or finger.

15. (Currently Amended) The method of claim 14, further comprising determining an apparent distance relative to the user that the first grouping of the plurality of icons should be displayed to be within a touching distance of the user.

16. (Original) The method of claim 15, wherein the apparent distance is determined based on an arm's length of a user.

17. (Original) The method of claim 15, wherein the apparent distance is determined based on a height of the user.

18. (Original) The method of claim 15, wherein the apparent distance is determined based on a predetermined value representing average arms' length for a predetermined group of persons.

19. (Currently Amended) The method of claim 12, further comprising determining an apparent distance relative to the user that the first grouping of the plurality of icons should be displayed to be within a touching distance of the user.

20. (Currently Amended) The method of claim [[12]] 13, further comprising determining an apparent distance relative to the user that the first grouping of the plurality of icons should be displayed to be within a touching distance of the user.

REMARKS/ARGUMENTS

Upon entry of the present amendment, claims 1-20 will be pending in this application. The claims have been renumbered to replace duplicate claim 1 with claim 2 and original claims 2-6 renumbered as claims 3-7. Original claim 7 has been cancelled. The amendments to independent claims 1, 8 and 12 are at least supported in the original specification at [0004], [0009], [0017] and [0025] . No new matter is added. Based on the following remarks, Applicant respectfully requests reconsideration and allowance of the pending claims.

Rejections under § 112

Claims 1-7 have been rejected under 35 U.S.C. 112(b) as being indefinite. Applicant has cancelled original claim 7, and renumbered duplicate claim 1 to claim 2 and original claims 2-6 to amended current claims 3-7 to clarify and correct the numbering of the claims and dependencies to preceding claims. Withdrawal of these rejections is respectfully requested.

Rejections under § 102

Claim 1 stands rejected under 35 U.S.C. §102(a)(1) as being anticipated by Fukushima et al. (US 6,346,929) ("Fukushima"). Reconsideration and withdrawal of this rejection is requested in view of the proposed amendment to claim 1. Specifically, claim 1 has been amended to distinguish between a first grouping of icons displayed as an application interface when a user is using body part, such as hands or fingers, for interacting with the virtual reality environment, and a second grouping of icons that is displayed as an application interface when physical controllers, such as joysticks or motion devices, are used to interact with the virtual reality environment. The proposed amendment further highlights that the invention of claim 1 is directed to the interface of the first grouping of icons used with body part control appearing closer to the user's body part that is tracked by a camera, as compared to the distance of the second grouping of icons displayed as an application interface when a physical controller is used by the user.

Fukushima does not disclose, teach or suggest any use of a physical controller in a virtual reality environment, and therefore fails to disclose any different groupings of icons between physical controller and body part interaction with the virtual environment – including failing to disclose that body part grouping of icons appears closer to the user than a physical controller grouping of icons in such respective interfaces. In view of the failure of Fukushima to disclose different application interfaces with different display characteristics (including closer display when a body part such as a hand or finger is being used) between when physical controllers are/are not used in the VR environment, it is respectfully requested that the §102 rejection be withdrawn and claim 1 be allowed.

Rejections under § 103

Claim 1 (original duplicate), now current Claim 2 stands rejected under 35 U.S.C. §103 as being unpatentable over Fukushima in view of Yu Zhan et al. (WO 2022/047436) ("Zhan"). Current claim 2 depends from independent claim 1, and reconsideration and withdrawal of this rejection is requested as Zhan does not cure the deficiencies as to Fukushima set forth in the preceding remarks. Specifically, Zhan is cited as teaching 3D icons used in application selection interfaces; however, Zhan does not teach different interface groupings in a virtual reality environment between a user's use of a physical controller vs. body/hand controls in such environment – and particularly not a body/hand control grouping of icons displayed closer to the user in the VR environment. Where Fukushima also does not each or suggest different display of groupings of icons depending on whether a user is using a physical controller or body part/hand, the combination of cited references fail to teach all of the limitations of amended independent claim 1, and necessarily current dependent claim 2. Withdrawal of the rejection and allowance of the pending claims is requested.

Claims 2-3 (original), now current Claims 3 and 4 stand rejected under 35 U.S.C. §103 as being unpatentable over Fukushima in view of Zhan and further in view of Tome et al. (US 2017/0336882 A1) ("Tome"). Current claims 3 and 4 depend from independent claim 1 and current dependent claim 2 (which also depends from claim 1), and

reconsideration and withdrawal of this rejection is requested as Tome does not cure the deficiencies as to Fukushima in view of Zhan as set forth in the preceding remarks. Specifically, Tome is cited in the Office Action as teaching up and down arrows with interactive scrolling function using a physical controller in a VR environment as shown at Tome's FIGS. 8A and 8B. However, Tome relates only to the use of a physical controller with a laser pointer to interact with arrows for scrolling, and does not teach or suggest any modification of an application interface to use hands or fingers as in Fukushima, and particularly not as claimed by the limitations of current claims 3 and 4 of "when directly interacted with by a user's hand or finger." Tome clearly provides no teaching or suggestion for different interface groupings in a virtual reality environment between a user's use of a physical controller vs. body/hand controls in such environment – and particularly not a body/hand control grouping of icons displayed closer to the user in the VR environment. Where Fukushima in combination with Zhan also does not each or suggest different display of groupings of icons depending on whether a user is using a physical controller or body part/hand, the combination of all of the cited references fail to teach all of the limitations of amended independent claim 1, and necessarily current dependent claims 3 and 4. Withdrawal of the rejections and allowance of the pending claims is requested.

Claims 4-5, now current Claims 5 and 6, stand rejected under 35 U.S.C. §103 as being unpatentable over Fukushima in view of Noda et al. (US 2012/0047465 A1) ("Noda"). Current claims 5 and 6 depend from independent claim 1 and current dependent claim 4 (which also depends from claim 1), and reconsideration and withdrawal of this rejection is requested as Noda does not cure the deficiencies as to Fukushima set forth in the preceding remarks. Specifically, Noda is cited in the Office Action as teaching that an application interface with a plurality of icons is displayed within an apparent user's arm length distance. However, Noda, like Fukushima, does not teach or suggest any modification of an application interface used with a physical controller that is different and appears closer than an interface that is interacted with a body part/hands. Noda provides no teaching or suggestion for different interface groupings in a virtual reality environment between a user's use of a physical controller vs. body/hand controls

in such environment – and particularly not a body/hand control grouping of icons displayed closer to the user in the VR environment. Where Fukushima in combination with Noda also does not each or suggest different display of groupings of icons depending on whether a user is using a physical controller or body part/hand, the combination of all of the cited references fail to teach all of the limitations of amended independent claim 1, and necessarily current dependent claims 4 and 5. Withdrawal of the rejections and allowance of the pending claims is requested.

Claims 6-7, prior claim 6 is current Claim 7 with prior claim 7 being cancelled, stand rejected under 35 U.S.C. §103 as being unpatentable over Fukushima in view of Zhan, further in view of Tome and further in view of Noda. Current claim 7 depends from current claim 2 (and thereby independent claim 1), and as set forth in the preceding remarks, all of the cited references taken together fail to teach the limitations of amended independent claim 1. Withdrawal of the rejections and allowance of the pending claims is therefore requested.

Claim 8 stands rejected under 35 U.S.C. §103 as being unpatentable over Fukushima in view of Sztuk et al. (US 11,086,392) ("Sztuk"). Reconsideration and withdrawal of this rejection is requested in view of the proposed amendment to claim 8. Specifically, claim 8 has been amended to distinguish between a first grouping of icons displayed as an application interface when a user is using body part, such as hands or fingers, for interacting with the virtual reality environment, and a second grouping of icons that is displayed as an application interface when physical controllers, such as joysticks or motion devices, are used to interact with the virtual reality environment. The proposed amendment further highlights that the invention of claim 8 is directed to the interface of the first grouping of icons used with body part control appearing closer to the user's body part that is tracked by a camera, as compared to the distance of the second grouping of icons displayed as an application interface when a physical controller is used by the user. Fukushima does not disclose, teach or suggest any use of a physical controller in a virtual reality environment, and therefore fails to disclose any different groupings of icons between physical controller and body part interaction with the virtual environment –

including failing to disclose that body part grouping of icons appears closer to the user than a physical controller grouping of icons in such respective interfaces. Sztuk, which disclosure is directed to using a separate user interface device (e.g. phone or tablet) in combination with a VR device, is cited in the Office Action as disclosing that icons can be settings and software application icons, but is silent as to any different first and second groupings of icons wherein body/hand control provides a closer interface than a physical controller being used to interact with icons in the VR environment. In view of the failure of Fukushima and Sztuk in combination to disclose different application interfaces with different display characteristics (including closer display when a body part such as a hand or finger is being used) between when physical controllers are/are not used in the VR environment, it is respectfully requested that the §103 rejection be withdrawn and independent claim 8 be allowed.

Claim 9 stands rejected under 35 U.S.C. §103 as being unpatentable over Fukushima in view of Sztuk, further in view of Zhan and further in view of Baic (US 2016/0004300 A1) ("Baic"). Reconsideration and withdrawal of the rejection is requested as claim 9 depends from amended independent claim 8, and as set forth in the preceding remarks Fukushima in view of Sztuk, and further in view of Zhan does not teach or suggest the limitations of claim 8, and Baic does not cure those deficiencies. Baic is cited in the Office Action as teaching the first icon (platform setting) as a 3D button, but Baic's disclosure of physical gesture controller (see e.g. Baic at FIGS. 4 and 5 and [0138]) is silent as to different interface of icon groupings and closeness of the interface depending on whether a physical controller or body part/hand is used to interact with an icons grouping. None of Fukushima, Sztuk, Zhan and/or Baic (individually or in combination) provides any suggestion of the limitations of amended claim 8 of such limitations. It is respectfully requested that the §103 rejection be withdrawn and claim 9 depending from independent claim 8 therefore be allowed.

Claim 10 stands rejected under 35 U.S.C. §103 as being unpatentable over Fukushima in view of Sztuk, further in view of Zhan and further in view of Baic and further in view of Noda. Claim 10 depends from dependent claim 9 which depends from amended independent claim 8 and the preceding remarks as to claims 8 and 9 set forth the deficiencies of Fukushima, Sztuk, Zhan and Baic to teach all of the limitations of such claims. Because Noda's arm's length distance teaching, as set forth in the remarks as to similar citation of Noda as to current claims 5-7, is silent as to suggesting or teaching different interface of icon groupings and closeness of the interface depending on whether a physical controller or body part/hand is used to interact with an icons grouping, this reference does not cure the deficiencies of the other cited references. Accordingly, Applicant respectfully requests that this rejection be withdrawn and the pending claims be allowed.

Claim 11 stands rejected under 35 U.S.C. §103 as being unpatentable over Fukushima in view of Sztuk and further in view of Noda. Claim 11 depends from amended independent claim 8 and the preceding remarks as to claim 8 set forth the deficiencies of Fukushima in view of Sztuk to teach all of the limitations of such claims. Because Noda's arm's length distance teaching, as set forth in the remarks as to similar citation of Noda as to current claims 5-7, is silent as to suggesting or teaching different interface of icon groupings and closeness of the interface depending on whether a physical controller or body part/hand is used to interact with an icons grouping, this reference does not cure the deficiencies of the Fukushima and Sztuk references. Accordingly, Applicant respectfully requests that this rejection be withdrawn and the pending claims be allowed.

Claim 12 stands rejected under 35 U.S.C. §103 as being unpatentable over Fukushima in view of Ravasz et al. (US 11,086,406). Method claim 12 has been amended to include the limitation of "displaying to the user a first grouping of a plurality of icons each representing at least one of a software application and a virtual reality platform system setting after said detecting, wherein the first grouping is displayed to appear closer to a body part of the user that is tracked by a camera to interact with the first grouping than another second grouping of software application and setting icons displayed to the

user when the user was using the physical device controller in the virtual reality environment". Following the preceding arguments as to amended independent claim 1, Fukushima discloses only the use of hand controls in a VR environment and does not display a first grouping of icons different from and closer the user as compared to a second grouping of icons that are displayed when a user is using a physical controller. Ravasv is cited in the Office Action as disclosing that both physical controller inputs and hand inputs can provide different modalities for interacting with a VR environment. However, Rasasv does not teach, suggest or provide any motivation to those of ordinary skill in the art as to how or why Fukushima (using only hand controls) would be modified to provide two different interface groupings with a body part/hand controls interface appearing closer to the user than when the user uses a physical controller. Applicant explains in the background of the application specification at [0002] that is known in conventional VR systems that physical controllers or hands can provide inputs for controlling a VR environment. However, in convention systems, which Rasasv's dual modality acknowledgement does not teach or suggest would be any different, a typical interface for a user to interact with application or setting icons is the same whether a physical controller or hands is being used – such that a user's hands controlling experience are provided with "laser pointing" to select icons. Neither Fukushima or Rasasv, or any of the other cited references taken together, teach or suggest that when a user switches from physical controller to, or chooses, body part/hands controlling functionality that a selection interface should be displayed as different and appear closer to the user so that the icons can be more naturally interacted with by the user's body part(s)/hand(s). Rasasv does not cure the deficiencies of Fukushima where neither references suggests that different interfaces of first and second groupings of selectable icons with different distance as to the user is displayed depending on whether or not the user is using a physical controller or a body/part hand for interactive selection in a VR environment. Applicant respectfully requests withdrawal and allowance of independent claim 12 where the cited references fail to provide obvious guidance to those ordinarily skilled in the relevant art to arrive at the claimed method.

Claim 13 stands rejected under 35 U.S.C. §103 as being unpatentable over Fukushima in view of Ravasz and further in view of Zhan. Current claim 13 depends from amended independent claim 12, and reconsideration and withdrawal of this rejection is requested as Zhan does not cure the deficiencies as to Fukushima in view of Ravasv set forth in the preceding remarks. Specifically, Zhan is cited as teaching 3D icons used in application selection interfaces; however, Zhan does not teach a method of displaying different interface groupings in a virtual reality environment between a user's use of a physical controller vs. body/hand controls in such environment – and particularly not a body/hand control grouping of icons displayed closer to the user in the VR environment. Where Fukushima and Ravasv together also do not each or suggest different display of groupings of icons depending on whether a user is using a physical controller or body part/hand, the combination of cited references fail to teach all of the limitations of amended independent claim 12, and necessarily current dependent claim 13. Withdrawal of the rejection and allowance of the pending claims is requested.

Claim 14 stands rejected under 35 U.S.C. §103 as being unpatentable over Fukushima in view of Ravasz, further in view of Zhan and further in view of Tome. Claim 14 depends from dependent claim 13 (which also depends from claim 12), and reconsideration and withdrawal of this rejection is requested as Tome does not cure the deficiencies as to Fukushima in view Ravasv and Zhan as set forth in the preceding remarks. Specifically, Tome is cited in the Office Action as teaching up and down arrows with interactive scrolling function using a physical controller in a VR environment as shown at Tome's FIGS. 8A and 8B. However, Tome relates only to the use of a physical controller with a laser pointer to interact with arrows for scrolling, and does not teach or suggest any modification of an application interface to use hands or fingers as in Fukushima, and particularly not as claimed by the limitations of current claims 3 and 4 of "when directly interacted with by a user's hand or finger." Tome clearly provides no teaching or suggestion for different interface groupings in a virtual reality environment between a user's use of a physical controller vs. body/hand controls in such environment – and particularly not a body/hand control grouping of icons displayed closer to the user in the VR environment. Where Fukushima in combination with Rasasv and Zhan also

does not each or suggest displaying different groupings of icons depending on whether a user is using a physical controller or body part/hand, the combination of all of the cited references fail to teach all of the limitations of amended independent claim 12, and necessarily current dependent claim 14. Withdrawal of the rejections and allowance of the pending claims is requested.

Claims 15-17 stand rejected under 35 U.S.C. §103 as being unpatentable over Fukushima in view of Ravasz, further in view of Zhan, further in view of Tome and further in view of Noda. Claims 15-17 depend from dependent claim 14 (which also depends from independent claim 12), and reconsideration and withdrawal of this rejection is requested as Noda does not cure the deficiencies as to Fukushima in view of Ravasv, further in view of Zhan and further in view of Tome as set forth in the preceding remarks. Specifically, Noda is cited in the Office Action as teaching that an application interface with a plurality of icons is displayed within an apparent user's arm length distance. However, Noda, like Fukushima, Ravasv, Zhan, and Tome, does not teach or suggest any modification of an application interface used with a physical controller that is different and appears closer than an interface that is interacted with a body part/hands. Noda provides no teaching or suggestion for displaying different interface groupings in a virtual reality environment between a user's use of a physical controller vs. body/hand controls in such environment – and particularly not a body/hand control grouping of icons displayed closer to the user in the VR environment. Where Fukushima, Ravasv, Zhan and Tome in combination with Noda also does not each or suggest different display of groupings of icons depending on whether a user is using a physical controller or body part/hand, the combination of all of the cited references fail to teach all of the limitations of amended independent claim 12, and necessarily current dependent claims 15-17. Withdrawal of the rejections and allowance of the pending claims is requested.

Claim 18 stands rejected under 35 U.S.C. §103 as being unpatentable over Fukushima in view of Ravasz, further in view of Zhan, further in view of Tome, further in view of Noda and further in view of Kenji (CA 2810307) ("Kenji"). Claim 18 depends from dependent claim 15 (which also depends from independent claim 12), and

reconsideration and withdrawal of this rejection is requested as Kenji does not cure the deficiencies as to Fukushima in view Ravasv and Zhan in further in view of Tome as set forth in the preceding remarks. Specifically, Kenji is cited in the Office Action as teaching using an average arm's length from a predetermined group of users to display a grouping of icons for hand control interface interaction. However, Kenji provides no teaching or suggestion for different interface groupings in a virtual reality environment between a user's use of a physical controller vs. body/hand controls in such environment – and particularly not a body/hand control grouping of icons displayed closer to the user in the VR environment as compared to use of a physical controller. Where Fukushima in combination with Rasasv, Zhan and Tome also does not each or suggest displaying different groupings of icons depending on whether a user is using a physical controller or body part/hand, the combination of all of the cited references including Kenji fail to teach all of the limitations of amended independent claim 12, and necessarily current dependent claim 18. Withdrawal of the rejections and allowance of the pending claims is requested.

Claims 19-20 stand rejected under 35 U.S.C. §103 as being unpatentable over Fukushima in view of Ravasz and further in view of Noda. Claims 19-20 depend from claim 12 (with claim 20 amended to depend from dependent claim 13 that depends from claim 12), and following the preceding arguments as to claim 15, where Fukushima, Ravasv and Noda together do not teach all of the limitations of independent claim 12, the references do not provide obvious teachings of all elements of claims 19 and 20. Withdrawal of the rejections and allowance of the pending claims is requested.

CONCLUSION

In view of the foregoing, Applicant believes all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

Except for the issue fees payable under 37 C.F.R. § 1.18, the Director is authorized to charge any additional fees during pendency of this application, including any required extension of time fees, or credit any overpayment to Deposit Account Number 50-1662

(reference 114784-729016). This paragraph is intended to be a constructive petition for extension of time in accordance with 37 C.F.R. § 1.136(a)(3).

If the Examiner believes a telephone conference would expedite prosecution of this application, please contact the undersigned at (404) 253-6276 or ehanson@polsinelli.com .

Respectfully submitted,

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Electronic Acknowledgement Receipt

EFS ID:	46838776
Application Number:	17830109
International Application Number:	
Confirmation Number:	3149
Title of Invention:	Hand Control Interfaces and Methods in Virtual Reality Environments
First Named Inventor/Applicant Name:	Ethan Fieldman
Customer Number:	27148
Filer:	Eric J. Hanson/Sarah Calzia
Filer Authorized By:	Eric J. Hanson
Attorney Docket Number:	114784-729016
Receipt Date:	18-OCT-2022
Filing Date:	01-JUN-2022
Time Stamp:	12:12:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		2022-10-18_Amendment_114784-729016.pdf	201015 1e2c88e976e8ce293a648e235f908df73539a9cc	yes	18

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Request for Reconsideration-After Non-Final Rejection	1	1
	Specification	2	2
	Claims	3	7
	Applicant Arguments/Remarks Made in an Amendment	8	18
Warnings:			
Information:			
	Total Files Size (in bytes):	201015	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/82A (07-13)
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TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	17/830,109
Filing Date	2022-06-01
First Named Inventor	Ethan Fieldman
Title	Hand Control Interfaces and Methods in Virtual Reality Environments
Art Unit	2175
Examiner Name	DANIEL RODRIGUEZ
Attorney Docket Number	114784-729016

SIGNATURE of Applicant or Patent Practitioner

Signature	/Eric J. Hanson/	Date (Optional)	
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Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 27148

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

VR-EDU, Inc.

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	DocuSigned by: Ethan Fieldman 4A4D2018BE0E4FE...	Date (Optional)	
Name	Ethan Fieldman		
Title	Founder		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

DocuSign Envelope ID: 8B662E7E-D91E-420C-A641-C8CF32859AFF

PTO/AIA/01 (06-12)
Approved for use through 05/31/2024. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Hand Control Interfaces and Methods in Virtual Reality Environments

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 17/830,109 filed on June 1, 2022.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Ethan Fieldman Date (Optional): 10/18/2022

Signature: DocuSigned by: Ethan Fieldman

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0032. Public burden for this form is estimated to average 1 minute per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.** If filing this completed form by mail, send to: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/830,109	**10/19/2022 05:13:57 PM ET**	**114784-729016**

Title of Invention

Hand Control Interfaces and Methods in Virtual Reality Environments

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3149	FILED BY	Sarah Calzia
PATENT CENTER #	61084472	FILING DATE	06/01/2022
CUSTOMER #	27148	FIRST NAMED INVENTOR	Ethan Fieldman
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Eric Hanson

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2022-10-19_POA_114784-729016.pdf	2	Power of Attorney	324 KB
2022-10-19_Declaration_114784-729016.pdf	1	Oath or Declaration filed	168 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2022-10-19_POA_114784-	55101C47DD2AB8575C17A89243ACBB3FEAA98A82BC173C02

729016.pdf	BFA2522549667438327D02224A41372059DABDE6CE5DFC4B759F3B0FD6BAE8BDBC24A0FEF272C9EB
2022-10-19_Declaration_114784-729016.pdf	AFB6FB95137EB89618DE673FD6662F3DE497387FF4477F5B5A94C1DD97AEC4E38BAC36FFA76141868245F53358BE794256482C53C312048EB2695B7AFEA7C90C

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/830,109	06/01/2022	Ethan Fieldman	114784-729016

CONFIRMATION NO. 3149

27148
POLSINELLI PC (Main Customer Number)
PO Box 140310
KANSAS CITY, MO 64114-0310

POA ACCEPTANCE LETTER

OC000000136670623

Date Mailed: 11/01/2022

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 10/19/2022.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/zretta/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

27148 7590 11/02/2022

POLSINELLI PC (Main Customer Number)
PO Box 140310
KANSAS CITY, MO 64114-0310

EXAMINER
RODRIGUEZ, DANIEL

ART UNIT	PAPER NUMBER
2175	

DATE MAILED: 11/02/2022

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/830,109	06/01/2022	Ethan Fieldman	114784-729016	3149

TITLE OF INVENTION: HAND CONTROL INTERFACES AND METHODS IN VIRTUAL REALITY ENVIRONMENTS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0.00	$0.00	$600	02/02/2023

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

27148 7590 11/02/2022

POLSINELLI PC (Main Customer Number)
PO Box 140310
KANSAS CITY, MO 64114-0310

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/830,109	06/01/2022	Ethan Fieldman	114784-729016	3149

TITLE OF INVENTION: HAND CONTROL INTERFACES AND METHODS IN VIRTUAL REALITY ENVIRONMENTS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$600	$0.00	$0.00	$600	02/02/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
RODRIGUEZ, DANIEL	2175	715-765000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required) ❑ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/830,109	06/01/2022	Ethan Fieldman	114784-729016	3149

27148 7590 11/02/2022

POLSINELLI PC (Main Customer Number)
PO Box 140310
KANSAS CITY, MO 64114-0310

EXAMINER	
RODRIGUEZ, DANIEL	
ART UNIT	PAPER NUMBER
2175	

DATE MAILED: 11/02/2022

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 17/830,109	Applicant(s) Fieldman, Ethan	
	Examiner DANIEL RODRIGUEZ	Art Unit 2175	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to the amendment filed on 10/18/2022.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-20 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/DANIEL RODRIGUEZ/
Primary Examiner, Art Unit 2175

Notice of References Cited	Application/Control No. 17/830,109	Applicant(s)/Patent Under Reexamination Fieldman, Ethan	
	Examiner DANIEL RODRIGUEZ	Art Unit 2175	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20210405760-A1	12-2021	Schoen; Hayden	G06F1/1686	1/1
*	B	US-20160004300-A1	01-2016	Baic; Milan	G06F3/0346	345/419
*	C	US-20200133453-A1	04-2020	Walker; Laura L.	G06F9/542	1/1
*	D	US-20140337749-A1	11-2014	PHANG; Joon-ho	H04N21/4886	715/740
*	E	US-20140009407-A1	01-2014	KIM; Jihyun	G06F3/04817	345/173
*	F	US-20160328884-A1	11-2016	Schowengerdt; Brian T.	H04N5/2258	1/1
*	G	US-20130054319-A1	02-2013	Woods; Thomas Steven	G06F3/04815	715/848
*	H	US-20180062691-A1	03-2018	Barnett, JR.; Thomas Charles	G06F3/167	1/1
*	I	US-20180040161-A1	02-2018	Tierney; Blake Andrew	H04L67/535	1/1
*	J	US-20190384460-A1	12-2019	HARNISCH; Michael Edward	G06F9/453	1/1
*	K	US-20170336882-A1	11-2017	TOME; Basheer	G06F3/03547	1/1
*	L	US-20190146578-A1	05-2019	IKUTA; Mayuko	G06F3/04815	345/8
*	M	US-20220086205-A1	03-2022	LeBeau; Michael James	G06F3/0219	1/1

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Notice of References Cited	Application/Control No. 17/830,109	Applicant(s)/Patent Under Reexamination Fieldman, Ethan	
	Examiner DANIEL RODRIGUEZ	Art Unit 2175	Page 2 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20180158053-A1	06-2018	Adams; Amanda J.	G06F3/04886	1/1
*	B	US-20220197277-A1	06-2022	Cabibihan; John	G05D1/0038	1/1
*	C	US-20190130531-A1	05-2019	Azeyanagi; Miki	G06F3/04817	1/1
*	D	US-20120047465-A1	02-2012	NODA; Takuro	G06F3/0346	715/848
*	E	US-11086392-B1	08-2021	Sztuk; Sebastian	G06F3/1423	1/1
*	F	US-11086406-B1	08-2021	Ravasz; Jonathan	G06F1/1686	1/1
*	G	US-6337694-B1	01-2002	Becker; Craig Henry	G06F3/04855	715/785
*	H	US-6346929-B1	02-2002	Fukushima; Nobuo	G06F3/017	345/9
*	I	US-20100211638-A1	08-2010	Rougier; Marc	G06F8/30	717/148
*	J	US-20180246698-A1	08-2018	HUANG; Ziqiang	H04R1/32	1/1
*	K	US-20200226814-A1	07-2020	TANG; Sheng Kai	G06F3/0304	1/1
*	L	US-10943395-B1	03-2021	Green; Jeffrey Michael	G06F3/04847	1/1
*	M	US-7702728-B2	04-2010	Zaner; Melora	H04L51/58	709/205

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/830,109	Fieldman, Ethan
	Examiner	Art Unit
	DANIEL RODRIGUEZ	2175

CPC - Searched*		
Symbol	**Date**	**Examiner**
G06F3/048-05	07/20/2022	DR

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
PE2E search - all databases	07/20/2022	DR
inventors search	07/20/2022	DR
ProQuest Dialog NPL search - all databases	07/20/2022	DR
Updated search	10/25/2022	DR

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
G06F3	048-05	10/25/2022	DR

/DANIEL RODRIGUEZ/ Primary Examiner, Art Unit 2175	

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/830,109	Fieldman, Ethan
	Examiner	**Art Unit**
	DANIEL RODRIGUEZ	2175

CPC						
Symbol					**Type**	**Version**
G06F	/	3	/	0482	F	2013-01-01
G06F	/	3	/	04815	I	2013-01-01
G06F	/	3	/	0485	I	2013-01-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/DANIEL RODRIGUEZ/ Primary Examiner, Art Unit 2175	25 October 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20221025

Meta Platforms, Inc. - Ex. 1002
Page 316

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/830,109	Fieldman, Ethan
	Examiner	**Art Unit**
	DANIEL RODRIGUEZ	2175

INTERNATIONAL CLASSIFICATION				
CLAIMED				
G06F	/	3	/	0482

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**
715	765

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	20	
/DANIEL RODRIGUEZ/ Primary Examiner, Art Unit 2175	25 October 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No.: 20221025

Meta Platforms, Inc. - Ex. 1002
Page 317

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/830,109	Fieldman, Ethan
	Examiner	**Art Unit**
	DANIEL RODRIGUEZ	2175

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	9	9	18	18										
2	1	10	10	19	19										
3	2	11	11	20	20										
4	3	12	12												
5	4	13	13												
6	5	14	14												
7	6	15	15												
	7	16	16												
8	8	17	17												

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	20	
/DANIEL RODRIGUEZ/ Primary Examiner, Art Unit 2175	25 October 2022	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office Part of Paper No.: 20221025

Meta Platforms, Inc. - Ex. 1002
Page 318

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/830,109	Fieldman, Ethan
	Examiner	**Art Unit**
	DANIEL RODRIGUEZ	2175

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	07/20/2022	10/25/2022							
	1	✓	=							
	1	✓	=							
	2	✓	=							
	3	✓	=							
	4	✓	=							
	5	✓	=							
	6	✓	=							
	7	✓	-							
	8	✓	=							
	9	✓	=							
	10	✓	=							
	11	✓	=							
	12	✓	=							
	13	✓	=							
	14	✓	=							
	15	✓	=							
	16	✓	=							
	17	✓	=							
	18	✓	=							
	19	✓	=							
	20	✓	=							

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	76	(virtual ADJ (reality environment world)) SAME (app application) ADJ icons!	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:00 AM
L2	7	(virtual ADJ (reality environment world)) SAME (app application) ADJ icons! SAME (arm)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:00 AM
L3	35	(virtual ADJ (reality environment world)) SAME (app application) ADJ icons! SAME (select$3)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:02 AM
L4	0	(virtual ADJ (reality environment world)) SAME icons WITH (arm) near3 (length	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU,	OR	ON	ON	2022/07/18 11:14 AM

		distance)	CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L5	9	(virtual ADJ (reality environment world)) AND icons WITH (arm) near3 (length distance)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:14 AM
L6	0	(virtual ADJ (reality environment world)) AND icons near3 (position arrang$5 layout) WITH (arm) near3 (length distance)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:15 AM
L7	0	(virtual ADJ (reality environment world)) AND icons WITH (position arrang$5 layout) WITH (arm) near3 (length distance)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA,	OR	ON	ON	2022/07/18 11:15 AM

			VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L8	9	((augmented mixed virtual) ADJ (reality environment world)) AND icons WITH (arm) near3 (length distance)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:17 AM
L9	293	((augmented mixed virtual) ADJ (reality environment world)) AND (arrang$5 layout) WITH (arm) near3 (length distance)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:17 AM
L10	13	((augmented mixed virtual) ADJ (reality environment world)) AND (arrang$5 layout) WITH (arm) near3 (length distance) WITH (objects! items! icons!)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:17 AM
L11	338	(display$3 present$3 arrang$5) near3 (objects! items!) WITH (arm) near3 (length distance)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB,	OR	ON	ON	2022/07/18 11:23 AM

			HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L12	18	(display$3 present$3 arrang$5) near3 (objects! items!) WITH (arm) near3 (length distance) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:23 AM
L13	1557	(arm "arm's") near3 (average) near3 (length)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:37 AM
L14	137	(arm "arm's") near3 (average) near3 (length) WITH (child$3 adult)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2022/07/18 11:38 AM

			IBM_TDB)				
L15	8	(arm "arm's") near3 (average) near3 (length) WITH (child$3) WITH (adult)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:38 AM
L16	15	(arm "arm's") near3 (average) near3 (length) WITH (child$3 adult) AND (715.clas. g06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:40 AM
L17	8043	((augmented mixed virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped) near3 (icon button object)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:47 AM
L18	1182	((augmented mixed virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) WITH gesture	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV,	OR	ON	ON	2022/07/18 11:47 AM

Meta Platforms, Inc. - Ex. 1002
Page 324

			MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L19	254	((augmented mixed virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) near3 (graphical virtual) WITH gesture	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:47 AM
L20	97	((augmented mixed virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) near3 (graphical virtual) WITH gesture AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:47 AM
L21	46	((augmented mixed virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) near3 (graphical virtual) WITH gesture WITH (hand finger) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:48 AM
L22	41	((augmented mixed	(US-PGPUB; USPAT;	OR	ON	ON	2022/07/18

		virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) near3 (graphical virtual) WITH gesture WITH (hand finger) WITH user AND (715.clas. G06f3/048-05.cpc.)	USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				11:48 AM
L23	30	((augmented mixed virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) near3 (graphical virtual) WITH gesture WITH (hand finger) WITH user SAME (headset head googles HMD) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:48 AM
L24	30	((virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) near3 (graphical virtual) WITH gesture WITH (hand finger) WITH user SAME (headset head googles HMD) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 11:48 AM
L25	39	((virtual) ADJ (reality environment world)) SAME (touch$3 tap tapping tapped press$3) near3 (icon button object) near3 (graphical virtual) WITH (push$3 pull$3 tap tapping tapped press$3 slid$3) near3 (hand	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL,	OR	ON	ON	2022/07/18 11:54 AM

		finger body) AND (715.clas. G06f3/048-05.cpc.)	PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L26	19	((virtual) ADJ (reality environment world)) SAME (icons! buttons!) near3 (virtual graphical) WITH (settings) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:03 PM
L27	0	((virtual) ADJ (reality environment world)) SAME (icons! buttons!) near3 (virtual graphical) WITH (settings) SAME (app application) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:04 PM
L28	19	((virtual) ADJ (reality environment world)) SAME (icons! buttons!) near3 (virtual graphical) WITH (settings) AND (app application) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:04 PM
L29	0	((virtual) ADJ (reality environment world)) SAME (icons! buttons!	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY,	OR	ON	ON	2022/07/18 12:04 PM

		shortcuts!) near3 (virtual graphical) WITH (settings) AND (app application) ADJ (icons! buttons! shortcuts!) AND (715.clas. G06f3/048-05.cpc.)	CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L30	3	((virtual) ADJ (reality environment world)) SAME (icons! buttons! shortcuts!) near3 (virtual graphical) WITH (settings) AND (app application) WITH (icons! buttons! shortcuts!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:04 PM
L31	11	((virtual) ADJ (reality environment world)) SAME (icons! buttons! shortcuts!) near3 (virtual graphical) SAME (settings) AND (app application) WITH (icons! buttons! shortcuts!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:05 PM
L32	33	((virtual) ADJ (reality environment world)) SAME (icons! buttons! shortcuts!) near3 (virtual graphical) SAME (settings) AND (app application) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH,	OR	ON	ON	2022/07/18 12:05 PM

			TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L33	12	((virtual) ADJ (reality environment world)) SAME (icons! buttons! shortcuts!) near3 (virtual graphical) SAME (settings) SAME (app application) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:05 PM
L34	17	((virtual) ADJ (reality environment world)) SAME scroll$3 adj2 (buttons icon) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:14 PM
L35	0	((virtual) ADJ (reality environment world)) SAME scroll$3 adj2 (arrows) WITH (icons!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:18 PM
L36	0	((virtual) ADJ (reality environment world)) SAME scroll$3 adj2 (arrows) WITH (icons! shortcuts!) AND	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2022/07/18 12:18 PM

		(715.clas. G06f3/048-05.cpc.)	EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L37	0	((virtual) ADJ (reality environment world)) SAME scroll$3 adj2 (arrows) SAME (app application) ADJ (icons! shortcuts! buttons! pages!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:18 PM
L38	0	((virtual) ADJ (reality environment world)) SAME scroll$3 WITH (arrows) SAME (app application) ADJ (icons! shortcuts! buttons! pages!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:18 PM
L39	0	((virtual) ADJ (reality environment world)) SAME scroll$3 WITH (arrows) SAME (app application) adj2 (icons! shortcuts! buttons! pages!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO;	OR	ON	ON	2022/07/18 12:19 PM

Meta Platforms, Inc. - Ex. 1002
Page 330

			JPO; DERWENT; IBM_TDB)				
L40	5	((virtual) ADJ (reality environment world)) AND scroll$3 WITH (arrows) SAME (app application) adj2 (icons! shortcuts! buttons! pages!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:19 PM
L41	4	((virtual) ADJ (reality environment world)) AND (up down) ADJ (arrows) SAME (app application) adj2 (icons! shortcuts! buttons! pages!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:20 PM
L42	46	((virtual) ADJ (reality environment world)) AND (up down) ADJ (arrows) WITH (icons! shortcuts! buttons! pages!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:24 PM
L43	43	((virtual) ADJ (reality environment world)) AND (up down) ADJ (arrows) WITH (icons! shortcuts! buttons! homescreen ADJ pages) AND (715.clas.	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS,	OR	ON	ON	2022/07/18 12:24 PM

		G06f3/048-05.cpc.)	IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L44	330	((virtual) ADJ (reality environment world)) AND scroll$3 near3 (icons! shortcuts!) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:31 PM
L45	0	((virtual) ADJ (reality environment world)) AND scroll$3 near3 (icons! shortcuts!) WITH (up down) ADJ arrows AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:32 PM
L46	22	((virtual) ADJ (reality environment world)) AND scroll$3 near3 (icons! shortcuts!) WITH arrows AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:32 PM

L47	0	((virtual) ADJ (reality environment world)) AND scroll$3 near3 (homescreen home ADJ screen) WITH arrows AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:37 PM
L48	0	((virtual) ADJ (reality environment world)) AND scroll$3 WITH (homescreen home ADJ screen) WITH arrows AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:37 PM
L49	11	((virtual) ADJ (reality environment world)) AND (homescreen home ADJ screen) WITH arrows AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/18 12:37 PM
L50	0	((virtual) ADJ (reality environment world)) AND (homescreen home ADJ screen) WITH arrows WITH (pages) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL,	OR	ON	ON	2022/07/18 12:37 PM

			NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L51	390	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:13 AM
L52	18	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon near3 (app application)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:14 AM
L53	390	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:17 AM
L54	195	(virtual ADJ (reality environment world)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP,	OR	ON	ON	2022/07/19 10:17 AM

		HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon AND (715.clas. G06f3/048-05.cpc.)	AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L55	90	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon AND (715.clas. G06f3/04815.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:17 AM
L56	24	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon WITH gesture AND (715.clas. G06f3/04815.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:18 AM
L57	2	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon WITH (camera space) AND (715.clas. G06f3/04815.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO,	OR	ON	ON	2022/07/19 10:19 AM

			RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L58	90	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 pull$3 tap tapping tapped slid$3) near3 icon AND (715.clas. G06f3/04815.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:20 AM
L59	14	(virtual ADJ (reality environment world) HMD head ADJ mounted ADJ display) SAME (push$3 press$3 tap tapping tapped slid$3) near3 icon WITH finger	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:23 AM
L60	783850	canon.as.	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:33 AM
L61	1378	canon.as. AND (HMD)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU,	OR	ON	ON	2022/07/19 10:34 AM

			CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L62	18	canon.as. AND (HMD) SAME finger	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:34 AM
L63	2	canon.as. AND (HMD) SAME finger WITH icon	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:34 AM
L64	276	(3d three ADJ dimension$4) near3 (app application) near3 button	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA,	OR	ON	ON	2022/07/19 10:59 AM

			VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L65	2	(3d three ADJ dimension$4) near3 (app application) near3 button SAME (virtual ADJ (reality environment world))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 10:59 AM
L66	97	(3d three ADJ dimension$4) near3 (app application) near3 button AND (virtual ADJ (reality environment world))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 11:00 AM
L67	8	(3d three ADJ dimension$4) near3 (app application) ADJ button AND (virtual ADJ (reality environment world))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 11:00 AM
L68	48	(3d three ADJ dimension$4) near3 (app application) ADJ icon AND (virtual ADJ (reality environment world))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB,	OR	ON	ON	2022/07/19 11:00 AM

			HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L69	12	(3d three ADJ dimension$4) near3 (app application) ADJ icon SAME (virtual ADJ (reality environment world))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 11:00 AM
L70	3	(setting) ADJ (icons!) SAME (virtual ADJ (reality environment world))	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 12:11 PM
L71	142	(virtual ADJ (reality world environment)) SAME (controller) SAME (finger hands) near3 (mode)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2022/07/19 01:15 PM

			IBM_TDB)				
L72	22	(virtual ADJ (reality world environment)) SAME (controller) near3 mode SAME (finger hands) near3 (mode)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:15 PM
L73	0	(virtual ADJ (reality world environment)) SAME (controller) near3 mode SAME (motion) near3 gesture near3 (mode)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:19 PM
L74	1	(virtual ADJ (reality world environment)) SAME (controller) near3 mode SAME (motion) near3 gesture	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:19 PM
L75	231	(virtual ADJ (reality world environment)) SAME (controller) WITH (motion) near3 gesture	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV,	OR	ON	ON	2022/07/19 01:20 PM

			MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L76	50	(virtual ADJ (reality world environment)) SAME (controller) WITH (motion) near3 gesture WITH (hand fingers)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:20 PM
L77	1	(virtual ADJ (reality world environment)) SAME (controller) WITH (motion) near3 gesture WITH (hand fingers) WITH (modality mode)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:20 PM
L78	5354	(virtual ADJ (reality world environment)) SAME detect$3 WITH (controller)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:20 PM
L79	0	(virtual ADJ (reality	(US-PGPUB; USPAT;	OR	ON	ON	2022/07/19

		world environment)) SAME detect$3 WITH (controller) near3 ("not using")	USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				01:21 PM
L80	6	(virtual ADJ (reality world environment)) SAME detect$3 WITH (controller) near3 ((off))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:21 PM
L81	643	(virtual ADJ (reality world environment)) SAME controller WITH (hand finger) near3 gesture	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:22 PM
L82	100	(virtual ADJ (reality world environment)) SAME controller WITH (hand finger) near3 gesture WITH (mode modality)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL,	OR	ON	ON	2022/07/19 01:22 PM

			PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L83	2	(virtual ADJ (reality world environment)) SAME controller WITH (hand finger) near3 gesture WITH (mode modality) SAME point$3	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:22 PM
L84	0	(virtual ADJ (reality world environment)) SAME remote ADJ controller WITH (hand finger) near3 gesture WITH (mode modality)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 01:24 PM
L85	82	(virtual ADJ (reality world environment)) SAME controller WITH (hand finger) near3 gesture WITH (mode modality)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 01:24 PM
L86	157	(virtual ADJ (reality world environment)) AND controller WITH (hand finger) near3 gesture WITH (mode modality)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 01:29 PM
L87	0	(virtual ADJ (reality world environment)) AND remote ADJ controller WITH (hand finger) near3 gesture WITH (mode modality)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 01:29 PM

L88	157	(virtual ADJ (reality world environment)) AND controller WITH (hand finger) near3 gesture WITH (mode modality)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 01:29 PM
L89	4	(virtual ADJ (reality world environment)) AND controller WITH (hand finger) near3 gesture WITH (modality)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 01:29 PM
L90	0	("not using") near3 controller	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 05:22 PM
L91	0	("not" ADJ (using holding)) near3 controller	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 05:22 PM
L92	0	("not" ADJ (using holding)) near3 remote	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 05:22 PM
L93	0	("not" ADJ (using holding)) near3 input ADJ device	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 05:22 PM
L94	0	("not" ADJ (using holding used)) near3 input ADJ device	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 05:22 PM
L95	0	("not" ADJ (using holding used)) near3 input	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 05:23 PM
L96	13	("not" ADJ (using holding used))	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/07/19 05:23 PM
L97	71	("not" ADJ (using holding used))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 05:24 PM
L98	0	("not" ADJ (using holding used)) near3 (input)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL,	OR	ON	ON	2022/07/19 05:24 PM

			NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L99	0	("not" ADJ (using holding used)) near3 (input controller)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 05:24 PM
L100	852	average near3 ("arm length")	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 05:58 PM
L101	24	average near3 ("arm length") WITH reach$3	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 05:58 PM
L102	2	average near3 ("arm	(US-PGPUB; USPAT;	OR	ON	ON	2022/07/19

		length") WITH reach$3 AND (715.clas. G06f3/048-05.cpc.)	USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				05:58 PM
L103	9	average near3 ("arm length") WITH within AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 05:59 PM
L104	0	average near3 (lenght) near3 arm WITH within AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:00 PM
L105	17	average near3 (length) near3 arm WITH within AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL,	OR	ON	ON	2022/07/19 06:00 PM

			PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L106	4	average near3 (length) near3 arm WITH reach$3 AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:01 PM
L107	15	average near3 (length) near3 arm WITH (child$3 adult) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:01 PM
L108	15	average near3 (length) near3 arm SAME (child$3 adult) AND (715.clas. G06f3/048-05.cpc.)	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:02 PM
L109	2	average near3 (length) near3 arm SAME (virtual ADJ (reality	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY,	OR	ON	ON	2022/07/19 06:02 PM

		world environment space)) AND (715.clas. G06f3/048-05.cpc.)	CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L110	2	average near3 (length) near3 arm SAME (virtual ADJ (reality world environment space))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:04 PM
L111	2	average near3 (length measurement) near3 arm SAME (virtual ADJ (reality world environment space))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:04 PM
L112	4	average near3 (length measurement distance) near3 arm SAME (virtual ADJ (reality world environment space))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH,	OR	ON	ON	2022/07/19 06:04 PM

			TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L113	4	average near3 (length measurement distance) near3 arm SAME ((mixed augmented virtual) ADJ (reality world environment space))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:05 PM
L114	4	(median average) near3 (length measurement distance) near3 arm SAME ((mixed augmented virtual) ADJ (reality world environment space))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:05 PM
L115	143	(median average) near3 (length measurement distance) near3 arm AND ((mixed augmented virtual) ADJ (reality world environment space))	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:06 PM
L116	2	(median average) near3 (length measurement distance) near3 arm SAME icons! AND ((mixed augmented	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2022/07/19 06:06 PM

		virtual) ADJ (reality world environment space))	EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L117	19	"2012032687"	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/07/19 06:11 PM
L118	0	((("VR-EDU") near3 ("INC"))).AS,AANM.	(USPAT)	OR	ON	ON	2022/07/20 08:24 AM
L119	34	((("FIELDMAN") near3 ("Ethan"))).INV.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/07/20 08:25 AM
L120	1	((("FIELDMAN") near3 ("Ethan"))).INV. AND (virtual ADJ reality).clm.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/07/20 08:25 AM
L121	880563	(virtual augmented mixed) ADJ (reality world environment space)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/10/24 05:41 PM
L122	7707	(virtual augmented mixed) ADJ (reality world environment space) AND (controller) WITH cursor	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA,	OR	ON	ON	2022/10/24 05:42 PM

			EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L123	584	(virtual augmented mixed) ADJ (reality world environment space) AND (controller) WITH cursor AND (hand finger arm) WITH (move moving reposition$3 moved) near3 (icons objects elements items)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/10/24 05:42 PM
L124	17	(virtual augmented mixed) ADJ (reality world environment space) AND (controller) WITH cursor AND (hand finger arm) WITH (move moving reposition$3 moved) near3 (icons objects elements items) WITH (reach proximity closer vicinity)	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/10/24 05:42 PM
L125	1151	(virtual augmented mixed) ADJ (reality world environment space) AND (controller) near3 mode AND (hand finger arm) near3 mode	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO;	OR	ON	ON	2022/10/24 05:46 PM

			JPO; DERWENT; IBM_TDB)				
L126	137	(virtual augmented mixed) ADJ (reality world environment space) AND (controller) near3 mode AND (hand finger arm) near3 mode WITH gesture	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/10/24 05:47 PM
L127	10	(virtual augmented mixed) ADJ (reality world environment space) AND (controller) near3 mode WITH cursor AND (hand finger arm) near3 mode WITH gesture	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/10/24 05:47 PM
L128	0	(virtual augmented mixed) ADJ (reality world environment space) AND (remot ADJ control$3) near3 mode AND (hand finger arm) near3 mode WITH gesture	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/10/24 05:51 PM
L129	58	(virtual augmented mixed) ADJ (reality world environment space) AND (remote ADJ control$3) near3 mode AND (hand finger arm) near3 mode WITH	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS,	OR	ON	ON	2022/10/24 05:51 PM

		gesture	IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L130	262	(virtual augmented mixed) ADJ (reality world environment space) AND (remote ADJ control$3) near3 mode AND (hand finger arm gesture) near3 mode	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/10/24 05:54 PM
L131	91	(virtual augmented mixed) ADJ (reality world environment space) AND (remote ADJ control$3) near3 mode SAME (hand finger arm gesture) near3 mode	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/10/24 05:54 PM
L132	26	(virtual augmented mixed) ADJ (reality world environment space) AND (remote ADJ control$3) near3 mode SAME (hand finger arm gesture) near3 mode WITH input	(US-PGPUB; USPAT; USOCR; FIT (AP, AT, AU, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, MC, MD, MY, NL, NO, NZ, OA, PH, PL, PT, RO, RS, RU, SE, SG, SI, SK, SU, TH, TN, TR, TW, UA, VN, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/10/24 05:55 PM

L133	26	(virtual augmented mixed) ADJ (reality world environment space) AND (remote ADJ control$3) near3 mode SAME (hand finger arm gesture) near3 mode	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 05:58 PM
L134	25	(virtual augmented mixed) ADJ (reality world environment space) AND (remote ADJ control$3) SAME (hand finger arm gesture) SAME (multimodal$3 multi-modal$3)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:02 PM
L135	836	(virtual augmented mixed) ADJ (reality world environment space) AND (remote ADJ control$3) SAME (hand finger arm gesture) AND (multimodal$3 multi-modal$3)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:08 PM
L136	1083	(virtual augmented mixed) ADJ (reality world environment space) AND (remote ADJ control$3) AND (hand finger arm gesture) WITH camera AND (multimodal$3 multi-modal$3)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:09 PM
L137	16	(virtual augmented mixed) ADJ (reality world environment space) AND (remote ADJ control$3) WITH cursor AND (hand finger arm gesture) WITH camera AND (multimodal$3 multi-modal$3)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:09 PM
L138	1	(virtual augmented mixed) ADJ (reality world environment space) AND (remote ADJ control$3) WITH cursor WITH icons AND (hand finger arm gesture) WITH camera WITH icon	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:13 PM
L139	5	(remote ADJ control$3) WITH cursor WITH	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:15 PM

		icons AND (hand finger arm gesture) WITH camera WITH icon					
L140	5	(remote ADJ control$3) WITH cursor WITH icons AND (hand finger arm gesture) WITH camera SAME icon	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:17 PM
L141	16	(remote ADJ control$3) WITH cursor SAME icons AND (hand finger arm gesture) WITH camera SAME icon	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:17 PM
L142	6	(remote ADJ control$3) WITH cursor AND (hand finger arm gesture) WITH camera SAME reach near3 within	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:18 PM
L143	5	(remote ADJ control$3) WITH input ADJ mode AND (hand finger arm gesture) WITH camera WITH input ADJ mode	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:19 PM
L144	361	(remote ADJ control$3) WITH mode AND (hand finger arm gesture) WITH camera WITH mode	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:21 PM
L145	189	(remote ADJ control$3) WITH mode AND (hand finger arm gesture) WITH camera WITH mode AND reach$3	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:21 PM
L146	10	(remote ADJ control$3) WITH mode AND (hand finger arm gesture) WITH camera WITH mode AND reach$3 near3 (hand finger arm)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:21 PM
L147	75558	without near3 (controller)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:26 PM
L148	27676	camera WITH detect$3 WITH (hand arm finger)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:26 PM
L149	1287	camera WITH detect$3 WITH (hand arm finger) AND remote ADJ controller	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:26 PM
L150	27	camera WITH detect$3 WITH (hand arm finger) AND remote ADJ controller WITH cursor	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:27 PM
L151	0	camera WITH detect$3 WITH (hand arm finger)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:27 PM

		AND remote ADJ controller WITH cursor SAME mode					
L152	105302	(head ADJ mounted goggles) WITH display$3	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:34 PM
L153	46	(head ADJ mounted goggles) WITH display$3 AND controller ADJ mode	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:34 PM
L154	5	(head ADJ mounted goggles) WITH display$3 AND controller ADJ mode AND (gesture) ADJ mode	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:34 PM
L155	12	(head ADJ mounted goggles) AND controller ADJ mode AND (gesture hand) ADJ mode	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:44 PM
L156	0	(head ADJ mounted goggles) AND controller ADJ mode AND (camera) ADJ input ADJ mode	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:45 PM
L157	0	(head ADJ mounted goggles) AND controller WITH input ADJ mode AND (camera) WITH input ADJ mode	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:45 PM
L158	56	controller WITH input ADJ mode AND (camera) WITH input ADJ mode	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:45 PM
L159	3999	(head ADJ mounted goggles) AND (multimodal$3 multi-modal$3)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:46 PM
L160	42	(head ADJ mounted goggles) AND (multimodal$3 multi-modal$3) SAME hand SAME controller	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:46 PM
L161	0	(head ADJ mounted goggles) AND (multimodal$3 multi-modal$3) SAME hand WITH camera SAME controller	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:46 PM
L162	0	hand adj2 mode WITH (move moving moved reposition$3 relocat$3) WITH (arm) near3	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:54 PM

		(reach$3 length distance)					
L163	162	mode WITH (move moving moved reposition$3 relocat$3) WITH (arm) near3 (reach$3 length distance)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:54 PM
L164	0	mode WITH (move moving moved reposition$3 relocat$3) near3 icons WITH (arm) near3 (reach$3 length distance)	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:54 PM
L165	0	mode WITH (move moving moved reposition$3 relocat$3) WITH (arm) near3 (reach$3 length distance) AND mode WITH controller WITH cursor	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:55 PM
L166	0	mode WITH (move moving moved reposition$3 relocat$3) WITH (arm) near3 (reach$3 length distance) AND mode WITH cursor	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:55 PM
L167	9	mode WITH (move moving moved reposition$3 relocat$3) WITH (arm) near3 (reach$3 length distance) AND (goggles head ADJ mounted (virtual augment$3 mixed) ADJ (reality world space environment))	(US-PGPUB; USPAT; USOCR)	OR	ON	ON	2022/10/24 06:56 PM
L168	2	((("FIELDMAN") near3 ("Ethan"))).INV. AND (virtual ADJ reality).clm.	(US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT)	OR	ON	ON	2022/10/25 09:38 AM

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	168072	G06F3/048-05.cpc.	(US-PGPUB; USPAT)	OR	ON	ON	2022/10/25 08:13 AM
N2	23531	G06F3/048-05.cpc. AND ((virtual augmented) ADJ (reality world space environment) vr)	(US-PGPUB; USPAT)	OR	ON	ON	2022/10/25 08:13 AM

N3	4401	G06F3/048-05.cpc. AND (goggles head-mount$2 (virtual augmented) ADJ (reality world space environment) vr) AND (hand) near3 gesture	(US-PGPUB; USPAT)	OR	ON	ON	2022/10/25 08:14 AM
N4	686	G06F3/048-05.cpc. AND (goggles head-mount$2 (virtual augmented) ADJ (reality world space environment) vr) AND (hand) WITH select$3 SAME camera	(US-PGPUB; USPAT)	OR	ON	ON	2022/10/25 08:15 AM
N5	207	G06F3/048-05.cpc. AND (goggles head-mount$2 (virtual augmented) ADJ (reality world space environment) vr) AND (hand) WITH select$3 SAME camera AND (controller hardware ADJ device) WITH select$3	(US-PGPUB; USPAT)	OR	ON	ON	2022/10/25 08:15 AM
N6	23	G06F3/048-05.cpc. AND (goggles head-mount$2 (virtual augmented) ADJ (reality world space environment) vr) AND (hand) WITH select$3 SAME camera AND (controller hardware ADJ device) WITH select$3 WITH cursor	(US-PGPUB; USPAT)	OR	ON	ON	2022/10/25 08:15 AM
N7	363	G06F3/048-05.cpc. AND (goggles head-mount$2 (virtual augmented) ADJ (reality world space environment) vr) AND (hand) WITH (closer vicinity nearby reach proximity) WITH (icons! items! objects! selectable)	(US-PGPUB; USPAT)	OR	ON	ON	2022/10/25 08:21 AM
N8	14	G06F3/048-05.cpc. AND (goggles head-mount$2 (virtual augmented) ADJ (reality world space environment) vr) AND (hand) WITH (closer vicinity nearby reach	(US-PGPUB; USPAT)	OR	ON	ON	2022/10/25 08:21 AM

		proximity) WITH (icons! items! objects! selectable) AND (controller) WITH cursor					

Bibliographic Data

Application No: 17/830,109

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /DANIEL RODRIGUEZ/ Examiner's Signature | Initials

Title: Hand Control Interfaces and Methods in Virtual Reality Environments

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
06/01/2022	715	2175	114784-729016
RULE			

APPLICANTS

VR-EDU, Inc., Gainesville, FL, UNITED STATES

INVENTORS

Ethan Fieldman, Gainesville, FL, UNITED STATES

CONTINUING DATA

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

06/07/2022

** SMALL ENTITY **

STATE OR COUNTRY

UNITED STATES

ADDRESS

POLSINELLI PC (Main Customer Number)
PO Box 140310
KANSAS CITY, MO 64114-0310
UNITED STATES

FILING FEE RECEIVED

$2,930

Document Description: Issue Fee Payment (PTO-85B)

Issue Fee Transmittal Form

Application Number	Filing Date	First Named Inventor	Atty. Docket No.	Confirmation No.
17830109	01-Jun-2022	Ethan Fieldman	114784-729016	3149

TITLE OF INVENTION :

HAND CONTROL INTERFACES AND METHODS IN VIRTUAL REALITY ENVIRONMENTS

Entity Status	Application Type	Art Unit	Class - Subclass	EXAMINER
Small	Utility under 35 USC 111(a)	2175	765000	DANIEL RODRIGUEZ

Issue Fee Due	Publication Due	Total Fee(s) Due	Date Due	Prev. Paid Fee
$600	$0	$600	02-Feb-2023	$0

1.Change of Correspondence Address and/or Indication Of Fee Address (37 CFR 1.33 & 1.363)

Current Correspondence Address:	Current Indicated Fee Address :
27148 POLSINELLI PC (Main Customer Number) PO Box 140310 KANSAS CITY MO 64114-0310 UNITED STATES 816-753-1000 patentdocketing@polsinelli.com	
☐ Change of correspondence address requested, system generated AIA/122-EFS form attached	☐ Fee Address indication requested, system generated SB/47-EFS form attached

2.Entity Status

Change in Entity Status

○ Applicant certifying micro entity status; system generated Micro Entity certification form attached. See 37 CFR 1.29.
Note: Absent a valid certification of micro entity status, issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. If this box is checked, you will be prompted to choose a micro entity status on the gross income basis (37 CFR 1.29(a)) or the institution of higher education basis (37 CFR 1.29(d)), and make the applicable certification online.

◉ Applicant asserting small entity status. See 37 CFR 1.27.
Note: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

○ Applicant changing to regular undiscounted fee status.
Note: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

Document Description: Issue Fee Payment (PTO-85B)

3.The Following Fee(s) Are Submitted:

☒ Issue Fee

☐ I authorize USPTO to apply my previously paid issue fee to the current fees due

☐ Publication Fee

☐ The Director is hereby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number _____

☐ Advance Order - # of copies _____

☒ If **in addition to** the payment of the issue fee amount submitted with this form, there are any discrepancies in any amount(s) due, the Director is authorized to charge any deficiency or credit any overpayment, to Deposit Account Number 501662 . The **issue fee must be submitted** with this form. **If payment of the issue fee does not accompany this form, checking this box and providing a deposit account number will NOT be effective to satisfy full payment of the fee(s) due.**

4.Firm and/or Attorney Names To Be Printed

NOTE: If no name is listed, no name will be printed
For printing on the patent front page, list to be displayed as entered

1. POLSINELLI PC
2.
3.

5.Assignee Name(s) and Residence Data To Be Printed

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

Name	City	State	Country	Category
VR-EDU, INC.	GAINESVILLE	FLORIDA	UNITED STATES	corporation

6.Signature

I certify, in accordance with 37 CFR 1.4(d)(4) that I am an attorney or agent registered to practice before the Patent and Trademark Office who has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via EFS-WEB on the date indicated below.

Signature	/Eric J. Hanson/	**Date**	11-15-2022
Name	Eric J. Hanson	**Registration Number**	44738

Electronic Patent Application Fee Transmittal

Application Number:	17830109
Filing Date:	01-Jun-2022
Title of Invention:	HAND CONTROL INTERFACES AND METHODS IN VIRTUAL REALITY ENVIRONMENTS
First Named Inventor/Applicant Name:	Ethan Fieldman
Filer:	Eric J. Hanson/Sarah Calzia
Attorney Docket Number:	114784-729016

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY APPL ISSUE FEE	2501	1	600	600
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**600**

Electronic Acknowledgement Receipt

EFS ID:	47018960
Application Number:	17830109
International Application Number:	
Confirmation Number:	3149
Title of Invention:	HAND CONTROL INTERFACES AND METHODS IN VIRTUAL REALITY ENVIRONMENTS
First Named Inventor/Applicant Name:	Ethan Fieldman
Customer Number:	27148
Filer:	Eric J. Hanson/Sarah Calzia
Filer Authorized By:	Eric J. Hanson
Attorney Docket Number:	114784-729016
Receipt Date:	15-NOV-2022
Filing Date:	01-JUN-2022
Time Stamp:	11:34:39
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$600
RAM confirmation Number	E2022AEB34384713
Deposit Account	501662
Authorized User	Sarah Calzia

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Web85b.pdf	62825 14da47a275717fb7f88c712e4de295020c277576	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	40200 328f93df0a99f9de9f9331f3fa68c36ffc757d5e	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	103025		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/830,109	12/20/2022	11531448	114784-729016	3149

27148 7590 11/30/2022

POLSINELLI PC (Main Customer Number)
PO Box 140310
KANSAS CITY, MO 64114-0310

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PAIR WEB site http://pair.uspto.gov for additional inventors):

Ethan Fieldman, Gainesville, FL;

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

VR-EDU, Inc., Gainesville, FL;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

Assignment ID: PATI629054

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	CHANGE OF NAME

CONVEYING PARTY DATA

Name	Execution Date
VR-EDU, INC.	07/02/2024

RECEIVING PARTY DATA

Company Name:	CURIOXR, INC.
Street Address:	2510 NW 16th Avenue
City:	Gainesville
State/Country:	FLORIDA
Postal Code:	32605

PROPERTY NUMBERS Total: 28

Property Type	Number
Patent Number:	11631228
Patent Number:	11531448
Patent Number:	11463499
Patent Number:	11562657
Patent Number:	11688151
Patent Number:	11792357
Patent Number:	11990059
Patent Number:	11983837
Patent Number:	11756280
Patent Number:	11734906
Patent Number:	11656742
Patent Number:	12153762
Patent Number:	12033293
Patent Number:	11900555
Patent Number:	11875472
Patent Number:	11917324
Application Number:	18766626
Application Number:	18658618
Application Number:	18461422
Application Number:	18459873

Property Type	Number
Application Number:	18300769
Application Number:	18461392
Application Number:	18462302
Application Number:	18406741
Application Number:	18537513
Application Number:	18764075
PCT Number:	US2161922
PCT Number:	US2367660

CORRESPONDENCE DATA

Fax Number:

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: (415)248-2100
Email: patentdocketing@polsinelli.com
Correspondent Name: POLSINELLI PC (Main Customer Number)
Address Line 1: PO BOX 140310
Address Line 4: Kansas City, MISSOURI 64114-0310

ATTORNEY DOCKET NUMBER:	114784-707955
NAME OF SUBMITTER:	Jasmine Han
SIGNATURE:	Jasmine Han
DATE SIGNED:	12/04/2024
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 22
source=CurioXR, Inc. - Amended and Restated Certificate of Incorporation (DE FILED 2024-07-02)#page1.tiff
source=CurioXR, Inc. - Amended and Restated Certificate of Incorporation (DE FILED 2024-07-02)#page2.tiff
source=CurioXR, Inc. - Amended and Restated Certificate of Incorporation (DE FILED 2024-07-02)#page3.tiff
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source=CurioXR, Inc. - Amended and Restated Certificate of Incorporation (DE FILED 2024-07-02)#page22.tiff

Delaware

The First State

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE RESTATED CERTIFICATE OF "VR-EDU, INC.", CHANGING ITS NAME FROM "VR-EDU, INC." TO "CURIOXR, INC.", FILED IN THIS OFFICE ON THE SECOND DAY OF JULY, A.D. 2024, AT 8:34 O`CLOCK A.M.

Jeffrey W. Bullock, Secretary of State

6265988 8100
SR# 20243040736

Authentication: 203842539
Date: 07-02-24

You may verify this certificate online at corp.delaware.gov/authver.shtml

State of Delaware
Secretary of State
Division of Corporations
Delivered 08:34 AM 07/02/2024
FILED 08:34 AM 07/02/2024
SR 20243040736 - File Number 6265988

Execution Version

AMENDED AND RESTATED CERTIFICATE OF INCORPORATION OF VR-EDU, INC.

(Pursuant to Sections 242 and 245 of the
General Corporation Law of the State of Delaware)

VR-EDU, Inc., a corporation organized and existing under and by virtue of the provisions of the General Corporation Law of the State of Delaware (the "**General Corporation Law**"),

DOES HEREBY CERTIFY:

1. That the name of this corporation is VR-EDU, Inc., and that this corporation was originally incorporated pursuant to the General Corporation Law on September 27, 2021.

2. That the Board of Directors of this corporation (the "**Board of Directors**") duly adopted resolutions proposing to amend and restate the Certificate of Incorporation of this corporation, declaring said amendment and restatement to be advisable and in the best interests of this corporation and its stockholders, and authorizing the appropriate officers of this corporation to solicit the consent of the stockholders therefor, which resolution setting forth the proposed amendment and restatement is as follows:

RESOLVED, that the Amended and Restated Certificate of Incorporation of this corporation be amended and restated in its entirety to read as follows:

FIRST: The name of this corporation is CurioXR, Inc. (the "**Corporation**").

SECOND: The address of the registered office of the Corporation in the State of Delaware is 3500 South Dupont Highway, in the City of Dover, County of Kent, Delaware 19901. The name of its registered agent at such address is Incorporating Services, Ltd.

THIRD: The nature of the business or purposes to be conducted or promoted is to engage in any lawful act or activity for which corporations may be organized under the General Corporation Law.

FOURTH: The total number of shares of all classes of stock which the Corporation shall have authority to issue is (i) 6,000,000 shares of Common Stock, $0.0001 par value per share ("**Common Stock**"), and (ii) 1,473,475 shares of Preferred Stock, $0.0001 par value per share ("**Preferred Stock**").

The following is a statement of the designations and the powers, privileges and rights, and the qualifications, limitations or restrictions thereof in respect of each class of capital stock of the Corporation.

A. COMMON STOCK

1. General. The voting, dividend and liquidation rights of the holders of the Common Stock are subject to and qualified by the rights, powers and preferences of the holders of the Preferred Stock set forth herein.

2. Voting. The holders of the Common Stock are entitled to one (1) vote for each share of Common Stock held at all meetings of stockholders (and written actions in lieu of meetings); provided, however, that, except as otherwise required by law, holders of Common Stock, as such, shall not be entitled to vote on any amendment to this Amended and Restated Certificate of Incorporation (this "**Restated Certificate**") that relates solely to the terms of one (1) or more outstanding series of Preferred Stock if the holders of such affected series are entitled, either separately or together with the holders of one (1) or more other such series, to vote thereon pursuant to this Restated Certificate or pursuant to the General Corporation Law. There shall be no cumulative voting. The number of authorized shares of Common Stock may be increased or decreased (but not below the number of shares thereof then outstanding) by (in addition to any vote of the holders of one (1) or more series of Preferred Stock that may be required by the terms of this Restated Certificate) the affirmative vote of the holders of shares of capital stock of the Corporation representing a majority of the votes represented by all outstanding shares of capital stock of the Corporation entitled to vote, irrespective of the provisions of Section 242(b)(2) of the General Corporation Law.

B. PREFERRED STOCK

893,016 shares of the Preferred Stock of the Corporation are hereby designated "**Series Seed Preferred Stock**". 580,459 shares of the Preferred Stock of the Corporation are hereby designated "**Series Seed-2 Preferred Stock**". The Preferred Stock shall have the following rights, preferences, powers, privileges and restrictions, qualifications and limitations.

Unless otherwise indicated, references to "sections" in this Part B of this Article Fourth refer to sections of Part B of this Article Fourth.

1. Dividends. The holders of then outstanding shares of Preferred Stock shall be entitled to receive, only when, as and if declared by the Board of Directors, out of any funds and assets legally available therefor, dividends at the rate of 8% of the Original Issue Price (as defined below) for each share of Preferred Stock, prior and in preference to any declaration or payment of any other dividend (other than dividends on shares of Common Stock payable in shares of Common Stock). The right to receive dividends on shares of Preferred Stock pursuant to the preceding sentence of this Section 1 shall not be cumulative, and no right to dividends shall accrue to holders of Preferred Stock by reason of the fact that dividends on said shares are not declared. The Corporation shall not declare, pay or set aside any dividends on shares of any other class or series of capital stock of the Corporation (other than dividends on shares of Common Stock payable in shares of Common Stock) unless (in addition to the obtaining of any consents required elsewhere in this Amended and Restated Certificate of Incorporation) the holders of the Preferred Stock then outstanding shall first receive, or simultaneously receive, in addition to the dividends payable pursuant to the first sentence of this Section 1, a dividend on each outstanding share of Preferred Stock in an amount at least equal to (i) in the case of a dividend on Common Stock or

Meta Platforms, Inc. - Ex. 1002
Page 373

any class or series that is convertible into Common Stock, that dividend per share of Preferred Stock as would equal the product of (A) the dividend payable on each share of such class or series determined, if applicable, as if all shares of such class or series had been converted into Common Stock and (B) the number of shares of Common Stock issuable upon conversion of a share of Preferred Stock, in each case calculated on the record date for determination of holders entitled to receive such dividend or (ii) in the case of a dividend on any class or series that is not convertible into Common Stock, at a rate per share of Preferred Stock determined by (A) dividing the amount of the dividend payable on each share of such class or series of capital stock by the original issuance price of such class or series of capital stock (subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to such class or series) and (B) multiplying such fraction by an amount equal to the Original Issue Price (as defined below); provided that, if the Corporation declares, pays or sets aside, on the same date, a dividend on shares of more than one (1) class or series of capital stock of the Corporation, the dividend payable to the holders of Preferred Stock pursuant to this Section 1 shall be calculated based upon the dividend on the class or series of capital stock that would result in the highest Preferred Stock dividend. The "**Original Issue Price**" shall mean, with respect to the Series Seed Preferred Stock and Series Seed-2 Preferred Stock, $4.4792 per share, subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the Series Seed Preferred Stock or Series Seed-2 Preferred Stock, as applicable.

2. Liquidation, Dissolution or Winding Up; Certain Mergers, Consolidations and Asset Sales.

2.1 Preferential Payments to Holders of Preferred Stock. In the event of any voluntary or involuntary liquidation, dissolution or winding up of the Corporation, the holders of shares of Preferred Stock then outstanding shall be entitled to be paid out of the assets of the Corporation available for distribution to its stockholders, and in the event of a Deemed Liquidation Event (as defined below), the holders of shares of Preferred Stock then outstanding shall be entitled to be paid out of the consideration payable to stockholders in such Deemed Liquidation Event or out of the Available Proceeds (as defined below), as applicable, before any payment shall be made to the holders of Common Stock by reason of their ownership thereof, an amount per share equal to the greater of (i) the Original Issue Price, plus any dividends declared but unpaid thereon, or (ii) such amount per share as would have been payable had all shares of Preferred Stock been converted into Common Stock pursuant to Section 4 immediately prior to such liquidation, dissolution, winding up or Deemed Liquidation Event (the amount payable pursuant to this sentence is hereinafter referred to as the "**Liquidation Amount**"). If upon any such liquidation, dissolution or winding up of the Corporation or Deemed Liquidation Event, the assets of the Corporation available for distribution to its stockholders shall be insufficient to pay the holders of shares of Preferred Stock the full amount to which they shall be entitled under this Section 2.1, the holders of shares of Preferred Stock shall share ratably in any distribution of the assets available for distribution in proportion to the respective amounts which would otherwise be payable in respect of the shares held by them upon such distribution if all amounts payable on or with respect to such shares were paid in full.

2.2 Payments to Holders of Common Stock. In the event of any voluntary or involuntary liquidation, dissolution or winding up of the Corporation, after the payment in full of

all Liquidation Amounts required to be paid to the holders of shares of Preferred Stock, the remaining assets of the Corporation available for distribution to its stockholders or, in the case of a Deemed Liquidation Event, the consideration not payable to the holders of shares of Preferred Stock pursuant to Section 2.1 or the remaining Available Proceeds, as the case may be, shall be distributed among the holders of shares of Common Stock, pro rata based on the number of shares held by each such holder.

2.3 Deemed Liquidation Events.

2.3.1 Definition. Each of the following events shall be considered a "**Deemed Liquidation Event**" unless the holders of a majority of the outstanding shares of Series Seed Preferred Stock or, in the event at such time there are no shares of Series Seed Preferred Stock then outstanding, the holders of a majority of the outstanding shares of Series Seed-2 Preferred Stock (the "**Requisite Holders**") elect otherwise by written notice sent to the Corporation at least ten (10) days prior to the effective date of any such event:

(a) a merger or consolidation in which

(i) the Corporation is a constituent party or

(ii) a subsidiary of the Corporation is a constituent party and the Corporation issues shares of its capital stock pursuant to such merger or consolidation,

except any such merger or consolidation involving the Corporation or a subsidiary in which the shares of capital stock of the Corporation outstanding immediately prior to such merger or consolidation continue to represent, or are converted into or exchanged for shares of capital stock that represent, immediately following such merger or consolidation, at least a majority, by voting power, of the capital stock of (1) the surviving or resulting corporation; or (2) if the surviving or resulting corporation is a wholly owned subsidiary of another corporation immediately following such merger or consolidation, the parent corporation of such surviving or resulting corporation; or

(b) (1) the sale, lease, transfer, exclusive license or other disposition, in a single transaction or series of related transactions, by the Corporation or any subsidiary of the Corporation of all or substantially all the assets of the Corporation and its subsidiaries taken as a whole, or (2) the sale or disposition (whether by merger, consolidation or otherwise, and whether in a single transaction or a series of related transactions) of one (1) or more subsidiaries of the Corporation if substantially all of the assets of the Corporation and its subsidiaries taken as a whole are held by such subsidiary or subsidiaries, except where such sale, lease, transfer, exclusive license or other disposition is to a wholly owned subsidiary of the Corporation.

2.3.2 Effecting a Deemed Liquidation Event.

(a) The Corporation shall not have the power to effect a Deemed Liquidation Event referred to in Section 2.3.1(a)(i) unless the agreement or plan of merger or consolidation for such transaction (the "**Merger Agreement**") provides that the consideration payable to the stockholders of the Corporation in such Deemed Liquidation Event shall be

Meta Platforms, Inc. - Ex. 1002
Page 375

allocated to the holders of capital stock of the Corporation in accordance with Sections 2.1 and 2.2.

(b) In the event of a Deemed Liquidation Event referred to in Section 2.3.1(a)(ii) or 2.3.1(b), if the Corporation does not effect a dissolution of the Corporation under the General Corporation Law within ninety (90) days after such Deemed Liquidation Event, then (i) the Corporation shall send a written notice to each holder of Preferred Stock no later than the ninetieth (90th) day after the Deemed Liquidation Event advising such holders of their right (and the requirements to be met to secure such right) pursuant to the terms of the following clause; (ii) to require the redemption of such shares of Preferred Stock, and (iii) if the Requisite Holders so request in a written instrument delivered to the Corporation not later than one hundred twenty (120) days after such Deemed Liquidation Event, the Corporation shall use the consideration received by the Corporation for such Deemed Liquidation Event (net of any retained liabilities associated with the assets sold or technology licensed, as determined in good faith by the Board of Directors), together with any other assets of the Corporation available for distribution to its stockholders, all to the extent permitted by Delaware law governing distributions to stockholders (the "**Available Proceeds**"), on the one hundred fiftieth (150th) day after such Deemed Liquidation Event, to redeem all outstanding shares of Preferred Stock at a price per share equal to the applicable Liquidation Amount. Notwithstanding the foregoing, in the event of a redemption pursuant to the preceding sentence, if the Available Proceeds are not sufficient to redeem all outstanding shares of Preferred Stock, the Corporation shall redeem a pro rata portion of each holder's shares of Preferred Stock to the fullest extent of such Available Proceeds, based on the respective amounts which would otherwise be payable in respect of the shares to be redeemed if the Available Proceeds were sufficient to redeem all such shares, and shall redeem the remaining shares as soon as it may lawfully do so under Delaware law governing distributions to stockholders. Prior to the distribution or redemption provided for in this Section 2.3.2(b), the Corporation shall not expend or dissipate the consideration received for such Deemed Liquidation Event, except to discharge expenses incurred in connection with such Deemed Liquidation Event or in the ordinary course of business.

2.3.3 Amount Deemed Paid or Distributed. The amount deemed paid or distributed to the holders of capital stock of the Corporation upon any such merger, consolidation, sale, transfer, exclusive license, other disposition or redemption shall be the cash or the value of the property, rights or securities to be paid or distributed to such holders pursuant to such Deemed Liquidation Event. The value of such property, rights or securities shall be determined in good faith by the Board of Directors.

2.3.4 Allocation of Escrow and Contingent Consideration. In the event of a Deemed Liquidation Event pursuant to Section 2.3.1(a)(i), if any portion of the consideration payable to the stockholders of the Corporation is payable only upon satisfaction of contingencies (the "**Additional Consideration**"), the Merger Agreement shall provide that (a) the portion of such consideration that is not Additional Consideration (such portion, the "**Initial Consideration**") shall be allocated among the holders of capital stock of the Corporation in accordance with Sections 2.1 and 2.2 as if the Initial Consideration were the only consideration payable in connection with such Deemed Liquidation Event; and (b) any Additional Consideration which becomes payable to the stockholders of the Corporation upon satisfaction of such contingencies shall be allocated among the holders of capital stock of the Corporation in accordance with

Sections 2.1 and 2.2 after taking into account the previous payment of the Initial Consideration as part of the same transaction. For the purposes of this Section 2.3.4, consideration placed into escrow or retained as a holdback to be available for satisfaction of indemnification or similar obligations in connection with such Deemed Liquidation Event shall be deemed to be Additional Consideration.

3. Voting.

3.1 General. On any matter presented to the stockholders of the Corporation for their action or consideration at any meeting of stockholders of the Corporation (or by written consent of stockholders in lieu of meeting), each holder of outstanding shares of Preferred Stock shall be entitled to cast the number of votes equal to the number of whole shares of Common Stock into which the shares of Preferred Stock held by such holder are convertible as of the record date for determining stockholders entitled to vote on such matter. Except as provided by law or by the other provisions of this Restated Certificate, holders of Preferred Stock shall vote together with the holders of Common Stock as a single class and on an as-converted to Common Stock basis.

3.2 Election of Directors. The holders of record of the shares of Common Stock and of any other class or series of voting stock (including the Preferred Stock), exclusively and voting together as a single class, shall be entitled to elect the directors of the Corporation.

3.3 Series Seed Preferred Stock Protective Provisions. At any time when at least 250,000 shares of Series Seed Preferred Stock (subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the Series Seed Preferred Stock) are outstanding, the Corporation shall not, either directly or indirectly by amendment, merger, consolidation, recapitalization, reclassification, or otherwise, do any of the following without (in addition to any other vote required by law or this Restated Certificate) the written consent or affirmative vote of the Requisite Holders given in writing or by vote at a meeting, consenting or voting (as the case may be) separately as a class, and any such act or transaction entered into without such consent or vote shall be null and void *ab initio*, and of no force or effect. In addition, at any time (i) the consent of the holders of Series Seed Preferred Stock is not required because there are insufficient shares of Series Seed Preferred Stock then outstanding, and (ii) at least 250,000 shares of Series Seed-2 Preferred Stock (subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the Series Seed-2 Preferred Stock) are outstanding, the Corporation shall not, either directly or indirectly by amendment, merger, consolidation, recapitalization, reclassification, or otherwise, do any of the following without (in addition to any other vote required by law or this Restated Certificate) the written consent or affirmative vote of the holders of a majority of the outstanding shares of the Series Seed-2 Preferred Stock given in writing or by vote at a meeting, consenting or voting (as the case may be) separately as a class, and any such act or transaction entered into without such consent or vote shall be null and void *ab initio*, and of no force or effect.

3.3.1 liquidate, dissolve or wind-up the business and affairs of the Corporation, effect any merger or consolidation or any other Deemed Liquidation Event, or consent to any of the foregoing, unless the holders of Series Seed Preferred would receive in such

Meta Platforms, Inc. - Ex. 1002
Page 377

Deemed Liquidation Event is at least three times (3x) or greater of the Series Seed Preferred Stock Original Issue Price on a per-share basis;

3.3.2 amend, alter, or repeal any provision of this Restated Certificate or the Bylaws of the Corporation; *provided, that*, no such amendment, alteration, or repeal shall adversely affect the rights of any holder of Series Seed-2 Preferred Stock in a manner disproportionate to any adverse effect such amendment, alteration, or repeal would have on the rights of holders of all Preferred Stock without the consent of the holders of a majority of the outstanding shares of Series Seed-2 Preferred Stock voting as a separate class;

3.3.3 (i) create, or authorize the creation of, or issue or obligate itself to issue shares of, or reclassify, any capital stock unless the same ranks junior to, or pari passu with, the Preferred Stock with respect to its rights, preferences and privileges, or (ii) increase the authorized number of shares of any class or series of capital stock of the Corporation;

3.3.4 purchase or redeem (or permit any subsidiary to purchase or redeem) or pay or declare any dividend or make any distribution on, any shares of capital stock of the Corporation other than (i) redemptions of or dividends or distributions on the Preferred Stock as expressly authorized herein, (ii) dividends or other distributions payable on the Common Stock solely in the form of additional shares of Common Stock, and (iii) repurchases of stock from former employees, officers, directors, consultants or other persons who performed services for the Corporation or any subsidiary in connection with the cessation of such employment or service at no greater than the original purchase price thereof;

3.3.5 create, adopt, amend, terminate or repeal any equity (or equity-linked) compensation plan or amend or waive any of the terms of any option or other grant pursuant to any such plan;

3.3.6 create, or authorize the creation of, or issue, or authorize the issuance of any debt security or create any lien or security interest (except for purchase money liens or statutory liens of landlords, mechanics, materialmen, workmen, warehousemen and other similar persons arising or incurred in the ordinary course of business) or incur other indebtedness for borrowed money, including but not limited to obligations and contingent obligations under guarantees, or permit any subsidiary to take any such action with respect to any debt security lien, security interest or other indebtedness for borrowed money, if the aggregate indebtedness of the Corporation and its subsidiaries for borrowed money following such action would exceed $1,000,000;

3.3.7 enter into or be a party to any transaction with any director, officer or employee of the Company or any "associate" (as defined in Rule 12b-2 promulgated under the Securities Exchange Act of 1934, as amended) of any such person; and

3.3.8 sell, assign, license, pledge, or encumber material technology, intellectual property, or other assets of the Company outside the ordinary course of business.

4. Optional Conversion.

The holders of the Preferred Stock shall have conversion rights as follows (the "**Conversion Rights**"):

4.1 Right to Convert.

4.1.1 Conversion Ratio. Each share of Preferred Stock shall be convertible, at the option of the holder thereof, at any time and from time to time, and without the payment of additional consideration by the holder thereof, into such number of fully paid and non-assessable shares of Common Stock as is determined by dividing the Original Issue Price by the Conversion Price (as defined below) in effect at the time of conversion. The "**Conversion Price**" for each series of Preferred Stock shall initially be equal to the Original Issue Price for such series of Preferred Stock. Such initial Conversion Price, and the rate at which shares of Preferred Stock may be converted into shares of Common Stock, shall be subject to adjustment as provided below.

4.1.2 Termination of Conversion Rights. In the event of a liquidation, dissolution or winding up of the Corporation or a Deemed Liquidation Event, the Conversion Rights shall terminate at the close of business on the last full day preceding the date fixed for the payment of any such amounts distributable on such event to the holders of Preferred Stock; provided that the foregoing termination of Conversion Rights shall not affect the amount(s) otherwise paid or payable in accordance with Section 2.1 to holders of Preferred Stock pursuant to such liquidation, dissolution or winding up of the Corporation or a Deemed Liquidation Event.

4.2 Fractional Shares. No fractional shares of Common Stock shall be issued upon conversion of the Preferred Stock. In lieu of any fractional shares to which the holder would otherwise be entitled, the number of shares of Common Stock to be issued upon conversion of the Preferred Stock shall be rounded to the nearest whole share.

4.3 Mechanics of Conversion.

4.3.1 Notice of Conversion. In order for a holder of Preferred Stock to voluntarily convert shares of Preferred Stock into shares of Common Stock, such holder shall (a) provide written notice to the Corporation's transfer agent at the office of the transfer agent for the Preferred Stock (or at the principal office of the Corporation if the Corporation serves as its own transfer agent) that such holder elects to convert all or any number of such holder's shares of Preferred Stock and, if applicable, any event on which such conversion is contingent and (b), if such holder's shares are certificated, surrender the certificate or certificates for such shares of Preferred Stock (or, if such registered holder alleges that such certificate has been lost, stolen or destroyed, a lost certificate affidavit and agreement reasonably acceptable to the Corporation to indemnify the Corporation against any claim that may be made against the Corporation on account of the alleged loss, theft or destruction of such certificate), at the office of the transfer agent for the Preferred Stock (or at the principal office of the Corporation if the Corporation serves as its own transfer agent). Such notice shall state such holder's name or the names of the nominees in which such holder wishes the shares of Common Stock to be issued. If required by the Corporation, any certificates surrendered for conversion shall be endorsed or accompanied by a written instrument or instruments of transfer, in form satisfactory to the Corporation, duly executed by the

Meta Platforms, Inc. - Ex. 1002
Page 379

registered holder or his, her or its attorney duly authorized in writing. The close of business on the date of receipt by the transfer agent (or by the Corporation if the Corporation serves as its own transfer agent) of such notice and, if applicable, certificates (or lost certificate affidavit and agreement) shall be the time of conversion (the "**Conversion Time**"), and the shares of Common Stock issuable upon conversion of the specified shares shall be deemed to be outstanding of record as of such date. The Corporation shall, as soon as practicable after the Conversion Time (i) issue and deliver to such holder of Preferred Stock, or to his, her or its nominees, a certificate or certificates for the number of full shares of Common Stock issuable upon such conversion in accordance with the provisions hereof and a certificate for the number (if any) of the shares of Preferred Stock represented by the surrendered certificate that were not converted into Common Stock, and (ii) pay all declared but unpaid dividends on the shares of Preferred Stock converted.

4.3.2 Reservation of Shares. The Corporation shall at all times when the Preferred Stock shall be outstanding, reserve and keep available out of its authorized but unissued capital stock, for the purpose of effecting the conversion of the Preferred Stock, such number of its duly authorized shares of Common Stock as shall from time to time be sufficient to effect the conversion of all outstanding Preferred Stock; and if at any time the number of authorized but unissued shares of Common Stock shall not be sufficient to effect the conversion of all then outstanding shares of the Preferred Stock, the Corporation shall take such corporate action as may be necessary to increase its authorized but unissued shares of Common Stock to such number of shares as shall be sufficient for such purposes, including, without limitation, engaging in best efforts to obtain the requisite stockholder approval of any necessary amendment to this Restated Certificate. Before taking any action which would cause an adjustment reducing the Conversion Price below the then par value of the shares of Common Stock issuable upon conversion of the Preferred Stock, the Corporation will take any corporate action which may, in the opinion of its counsel, be necessary in order that the Corporation may validly and legally issue fully paid and non-assessable shares of Common Stock at such adjusted Conversion Price.

4.3.3 Effect of Conversion. All shares of Preferred Stock which shall have been surrendered for conversion as herein provided shall no longer be deemed to be outstanding and all rights with respect to such shares shall immediately cease and terminate at the Conversion Time, except only the right of the holders thereof to receive shares of Common Stock in exchange therefor and to receive payment of any dividends declared but unpaid thereon. Any shares of Preferred Stock so converted shall be retired and cancelled and may not be reissued as shares of such series, and the Corporation may thereafter take such appropriate action (without the need for stockholder action) as may be necessary to reduce the authorized number of shares of Preferred Stock accordingly.

4.3.4 No Further Adjustment. Upon any such conversion, no adjustment to the Conversion Price shall be made for any declared but unpaid dividends on the Preferred Stock surrendered for conversion or on the Common Stock delivered upon conversion.

4.3.5 Taxes. The Corporation shall pay any and all issue and other similar taxes that may be payable in respect of any issuance or delivery of shares of Common Stock upon conversion of shares of Preferred Stock pursuant to this Section 4. The Corporation shall not, however, be required to pay any tax which may be payable in respect of any transfer involved in the issuance and delivery of shares of Common Stock in a name other than that in which the shares

of Preferred Stock so converted were registered, and no such issuance or delivery shall be made unless and until the person or entity requesting such issuance has paid to the Corporation the amount of any such tax or has established, to the satisfaction of the Corporation, that such tax has been paid.

4.4 Adjustments to Conversion Price for Diluting Issues.

4.4.1 Special Definitions. For purposes of this Article Fourth, the following definitions shall apply:

(a) "**Additional Shares of Common Stock**" shall mean all shares of Common Stock issued (or, pursuant to Section 4.4.3 below, deemed to be issued) by the Corporation after the Original Issue Date, other than (1) the following shares of Common Stock and (2) shares of Common Stock deemed issued pursuant to the following Options and Convertible Securities (clauses (1) and (2), collectively, "**Exempted Securities**"):

(i) as to any series of Preferred Stock, shares of Common Stock, Options or Convertible Securities issued as a dividend or distribution on such series of Preferred Stock;

(ii) shares of Common Stock, Options or Convertible Securities issued by reason of a dividend, stock split, split-up or other distribution on shares of Common Stock that is covered by Section 4.5, 4.6, 4.7 or 4.8;

(iii) shares of Common Stock or Options issued to employees or directors of, or consultants or advisors to, the Corporation or any of its subsidiaries pursuant to a plan, agreement or arrangement approved by the Board of Directors; or

(iv) shares of Common Stock or Convertible Securities actually issued upon the exercise of Options or shares of Common Stock actually issued upon the conversion or exchange of Convertible Securities, in each case provided such issuance is pursuant to the terms of such Option or Convertible Security; or

(v) shares of Common Stock, Options or Convertible Securities issued to banks, equipment lessors or other financial institutions, or to real property lessors, pursuant to a debt financing, equipment leasing or real property leasing transaction approved by the Board of Directors.

(b) "**Convertible Securities**" shall mean any evidences of indebtedness, shares or other securities directly or indirectly convertible into or exchangeable for Common Stock, but excluding Options.

(c) "**Option**" shall mean rights, options or warrants to subscribe for, purchase or otherwise acquire Common Stock or Convertible Securities.

(d) "**Original Issue Date**" shall mean the first date following the date the first share of Series Seed Preferred Stock was issued.

4.4.2 No Adjustment of Conversion Price. No adjustment in the Conversion Price shall be made as the result of the issuance or deemed issuance of Additional Shares of Common Stock if the Corporation receives written notice from the Requisite Holders agreeing that no such adjustment shall be made as the result of the issuance or deemed issuance of such Additional Shares of Common Stock.

4.4.3 Deemed Issue of Additional Shares of Common Stock.

(a) If the Corporation at any time or from time to time after the Original Issue Date shall issue any Options or Convertible Securities (excluding Options or Convertible Securities which are themselves Exempted Securities) or shall fix a record date for the determination of holders of any class of securities entitled to receive any such Options or Convertible Securities, then the maximum number of shares of Common Stock (as set forth in the instrument relating thereto, assuming the satisfaction of any conditions to exercisability, convertibility or exchangeability but without regard to any provision contained therein for a subsequent adjustment of such number) issuable upon the exercise of such Options or, in the case of Convertible Securities and Options therefor, the conversion or exchange of such Convertible Securities, shall be deemed to be Additional Shares of Common Stock issued as of the time of such issue or, in case such a record date shall have been fixed, as of the close of business on such record date.

(b) If the terms of any Option or Convertible Security, the issuance of which resulted in an adjustment to the Conversion Price pursuant to the terms of Section 4.4.4, are revised as a result of an amendment to such terms or any other adjustment pursuant to the provisions of such Option or Convertible Security (but excluding automatic adjustments to such terms pursuant to anti-dilution or similar provisions of such Option or Convertible Security) to provide for either (1) any increase or decrease in the number of shares of Common Stock issuable upon the exercise, conversion and/or exchange of any such Option or Convertible Security or (2) any increase or decrease in the consideration payable to the Corporation upon such exercise, conversion and/or exchange, then, effective upon such increase or decrease becoming effective, the Conversion Price computed upon the original issue of such Option or Convertible Security (or upon the occurrence of a record date with respect thereto) shall be readjusted to such Conversion Price as would have obtained had such revised terms been in effect upon the original date of issuance of such Option or Convertible Security. Notwithstanding the foregoing, no readjustment pursuant to this clause (b) shall have the effect of increasing the Conversion Price to an amount which exceeds the lower of (i) the Conversion Price in effect immediately prior to the original adjustment made as a result of the issuance of such Option or Convertible Security, or (ii) the Conversion Price that would have resulted from any issuances of Additional Shares of Common Stock (other than deemed issuances of Additional Shares of Common Stock as a result of the issuance of such Option or Convertible Security) between the original adjustment date and such readjustment date.

(c) If the terms of any Option or Convertible Security (excluding Options or Convertible Securities which are themselves Exempted Securities), the issuance of which did not result in an adjustment to the Conversion Price pursuant to the terms of Section 4.4.4 (either because the consideration per share (determined pursuant to Section 4.4.5) of the Additional Shares of Common Stock subject thereto was equal to or greater than the

Meta Platforms, Inc. - Ex. 1002
Page 382

Conversion Price then in effect, or because such Option or Convertible Security was issued before the Original Issue Date), are revised after the Original Issue Date as a result of an amendment to such terms or any other adjustment pursuant to the provisions of such Option or Convertible Security (but excluding automatic adjustments to such terms pursuant to anti-dilution or similar provisions of such Option or Convertible Security) to provide for either (1) any increase in the number of shares of Common Stock issuable upon the exercise, conversion or exchange of any such Option or Convertible Security or (2) any decrease in the consideration payable to the Corporation upon such exercise, conversion or exchange, then such Option or Convertible Security, as so amended or adjusted, and the Additional Shares of Common Stock subject thereto (determined in the manner provided in Section 4.4.3(a) shall be deemed to have been issued effective upon such increase or decrease becoming effective.

(d) Upon the expiration or termination of any unexercised Option or unconverted or unexchanged Convertible Security (or portion thereof) which resulted (either upon its original issuance or upon a revision of its terms) in an adjustment to the Conversion Price pursuant to the terms of Section 4.4.4, the Conversion Price shall be readjusted to such Conversion Price as would have obtained had such Option or Convertible Security (or portion thereof) never been issued.

(e) If the number of shares of Common Stock issuable upon the exercise, conversion and/or exchange of any Option or Convertible Security, or the consideration payable to the Corporation upon such exercise, conversion and/or exchange, is calculable at the time such Option or Convertible Security is issued or amended but is subject to adjustment based upon subsequent events, any adjustment to the Conversion Price provided for in this Section 4.4.3 shall be effected at the time of such issuance or amendment based on such number of shares or amount of consideration without regard to any provisions for subsequent adjustments (and any subsequent adjustments shall be treated as provided in clauses (b) and (c) of this Section 4.4.3). If the number of shares of Common Stock issuable upon the exercise, conversion and/or exchange of any Option or Convertible Security, or the consideration payable to the Corporation upon such exercise, conversion and/or exchange, cannot be calculated at all at the time such Option or Convertible Security is issued or amended, any adjustment to the Conversion Price that would result under the terms of this Section 4.4.3 at the time of such issuance or amendment shall instead be effected at the time such number of shares and/or amount of consideration is first calculable (even if subject to subsequent adjustments), assuming for purposes of calculating such adjustment to the Conversion Price that such issuance or amendment took place at the time such calculation can first be made.

4.4.4 Adjustment of Conversion Price Upon Issuance of Additional Shares of Common Stock. In the event the Corporation shall at any time after the Original Issue Date issue Additional Shares of Common Stock (including Additional Shares of Common Stock deemed to be issued pursuant to Section 4.4.3), without consideration or for a consideration per share less than the Conversion Price in effect immediately prior to such issuance or deemed issuance, then the Conversion Price shall be reduced, concurrently with such issue, to a price (calculated to the nearest one-hundredth of a cent) determined in accordance with the following formula:

$$CP_2 = CP_1 * (A + B) \div (A + C).$$

Meta Platforms, Inc. - Ex. 1002
Page 383

For purposes of the foregoing formula, the following definitions shall apply:

(a) "**CP_2**" shall mean the Conversion Price in effect immediately after such issuance or deemed issuance of Additional Shares of Common Stock

(b) "**CP_1**" shall mean the Conversion Price in effect immediately prior to such issuance or deemed issuance of Additional Shares of Common Stock;

(c) "**A**" shall mean the number of shares of Common Stock outstanding immediately prior to such issuance or deemed issuance of Additional Shares of Common Stock (treating for this purpose as outstanding all shares of Common Stock issuable upon exercise of Options outstanding immediately prior to such issuance or deemed issuance or upon conversion or exchange of Convertible Securities (including the Preferred Stock) outstanding (assuming exercise of any outstanding Options therefor) immediately prior to such issue);

(d) "**B**" shall mean the number of shares of Common Stock that would have been issued if such Additional Shares of Common Stock had been issued or deemed issued at a price per share equal to CP_1 (determined by dividing the aggregate consideration received by the Corporation in respect of such issue by CP_1); and

(e) "**C**" shall mean the number of such Additional Shares of Common Stock issued in such transaction.

4.4.5 Determination of Consideration. For purposes of this Section 4.4, the consideration received by the Corporation for the issuance or deemed issuance of any Additional Shares of Common Stock shall be computed as follows:

(a) Cash and Property. Such consideration shall:

(i) insofar as it consists of cash, be computed at the aggregate amount of cash received by the Corporation, excluding amounts paid or payable for accrued interest;

(ii) insofar as it consists of property other than cash, be computed at the fair market value thereof at the time of such issue, as determined in good faith by the Board of Directors; and

(iii) in the event Additional Shares of Common Stock are issued together with other shares or securities or other assets of the Corporation for consideration which covers both, be the proportion of such consideration so received, computed as provided in clauses (i) and (ii) above, as determined in good faith by the Board of Directors.

(b) Options and Convertible Securities. The consideration per share received by the Corporation for Additional Shares of Common Stock deemed to have been issued pursuant to Section 4.4.3, relating to Options and Convertible Securities, shall be determined by dividing:

Meta Platforms, Inc. - Ex. 1002
Page 384

(i) The total amount, if any, received or receivable by the Corporation as consideration for the issue of such Options or Convertible Securities, plus the minimum aggregate amount of additional consideration (as set forth in the instruments relating thereto, without regard to any provision contained therein for a subsequent adjustment of such consideration) payable to the Corporation upon the exercise of such Options or the conversion or exchange of such Convertible Securities, or in the case of Options for Convertible Securities, the exercise of such Options for Convertible Securities and the conversion or exchange of such Convertible Securities, by

(ii) the maximum number of shares of Common Stock (as set forth in the instruments relating thereto, without regard to any provision contained therein for a subsequent adjustment of such number) issuable upon the exercise of such Options or the conversion or exchange of such Convertible Securities, or in the case of Options for Convertible Securities, the exercise of such Options for Convertible Securities and the conversion or exchange of such Convertible Securities.

4.4.6 Multiple Closing Dates. In the event the Corporation shall issue on more than one date Additional Shares of Common Stock that are a part of one transaction or a series of related transactions and that would result in an adjustment to the Conversion Price pursuant to the terms of Section 4.4.4, and such issuance dates occur within a period of no more than ninety (90) days from the first such issuance to the final such issuance, then, upon the final such issuance, the Conversion Price shall be readjusted to give effect to all such issuances as if they occurred on the date of the first such issuance (and without giving effect to any additional adjustments as a result of any such subsequent issuances within such period).

4.5 Adjustment for Stock Splits and Combinations. If the Corporation shall at any time or from time to time after the Original Issue Date effect a subdivision of the outstanding Common Stock, the Conversion Price in effect immediately before that subdivision shall be proportionately decreased so that the number of shares of Common Stock issuable on conversion of each share of such series shall be increased in proportion to such increase in the aggregate number of shares of Common Stock outstanding. If the Corporation shall at any time or from time to time after the Original Issue Date combine the outstanding shares of Common Stock, the Conversion Price in effect immediately before the combination shall be proportionately increased so that the number of shares of Common Stock issuable on conversion of each share of such series shall be decreased in proportion to such decrease in the aggregate number of shares of Common Stock outstanding. Any adjustment under this Section shall become effective at the close of business on the date the subdivision or combination becomes effective.

4.6 Adjustment for Certain Dividends and Distributions. In the event the Corporation at any time or from time to time after the Original Issue Date shall make or issue, or fix a record date for the determination of holders of Common Stock entitled to receive, a dividend or other distribution payable on the Common Stock in additional shares of Common Stock, then and in each such event the Conversion Price in effect immediately before such event shall be decreased as of the time of such issuance or, in the event such a record date shall have been fixed, as of the close of business on such record date, by multiplying the Conversion Price then in effect by a fraction:

Meta Platforms, Inc. - Ex. 1002
Page 385

(1) the numerator of which shall be the total number of shares of Common Stock issued and outstanding immediately prior to the time of such issuance or the close of business on such record date, and

(2) the denominator of which shall be the total number of shares of Common Stock issued and outstanding immediately prior to the time of such issuance or the close of business on such record date plus the number of shares of Common Stock issuable in payment of such dividend or distribution.

Notwithstanding the foregoing (a) if such record date shall have been fixed and such dividend is not fully paid or if such distribution is not fully made on the date fixed therefor, the Conversion Price shall be recomputed accordingly as of the close of business on such record date and thereafter the Conversion Price shall be adjusted pursuant to this Section as of the time of actual payment of such dividends or distributions; and (b) that no such adjustment shall be made if the holders of Preferred Stock simultaneously receive a dividend or other distribution of shares of Common Stock in a number equal to the number of shares of Common Stock as they would have received if all outstanding shares of Preferred Stock had been converted into Common Stock on the date of such event.

4.7 Adjustments for Other Dividends and Distributions. In the event the Corporation at any time or from time to time after the Original Issue Date shall make or issue, or fix a record date for the determination of holders of Common Stock entitled to receive, a dividend or other distribution payable in securities of the Corporation (other than a distribution of shares of Common Stock in respect of outstanding shares of Common Stock) or in other property and the provisions of Section 1 do not apply to such dividend or distribution, then and in each such event the holders of Preferred Stock shall receive, simultaneously with the distribution to the holders of Common Stock, a dividend or other distribution of such securities or other property in an amount equal to the amount of such securities or other property as they would have received if all outstanding shares of Preferred Stock had been converted into Common Stock on the date of such event.

4.8 Adjustment for Merger or Reorganization, etc. Subject to the provisions of Section 2.3, if there shall occur any reorganization, recapitalization, reclassification, consolidation or merger involving the Corporation in which the Common Stock (but not the Preferred Stock) is converted into or exchanged for securities, cash or other property (other than a transaction covered by Sections 4.4, 4.6 or 4.7), then, following any such reorganization, recapitalization, reclassification, consolidation or merger, each share of Preferred Stock shall thereafter be convertible in lieu of the Common Stock into which it was convertible prior to such event into the kind and amount of securities, cash or other property which a holder of the number of shares of Common Stock of the Corporation issuable upon conversion of one (1) share of Preferred Stock immediately prior to such reorganization, recapitalization, reclassification, consolidation or merger would have been entitled to receive pursuant to such transaction; and, in such case, appropriate adjustment (as determined in good faith by the Board of Directors) shall be made in the application of the provisions in this Section 4 with respect to the rights and interests thereafter of the holders of the Preferred Stock, to the end that the provisions set forth in this Section 4 (including provisions with respect to changes in and other adjustments of the Conversion Price) shall thereafter be

Meta Platforms, Inc. - Ex. 1002
Page 386

applicable, as nearly as reasonably may be, in relation to any securities or other property thereafter deliverable upon the conversion of the Preferred Stock.

4.9 Certificate as to Adjustments. Upon the occurrence of each adjustment or readjustment of the Conversion Price pursuant to this Section 4, the Corporation at its expense shall, as promptly as reasonably practicable but in any event not later than ten (10) days thereafter, compute such adjustment or readjustment in accordance with the terms hereof and furnish to each holder of Preferred Stock a certificate setting forth such adjustment or readjustment (including the kind and amount of securities, cash or other property into which the Preferred Stock is convertible) and showing in detail the facts upon which such adjustment or readjustment is based. The Corporation shall, as promptly as reasonably practicable after the written request at any time of any holder of Preferred Stock (but in any event not later than ten (10) days thereafter), furnish or cause to be furnished to such holder a certificate setting forth (i) the Conversion Price then in effect, and (ii) the number of shares of Common Stock and the amount, if any, of other securities, cash or property which then would be received upon the conversion of Preferred Stock.

4.10 Notice of Record Date. In the event:

(a) the Corporation shall take a record of the holders of its Common Stock (or other capital stock or securities at the time issuable upon conversion of the Preferred Stock) for the purpose of entitling or enabling them to receive any dividend or other distribution, or to receive any right to subscribe for or purchase any shares of capital stock of any class or any other securities, or to receive any other security; or

(b) of any capital reorganization of the Corporation, any reclassification of the Common Stock of the Corporation, or any Deemed Liquidation Event; or

(c) of the voluntary or involuntary dissolution, liquidation or winding-up of the Corporation,

then, and in each such case, the Corporation will send or cause to be sent to the holders of the Preferred Stock a notice specifying, as the case may be, (i) the record date for such dividend, distribution or right, and the amount and character of such dividend, distribution or right, or (ii) the effective date on which such reorganization, reclassification, consolidation, merger, transfer, dissolution, liquidation or winding-up is proposed to take place, and the time, if any is to be fixed, as of which the holders of record of Common Stock (or such other capital stock or securities at the time issuable upon the conversion of the Preferred Stock) shall be entitled to exchange their shares of Common Stock (or such other capital stock or securities) for securities or other property deliverable upon such reorganization, reclassification, consolidation, merger, transfer, dissolution, liquidation or winding-up, and the amount per share and character of such exchange applicable to the Preferred Stock and the Common Stock. Such notice shall be sent at least 10 days prior to the record date or effective date for the event specified in such notice.

5. Mandatory Conversion.

5.1 Trigger Events. Upon either (a) the closing of the sale of shares of Common Stock to the public in a firm-commitment underwritten public offering pursuant to an effective registration statement under the Securities Act of 1933, as amended, resulting in at least

Meta Platforms, Inc. - Ex. 1002
Page 387

$30,000,000 of gross proceeds to the Corporation and in connection with such offering the Common Stock is listed for trading on the Nasdaq Stock Market's National Market, the New York Stock Exchange or another exchange or marketplace approved the Board of Directors, or (b) the date and time, or the occurrence of an event, specified by vote or written consent of the Requisite Holders (the time of such closing or the date and time specified or the time of the event specified in such vote or written consent is referred to herein as the "**Mandatory Conversion Time**"), then (i) all outstanding shares of Preferred Stock shall automatically be converted into shares of Common Stock, at the then effective conversion rate as calculated pursuant to Section 4.1.1 and (ii) such shares may not be reissued by the Corporation.

5.2 Procedural Requirements. All holders of record of shares of Preferred Stock shall be sent written notice of the Mandatory Conversion Time and the place designated for mandatory conversion of all such shares of Preferred Stock pursuant to this Section 5. Such notice need not be sent in advance of the occurrence of the Mandatory Conversion Time. Upon receipt of such notice, each holder of shares of Preferred Stock in certificated form shall surrender his, her or its certificate or certificates for all such shares (or, if such holder alleges that such certificate has been lost, stolen or destroyed, a lost certificate affidavit and agreement reasonably acceptable to the Corporation to indemnify the Corporation against any claim that may be made against the Corporation on account of the alleged loss, theft or destruction of such certificate) to the Corporation at the place designated in such notice. If so required by the Corporation, any certificates surrendered for conversion shall be endorsed or accompanied by written instrument or instruments of transfer, in form satisfactory to the Corporation, duly executed by the registered holder or by his, her or its attorney duly authorized in writing. All rights with respect to the Preferred Stock converted pursuant to Section 5.1, including the rights, if any, to receive notices and vote (other than as a holder of Common Stock), will terminate at the Mandatory Conversion Time (notwithstanding the failure of the holder or holders thereof to surrender any certificates at or prior to such time), except only the rights of the holders thereof, upon surrender of any certificate or certificates of such holders (or lost certificate affidavit and agreement) therefor, to receive the items provided for in the next sentence of this Section 5.2. As soon as practicable after the Mandatory Conversion Time and, if applicable, the surrender of any certificate or certificates (or lost certificate affidavit and agreement) for Preferred Stock, the Corporation shall (a) issue and deliver to such holder, or to his, her or its nominees, a certificate or certificates for the number of full shares of Common Stock issuable on such conversion in accordance with the provisions hereof, and (b) pay any declared but unpaid dividends on the shares of Preferred Stock converted. Such converted Preferred Stock shall be retired and cancelled and may not be reissued as shares of such series, and the Corporation may thereafter take such appropriate action (without the need for stockholder action) as may be necessary to reduce the authorized number of shares of Preferred Stock accordingly.

6. Redemption. The Preferred Stock is not redeemable at the option of the holder thereof.

7. Redeemed or Otherwise Acquired Shares. Any shares of Preferred Stock that are redeemed, converted or otherwise acquired by the Corporation or any of its subsidiaries shall be automatically and immediately cancelled and retired and shall not be reissued, sold or transferred. Neither the Corporation nor any of its subsidiaries may exercise any voting or other rights granted to the holders of Preferred Stock following redemption, conversion or acquisition.

8. Waiver. Except as otherwise set forth herein, any of the rights, powers, preferences and other terms of the Preferred Stock set forth herein may be waived on behalf of all holders of Preferred Stock by the affirmative written consent or vote of the holders of a majority of the shares of Preferred Stock then outstanding; *provided, that*, no such waiver shall adversely affect the rights of any holder of Series Seed-2 Preferred Stock in a manner disproportionate to any adverse effect such waiver would have on the rights of holders of all Preferred Stock without the consent of the holders of a majority of the outstanding shares of Series Seed-2 Preferred Stock voting as a separate class.

9. Notices. Any notice required or permitted by the provisions of this Article Fourth to be given to a holder of shares of Preferred Stock shall be mailed, postage prepaid, to the post office address last shown on the records of the Corporation, or given by electronic communication in compliance with the provisions of the General Corporation Law, and shall be deemed sent upon such mailing or electronic transmission.

FIFTH: Subject to any additional vote required by this Restated Certificate or Bylaws, in furtherance and not in limitation of the powers conferred by statute, the Board of Directors is expressly authorized to make, repeal, alter, amend and rescind any or all of the Bylaws of the Corporation.

SIXTH: Subject to any additional vote required by this Restated Certificate, the number of directors of the Corporation shall be determined in the manner set forth in the Bylaws of the Corporation Each director shall be entitled to one vote on each matter presented to the Board of Directors.

SEVENTH: Elections of directors need not be by written ballot unless the Bylaws of the Corporation shall so provide.

EIGHTH: Meetings of stockholders may be held within or without the State of Delaware, as the Bylaws of the Corporation may provide. The books of the Corporation may be kept outside the State of Delaware at such place or places as may be designated from time to time by the Board of Directors or in the Bylaws of the Corporation.

NINTH: To the fullest extent permitted by law, a director of the Corporation shall not be personally liable to the Corporation or its stockholders for monetary damages for breach of fiduciary duty as a director. If the General Corporation Law or any other law of the State of Delaware is amended after approval by the stockholders of this Article Ninth to authorize corporate action further eliminating or limiting the personal liability of directors, then the liability of a director of the Corporation shall be eliminated or limited to the fullest extent permitted by the General Corporation Law as so amended.

Any repeal or modification of the foregoing provisions of this Article Ninth by the stockholders of the Corporation shall not adversely affect any right or protection of a director of the Corporation existing at the time of, or increase the liability of any director of the Corporation with respect to any acts or omissions of such director occurring prior to, such repeal or modification.

TENTH: To the fullest extent permitted by applicable law, the Corporation is authorized to provide indemnification of (and advancement of expenses to) directors, officers and agents of the Corporation (and any other persons to which General Corporation Law permits the Corporation to provide indemnification) through Bylaw provisions, agreements with such agents or other persons, vote of stockholders or disinterested directors or otherwise, in excess of the indemnification and advancement otherwise permitted by Section 145 of the General Corporation Law.

Any amendment, repeal or modification of the foregoing provisions of this Article Tenth shall not (a) adversely affect any right or protection of any director, officer or other agent of the Corporation existing at the time of such amendment, repeal or modification or (b) increase the liability of any director of the Corporation with respect to any acts or omissions of such director, officer or agent occurring prior to, such amendment, repeal or modification.

ELEVENTH: The Corporation renounces, to the fullest extent permitted by law, any interest or expectancy of the Corporation in, or in being offered an opportunity to participate in, any Excluded Opportunity. An "**Excluded Opportunity**" is any matter, transaction or interest that is presented to, or acquired, created or developed by, or which otherwise comes into the possession of (i) any director of the Corporation who is not an employee of the Corporation or any of its subsidiaries, or (ii) any holder of Preferred Stock or any partner, member, director, stockholder, employee, affiliate or agent of any such holder, other than someone who is an employee of the Corporation or any of its subsidiaries (collectively, the persons referred to in clauses (i) and (ii) are "**Covered Persons**"), unless such matter, transaction or interest is presented to, or acquired, created or developed by, or otherwise comes into the possession of, a Covered Person expressly and solely in such Covered Person's capacity as a director of the Corporation while such Covered Person is performing services in such capacity. Any repeal or modification of this Article Eleventh will only be prospective and will not affect the rights under this Article Eleventh in effect at the time of the occurrence of any actions or omissions to act giving rise to liability. Notwithstanding anything to the contrary contained elsewhere in this Restated Certificate, the affirmative vote of the holders of a majority of the shares of Series Seed Preferred Stock then outstanding will be required to amend or repeal, or to adopt any provisions inconsistent with, this Article Eleventh.

TWELFTH: Unless the Corporation consents in writing to the selection of an alternative forum, the Court of Chancery in the State of Delaware shall be the sole and exclusive forum for any stockholder (including a beneficial owner) to bring (i) any derivative action or proceeding brought on behalf of the Corporation, (ii) any action asserting a claim of breach of fiduciary duty owed by any director, officer or other employee of the Corporation to the Corporation or the Corporation's stockholders, (iii) any action asserting a claim against the Corporation, its directors, officers or employees arising pursuant to any provision of the Delaware General Corporation Law or the Corporation's certificate of incorporation or bylaws or (iv) any action asserting a claim against the Corporation, its directors, officers or employees governed by the internal affairs doctrine, except for, as to each of (i) through (iv) above, any claim as to which the Court of Chancery determines that there is an indispensable party not subject to the jurisdiction of the Court of Chancery (and the indispensable party does not consent to the personal jurisdiction of the Court of Chancery within ten (10) days following such determination), which is vested in the exclusive jurisdiction of a court or forum other than the Court of Chancery, or for which the Court of Chancery does not have subject matter jurisdiction. If any provision or provisions of this Article Twelfth shall be held to be invalid, illegal or unenforceable as applied to any person or entity or

circumstance for any reason whatsoever, then, to the fullest extent permitted by law, the validity, legality and enforceability of such provisions in any other circumstance and of the remaining provisions of this Article Twelfth (including, without limitation, each portion of any sentence of this Article Twelfth containing any such provision held to be invalid, illegal or unenforceable that is not itself held to be invalid, illegal or unenforceable) and the application of such provision to other persons or entities and circumstances shall not in any way be affected or impaired thereby.

THIRTEENTH: For purposes of Section 500 of the California Corporations Code (to the extent applicable), in connection with any repurchase of shares of Common Stock permitted under this Restated Certificate from employees, officers, directors or consultants of the Corporation in connection with a termination of employment or services pursuant to agreements or arrangements approved by the Board of Directors (in addition to any other consent required under this Restated Certificate), such repurchase may be made without regard to any "preferential dividends arrears amount" or "preferential rights amount" (as those terms are defined in Section 500 of the California Corporations Code). Accordingly, for purposes of making any calculation under California Corporations Code Section 500 in connection with such repurchase, the amount of any "preferential dividends arrears amount" or "preferential rights amount" (as those terms are defined therein) shall be deemed to be zero (0).

* * *

3. That the foregoing amendment and restatement was approved by the holders of the requisite number of shares of this corporation in accordance with Section 228 of the General Corporation Law.

4. That this Certificate of Incorporation, which restates and integrates and further amends the provisions of this Corporation's Certificate of Incorporation, has been duly adopted in accordance with Sections 242 and 245 of the General Corporation Law.

[*Signature Page Follows*]

Meta Platforms, Inc. - Ex. 1002
Page 391

IN WITNESS WHEREOF, this Amended and Restated Certificate of Incorporation has been executed by a duly authorized officer of this corporation on this 2nd day of July, 2024.

By: */s/Ethan Fieldman*
Ethan Fieldman
Chief Executive Officer

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/830,109	**11/08/2025 02:57:42 PM Z ET**	**114784-729016**

Title of Invention

HAND CONTROL INTERFACES AND METHODS IN VIRTUAL REALITY ENVIRONMENTS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	11531448
CONFIRMATION #	3149	FILED BY	ERIC HANSON
PATENT CENTER #	73095123	AUTHORIZED BY	-
CUSTOMER #	27148	FILING DATE	06/01/2022
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Ethan Fieldman

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
DA / 501662	**E2025A8E58045203**	**ERIC HANSON**

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2811	CERTIFICATE OF CORRECTION	172.00	1	172.00
			TOTAL AMOUNT:	**$172.00**

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage

submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	17/830,109	Confirmation No. 3149
Patent No.	:	11,531,448	
Inventor(s)	:	Ethan Fieldman	
Filed	:	June 1, 2022	
Art Unit	:	2175	
Examiner	:	DANIEL RODRIGUEZ	
Atty Docket No.		114784-729016	
Title	:	Hand Control Interfaces and Methods in Virtual Reality Environments	

Via EFS-Web
Attn : Certificate of Correction Branch
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR CERTIFICATE OF CORRECTION PURSUANT TO 35 U.S. Code § 255 AND CFR 1.323

Dear Commissioner:

This request is for the issuance of a Certificate of Correction for U.S. Patent No. 11,531,448, in order to correct the following errors:

In the Claims

Claim 1, Col. 5, Line 25, "virtual hardware device" should read --virtual reality hardware device--.

Claim 1, Col. 5, Line 31, "software icons" should read --software application icons--.

Claim 1, Col. 5, Line 35, "the application icon" should read --the at least one software application icon--.

Claim 8, Col. 6, Line 1, "virtual hardware device" should read --virtual reality hardware device--.

This Request corrects mistakes as set forth in included Form PTO/SB/44 of a clerical or typographical nature, or of minor character, and resulted from an error made in good faith by patentee(s).

If any unaccounted-for petitions or fees are necessary, please consider this a request for the same and an authorization to charge Deposit Account No. 50-1662 accordingly. Any deficiency or overpayment may also be applied to Deposit Account No. 50-1662.

Respectfully submitted,

Date: November 8, 2025

/Eric J. Hanson/
Eric J. Hanson
Registration No. 44,738

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UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/830,109	**11/08/2025 02:57:42 PM Z ET**	**114784-729016**

Title of Invention

HAND CONTROL INTERFACES AND METHODS IN VIRTUAL REALITY ENVIRONMENTS

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	11531448
CONFIRMATION #	3149	FILED BY	ERIC HANSON
PATENT CENTER #	73095123	FILING DATE	06/01/2022
CUSTOMER #	27148	FIRST NAMED INVENTOR	Ethan Fieldman
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	-

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
Cert_of_Correction_US11531448.pdf	2	Request for Certificate of Correction	332 KB
11-8-2025_Request_Certificate_of_Correction_11531448.pdf	2	Request for Certificate of Correction	2072 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
Cert_of_Correction_US11531448.pdf	9B790326EEBAA5C2C76231A7705D154C288C7103FBB4A0BEA91BAD8E071B73FB070D4D72D8B07ECD979504D13C96379058FBD3BC1D563E35CBF67EC851A62AC2

11-8-2025_Request_Certificate_of_Correction_11531448.pdf	C648742C070A2C3E5A555DCF6490520CD804D515288F55518AB52EB6FB9B81D649AAF82A600C59637024A664C8BD36DA8BCB9FBC63549E49ADBEE5001083CECB

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/44 (09-07)
Approved for use through 03/31/2026. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.
(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 11,531,448

APPLICATION NO.: 17/830,109

ISSUE DATE : December 20, 2022

INVENTOR(S) : Ethan Fieldman

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims

Claim 1, Col. 5, Line 25, “virtual hardware device” should read --virtual reality hardware device--.

Claim 1, Col. 5, Line 31, “software icons” should read --software application icons--.

Claim 1, Col. 5, Line 35, “the application icon” should read --the at least one software application icon--.

Claim 8, Col. 6, Line 1, “virtual hardware device” should read --virtual reality hardware device--.

MAILING ADDRESS OF SENDER (Please do not use Customer Number below):
POLSINELLI PC
1201 West Peachtree Street NW, Suite 1100
Atlanta, GA 30309

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/830,109	06/01/2022	Ethan Fieldman	114784-729016	3149

27148 7590 11/25/2025
POLSINELLI PC (Main Customer Number)
PO Box 140310
KANSAS CITY, MO 64114-0310

EXAMINER	
RODRIGUEZ, DANIEL	

ART UNIT	PAPER NUMBER
2175	

NOTIFICATION DATE	DELIVERY MODE
11/25/2025	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocketing@polsinelli.com
uspt@polsinelli.com

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United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
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Patent No.: 11531448
Issue Date: 12/20/2022
Appl. No.: 17/830,109
Filed: 06/01/2022

PART (A) RESPONSE FOR CERTIFICATES OF CORRECTION

This is a decision on the Certificate of Correction request filed 08 November 2025.

The request for issuance of Certificate of Correction for the above-identified correction(s) under the provisions of 37 CFR 1.322 and/or 1.323 is hereby:

(Check one)
☑ Approved ☐ Approved in Part ☐ Denied

Comments: ____

PART (B) PETITION UNDER 37 CFR 1.324 OR 37 CFR 1.48

☐ This is a decision on the petition filed ____ to correct inventorship under 37 CFR 1.324.

☐ This is a decision on the request under 37 CFR 1.48, petition filed ____. In view of the fact that the patent has already issued, the request under 37 CFR 1.48 has been treated as a petition to correct inventorship under 37 CFR 1.324.

The petition is hereby: ☐ Granted ☐ Dismissed

Comment: ____

The patented filed is being forwarded to Certificate of Corrections Branch for issuance of a certificate naming only the actual inventor or inventors.

/STEPHEN S HONG/
Supervisory Patent Examiner, Art Unit 2178
Technology Center 2100
Phone: (571) 272-4124

Certificates of Correction Branch email: CustomerServiceCoC@uspto.gov CoC Central Phone Number: (703) 756-1814

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 11,531,448 B1
APPLICATION NO. : 17/830109
DATED : December 20, 2022
INVENTOR(S) : Ethan Fieldman

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims

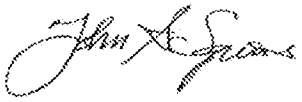
Claim 1, Column 5, Line 25, "virtual hardware device" should read --virtual reality hardware device--.

Claim 1, Column 5, Line 31, "software icons" should read --software application icons--.

Claim 1, Column 5, Line 35, "the application icon" should read --the at least one software application icon--.

Claim 8, Column 6, Line 1, "virtual hardware device" should read --virtual reality hardware device--.

Signed and Sealed this
Sixteenth Day of December, 2025



John A. Squires
Director of the United States Patent and Trademark Office

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/830,109	06/01/2022	Ethan Fieldman	114784-729016	3149

27148 7590 12/16/2025
POLSINELLI PC (Main Customer Number)
PO Box 140310
KANSAS CITY, MO 64114-0310

EXAMINER	
RODRIGUEZ, DANIEL	

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2175	

NOTIFICATION DATE	DELIVERY MODE
12/16/2025	ELECTRONIC

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patentdocketing@polsinelli.com
uspt@polsinelli.com

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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
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APPLICATION NO.	ISSUE DATE	PATENT NO.
17/830,109	16-Dec-2025	11531448

POLSINELLI PC (Main Customer Number)
KANSAS CITY, MO 64114-0310

ELECTRONIC CERTIFICATE OF CORRECTION NOTIFICATION

Your electronic certificate of correction is now available, and can be accessed via Patent Center at https://patentcenter.uspto.gov.

The electronic certificate of correction is the official certificate of correction under 35 U.S.C. 254 or 255. For more information, please visit https://www.uspto.gov/electronicgrants.

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Western District of Texas on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
7:26-cv-00123	4/2/2026	for the Western District of Texas

PLAINTIFF	DEFENDANT
CurioXR, Inc.	Meta Platforms, Inc.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	11,531,448	12/20/2022	CurioXR, Inc.
2	11,656,742	5/23/2023	CurioXR, Inc.
3			
4			
5			

In the above----entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
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1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy