

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

Assignment ID: PATI342200

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT
CONVEYING PARTY DATA	
Name	Execution Date
KONINKLIJKE PHILIPS N.V.	04/01/2024
RECEIVING PARTY DATA	
Company Name:	GENERAL VIDEO, LLC
Street Address:	7209 LANCASTER PIKE
Internal Address:	SUITE 4
City:	HOCKESSIN
State/Country:	DELAWARE
Postal Code:	19707
PROPERTY NUMBERS Total: 8	
Property Type	Number
Patent Number:	7088398
Patent Number:	6914637
Patent Number:	7257163
Patent Number:	7359437
Patent Number:	7225282
Patent Number:	9036010
Patent Number:	9462258
Patent Number:	9843786
CORRESPONDENCE DATA	
Fax Number:	
<i>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.</i>	
Phone:	+82(109)2809544
Email:	dylan@generalvideo.com
Correspondent Name:	MINSANG CHO
Address Line 1:	333, Godeok-ro, Gangdong-gu
Address Line 2:	115-604
Address Line 4:	Seoul, KOREA, REPUBLIC OF 05224
NAME OF SUBMITTER:	Minsang Cho
SIGNATURE:	Minsang Cho

DATE SIGNED:	07/04/2024
	This document serves as an Oath/Declaration (37 CFR 1.63).
Total Attachments: 2 source=US DoA#page1.tiff source=US DoA#page2.tiff	

ASSIGNMENT

WHEREAS, **KONINKLIJKE PHILIPS N.V.** ("ASSIGNOR"), a corporation organized under the laws of **The Netherlands**, with a place of business at **HIGH TECH CAMPUS 5 EINDHOVEN 5656 AE NETHERLANDS**, owns the United States Patent(s) (the "Patent(s)") listed on the attached Schedule A; and

WHEREAS, **General Video, LLC** ("ASSIGNEE"), a corporation organized under the laws of **U.S.A.**, with a place of business at **7209 Lancaster Pike, Suite, Hockessin, DE, 19707, U.S.A.**, desires to acquire all rights to the Patent(s);

NOW, THEREFORE, in consideration of One Dollar (\$1.00) and other valuable consideration, the receipt of which ASSIGNOR acknowledges, ASSIGNOR has sold, assigned, transferred, and set over, and does, by this Assignment, sell, assign, transfer, and set over unto ASSIGNEE, all rights to the Patent(s), including reissues and extensions, to be held and enjoyed by ASSIGNEE, its successors, assigns, and legal representatives, for ASSIGNEE's own use and benefit and for the use and benefit of its successors, assigns, and legal representatives, to the end of the term(s) for which the Patent(s) has/have been granted or may be reissued or extended, as fully and entirely as the Patent(s) would have been held and enjoyed by ASSIGNOR had this assignment and sale not been made; together with all claims for profits and damages by reason of past infringement, with the right to sue for and collect the same for the use and benefit of ASSIGNEE, its successors, assigns, and legal representatives.

This Assignment is deemed to have become effective as from: April 01, 2024

IN WITNESS WHEREOF, ASSIGNOR and ASSIGNEE have caused this Assignment to be executed by its duly authorized officer or representative on the date(s) indicated below.

KONINKLIJKE PHILIPS N.V.

By: _____

Name: Paul Enle de Haan
Title: Head of IP Support
Date: June 26, 2024

General Video, LLC

By: _____

Name: ROBERT COLAO
Title: PRESIDENT
Date: JUNE 18, 2024

Schedule

Country	Application Number	IP Grant Number
U.S.A.	10171860	7088398
U.S.A.	10192296	6914637
U.S.A.	10095422	7257163
U.S.A.	10036234	7359437
U.S.A.	10171820	7225282
U.S.A.	12808685	9036010
U.S.A.	14629642	9462258
U.S.A.	15256839	9843786



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.
15/256,839	12/12/2017	9843786	2007P01979US01	5045

24737 7590 11/21/2017
PHILIPS INTELLECTUAL PROPERTY & STANDARDS
465 Columbus Avenue
Suite 340
Valhalla, NY 10595

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 Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

KONINKLIJKE PHILIPS N.V., Eindhoven, NETHERLANDS;
Nicoll Burleigh SHEPHERD, Coulsdon, UNITED KINGDOM;

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.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax **(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)

24737 7590 08/07/2017
PHILIPS INTELLECTUAL PROPERTY & STANDARDS
465 Columbus Avenue
Suite 340
Valhalla, NY 10595

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 facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/256,839	09/06/2016	Nicoll Burleigh SHEPHERD	2007P01979US01	5045

TITLE OF INVENTION: TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	11/07/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHAM, NAM D	2487	348-046000

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/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form 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, 1 _____
- (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. 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 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.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

KONINKLIJKE PHILIPS N.V.

EINDHOVEN, THE NETHERLANDS

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 14-1270 (enclose an extra copy of this form).

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 /Michael E. Belk/

Date November 7, 2017

Typed or printed name Michael E. Belk

Registration No. 33357

Electronic Patent Application Fee Transmittal				
Application Number:		15256839		
Filing Date:		06-Sep-2016		
Title of Invention:		TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE		
First Named Inventor/Applicant Name:		Nicoll Burleigh SHEPHERD		
Filer:		Michael E. Belk/Patti DeMichele		
Attorney Docket Number:		2007P01979US01		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				960

Electronic Acknowledgement Receipt	
EFS ID:	30879079
Application Number:	15256839
International Application Number:	
Confirmation Number:	5045
Title of Invention:	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE
First Named Inventor/Applicant Name:	Nicoll Burleigh SHEPHERD
Customer Number:	24737
Filer:	Michael E. Belk/Patti DeMichele
Filer Authorized By:	Michael E. Belk
Attorney Docket Number:	2007P01979US01
Receipt Date:	07-NOV-2017
Filing Date:	06-SEP-2016
Time Stamp:	15:27:59
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$960
RAM confirmation Number	110817INTEFSW00001971141270
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

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)	2007P01979US01_IF_2017NOV07.pdf	176022	no	1
			9515312f1ea06f3fb8981ed08a76ab25e643ee68		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30693	no	2
			01afa608a248744c34ba6fe0bcaace35f007862a		
Warnings:					
Information:					
Total Files Size (in bytes):			206715		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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
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www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

24737 7590 08/07/2017
PHILIPS INTELLECTUAL PROPERTY & STANDARDS
465 Columbus Avenue
Suite 340
Valhalla, NY 10595

EXAMINER

PHAM, NAM D

ART UNIT

PAPER NUMBER

2487

DATE MAILED: 08/07/2017

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/256,839	09/06/2016	Nicoll Burleigh SHEPHERD	2007P01979US01	5045

TITLE OF INVENTION: TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	11/07/2017

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 and an extra copy of the form should be submitted. 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: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax **(571)-273-2885**

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CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

24737 7590 08/07/2017
PHILIPS INTELLECTUAL PROPERTY & STANDARDS
465 Columbus Avenue
Suite 340
Valhalla, NY 10595

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 facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/256,839	09/06/2016	Nicoll Burleigh SHEPHERD	2007P01979US01	5045

TITLE OF INVENTION: TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	11/07/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHAM, NAM D	2487	348-046000

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/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form 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, 1 _____
- (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. 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 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.

(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. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

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. _____



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.
15/256,839	09/06/2016	Nicoll Burleigh SHEPHERD	2007P01979US01	5045

24737	7590	08/07/2017
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PHILIPS INTELLECTUAL PROPERTY & STANDARDS
465 Columbus Avenue
Suite 340
Valhalla, NY 10595

EXAMINER
PHAM, NAM D

ART UNIT	PAPER NUMBER
2487	

DATE MAILED: 08/07/2017

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 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, 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. 15/256,839	Applicant(s) SHEPHERD, NICOLL BURLEIGH	
	Examiner NAM PHAM	Art Unit 2487	AIA (First Inventor to File) Status No

-- 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 09/06/2016.
☐ 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 1-22. 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) | 5. ☐ Examiner's Amendment/Comment |
| 2. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date <u>09/06/2016, 01/23/2017</u> | 6. ☒ Examiner's Statement of Reasons for Allowance |
| 3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material | 7. ☐ Other _____. |
| 4. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____. | |

/NAM PHAM/
Primary Examiner, Art Unit 2487

The present application is being examined under the pre-AIA first to invent provisions.

Allowable Subject Matter

The following is an examiner's statement of reasons for allowance:

Ha (US 20060279750 A1) discloses an image display mode conversion apparatus and method, the apparatus having a display unit displaying image data included in an image signal, an image characteristic parameter detector detecting an image characteristic parameter which is information regarding whether the image data included in the image signal represents a two-dimensional (2D) image or a three-dimensional (3D) image, and an operation mode conversion determining unit receiving the detected image characteristic parameter, determining whether or not an operation mode of the display unit should be converted, and outputting an operation mode conversion signal to the display unit according to the determination result. Therefore, it is possible to provide more convenience to users in various fields, such as a 3D image broadcasting and so on, by implementing the image display mode conversion apparatus in a digital broadcast standard system [abstract]. Ha (US 20060279750 A1) does not disclose specifics about the interface having its known data carrying capacity operating in two different modes of transmitting 2D/3D image as claimed. While a signaling information comprises information with respect to a multiplexing scheme used in a second mode for enabling a second audio-visual device to determine a decoding scheme to be used to decode a stereoscopic image format being used in the second mode. A further search was conducted which failed to yield any prior art. Therefore, the prior art fails to teach or render obvious these limitations taken within the others in the claim.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comment of Reasons for Allowance."

Art Unit: 2487

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nam Pham, who can be contacted by phone at (571)270-7352. The examiner can normally be reached on Mon—Thurs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, CZEKAJ DAVID, can be reached on (571)272-7327.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) AT 866-217-9197 (toll free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam Pham/
Primary Examiner, Art Unit 2487

Notice of References Cited	Application/Control No. 15/256,839	Applicant(s)/Patent Under Reexamination SHEPHERD, NICOLL BURLEIG	
	Examiner NAM PHAM	Art Unit 2487	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-2006/0279750 A1	12-2006	Ha; Tae-Hyeun	H04N13/0454	358/1.2
	B	US-				
	C	US-				
	D	US-				
	E	US-				
	F	US-				
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	J	US-				
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*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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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.

U.S. Patent and Trademark Office
PTO-892 (Rev. 01-2001)
20170125

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BIB DATA SHEET

CONFIRMATION NO. 5045

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
15/256,839	09/06/2016	348	2487	2007P01979US01		
APPLICANTS KONINKLIJKE PHILIPS N.V., Eindhoven, NETHERLANDS; INVENTORS Nicoll Burleigh SHEPHERD, Coulsdon, UNITED KINGDOM; ** CONTINUING DATA ***** This application is a CON of 14/629,642 02/24/2015 PAT 9462258 which is a CON of 12/808,685 06/17/2010 PAT 9036010 which is a 371 of PCT/IB2008/055305 12/15/2008 ** FOREIGN APPLICATIONS ***** EUROPEAN PATENT OFFICE (EPO) 07123461.1 12/18/2007 ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 09/15/2016						
Foreign Priority claimed ☒ Yes ☐ No 35 USC 119(a-d) conditions met ☒ Yes ☐ No Verified and Acknowledged <u>/NAM D PHAM/</u> Examiner's Signature		☐ Met after Allowance <u>/N. P./</u> Initials	STATE OR COUNTRY UNITED KINGDOM	SHEETS DRAWINGS 3	TOTAL CLAIMS 22	INDEPENDENT CLAIMS 8
ADDRESS PHILIPS INTELLECTUAL PROPERTY & STANDARDS 465 Columbus Avenue Suite 340 Valhalla, NY 10595 UNITED STATES						
TITLE TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE						
FILING FEE RECEIVED 3860	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15256839
	Filing Date	2016-09-06
	First Named Inventor	Nicoll Burleigh Shepherd
	Art Unit	2487
	Examiner Name	Nam D. Pham
	Attorney Docket Number	2007P01979US01

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	1	H0530538	JP	A	1993-02-05	OLYMPUS OPTICAL CO		×
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15256839
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	Art Unit	2487
	Examiner Name	Nam D. Pham
	Attorney Docket Number	2007P01979US01

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Examiner Signature	/NAM D PHAM/	Date Considered	01/25/2017
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¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15256839
	Filing Date	2016-09-06
	First Named Inventor	Nicoll Burleigh Shepherd
	Art Unit	2487
	Examiner Name	Nam D. Pham
	Attorney Docket Number	2007P01979US01

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Michael E. Belk/	Date (YYYY-MM-DD)	2017-01-23
Name/Print	Michael E. Belk	Registration Number	33357

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**

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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.
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	
	Filing Date	
	First Named Inventor	Nicholl B. Shepherd
	Art Unit	
	Examiner Name	
	Attorney Docket Number	2007P01979US01

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	1	6914637	B1	2005-07-05	WOLF ET AL		
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	1	20060279750	A1	2006-12-14	HA		
	2	20060044388	A1	2006-03-02	KIM ET AL		
	3	20060192776	A1	2006-08-31	NOMURA ET AL		
	4	20070296859	A1	2007-12-27	SUZUKI		
	5	20050146521	A1	2005-07-07	KAYE ET AL		

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STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		
Filing Date		
First Named Inventor	Nicholl B. Shepherd	
Art Unit		
Examiner Name		
Attorney Docket Number	2007P01979US01	

6	20020009137	A1	2002-01-24	NELSON ET AL
7	20070139769	A1	2007-06-21	DECUSTIS ET AL

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FOREIGN PATENT DOCUMENTS

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	1	2003111101	JP	A	2003-04-11	MASUTANI ET AL		×
	2	2006295289	JP	A	2006-10-26	TAKADA ET AL		☒
	3	2007325101	JP	A	2007-12-13	MATSUURA		☒
	4	2008117289	JP	A	2008-05-22	KUSAKARI		☒
	5	2006137006	WO	A2	2006-12-28	FUNKE ET AL		☐
	6	2007069195	WO	A2	2007-06-21	ZUIDEMA ET AL		☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		
	Filing Date		
	First Named Inventor	Nicholl B. Shepherd	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	2007P01979US01	

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
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Examiner Signature	/NAM D PHAM/	Date Considered	01/25/2017
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¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	Nicholl B. Shepherd
Art Unit	
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See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Michael E. Belk/	Date (YYYY-MM-DD)	2016-09-06
Name/Print	Michael E. Belk	Registration Number	33,357

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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.

<i>Search Notes</i> 	Application/Control No. 15256839	Applicant(s)/Patent Under Reexamination SHEPHERD, NICOLL BURLEIGH
	Examiner NAM PHAM	Art Unit 2487

CPC- SEARCHED		
Symbol	Date	Examiner
H04N13/0402	01/25/2017	/N.P./
H04N5/60	01/25/2017	/N.P./
H04N5/067	01/25/2017	/N.P./

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
348	46	01/25/2017	/N.P./

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor search	01/25/2017	/N.P./
East search	01/25/2017	/N.P./

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
Interference		01/25/2017	/N. P./

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<i>Index of Claims</i> 	Application/Control No. 15256839	Applicant(s)/Patent Under Reexamination SHEPHERD, NICOLL BURLEIGH
	Examiner NAM PHAM	Art Unit 2487

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

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47										
CLAIM		DATE								
Final	Original	01/25/2017								
1	1	=								
2	2	=								
3	3	=								
4	4	=								
5	5	=								
6	6	=								
7	7	=								
8	8	=								
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12	17	=								
18	18	=								
19	19	=								
20	20	=								
21	21	=								
22	22	=								

Issue Classification 	Application/Control No. 15256839	Applicant(s)/Patent Under Reexamination SHEPHERD, NICOLL BURLEIGH	
	Examiner NAM PHAM	Art Unit 2487	

CPC					
Symbol				Type	Version
H04N	13	0059		F	2013-01-01
H04N	13	0048		I	2013-01-01
H04N	2213	003		A	2013-01-01
H04N	5	067		I	2013-01-01
H04N	5	60		I	2013-01-01
H04N	13	0402		I	2013-01-01
H04N	21	43635		I	2013-01-01
H04N	21	43637		I	2013-01-01
H04N	21	816		I	2013-01-01

CPC Combination Sets					
Symbol	Type	Set	Ranking	Version	

		Total Claims Allowed:	
(Assistant Examiner)	(Date)	22	
/NAM PHAM/ Examiner, Art Unit 2487	01/25/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

Issue Classification 	Application/Control No. 15256839	Applicant(s)/Patent Under Reexamination SHEPHERD, NICOLL BURLEIGH
	Examiner NAM PHAM	Art Unit 2487

US ORIGINAL CLASSIFICATION						INTERNATIONAL CLASSIFICATION													
CLASS			SUBCLASS			CLAIMED					NON-CLAIMED								
348			46			H	0	4	N	13 / 0402									
CROSS REFERENCE(S)						H	0	4	N	5 / 60 (2006.01.01)									
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)																		

		Total Claims Allowed:	
		22	
(Assistant Examiner) /NAM PHAM/ Examiner, Art Unit 2487	(Date) 01/25/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2

Issue Classification 	Application/Control No. 15256839	Applicant(s)/Patent Under Reexamination SHEPHERD, NICOLL BURLEIGH
	Examiner NAM PHAM	Art Unit 2487

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	12	17												
2	2	18	18												
3	3	19	19												
4	4	20	20												
5	5	21	21												
6	6	22	22												
7	7														
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9	9														
10	10														
11	11														
13	12														
14	13														
15	14														
16	15														
17	16														

(Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 22	
/NAM PHAM/ Examiner, Art Unit 2487 (Primary Examiner) _____ (Date) _____		O.G. Print Claim(s) 1	O.G. Print Figure 2

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"15256839"	US-PGPUB; USPAT	OR	OFF	2017/01/25 12:34
S1	758	348/46.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/08/29 15:10
S2	688	video adj summary	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/08/29 15:12
S3	39	(video adj summary) SAME signal	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/08/29 15:17
S4	3	(video adj summary) SAME (content adj signal)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/08/29 15:50
S5	16	(video adj summary) SAME (classif\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/08/29 16:03
S6	751	348/46.ccls.	US-PGPUB; USPAT	OR	ON	2012/08/31 15:17
S7	225	digital adj display adj interface	US-PGPUB; USPAT	OR	ON	2012/08/31 15:23
S8	16	S7 AND (2D OR 3D)	US-PGPUB; USPAT	OR	ON	2012/08/31 15:31
S9	7	S7 AND (stereoscop\$3)	US-PGPUB; USPAT	OR	ON	2012/08/31 15:36
S10	131	S7 AND mode	US-PGPUB; USPAT	OR	ON	2012/08/31 15:39
S11	5	interface AND stereocop\$3	US-PGPUB; USPAT	OR	ON	2012/08/31 16:00

S12	26078	display adj interface	US-PGPUB; USPAT	OR	ON	2012/08/31 16:02
S13	5401	S12 AND ((transmit OR generate) adj (data OR image))	US-PGPUB; USPAT	OR	ON	2012/08/31 16:03
S14	4631	S13 AND digital	US-PGPUB; USPAT	OR	ON	2012/08/31 16:03
S15	3293	S14 AND format	US-PGPUB; USPAT	OR	ON	2012/08/31 16:04
S16	2364	S15 AND mode	US-PGPUB; USPAT	OR	ON	2012/08/31 16:04
S17	2308	S16 AND first	US-PGPUB; USPAT	OR	ON	2012/08/31 16:04
S18	2234	S17 AND second	US-PGPUB; USPAT	OR	ON	2012/08/31 16:04
S19	442	S18 and (2D OR 3D)	US-PGPUB; USPAT	OR	ON	2012/08/31 16:05
S20	422	S19 AND signal	US-PGPUB; USPAT	OR	ON	2012/08/31 16:05
S21	418	S20 AND information	US-PGPUB; USPAT	OR	ON	2012/08/31 16:06
S22	247	S21 AND pixel	US-PGPUB; USPAT	OR	ON	2012/08/31 16:06
S23	4191	left adj eye adj image	US-PGPUB; USPAT	OR	ON	2012/09/04 07:54
S24	3410	(left adj eye adj image) SAME (right adj eye adj image)	US-PGPUB; USPAT	OR	ON	2012/09/04 07:54
S25	610	(left adj eye adj image) SAME (right adj eye adj image) SAME "2"\$1D	US-PGPUB; USPAT	OR	ON	2012/09/04 07:55
S26	461	S25 AND stereoscop\$3	US-PGPUB; USPAT	OR	ON	2012/09/04 07:56
S27	451	S26 AND display	US-PGPUB; USPAT	OR	ON	2012/09/04 07:56
S28	228	S27 AND interface	US-PGPUB; USPAT	OR	ON	2012/09/04 07:56
S29	175	S28 AND mode	US-PGPUB; USPAT	OR	ON	2012/09/04 07:57
S31	4	S29 AND (signaling adj information)	US-PGPUB; USPAT	OR	ON	2012/09/04 08:21
S32	37	data adj island adj packet	US-PGPUB; USPAT	OR	ON	2012/09/05 08:56
S33	610	(left adj eye adj image) SAME (right adj eye adj image) SAME "2"\$1D	US-PGPUB; USPAT	OR	ON	2012/09/05 09:30
S34	461	S33 AND stereoscop\$3	US-PGPUB; USPAT	OR	ON	2012/09/05 09:30
S35	451	S34 AND display	US-PGPUB; USPAT	OR	ON	2012/09/05 09:30
S36	318	S35 AND mode	US-PGPUB; USPAT	OR	ON	2012/09/05 09:30
S37	2	"20090080853"	US-PGPUB; USPAT	OR	ON	2012/09/06 11:32
S38	1	"20020093812"	US-PGPUB; USPAT	OR	ON	2012/09/06 13:31
S39	2	"20080037033"	US-PGPUB; USPAT	OR	ON	2012/09/06 13:35

S40	9	"6320641"	US-PGPUB; USPAT	OR	ON	2012/09/06 13:36
S41	1	"7668382"	US-PGPUB; USPAT	OR	ON	2012/09/06 13:52
S42	2915	("3"\$1d or three\$1dimension\$3 or "3"\$1dimension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1dimension\$3) same mode\$1 same (transmit\$5 or transfer\$5)	US-PGPUB; USPAT	OR	ON	2013/06/05 13:33
S43	11	("3"\$1d or three\$1dimension\$3 or "3"\$1dimension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1dimension\$3) same mode\$1 same (transmit\$5 or transfer\$5) same un\$1compress\$3	US-PGPUB; USPAT	OR	ON	2013/06/05 13:35
S44	9	S43 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/05 13:40
S45	1637	("3"\$1d or three\$1dimension\$3 or "3"\$1dimension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1dimension\$3) same mode\$1 same (transmit\$5 or transfer\$5 or send\$5) same image\$1	US-PGPUB; USPAT	OR	ON	2013/06/05 13:57
S46	783	("3"\$1d or three\$1dimension\$3 or "3"\$1dimension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1dimension\$3) same mode\$1 same (transmit\$5 or transfer\$5 or send\$5) same image\$1 same (generat\$4 or produc\$4)	US-PGPUB; USPAT	OR	ON	2013/06/05 14:02
S47	25	S46 AND HDMI\$1	US-PGPUB; USPAT	OR	ON	2013/06/05 14:04
S48	1	S47 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/05 14:04
S49	83	S45 AND HDMI\$1	US-PGPUB; USPAT	OR	ON	2013/06/05 14:05
S50	2	S49 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/05 14:05
S51	476	S46 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/05 14:15
S52	14	S51 AND un\$1compress\$5	US-PGPUB; USPAT	OR	ON	2013/06/05 14:16
S53	154	("3"\$1d or three\$1dimension\$3 or "3"\$1dimension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1dimension\$3) same image\$1 same HDMI\$1	US-PGPUB; USPAT	OR	ON	2013/06/05 14:38
S54	3	S53 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/05 15:09
S55	12611	("3"\$1d or three\$1dimension\$3 or "3"\$1dimension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1dimension\$3) same image\$1 same mode\$1	US-PGPUB; USPAT	OR	ON	2013/06/05 15:13
S56	1179	("3"\$1d or three\$1dimension\$3 or "3"\$1dimension\$3 or steoscop\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1dimension\$3) same image\$1 same	US-PGPUB; USPAT	OR	ON	2013/06/05 15:15

		mode\$1 same interfac\$4				
S57	286	("3"\$1d or three\$1dimension\$3 or "3"\$1demension\$3 or steoscop\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1demension\$3) same image\$1 same mode\$1 same interfac\$4 same (transfer\$4 or transmit\$4 or send\$4)	US-PGPUB; USPAT	OR	ON	2013/06/05 15:17
S58	175	S57 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/05 15:19
S59	236	("3"\$1d or three\$1dimension\$3 or "3"\$1demension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1demension\$3) same signal same capabilit\$3 same (sen\$4 or receiv\$4)	US-PGPUB; USPAT	OR	ON	2013/06/19 08:50
S60	153	S59 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/19 08:52
S61	25	(US-20030231191-\$ or US-20040181806-\$ or US-20040218599-\$ or US-20050184993-\$ or US-20100315489-\$ or US-20080240152-\$ or US-20080008172-\$ or US-20070286246-\$ or US-20070242068-\$ or US-20100027113-\$ or US-20030128871-\$ or US-20050030301-\$ or US-20080013001-\$ or US-20070165304-\$ or US-20070097024-\$ or US-20060279750-\$ or US-20070296721-\$).did. or (US-8068485-\$ or US-5644324-\$ or US-6094182-\$ or US-6911975-\$ or US-7098888-\$ or US-7362324-\$ or US-6914637-\$ or US-7088398-\$).did.	US-PGPUB; USPAT	OR	ON	2013/06/19 08:52
S62	11	S61 AND capabilit\$4	US-PGPUB; USPAT	OR	ON	2013/06/19 08:53
S63	5443	("3"\$1d or three\$1dimension\$3 or "3"\$1demension\$3 or stereoscop\$3) with ("2"\$1d or two\$1dimension\$3 or "2"\$1demension\$3) with (size\$1 or capabilit\$3)	US-PGPUB; USPAT	OR	ON	2013/06/19 09:11
S64	988	("3"\$1d or three\$1dimension\$3 or "3"\$1demension\$3 or stereoscop\$3) with ("2"\$1d or two\$1dimension\$3 or "2"\$1demension\$3) with (size\$1 or capabilit\$3) with (great\$1 or small\$4 or sam\$1 or reduc\$4)	US-PGPUB; USPAT	OR	ON	2013/06/19 09:14
S65	123	S64 AND (transmitter\$1 or encoder\$1) and (receiver\$1 or decoder\$1)	US-PGPUB; USPAT	OR	ON	2013/06/19 09:16
S66	56	S65 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/19 09:16
S67	829	3d same 2d same size same (size or capability or capacity) same (smaller or greater or bigger)	US-PGPUB; USPAT	OR	ON	2013/12/23 11:47
S68	404	3d same 2d same size same (size or capability or capacity) same (smaller or greater or bigger) same image	US-PGPUB; USPAT	OR	ON	2013/12/23 11:47
S69	404	3d same 2d same size same (size or capability or capacity) same (smaller or greater or bigger) same image	US-PGPUB; USPAT	OR	ON	2013/12/23 11:48
S70	48	3d same 2d same size same (size or capability or capacity) same (smaller or	US-PGPUB; USPAT	OR	ON	2013/12/23 11:49

		greater or bigger) same image same (interface or transmit\$4 or send\$4)				
S71	32	S70 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/12/23 11:50
S72	4	"3"\$1dimension\$3 same "2"\$1dimension\$3 same size same (size or capability or capacity) same (smaller or greater or bigger) same (content or image) same (interface or transmit\$4 or send\$4)	US-PGPUB; USPAT	OR	ON	2013/12/23 12:12
S73	4	"3"\$1dimension\$3 same "2"\$1dimension\$3 same (size or capability or capacity) same (smaller or greater or bigger) same (content or image) same (interface or transmit\$4 or send\$4)	US-PGPUB; USPAT	OR	ON	2013/12/23 12:20
S74	51	"3"\$1dimension\$3 same "2"\$1dimension\$3 same (size or capability or capacity) same (smaller or greater or bigger) same (content or image)	US-PGPUB; USPAT	OR	ON	2013/12/23 12:22
S75	50	"3"\$1dimension\$3 same "2"\$1dimension\$3 same (content or size or capability or capacity) same (smaller or greater or bigger) same (image)	US-PGPUB; USPAT	OR	ON	2013/12/23 12:23
S76	35	S74 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/12/23 12:23
S77	793	("3"\$1d or "3"\$1dimension\$3) same ("2"\$1d or "2"\$1dimension\$3) same (size or capability or capacity) same (smaller or greater or bigger) same (content or image)	US-PGPUB; USPAT	OR	ON	2013/12/23 13:55
S78	231	("3"\$1d or "3"\$1dimension\$3) same ("2"\$1d or "2"\$1dimension\$3) same (size or capability or capacity) same (smaller or greater or bigger) same (content or image) same (send\$3 or sent or transmit\$4 or communicat\$3 or display\$4)	US-PGPUB; USPAT	OR	ON	2013/12/23 14:21
S79	117	S78 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/12/23 14:23
S80	245	("3"\$1d or "3"\$1dimension\$3) same ("2"\$1d or "2"\$1dimension\$3) same (size or capability or capacity) same (smaller or greater or bigger) same (content or image) same (send\$3 or sent or transmit\$4 or communicat\$3 or display\$4 or interfac\$4)	US-PGPUB; USPAT	OR	ON	2013/12/23 14:23
S81	5537	("3"\$1d or "3"\$1dimension\$3 or stereoscop\$3) with ("2"\$1d or "2"\$1dimension\$3) with conver\$5	US-PGPUB; USPAT	OR	ON	2013/12/23 15:57
S82	550	("3"\$1d or "3"\$1dimension\$3 or stereoscop\$3) with ("2"\$1d or "2"\$1dimension\$3) with conver\$5 same (size or scal\$3)	US-PGPUB; USPAT	OR	ON	2013/12/23 15:58
S83	247	S82 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/12/23 16:00
S84	176	S83 AND (greater or smaller or bigger)	US-PGPUB; USPAT	OR	ON	2013/12/23 16:00

S85	53	stereoscop\$3 near\$3 encod\$3 same resolution	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/12/24 09:16
S86	19	S85 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/12/24 09:16
S87	251	stereoscop\$3 SAME (interlac\$4 or interleav\$3 or down\$1sampl\$3) same resolution	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/12/24 09:28
S88	193	stereoscop\$3 SAME (interlac\$4 or interleav\$3 or down\$1sampl\$3) same resolution same image	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/12/24 09:28
S89	93	S88 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/12/24 09:28
S90	1	"13067880"	US-PGPUB; USPAT	OR	ON	2014/08/11 16:22
S91	15125	("3"\$1d or three\$1dimension\$3 or "3"\$1dimension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1dimension\$3) same interface	US-PGPUB; USPAT	OR	ON	2014/10/08 07:35
S92	253	("3"\$1d or three\$1dimension\$3 or "3"\$1dimension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1dimension\$3) same interface same transmi\$5 near\$5 image	US-PGPUB; USPAT	OR	ON	2014/10/08 07:37
S93	14	("3"\$1d or three\$1dimension\$3 or "3"\$1dimension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1dimension\$3) same interface same transmi\$5 near\$5 image same (segment or portion or capacity)	US-PGPUB; USPAT	OR	ON	2014/10/08 07:47
S94	3	S93 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2014/10/08 07:49
S95	81	S92 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2014/10/08 07:51
S96	1	Shepherd NEAR2 Nicoll NEAR2 Burleigh	US-PGPUB; USPAT	OR	ON	2014/10/08 09:38
S97	0	(interface same stereoscop\$3 same image same capacity same first same second).clm.	US-PGPUB; USPAT	OR	ON	2014/10/08 09:39
S98	1	"14629642"	US-PGPUB; USPAT	OR	OFF	2016/01/20 09:47
S99	3	"12808685"	US-PGPUB; USPAT	OR	OFF	2016/01/20 09:52
S100	70	hdmi same "24" same color same pixel	US-PGPUB; USPAT	OR	OFF	2016/01/20 12:16
S101	13	S100 AND @ad<"20071218"	US-PGPUB;	OR	ON	2016/01/20

			USPAT			12:17
S102	53	receiver same capability same (maximum near3 bandwidth)	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:44
S103	14	S102 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2016/01/21 11:44
S104	140	interface same capability same (maximum near3 bandwidth)	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:45
S105	1	S104 and hdmi	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:45
S106	69	S104 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2016/01/21 11:46
S107	28	(US-20030231191-\$ or US-20040181806-\$ or US-20040218599-\$ or US-20050184993-\$ or US-20100315489-\$ or US-20080240152-\$ or US-20080008172-\$ or US-20070286246-\$ or US-20070242068-\$ or US-20100027113-\$ or US-20030128871-\$ or US-20050030301-\$ or US-20080013001-\$ or US-20070165304-\$ or US-20070097024-\$ or US-20060279750-\$ or US-20070296721-\$ or US-20050146521-\$ or US-20060044388-\$ or US-20060192776-\$).did. or (US-8068485-\$ or US-5644324-\$ or US-6094182-\$ or US-6911975-\$ or US-7098888-\$ or US-7362324-\$ or US-6914637-\$ or US-7088398-\$).did.	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:47
S108	15	S107 AND bandwidth	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:47
S109	2775	receiver same capability same (bandwidth)	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:53
S110	0	receiver same capability same (bandwidth) same interace	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:53
S111	210	receiver same capability same (bandwidth) same interface	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:53
S112	125	S111 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2016/01/21 11:53
S113	510	receiver with capability with (bandwidth)	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:54
S114	25	S113 AND HDMI	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:54
S115	3	S114 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2016/01/21 11:54
S116	1785	(H04N13/0402 or H04N5/60 or H04N5/067).cpc.	US-PGPUB; USPAT	OR	OFF	2016/01/21 12:18
S117	236	S116 AND (size same (size or capability or capacity) same (smaller or greater or bigger))	US-PGPUB; USPAT	OR	ON	2016/01/21 12:23
S118	873	H19 AND interface	US-PGPUB; USPAT	OR	ON	2016/01/21 12:23
S119	116	S117 AND interface	US-PGPUB; USPAT	OR	ON	2016/01/21 12:24
S120	132	S118 AND (("3"\$1d or "3"\$1dimension\$3) same ("2"\$1d or "2"\$1dimension\$3))	US-PGPUB; USPAT	OR	ON	2016/01/21 12:24

EAST Search History

S121	37	S119 AND (("3"\$1d or "3"\$1dimension\$3) same ("2"\$1d or "2"\$1dimension\$3))	US-PGPUB; OR USPAT		ON	2016/01/21 12:25
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1/ 25/ 2017 1:20:04 PM
C:\ Users\ npham\ Documents\ EAST\ Workspaces\ 15256839.wsp

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Shepherd, N. B.	Attn. No.: 2007P01979US01
SERIAL NO.:	15/256,839	EXAMINER: Pham, Nam D.
FILED:	09/06/2016	ART UNIT: 2487
		CONFIRMATION No.: 5045

FOR: *TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE*

Mail Stop: **Amendment**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE BEFORE FINAL UNDER 37 CFR 1.111

Dear Sir:

Applicant requests reconsideration in view of the following remarks and the accompanying Terminal Disclaimer.:

Remarks begin on page 2.

REMARKS

Reconsideration is respectfully requested in view of the accompanying **Terminal Disclaimer** and the remarks as follows.

Claims 1-22 are pending.

Claims 1-22 stand rejected under non-statutory obviousness type double patenting..

Applicant makes no statement regarding the patentability of the subject matter recited in the claims prior to this Amendment and has amended the claims solely to facilitate expeditious prosecution of this patent application. Applicant respectfully reserves the right to pursue claims, including the subject matter encompassed by the originally filed claims, as presented prior to this Amendment, and any additional claims in one or more continuing applications during the pendency of the instant application.

In order to advance the prosecution of the matter, applicant respectfully requests that any errors in form that do not alter the substantive nature of the arguments presented herein be transmitted telephonically to the applicant's representative so that such errors may be quickly resolved or pursuant to MPEP 714.03 be entered into the record to avoid continued delay of the prosecution of this matter any further.

MPEP 714.03 affords the Examiner the discretion, pursuant to 37 CFR 1.135 (c), to enter into the record a bona fide attempt to advance the application that includes minor errors in form.

However, if the Examiner believes that such minor errors in form cannot be entered into the record or that the disposition of any issues arising from this response may be best resolved by a telephone call, then the Examiner is invited to contact applicant's representative at the telephone number listed below to resolve such minor errors or issues.

Amendment
Docket No. 2007P01979WOUS
Serial No. 12/808,685

Please charge any fees deficiencies (except issue fees) and credit any overpayments to
Deposit Account No. 14-1270.

Respectfully submitted,

By /Michael E. Belk/
Michael E. Belk, Reg. 33,357
Senior IP Counsel
(914) 610-5826
mike.belk@philips.com

Electronic Acknowledgement Receipt	
EFS ID:	29831588
Application Number:	15256839
International Application Number:	
Confirmation Number:	5045
Title of Invention:	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE
First Named Inventor/Applicant Name:	Nicoll Burleigh SHEPHERD
Customer Number:	24737
Filer:	Michael E. Belk/Patti DeMichele
Filer Authorized By:	Michael E. Belk
Attorney Docket Number:	2007P01979US01
Receipt Date:	19-JUL-2017
Filing Date:	06-SEP-2016
Time Stamp:	16:09:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		2007P01979US01_AMD_2017Jul19.pdf	54653	yes	3
			36ba06a6c45763211df233fb7deba291f1584bfff		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Applicant Arguments/Remarks Made in an Amendment	2	3
Warnings:			
Information:			
Total Files Size (in bytes):		54653	
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.			

Doc Code: DIST.E.FILE Document Description: Electronic Terminal Disclaimer - Filed		PTO/SB/26 U.S. Patent and Trademark Office Department of Commerce	
Electronic Petition Request	TERMINAL DISCLAIMER TO OBTAIN A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT		
Application Number	15256839		
Filing Date	06-Sep-2016		
First Named Inventor	Nicol SHEPHERD		
Attorney Docket Number	2007P01979US01		
Title of Invention	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE		
☒ Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action ☒ This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.			
Owner		Percent Interest	
KONINKLIJKE PHILIPS N.V.		100%	
The owner(s) with percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of prior patent number(s) 9036010 as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns. In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later: - expires for failure to pay a maintenance fee; - is held unenforceable; - is found invalid by a court of competent jurisdiction; - is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321; - has all claims canceled by a reexamination certificate; - is reissued; or - is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer. ☒ Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.			

☐ I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.	
Applicant claims the following fee status: ☐ Small Entity ☐ Micro Entity ☒ Regular Undiscounted	
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.	
THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES 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 is of record in this application Registration Number <u>33357</u> ☐ A sole inventor ☐ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application ☐ A joint inventor; all of whom are signing this request	
Signature	/Michael E. Belk/
Name	Michael E. Belk

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
 Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

Electronic Patent Application Fee Transmittal				
Application Number:		15256839		
Filing Date:		06-Sep-2016		
Title of Invention:		TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE		
First Named Inventor/Applicant Name:		Nicoll Burleigh SHEPHERD		
Filer:		Michael E. Belk/Patti DeMichele		
Attorney Docket Number:		2007P01979US01		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
STATUTORY OR TERMINAL DISCLAIMER	1814	1	160	160
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				160

Doc Code: DISQ.E.FILE
Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 15256839

Filing Date: 06-Sep-2016

Applicant/Patent under Reexamination: SHEPHERD

Electronic Terminal Disclaimer filed on July 19, 2017

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

Approved/Disapproved by: Electronic Terminal Disclaimer automatically approved by EFS-Web

U.S. Patent and Trademark Office

Electronic Acknowledgement Receipt	
EFS ID:	29831664
Application Number:	15256839
International Application Number:	
Confirmation Number:	5045
Title of Invention:	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE
First Named Inventor/Applicant Name:	Nicoll Burleigh SHEPHERD
Customer Number:	24737
Filer:	Michael E. Belk/Patti DeMichele
Filer Authorized By:	Michael E. Belk
Attorney Docket Number:	2007P01979US01
Receipt Date:	19-JUL-2017
Filing Date:	06-SEP-2016
Time Stamp:	16:12:57
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$160
RAM confirmation Number	072017INTEFSW00002955141270
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	33467	no	2
			4e1d054dd7a852cd676b9b73548b7d3054a6ae1c		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30634	no	2
			3772d794e98cb90eed9cf528dc47ceb5d7ea5a38		
Warnings:					
Information:					
Total Files Size (in bytes):			64101		
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.					



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/256,839	09/06/2016	Nicoll Burleigh SHEPHERD	2007P01979US01	5045
24737 7590 04/19/2017 PHILIPS INTELLECTUAL PROPERTY & STANDARDS 465 Columbus Avenue Suite 340 Valhalla, NY 10595			EXAMINER PHAM, NAM D	
			ART UNIT 2487	PAPER NUMBER
			NOTIFICATION DATE 04/19/2017	DELIVERY MODE 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):

marianne.fox@philips.com
debbie.henn@philips.com
patti.demichele@Philips.com

Office Action Summary	Application No. 15/256,839	Applicant(s) SHEPHERD, NICOLL BURLEIGH	
	Examiner NAM PHAM	Art Unit 2487	AIA (First Inventor to File) Status No

-- 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 09/06/2016.
☐ 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) 1-22 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) ____ 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 09/06/2016, 01/23/2017.
- 3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 4) ☐ Other: ____.

The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Summary

1. This office action for US Patent application 15/256839 is responsive to communications filed on September 06, 2016. Currently, claims 1-22 are pending are presented for examination.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Art Unit: 2487

Claims 1-22 provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 50-67 of copending Application No 12/808685, in view of US Patent 7536705 B1-Boucher et al. Although the conflicting claims are not identical, they are not patentably distinct from each other because it is merely in the terminology used in both sets of claims.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented. Below is a list of limitations that perform the same function.

However different terminology is used in both sets to describe the limitations.

Conflicting Co-pending Application 15/256839	Instant Application-12/808685- Note* bold means difference in instant application
1. An interface part for a digital display, for use in a first audio-visual device for supporting a digital display transmission interface between the first audio-visual device and a second audio-visual device, the interface for transmitting uncompressed pixel information, the interface part comprising: an input for receiving image data; a formatter configured to format the received digital data for transport over a transmission interface, wherein the formatter is operable in: a first mode in which the formatter generates a stream of first data elements comprising pixel data of a 2D image; and;	61. (Currently amended) A digital display interface part for use in an audio-visual device, <u>said interface part</u> for supporting a digital display interface <u>having a known data carrying capacity</u> between the audio-visual device and a second audio-visual device, <u>the digital display interface, of a known capacity, for and</u> transmitting uncompressed pixel information[^] the interface part comprising: an input for receiving formatted image data from the interface; a processor arranged to extract <u>said</u> image data, the processor being operable, in accordance with capabilities of said second audio-visual device, <u>wherein</u> in a first mode[^] the processor extracts pixel image data for a 2D image from a

a second mode, different from the first mode, operating at different times than the first mode, in which the formatter generates a stream of second data elements comprising a multiplexed combination of components of a stereoscopic image; wherein the interface part is configured to send signaling information across the transmission interface, the signaling information identifying which mode the formatter is using; wherein the signaling information comprises information with respect to a multiplexing scheme used in a second mode for enabling the second audio-visual device to determine a decoding scheme to be used to decode a stereoscopic image format being used in the second mode; wherein the formatter is configured to generate a stream of data elements comprising either the first or second data elements and auxiliary data carrying data elements at intervals in the stream; and the signaling information being carried in the auxiliary data elements.	stream of first data elements <u>at a data carrying capacity no greater than known data carrying capability</u>; and, in a second mode[^] the processor demultiplexes components of a stereoscopic image from a stream of second data elements which carry a multiplexed combination of components of a stereoscopic image, <u>wherein said components of said stereoscopic image data elements being transmitted in a first portion segment of said interface and in a second portion segment of said interface, each of said first portion segment and said second portion segment having a lesser data carrying capacity than said known data carrying capacity and a combined data carrying capacity no greater than said known data carrying capacity</u>, the interface part arranged to receive signaling information across the interface, the signaling information identifying which mode the formatter is using and characteristics of said stream of second data elements. In view of Boucher et al. (US 7536705 B1)
--	--

2. The interface part of claim 1, wherein the signaling information comprises information for enabling the second audio-visual device to determine a stereoscopic image format being used in the second mode on which the decoding scheme is based.	62. (Currently amended) The interface part according to claim 61, wherein the signaling information comprises; information for enabling the second audio-visual device to determine a stereoscopic image format being used, and the interface part arranged to determine said stereoscopic image format being used.
3. The interface part of claim 1, wherein the signaling information is carried in a horizontal or vertical blanking period.	52. (Currently amended) The interface part according to claim 51, wherein the signaling information is carried in <u>one of</u>: a horizontal ~~[[or]]~~ and a vertical blanking period.
4. The interface part according claim 1, wherein the interface is a High Definition Multimedia Interface (HDMI) and the signaling information is sent in a Data Island Packet between image data.	53. (Previously presented) The interface part according to claim 50, wherein the interface is a High Definition Multimedia interface (HDMI) and the signaling information is sent in a Data Island Packet between image data.
5. The interface part of claim 4, which is arranged to receive signaling information across the interface specifying capabilities of the second audio-visual device.	54. (Previously presented) The interface part according to claim 53, said signaling information received across the interface specifies capabilities of the second audiovisual device.
6. The interface part of claim 1, wherein the stereoscopic image data components include left eye image data and right eye image data.	55. (Previously presented) The interface part according to claim 50, wherein the stereoscopic image data components are left eye image data and

	right eye image data.
7. The interface part of claim 6 arranged for sending the left eye image data and the right eye image data sequentially,	56. (Previously presented) The interface part according to claim 55, arranged for sending the left eye image data and the right eye image data sequentially.
8. The interface part of claim 7 wherein an indication of the left and right image data being indicated by signaling information carried directly adjacent a position of the image data.	57. (Previously presented) The interface part according to claim 56, wherein an indication of the left and right image data being indicated by signaling information carried directly adjacent a position of the image data.
9. The interface part of claim 6 arranged for sending the left eye image data and the right eye image data by line interleaving.	58. (Previously presented) The interface part according to claim 55, arranged for sending the left eye image data and the right eye image data by line interleaving.
10. The interface part of claim 1, wherein the stereoscopic image data components are 2D image data and image depth data.	59. (Previously presented) The interface part according to claims 50, wherein the stereoscopic image data components are 2D image data and image depth data.
11. The interface part of claim 9 wherein the formatter is arranged to use a portion of the second data element to carry the 2D image data and another portion of the second data element to carry the image depth data.	60. (Previously presented) The interface part according to claim 59, wherein the formatter is arranged to use a portion of the second data element to carry the 2D image data and another portion of the second data element to carry the image depth data.
17. The interface part of claim 1, wherein the signaling information comprises information for enabling the second audio-visual device to determine	Claim 62

a stereoscopic image format being used.	
Claims 12, 16, 18-22	Claim 61 In view of Boucher et al. (US 7536705 B1)
13. The interface part of claim 12, wherein the signaling information comprises information for enabling the second audio-visual device to determine a stereoscopic image format being used, the interface part arranged to determine a stereoscopic image format being used on which the decoding scheme is based.	Claim 62
14. The interface part according claim 12, wherein the interface is a High Definition Multimedia Interface (HDMI) and the signaling information is received in a Data Island Packet between image data.	Claim 54
15. The interface part of claim 12 wherein the stereoscopic image data components are left eye image data and right eye image data.	Claim 55

Referring to claims 1 and 12, 16, 18-22, taking claim 1 as exemplary, although conflicting application 12/808685, does not explicitly disclose what's claimed in instant application 15/256839, a specific stream which includes a data element for storing encoded data and an auxiliary data element for storing a signal information .

However, Boucher et al. (US 7536705 B1) discloses an encoded digital data stream can include encoded multimedia element data, encoded auxiliary data for transmission [i.e. col. 39, ll. 16-24].

Therefore, one of ordinary skill in the art at the time of applicant's invention would have clearly recognized that it is quite advantageous for the instant application 15/256839 to combine

Art Unit: 2487

the teachings of Boucher et al. (US 7536705 B1) to transmit a normal image data in a data element and a signaling information in an auxiliary data element.

Allowable Subject Matter

3. **Claims 1-22** is/are rejected on the ground of nonstatutory obviousness-type double patenting. However, these claims would be allowable if the obvious-type double patenting is overcome.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nam Pham, who can be contacted by phone at (571)270-7352. The examiner can normally be reached on Mon—Thurs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, CZEKAJ DAVID, can be reached on (571)272-7327.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) AT 866-217-9197 (toll free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam Pham/
Examiner, Art Unit 2487

Notice of References Cited	Application/Control No. 15/256,839	Applicant(s)/Patent Under Reexamination SHEPHERD, NICOLL BURLEIG	
	Examiner NAM PHAM	Art Unit 2487	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2006/0279750 A1	12-2006	Ha, Tae-Hyeun	358/001.2
*	B	US-6,914,637 B1	07-2005	Wolf et al.	348/473
*	C	US-2006/0044388 A1	03-2006	Kim et al.	348/042
*	D	US-2006/0192776 A1	08-2006	Nomura et al.	345/419
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
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	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.

<i>Index of Claims</i> 	Application/Control No. 15256839	Applicant(s)/Patent Under Reexamination SHEPHERD, NICOLL BURLEIGH
	Examiner NAM PHAM	Art Unit 2487

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

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47										
CLAIM		DATE								
Final	Original	04/08/2017								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
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	9	✓								
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	20	✓								
	21	✓								
	22	✓								

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	
	Filing Date	
	First Named Inventor	Nicholl B. Shepherd
	Art Unit	
	Examiner Name	
	Attorney Docket Number	2007P01979US01

U.S.PATENTS							Remove
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	
	1	6914637	B1	2005-07-05	WOLF ET AL		
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	1	20060279750	A1	2006-12-14	HA		
	2	20060044388	A1	2006-03-02	KIM ET AL		
	3	20060192776	A1	2006-08-31	NOMURA ET AL		
	4	20070296859	A1	2007-12-27	SUZUKI		
	5	20050146521	A1	2005-07-07	KAYE ET AL		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		
	Filing Date		
	First Named Inventor	Nicholl B. Shepherd	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	2007P01979US01	

	6	20020009137	A1	2002-01-24	NELSON ET AL	
	7	20070139769	A1	2007-06-21	DECUSTIS ET AL	

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FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ² i	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1	2003111101	JP	A	2003-04-11	MASUTANI ET AL		×
	2	2006295289	JP	A	2006-10-26	TAKADA ET AL		☒
	3	2007325101	JP	A	2007-12-13	MATSUURA		☒
	4	2008117289	JP	A	2008-05-22	KUSAKARI		☒
	5	2006137006	WO	A2	2006-12-28	FUNKE ET AL		☐
	6	2007069195	WO	A2	2007-06-21	ZUIDEMA ET AL		☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		
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	First Named Inventor	Nicholl B. Shepherd	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	2007P01979US01	

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
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Examiner Signature	/NAM D PHAM/	Date Considered	04/08/2017
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		
	Filing Date		
	First Named Inventor	Nicholl B. Shepherd	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	2007P01979US01	

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

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See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Michael E. Belk/	Date (YYYY-MM-DD)	2016-09-06
Name/Print	Michael E. Belk	Registration Number	33,357

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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.**

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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.
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<i>Search Notes</i> 	Application/Control No. 15256839	Applicant(s)/Patent Under Reexamination SHEPHERD, NICOLL BURLEIGH
	Examiner NAM PHAM	Art Unit 2487

CPC- SEARCHED		
Symbol	Date	Examiner
H04N13/0402	04/08/2017	/N.P./
H04N5/60	04/08/2017	/N.P./
H04N5/067	04/08/2017	/N.P./

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
348	46	01/25/2017	/N.P./

SEARCH NOTES		
Search Notes	Date	Examiner
Inventor search	04/08/2017	/N.P./
East search	04/08/2017	/N.P./

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
Interference		04/08/2017	/N. P./

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15256839
	Filing Date	2016-09-06
	First Named Inventor	Nicoll Burleigh Shepherd
	Art Unit	2487
	Examiner Name	Nam D. Pham
	Attorney Docket Number	2007P01979US01

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15256839
	Filing Date		2016-09-06
	First Named Inventor	Nicoll Burleigh Shepherd	
	Art Unit	2487	
	Examiner Name	Nam D. Pham	
	Attorney Docket Number	2007P01979US01	

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Examiner Signature	/Nam Pham/	Date Considered	04/13/2017
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	Filing Date	2016-09-06
	First Named Inventor	Nicoll Burleigh Shepherd
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	Examiner Name	Nam D. Pham
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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Michael E. Belk/	Date (YYYY-MM-DD)	2017-01-23
Name/Print	Michael E. Belk	Registration Number	33357

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EAST Search History**EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	758	348/46.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/08/29 15:10
S2	688	video adj summary	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/08/29 15:12
S3	39	(video adj summary) SAME signal	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/08/29 15:17
S4	3	(video adj summary) SAME (content adj signal)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/08/29 15:50
S5	16	(video adj summary) SAME (classif\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/08/29 16:03
S6	751	348/46.ccls.	US-PGPUB; USPAT	OR	ON	2012/08/31 15:17
S7	225	digital adj display adj interface	US-PGPUB; USPAT	OR	ON	2012/08/31 15:23
S8	16	S7 AND (2D OR 3D)	US-PGPUB; USPAT	OR	ON	2012/08/31 15:31
S9	7	S7 AND (stereoscop\$3)	US-PGPUB; USPAT	OR	ON	2012/08/31 15:36
S10	131	S7 AND mode	US-PGPUB; USPAT	OR	ON	2012/08/31 15:39
S11	5	interface AND stereocop\$3	US-PGPUB; USPAT	OR	ON	2012/08/31 16:00
S12	26078	display adj interface	US-PGPUB; USPAT	OR	ON	2012/08/31 16:02

S13	5401	S12 AND ((transmit OR generate) adj (data OR image))	US-PGPUB; USPAT	OR	ON	2012/08/31 16:03
S14	4631	S13 AND digital	US-PGPUB; USPAT	OR	ON	2012/08/31 16:03
S15	3293	S14 AND format	US-PGPUB; USPAT	OR	ON	2012/08/31 16:04
S16	2364	S15 AND mode	US-PGPUB; USPAT	OR	ON	2012/08/31 16:04
S17	2308	S16 AND first	US-PGPUB; USPAT	OR	ON	2012/08/31 16:04
S18	2234	S17 AND second	US-PGPUB; USPAT	OR	ON	2012/08/31 16:04
S19	442	S18 and (2D OR 3D)	US-PGPUB; USPAT	OR	ON	2012/08/31 16:05
S20	422	S19 AND signal	US-PGPUB; USPAT	OR	ON	2012/08/31 16:05
S21	418	S20 AND information	US-PGPUB; USPAT	OR	ON	2012/08/31 16:06
S22	247	S21 AND pixel	US-PGPUB; USPAT	OR	ON	2012/08/31 16:06
S23	4191	left adj eye adj image	US-PGPUB; USPAT	OR	ON	2012/09/04 07:54
S24	3410	(left adj eye adj image) SAME (right adj eye adj image)	US-PGPUB; USPAT	OR	ON	2012/09/04 07:54
S25	610	(left adj eye adj image) SAME (right adj eye adj image) SAME "2"\$1D	US-PGPUB; USPAT	OR	ON	2012/09/04 07:55
S26	461	S25 AND stereoscop\$3	US-PGPUB; USPAT	OR	ON	2012/09/04 07:56
S27	451	S26 AND display	US-PGPUB; USPAT	OR	ON	2012/09/04 07:56
S28	228	S27 AND interface	US-PGPUB; USPAT	OR	ON	2012/09/04 07:56
S29	175	S28 AND mode	US-PGPUB; USPAT	OR	ON	2012/09/04 07:57
S31	4	S29 AND (signaling adj information)	US-PGPUB; USPAT	OR	ON	2012/09/04 08:21
S32	37	data adj island adj packet	US-PGPUB; USPAT	OR	ON	2012/09/05 08:56
S33	610	(left adj eye adj image) SAME (right adj eye adj image) SAME "2"\$1D	US-PGPUB; USPAT	OR	ON	2012/09/05 09:30
S34	461	S33 AND stereoscop\$3	US-PGPUB; USPAT	OR	ON	2012/09/05 09:30
S35	451	S34 AND display	US-PGPUB; USPAT	OR	ON	2012/09/05 09:30
S36	318	S35 AND mode	US-PGPUB; USPAT	OR	ON	2012/09/05 09:30
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S38	1	"20020093812"	US-PGPUB; USPAT	OR	ON	2012/09/06 13:31
S39	2	"20080037033"	US-PGPUB; USPAT	OR	ON	2012/09/06 13:35
S40	9	"6320641"	US-PGPUB; USPAT	OR	ON	2012/09/06 13:36

S41	1	"7668382"	US-PGPUB; USPAT	OR	ON	2012/09/06 13:52
S42	2915	("3"\$1d or three\$1dimension\$3 or "3"\$1demension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1demension\$3) same mode\$1 same (transmit\$5 or transfer\$5)	US-PGPUB; USPAT	OR	ON	2013/06/05 13:33
S43	11	("3"\$1d or three\$1dimension\$3 or "3"\$1demension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1demension\$3) same mode\$1 same (transmit\$5 or transfer\$5) same un\$1compress\$3	US-PGPUB; USPAT	OR	ON	2013/06/05 13:35
S44	9	S43 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/05 13:40
S45	1637	("3"\$1d or three\$1dimension\$3 or "3"\$1demension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1demension\$3) same mode\$1 same (transmit\$5 or transfer\$5 or send\$5) same image\$1	US-PGPUB; USPAT	OR	ON	2013/06/05 13:57
S46	783	("3"\$1d or three\$1dimension\$3 or "3"\$1demension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1demension\$3) same mode\$1 same (transmit\$5 or transfer\$5 or send\$5) same image\$1 same (generat\$4 or produc\$4)	US-PGPUB; USPAT	OR	ON	2013/06/05 14:02
S47	25	S46 AND HDMI\$1	US-PGPUB; USPAT	OR	ON	2013/06/05 14:04
S48	1	S47 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/05 14:04
S49	83	S45 AND HDMI\$1	US-PGPUB; USPAT	OR	ON	2013/06/05 14:05
S50	2	S49 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/05 14:05
S51	476	S46 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/05 14:15
S52	14	S51 AND un\$1compress\$5	US-PGPUB; USPAT	OR	ON	2013/06/05 14:16
S53	154	("3"\$1d or three\$1dimension\$3 or "3"\$1demension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1demension\$3) same image\$1 same HDMI\$1	US-PGPUB; USPAT	OR	ON	2013/06/05 14:38
S54	3	S53 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/05 15:09
S55	12611	("3"\$1d or three\$1dimension\$3 or "3"\$1demension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1demension\$3) same image\$1 same mode\$1	US-PGPUB; USPAT	OR	ON	2013/06/05 15:13
S56	1179	("3"\$1d or three\$1dimension\$3 or "3"\$1demension\$3 or steoscop\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1demension\$3) same image\$1 same mode\$1 same interfac\$4	US-PGPUB; USPAT	OR	ON	2013/06/05 15:15
S57	286	("3"\$1d or three\$1dimension\$3 or	US-PGPUB;	OR	ON	2013/06/05

		"3"\$1dimension\$3 or stereoscop\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1dimension\$3) same image\$1 same mode\$1 same interfac\$4 same (transfer\$4 or transmit\$4 or send\$4)	USPAT			15:17
S58	175	S57 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/05 15:19
S59	236	("3"\$1d or three\$1dimension\$3 or "3"\$1dimension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1dimension\$3) same signal same capabilit\$3 same (sen\$4 or receiv\$4)	US-PGPUB; USPAT	OR	ON	2013/06/19 08:50
S60	153	S59 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/19 08:52
S61	25	(US-20030231191-\$ or US-20040181806-\$ or US-20040218599-\$ or US-20050184993-\$ or US-20100315489-\$ or US-20080240152-\$ or US-20080008172-\$ or US-20070286246-\$ or US-20070242068-\$ or US-20100027113-\$ or US-20030128871-\$ or US-20050030301-\$ or US-20080013001-\$ or US-20070165304-\$ or US-20070097024-\$ or US-20060279750-\$ or US-20070296721-\$).did. or (US-8068485-\$ or US-5644324-\$ or US-6094182-\$ or US-6911975-\$ or US-7098888-\$ or US-7362324-\$ or US-6914637-\$ or US-7088398-\$).did.	US-PGPUB; USPAT	OR	ON	2013/06/19 08:52
S62	11	S61 AND capabilit\$4	US-PGPUB; USPAT	OR	ON	2013/06/19 08:53
S63	5443	("3"\$1d or three\$1dimension\$3 or "3"\$1dimension\$3 or stereoscop\$3) with ("2"\$1d or two\$1dimension\$3 or "2"\$1dimension\$3) with (size\$1 or capabilit\$3)	US-PGPUB; USPAT	OR	ON	2013/06/19 09:11
S64	988	("3"\$1d or three\$1dimension\$3 or "3"\$1dimension\$3 or stereoscop\$3) with ("2"\$1d or two\$1dimension\$3 or "2"\$1dimension\$3) with (size\$1 or capabilit\$3) with (great\$1 or small\$4 or sam\$1 or reduc\$4)	US-PGPUB; USPAT	OR	ON	2013/06/19 09:14
S65	123	S64 AND (transmitter\$1 or encoder\$1) and (receiver\$1 or decoder\$1)	US-PGPUB; USPAT	OR	ON	2013/06/19 09:16
S66	56	S65 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/06/19 09:16
S67	829	3d same 2d same size same (size or capability or capacity) same (smaller or greater or bigger)	US-PGPUB; USPAT	OR	ON	2013/12/23 11:47
S68	404	3d same 2d same size same (size or capability or capacity) same (smaller or greater or bigger) same image	US-PGPUB; USPAT	OR	ON	2013/12/23 11:47
S69	404	3d same 2d same size same (size or capability or capacity) same (smaller or greater or bigger) same image	US-PGPUB; USPAT	OR	ON	2013/12/23 11:48
S70	48	3d same 2d same size same (size or capability or capacity) same (smaller or greater or bigger) same image same (interface or transmit\$4 or send\$4)	US-PGPUB; USPAT	OR	ON	2013/12/23 11:49

S71	32	S70 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/12/23 11:50
S72	4	"3"\$1dimension\$3 same "2"\$1dimension\$3 same size same (size or capability or capacity) same (smaller or greater or bigger) same (content or image) same (interface or transmit\$4 or send\$4)	US-PGPUB; USPAT	OR	ON	2013/12/23 12:12
S73	4	"3"\$1dimension\$3 same "2"\$1dimension\$3 same (size or capability or capacity) same (smaller or greater or bigger) same (content or image) same (interface or transmit\$4 or send\$4)	US-PGPUB; USPAT	OR	ON	2013/12/23 12:20
S74	51	"3"\$1dimension\$3 same "2"\$1dimension\$3 same (size or capability or capacity) same (smaller or greater or bigger) same (content or image)	US-PGPUB; USPAT	OR	ON	2013/12/23 12:22
S75	50	"3"\$1dimension\$3 same "2"\$1dimension\$3 same (content or size or capability or capacity) same (smaller or greater or bigger) same (image)	US-PGPUB; USPAT	OR	ON	2013/12/23 12:23
S76	35	S74 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/12/23 12:23
S77	793	("3"\$1d or "3"\$1dimension\$3) same ("2"\$1d or "2"\$1dimension\$3) same (size or capability or capacity) same (smaller or greater or bigger) same (content or image)	US-PGPUB; USPAT	OR	ON	2013/12/23 13:55
S78	231	("3"\$1d or "3"\$1dimension\$3) same ("2"\$1d or "2"\$1dimension\$3) same (size or capability or capacity) same (smaller or greater or bigger) same (content or image) same (send\$3 or sent or transmit\$4 or communicat\$3 or display\$4)	US-PGPUB; USPAT	OR	ON	2013/12/23 14:21
S79	117	S78 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/12/23 14:23
S80	245	("3"\$1d or "3"\$1dimension\$3) same ("2"\$1d or "2"\$1dimension\$3) same (size or capability or capacity) same (smaller or greater or bigger) same (content or image) same (send\$3 or sent or transmit\$4 or communicat\$3 or display\$4 or interfac\$4)	US-PGPUB; USPAT	OR	ON	2013/12/23 14:23
S81	5537	("3"\$1d or "3"\$1dimension\$3 or stereoscop\$3) with ("2"\$1d or "2"\$1dimension\$3) with conver\$5	US-PGPUB; USPAT	OR	ON	2013/12/23 15:57
S82	550	("3"\$1d or "3"\$1dimension\$3 or stereoscop\$3) with ("2"\$1d or "2"\$1dimension\$3) with conver\$5 same (size or scal\$3)	US-PGPUB; USPAT	OR	ON	2013/12/23 15:58
S83	247	S82 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/12/23 16:00
S84	176	S83 AND (greater or smaller or bigger)	US-PGPUB; USPAT	OR	ON	2013/12/23 16:00
S85	53	stereoscop\$3 near\$3 encod\$3 same resolution	US-PGPUB; USPAT;	OR	ON	2013/12/24 09:16

			USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			
S86	19	S85 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/12/24 09:16
S87	251	stereoscop\$3 SAME (interlac\$4 or interleav\$3 or down\$1sampl\$3) same resolution	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/12/24 09:28
S88	193	stereoscop\$3 SAME (interlac\$4 or interleav\$3 or down\$1sampl\$3) same resolution same image	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/12/24 09:28
S89	93	S88 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2013/12/24 09:28
S90	1	"13067880"	US-PGPUB; USPAT	OR	ON	2014/08/11 16:22
S91	15125	("3"\$1d or three\$1dimension\$3 or "3"\$1demension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1demension\$3) same interface	US-PGPUB; USPAT	OR	ON	2014/10/08 07:35
S92	253	("3"\$1d or three\$1dimension\$3 or "3"\$1demension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1demension\$3) same interface same transmi\$5 near\$5 image	US-PGPUB; USPAT	OR	ON	2014/10/08 07:37
S93	14	("3"\$1d or three\$1dimension\$3 or "3"\$1demension\$3) same ("2"\$1d or two\$1dimension\$3 or "2"\$1demension\$3) same interface same transmi\$5 near\$5 image same (segment or portion or capacity)	US-PGPUB; USPAT	OR	ON	2014/10/08 07:47
S94	3	S93 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2014/10/08 07:49
S95	81	S92 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2014/10/08 07:51
S96	1	Shepherd NEAR2 Nicoll NEAR2 Burleigh	US-PGPUB; USPAT	OR	ON	2014/10/08 09:38
S97	0	(interface same stereoscop\$3 same image same capacity same first same second).clm.	US-PGPUB; USPAT	OR	ON	2014/10/08 09:39
S98	1	"14629642"	US-PGPUB; USPAT	OR	OFF	2016/01/20 09:47
S99	3	"12808685"	US-PGPUB; USPAT	OR	OFF	2016/01/20 09:52
S100	70	hdmi same "24" same color same pixel	US-PGPUB; USPAT	OR	OFF	2016/01/20 12:16
S101	13	S100 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2016/01/20 12:17
S102	53	receiver same capability same (maximum	US-PGPUB;	OR	OFF	2016/01/21

		near3 bandwidth)	USPAT			11:44
S103	14	S102 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2016/01/21 11:44
S104	140	interface same capability same (maximum near3 bandwidth)	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:45
S105	1	S104 and hdmi	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:45
S106	69	S104 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2016/01/21 11:46
S107	28	(US-20030231191-\$ or US- 20040181806-\$ or US-20040218599-\$ or US-20050184993-\$ or US-20100315489- \$ or US-20080240152-\$ or US- 20080008172-\$ or US-20070286246-\$ or US-20070242068-\$ or US-20100027113- \$ or US-20030128871-\$ or US- 20050030301-\$ or US-20080013001-\$ or US-20070165304-\$ or US-20070097024- \$ or US-20060279750-\$ or US- 20070296721-\$ or US-20050146521-\$ or US-20060044388-\$ or US-20060192776- \$).did. or (US-8068485-\$ or US- 5644324-\$ or US-6094182-\$ or US- 6911975-\$ or US-7098888-\$ or US- 7362324-\$ or US-6914637-\$ or US- 7088398-\$).did.	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:47
S108	15	S107 AND bandwidth	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:47
S109	2775	receiver same capability same (bandwidth)	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:53
S110	0	receiver same capability same (bandwidth) same interace	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:53
S111	210	receiver same capability same (bandwidth) same interface	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:53
S112	125	S111 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2016/01/21 11:53
S113	510	receiver with capability with (bandwidth)	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:54
S114	25	S113 AND HDMI	US-PGPUB; USPAT	OR	OFF	2016/01/21 11:54
S115	3	S114 AND @ad<"20071218"	US-PGPUB; USPAT	OR	ON	2016/01/21 11:54
S116	1785	(H04N13/0402 or H04N5/60 or H04N5/067).cpc.	US-PGPUB; USPAT	OR	OFF	2016/01/21 12:18
S117	236	S116 AND (size same (size or capability or capacity)same (smaller or greater or bigger))	US-PGPUB; USPAT	OR	ON	2016/01/21 12:23
S118	873	H19 AND interface	US-PGPUB; USPAT	OR	ON	2016/01/21 12:23
S119	116	S117 AND interface	US-PGPUB; USPAT	OR	ON	2016/01/21 12:24
S120	132	S118 AND ((("3"\$1d or "3"\$1dimension\$3) same ("2"\$1d or "2"\$1dimension\$3))	US-PGPUB; USPAT	OR	ON	2016/01/21 12:24
S121	37	S119 AND ((("3"\$1d or "3"\$1dimension\$3) same ("2"\$1d or "2"\$1dimension\$3))	US-PGPUB; USPAT	OR	ON	2016/01/21 12:25

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BIB DATA SHEET

CONFIRMATION NO. 5045

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
15/256,839	09/06/2016	348	2487	2007P01979US01		
APPLICANTS KONINKLIJKE PHILIPS N.V., Eindhoven, NETHERLANDS; INVENTORS Nicoll Burleigh SHEPHERD, Coulsdon, UNITED KINGDOM; ** CONTINUING DATA ***** This application is a CON of 14/629,642 02/24/2015 PAT 9462258 which is a CON of 12/808,685 06/17/2010 PAT 9036010 which is a 371 of PCT/IB2008/055305 12/15/2008 ** FOREIGN APPLICATIONS ***** EUROPEAN PATENT OFFICE (EPO) 07123461.1 12/18/2007 ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 09/15/2016						
Foreign Priority claimed ☒ Yes ☐ No 35 USC 119(a-d) conditions met ☒ Yes ☐ No Verified and Acknowledged <u>/NAM D PHAM/</u> Examiner's Signature		☐ Met after Allowance <u>/N. P./</u> Initials	STATE OR COUNTRY UNITED KINGDOM	SHEETS DRAWINGS 3	TOTAL CLAIMS 22	INDEPENDENT CLAIMS 8
ADDRESS PHILIPS INTELLECTUAL PROPERTY & STANDARDS 465 Columbus Avenue Suite 340 Valhalla, NY 10595 UNITED STATES						
TITLE TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE						
FILING FEE RECEIVED 3860	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15256839
	Filing Date	2016-09-06
	First Named Inventor	Nicoll Burleigh Shepherd
	Art Unit	2487
	Examiner Name	Nam D. Pham
	Attorney Docket Number	2007P01979US01

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15256839
	Filing Date		2016-09-06
	First Named Inventor	Nicol Burleigh Shepherd	
	Art Unit	2487	
	Examiner Name	Nam D. Pham	
	Attorney Docket Number	2007P01979US01	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15256839
	Filing Date	2016-09-06
	First Named Inventor	Nicoll Burleigh Shepherd
	Art Unit	2487
	Examiner Name	Nam D. Pham
	Attorney Docket Number	2007P01979US01

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Michael E. Belk/	Date (YYYY-MM-DD)	2017-01-23
Name/Print	Michael E. Belk	Registration Number	33357

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IMAGE RECORDING DEVICE AND IMAGE REPRODUCING DEVICE

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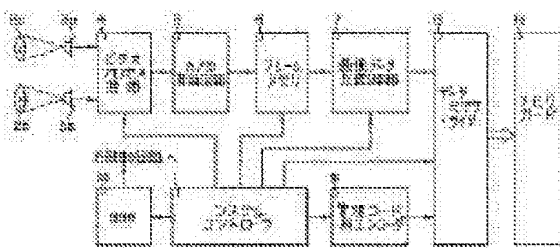
Priority number(s): JP19910184746 19910724

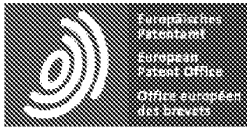
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Abstract of JPH0530538 (A)

PURPOSE: To obtain an image recording/reproducing device capable of correctly and quickly selecting and specifying multi-eye image signal indicating a stereoscopic image at the time of reproducing it.

CONSTITUTION: Subject images making a pair are inputted by taking lenses 2a, 2b and a pair of stereoscopic image signals are written in a frame memory 6 through CCDs 3a, 3b, a video process circuit 4, and so on. On the other hand, stereo pair code data consisting of a stereo image identifying signal, L and R image identifying signals, a stereo frame numbers, etc., are added to the image signal by a data mixer/writer 8 and the added signal is recorded in a memory card 11. In the reproducing device, the stereo pair codes are decoded and correct stereo pair images are quickly retrieved and reproduced.





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DESCRIPTION JPH0530538

[0001]

The present invention relates to an image recording apparatus and an image reproducing apparatus, and more particularly, to record a three-dimensional image using a multi-eye image signal, or, in the apparatus for reproducing, relates to a device for managing a multi-eye image signal it is intended.

[0002]

Recording of the Prior Art] three-dimensional image, but the method of reproduction there is a variety of methods, in recent years, Bideomu - captures the two image signals in the shooting lens of a different position by the buildings and the like, to play it, so-called, 2 recording of eye type stereoscopic image or apparatus capable of reproduction is practically have been many proposed for that device. Recording processing of the stereo image, L (left eye) is a multi-eye image signal, R alternately two image signals for (right eye) or, at the same time, the magnetic Te - flop, floppy disks, solid state memory, etc. is performed is recorded in different areas of the recording medium. Moreover, the reproduction process, said L, is read reproduced in the form of a pair of alternating image signals R from the recording medium. Then, on the side to observe, said L, in accordance with the reproduction timing of the image signals of R, for example, the left eye, and controls the on-off of the liquid crystal shutter for the right eye, L image for the left eye,

R image for the observed respectively in the right eye, you will see a three-dimensional image by the parallax of both eyes. Accordingly, the at the time of reproduction L, it is necessary to correctly correspond the image of the R to the eye of each side, as those proposed for the, three-dimensional color television apparatus disclosed in JP-B-61-23913, uptake L, alternately image signal R via the two cameras when the stereoscopic image recording will be recorded in a predetermined format, then, for every one horizontal scanning line L, the R either side of the video signal L to the starting point before, is to insert the decision pulse to identify the R. Then, L, to identify the R screen reproduced correctly on the basis of the L, R identification signal during stereoscopic image reproduction is intended to enable observation of the stereoscopic image.

[0003]

The present invention is to Solve However, the above-mentioned Japanese Patent Publication 61-23913 No. three-dimensional color television apparatus disclosed in Japanese, is for the shooting of the movie, is played always in the order at the time of recording at the time of reproduction of the image that. Accordingly, L, if made even identity of R, L, or shift pairs R image, the inconvenience combined with other image signal does not occur in principle. However, when it comes to the recording reproduction of a still image, not necessarily the image data pair for sequential area adjacent the recording medium is written during recording. In particular, the recording, reproducing apparatus is not a stereoscopic image-only, L, if it is both processing apparatus capable of monocular images signals of the stereo image signal and the normal monocular image of a stereoscopic image consisting of R image, and the stereo image signal there is a possibility that the recording area of the monocular image signal is positioned mixed, in which case, it may L, that the correct corresponding R images can not be taken occurs.

[0004]

For example, if the recording medium is a floppy disc, recording a stereoscopic image signal to the portion of the middle omission teeth or floppy disk when the monocular photography recording state of stereoscopic photography (state before and after the recorded track is erased) when, in a state in which monocular images signal recording track is interposed between the stereo image signal recording tracks. In that state, L image signal to an odd track, also not limited to the R image signals in the even track is recorded, moreover, L, becomes impossible to take correspondence for the combination of R pairs. Specifically, for example, the L signal in the stereo image pair in a tenth track Fi - recorded as field pictures, if you try to record a R signal to a subsequent eleventh track, there is already monocular images when as recorded would write the R signal in the pair to the track looking for somewhere empty track. Then, L image signal

when reproducing of the stereoscopic image can be reproduced, R image signal to be a the pair, since there is no clue to access the recording track, will not play. It should be noted that, of the stereo image signal L, R signal each frame - a similar defect and monocular image data is also interposed in the middle of the case to be recorded as a non-image occur.

[0005]

Further, it constitutes one large screen of lined screens to a plurality of the unit, so-called, in the multi-screen image recording and reproducing apparatus of a large screen by, recording a stereo image, if that is reproduced again, each screen there is a need is composed of L, a pair of R image. L Such image management data even when such, the only distinction between R it may be extracted image signals in the pair since the number of screens becomes each element is often incorrectly difficult.

[0006]

The present invention has been made to solve the inconvenience described above, the multi-eye image signals for representing a stereoscopic image properly during reproduction, respectively, and, immediately the image signal identification information needed to order can be selected providing an image recording apparatus for recording superimposed on, further, properly stereoscopic image by recognizing the above information, and aims to provide an image reproducing apparatus capable of reproducing rapidly.

[0007]

The image recording apparatus of the present invention Means for Solving the Problems], for each one of the multi-eye image signals for representing one stereoscopic image, the first for the first information for identifying the three-dimensional image an identification signal generating means for identifying signal and the image signal to generate a second identification signal corresponding to the second information indicating whether a any signal out of the multi-eye image signal, generated by said identification signal generating means the first identification signal, and, characterized in that the second identification signal formed by and a correlating means for recording in the appropriate ones certain embodiments keeping the correspondence among the multi-view image signals to. Further, the image reproducing apparatus of the present invention, for each one of the multi-eye image signal reproduced through the supply, the

playback on the basis of recognition by the recognition means and the recognition means for recognizing a said first information and the second information or characterized by comprising comprises a means for obtaining a signal for reproducing a stereoscopic image corresponding to the supplied multiview image signal.

[0008]

[Action] In the image recording apparatus, the image signal of the multi-eye image signal to said first and second identification signal recorded in a manner maintaining a predetermined correspondence, in the image reproducing apparatus, the above image recording apparatus the recorded image signal is reproduced to provide recognizes the first and second identification signals from the multi-eye image signal obtained by, for reproducing a stereoscopic image corresponding to the multiview image signal the reproduction or supply.

[0009]

The present invention will be described with reference to the examples which illustrated below. FIG. 1 is a main block diagram of an image recording apparatus according to an embodiment of the present invention.

[0010]

The apparatus, an image signal of binocular stereo image and the monocular images are mixed, or, Memorika is recorded in a state where not mixed - The image recording apparatus capable of using de, the apparatus as shown in FIG. 1 each control element, the operation is controlled by the system controller 1. Control timing of the operation is to be controlled via a SSG10 of the synchronizing signal generating circuit. Then, in the case of a stereo image recording, an image pickup element captures the subject image formed of different-taking lens 2a of the pair that is disposed at a position, for L (Left), respectively 2b, a pair for the R (right) CCD3a, to form an image to 3b. CCD3a, the imaging signal from 3b, the two video signals by the video processing circuit 4 becomes a stereo image pair is a multi-eye image signal, i.e., L image signal is converted into an R image signal. The signal is, by the A / D converter circuit 5 is converted into a digital signal frame - are written into the frame memory 6. It should be noted that this frame - frame memory 6, 1 frame - No amount of capacity and a plurality of frame does not necessarily - may be able to write-time of data.

[0011]

Subsequently, the digitized said respective image signals are compressed by the image data compression circuit 7 respectively is performed. On the other hand, the first identification signal for the stereo image reproducing to be described later, and the management code including the second identification signal management code for diene which is an identification signal generating means in accordance with an instruction from the system controller 1 - is produced by da 9. Added to the compressed image data by the data mixer writer 8 is a correspondence with means for recording the code data in a manner that with a predetermined association, detachable mosquito consisting solid-state memory - be recorded in the Domemori 11 . The above-mentioned management code, the first identification signal to the stereo image, and, in addition to the stereo pair code based on the second identification signal, Fi - field / frame - identification code indicating the recording method of the arm or the like are also included. Then, the code data is to be stored in a region preceding the picture data area.

[0012]

Also, a stereo pair code is a code data required when reproducing a stereo image, be one to be written to the n-th byte in a given said management code, indicating the bit pattern in FIG. Stereopair code as shown in the figure is a 8-bit configuration, first, the data D7 of the eighth bit (bit 7), data identifying the stereo images / monocular images of the signal is written, one stereo image signal, 0 corresponds to the monocular image signal. The data D6 of the seventh bit (bit 6), of either the L image of the stereo image signal pair is a second information, L / R identification signal of said second identification signal identifying which R image is written , 0 L image signals, 1 corresponds to the R image signals. The data D5~D0 the sixth to one bit (bit 6-0), frame number of the stereo image of the first identification signal is written corresponding to the first information for identifying the three-dimensional image. The stereo pair code example of FIG. 3, an the image data stereo image signal, R image signal of which indicates that the frame number of the stereo image is the 5 th.

[0013]

The image recording apparatus of the present embodiment configured as described above, when recording a stereo image, the stereo image data captured via the-taking lens 2a, 2b of the pair is

processed by the control circuit described above. It is, generated stereo pair code and other management code and mixing state in Memorika - is recorded in a predetermined area of de 11. Also, when recording monocular images, - taking lens 2a, monocular image data captured through the one lens among 2b is similarly treated with the control circuit described above, the generated management code Mixing Memorika in a state of being - is recorded in a predetermined area of de 11. In this case, data D7 stereopair code is set to 0. In this manner, in the ones of the present embodiment, the same Memorika - even as both stereo / monocular image signal was recorded in a state of being mixed in de, during reproduction, the stereo image L, the R image data it can be reproduced accurately without a wrong combination.

[0014]

The recording stereo images on large screens by the multi-screen, it is possible also to apply the stereo pair code for apparatus for reproducing, L of each unit screen each time constituting a multi-screen, corresponding to R for the image data, code data of the same stereo pair frame number, also stereo identification code, recorded as similarly stereo pair encodes an identification code such as the L / R, rapidly among many screen configuration during reproduction an image in the pair to search identified by stereo pair code, it is possible to reproduce a multi-screen. Incidentally, those of the present embodiment has been utilized solid-state memory as a recording medium, of course, may be performed image recorded using a floppy disk of the magnetic recording medium. In this case, data of the management code is recorded by frequency division multiplexing recorded in the image signal. Further, the recording apparatus, but had a imaging optical system, necessarily, without the need of imaging optical system, a stereo image data recorded on another imaging optical system above frame - uptake in frame memory, above with mixing the stereo pair code is also the present invention to apparatus for recording of a stereo image signal can be applied.

[0015]

Next, an image reproducing apparatus according to an embodiment of the present invention will be described with reference to FIG. Figure 2 is a main block diagram of the image reproducing apparatus. The reproducing apparatus, Memorika was recorded by the recording apparatus of the above example - be those that use the soil, as well, Memorika mixed signals of binocular stereo image and monocular images - even in the soil, respectively image is the image reproducing apparatus capable of reproducing. For stereo image reproduction is intended to observe an image using a liquid crystal shutter. Then, the control elements of the apparatus as shown in FIG. 2, the operation is controlled by the system controller 21. Further, the control

timing of the operation is to be controlled via a SSG29 of the synchronizing signal generating circuit. Then, when you play the image data is „ First, Memorika stereo image signal has been recorded by the recording device - to mount the de 11 to the playback device. Then, the data reader-separator - uptake through the data 22 and the L or R image data of the synthetic data management code data, to separate the image data and code data. The management code data, the relative stereo images first identification signal, and, in addition to the stereo pair code based on the second identification signal, Fi - includes a code indicating the absence of recording - field / frame. The code is decoded by the management code decoder 27, is taken into the system controller 21 is the identification means of the identification signal. On the other hand, the image data is compressed data by the image data decompression circuit 23 is extended frame - are written into the frame memory 24. This frame - frame memory 24 is also 1 frame - Multiple frame not only for the arm - may have free capacity.

[0016]

Therefore, to determine the stereo pair code on the system controller 21, it if it was a stereo image pairs become to R, or a data of the L image, is recorded in D5-D0 stereopair code data Memorika the image data frame numbers match was - to search from de 11 frame - incorporated into the frame memory 24. Subsequently, frame - frame memory 24 in the incorporated the L, R image data, it Fi - if field recording data, 1 Fi - are time-division control alternately every field, D / the A conversion circuit 25 in converted D / the a, video signals encoder - in da 26, it is converted into a video signal such as the NTSC system is outputted to the TV monitor 30. At that time, the system controller 21 via the LR pulse generator 28 is a means for obtaining a signal for reproducing a stereoscopic image corresponding to the stereoscopic image signal, LR liquid crystal shutters in synchronization above L, the output of the R image data It outputs a pulse for performing 31 off of, and off the liquid crystal shutter 31, to permit observation of the stereoscopic image. The reproduction image by the reading of the stereo pair code if found to be monocular images, as is, without performing the search of the paired images, to reproduce the monocular images.

[0017]

Next, flow of the reproduction processing of FIG. 4 of the playback apparatus of the present embodiment constructed as described above - Cha - be explained by and. Memorika - Insert the de, to start the regeneration process, Memorika - read one screen image signal which has been recorded in the mode. Then, in step S11, reads a stereo pair code recorded in the image signal, it performs a stereo image determine whether (step S12). If was not a stereo image, it jumps to step

S16, by performing the normal monocular image processing this Lumpur - to end the routine. Also, if a stereo image, the process proceeds to step S13, Memorika - said stereo frame number is equal to the recording image data in de L, or performs the search whether there is R image data (step S14) . And, an incomplete one of the data is recorded in a state at the time of recording, if such did not have a pair of data, this le a warning display of that there is no pair data jumps to step S17 - the Chin finish. If a data pair, the image data frame - capturing the frame memory 24, and, L, and outputs the image data of the R pairs of alternately synchronizes the LR liquid crystal shutter at the output timing of the image data is turned on and off It is not to allow the observation of the three-dimensional image (step S15).

[0018]

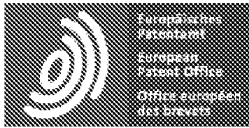
It should be noted that, in the present apparatus, a method of erasing the stereo image data, L, if you want to erase the data on the R of the pair at the same time, it is sufficient to erase and search for only those same of the above stereo frame number. Also, if you want to erase the only one of the data, be rewritten to 0 the stereo / monocular identification code of the stereo pair code, thereafter, can use the image data as a monocular image data. Also, during reproduction of the stereo image, L, although flicker from switching the R screen is caused by the speed of the number of cycles time division play when stereo pair image reproduction, it is possible to suppress the flicker.

[0019]

The playback device can also be applied to the reproduction of the stereo image by the liquid crystal projector, in which case, L in the projector projects the paired images with polarized light corresponding to R screen, which in the observer side It will be observed by polarized glasses. Also in this case, it is always in the correct stereo image reproduced by applying the above-mentioned stereo pair code. Furthermore, it is the reproduction of correct stereoscopic image by be applied to the management code the stereo pair code in reproduction of a stereoscopic image using a holographic technique. Also, the stereo pair code, when used in printing the stereoscopic image on the original stereoscopic viewer apparatus, another stereo / monocular stereo image using the stereo pair code, another L / R, furthermore, stereo by printing the frame number of the image, it becomes very useful when the user chooses an original to be inserted into the viewer apparatus from among the similar original. Furthermore, those of the present invention, it is of course also applicable to a video recording and reproducing apparatus not only for a still image.

[0020]

According to the present invention the above-described image recording apparatus and an image reproducing apparatus of the present invention as, Dono out of the first identification signal and the image signal is the multi-eye image signal for identifying the three-dimensional image in the above recording device and a second identification signal indicating whether those signals recorded superimposed on the image signals, further, since in the reproducing apparatus has to reproduce a stereoscopic image to recognize the above information, the present invention According to those, L in the pair of stereo images at the time of image reproduction, the R image data properly, and it is possible to choose quickly, have numerous remarkable effect such as can be applied to the reproduction of various stereoscopic images it is intended.



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CLAIMS JPH0530538

[1]

1. For each one of the multi-eye image signals for representing one stereoscopic image, which the first identification signal and the image signal corresponding to the first information for identifying the three-dimensional image is among the multi-view image signals an identification signal generating means for generating a second identification signal corresponding to the second information indicating whether the a signal, a first identification signal generated by said identification signal generating means, and, the multiview a second identification signal the image recording apparatus characterized by comprising comprises a correlating means for recording in the appropriate ones predetermined manner kept the correspondence of the image signal.

2.

For each one of the multi-eye image signal reproduced through the supply, the first information and the multi-eye image signal for specifying the three-dimensional image in which the multi-eye image signal belongs is any signal among the multi-eye image signal comprising a recognition means for recognizing a second information, means for obtaining a signal for reproducing a stereoscopic image corresponding to the multiview image signal the reproduction or supplied on the basis of recognition by the recognition unit, a representative of whether the image

reproducing apparatus characterized by the composed.

【特許請求の範囲】

【請求項1】1つの立体画像を表すための多眼画像信号の各1つについて、当該立体画像を特定するための第1情報に対応する第1識別信号と当該画像信号が上記多眼画像信号のうちのどの信号であるのかを表す第2情報に対応する第2識別信号とを生成する識別信号生成手段と、

上記識別信号生成手段により生成された第1識別信号、および、第2識別信号を当該多眼画像信号のうちの該当するものと所定の対応付けを保った状態で記録するための対応付け手段と、

を具備してなることを特徴とする画像記録装置。

【請求項2】再生乃至供給された多眼画像信号の各1つについて、当該多眼画像信号が属する立体画像を特定するための第1情報と多眼画像信号が多眼画像信号のうちのどの信号であるのかを表す第2情報とを認識する認識手段と、

この認識手段による認識に基づいて上記再生乃至供給された多眼画像信号に対応する立体画像を再現するための信号を得る手段と、

を具備してなることを特徴とする画像再生装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は画像記録装置および画像再生装置、詳しくは、多眼画像信号を用いて立体画像を記録、あるいは、再生する装置において、該多眼画像信号を管理する装置に関するものである。

【0002】

【従来の技術】立体画像の記録、再生の方式には各種の方式があるが、近年、ビデオムービー等により異なる位置の撮影レンズで2つの画像信号を取り込み、それを再生する、所謂、2眼式立体画像の記録、あるいは、再生を可能とする装置が実用化され、その装置のための提案も数多くなされている。この立体画像の記録処理は、多眼画像信号であるL（左眼）、R（右眼）用の2つの画像信号を交互、あるいは、同時に、磁気テープ、フロッピーディスク、固体メモリ等の記録媒体の異なる領域に記録して行われる。また、その再生処理は、記録媒体より上記L、Rの画像信号を交互にペアの形で読み出し再生される。そして、観察する側では、上記L、Rの画像信号の再生タイミングに合わせて、例えば、左眼、右眼用の液晶シャッターのオンオフを制御し、L用画像は左眼で、R用画像は右眼でそれぞれ観察し、両眼の視差により立体画像を見ることになる。従って、再生時に上記L、Rの画像をそれぞれの側の眼に正しく対応させる必要があるが、そのために提案されたものとして、特公昭61-23913号公報に開示の立体カラーテレビジョン装置は、立体画像記録時に2台のカメラを介してL、Rの画像信号が交互に取り込み、所定のフォーマットで記録するが、そのとき、一水平走査線毎にL、R何れか

の側の映像信号の開始点以前にL、Rを識別する判定パルス挿入するものである。そして、立体画像再生時の上記L、R識別信号に基づいてL、R画面を識別して正しく再生し、立体画像を観察可能とするものである。

【0003】

【発明が解決しようとする課題】ところが、上述の特公昭61-23913号公報に開示の立体カラーテレビジョン装置は、動画の撮影用であり、その画像の再生時には必ず記録時の順で再生される。従って、L、Rの識別さえなされていれば、L、Rの画像のペアがずれたり、他の画像信号と組み合わされるといった不具合は原理的に起こらない。しかし、静止画の記録再生用になると、記録時に必ずしも記録媒体の隣接する順次の領域にペアの画像データが書き込まれるとは限らない。特に、その記録、再生装置が立体画像専用ではなく、L、R画像からなる立体画像のステレオ画像信号と通常単眼画像のモノキュア画像信号の双方の処理が可能な装置である場合、ステレオ画像信号とモノキュア画像信号の記録領域が混在して位置する可能性があるが、その場合、L、Rの画像の正しい対応がとれなくなることが生じることがある。

【0004】例えば、記録媒体がフロッピーディスクである場合、立体撮影の途中で単眼撮影をしたときやフロッピーディスクが歯抜け記録状態（記録済みトラックの前後が消去されている状態）の部分に立体画像信号を記録したとき、ステレオ画像信号記録トラックの間にモノキュア画像信号記録トラックが介在した状態になる。その状態では、奇数トラックにL画像信号が、また、偶数トラックにR画像信号が記録されているとは限らず、しかも、L、Rのペアの組み合わせについての対応がとれなくなってしまう。具体的に説明すると、例えば、第10トラックにあるステレオ画像ペアのうちL信号をフィールド画像として記録し、後続の第11トラックにR信号を記録しようとした場合、そこに既にモノキュア画像が記録されているようなときは、どこか空きトラックを探してそのトラックにペアとなるR信号を書き込むことになる。そして、該ステレオ画像の再生を行う際にL画像信号は、再生することはできるが、そのペアとなるべきR画像信号は、その記録トラックをアクセスする手がかりがないため、再生できないことになる。なお、上記ステレオ画像信号のL、R信号が各々フレーム画像として記録される場合も途中にモノキュア画像データが介在すると同様な不具合が生じる。

【0005】また、複数の各単位とする画面を連ねて一つの大型画面を構成する、所謂、マルチ画面による大型画面の画像記録再生装置において、ステレオ画像を記録、再生させるような場合、やはり、各々の画面はL、R画像のペアで構成される必要がある。このようなときにも画像管理データとしてL、Rの区別だけでは各要素となる画面の数が多いことからペアとなる画像信号を正

しく取り出すことが困難となる場合がある。

【0006】本発明は、上述の不具合を解決するためになされたものであり、立体画像を表すための多眼画像信号がそれぞれ再生時に正しく、かつ、速やかに選択できるように必要とする識別情報を画像信号に重畳して記録する画像記録装置を提供し、更に、上記の情報を認識して立体画像を正しく、かつ、速やかに再生することが可能な画像再生装置を提供することを目的とする。

【0007】

【課題を解決するための手段】本発明のうち画像記録装置は、1つの立体画像を表すための多眼画像信号の各1つについて、当該立体画像を特定するための第1情報に対する第1識別信号と当該画像信号が上記多眼画像信号のうちのどの信号であるのかを表す第2情報に対応する第2識別信号とを生成する識別信号生成手段と、上記識別信号生成手段により生成された第1識別信号、および、第2識別信号を当該多眼画像信号のうちの該当するものと所定の対応付けを保った態様で記録するための対応付け手段とを具備してなることを特徴とする。また、本発明の画像再生装置は、再生乃至供給された多眼画像信号の各1つについて、上記第1情報と第2情報とを認識する認識手段とこの認識手段による認識に基づいて上記再生乃至供給された多眼画像信号に対応する立体画像を再現するための信号を得る手段とを具備してなることを特徴とする。

【0008】

【作用】上記画像記録装置においては、多眼画像信号の画像信号とともに上記第1、2識別信号を所定の対応付けを保った態様で記録し、上記画像再生装置においては、上記画像記録装置で記録された画像信号を再生乃至供給して得られる多眼画像信号から上記第1、2識別信号を認識し、上記再生乃至供給された多眼画像信号に対応する立体画像を再現する。

【0009】

【実施例】以下図示の実施例に基づいて本発明を説明する。図1は、本発明の実施例を示す画像記録装置の主要ブロック構成図である。

【0010】本装置は、2眼式のステレオ画像とモノキュア画像の画像信号が混在、あるいは、混在しない状態で記録されるメモリカードを使用可能な画像記録装置であって、図1に示すように本装置の各制御要素は、システムコントローラ1によってその動作はコントロールされる。その動作の制御タイミングは、同期信号発生回路のSSG10を介して制御されるものとする。そして、ステレオ画像の記録の場合は、異なる位置に配設された対のテイキングレンズ2a、2bでそれぞれL（左）用、R（右）用のペアとなる被写体像を取り込み撮像素子であるCCD3a、3bに結像させる。CCD3a、3bからの撮像信号は、ビデオプロセス回路4により多眼画像信号であるステレオ画像のペアとなる2つの映像

信号、即ち、L画像信号、R画像信号に変換される。その信号は、A/D変換回路5によりデジタル信号に変換されてフレームメモリ6に書き込まれる。なお、このフレームメモリ6は、1フレーム分の容量とは限らず複数のフレームのデータを書き込めるようにしてもよい。

【0011】続いて、デジタル化された上記各画像信号は、それぞれ画像データ圧縮回路7で圧縮処理が施される。一方、後述するステレオ画像再生のための第1識別信号、および、第2識別信号を含む管理コードがシステムコントローラ1の指示により識別信号生成手段である管理コード用エンコーダ9により生成される。そのコードデータを所定の対応付けを保った態様で記録するための対応付け手段であるデータミキサ・ライタ8により上記圧縮画像データに付加し、固体メモリからなる着脱自在のカードメモリ11に記録する。上記管理コードとは、ステレオ画像に対する第1識別信号、および、第2識別信号に基づくステレオペアコードの他に、フィールド／フレームの記録方式を示す識別コード等も含まれる。そして、このコードデータは、画像データ領域に先行した領域に格納されるものとする。

【0012】また、ステレオペアコードは、ステレオ画像を再生する場合に必要なコードデータであり、上記管理コード中所定の第nバイトに書き込まれるものであって、図3にそのビットパターンを示す。本図に示すようにステレオペアコードは8ビット構成であり、まず、第8ビット（ビット7）のデータD7には、ステレオ画像／モノキュア画像の信号の識別をするデータが書き込まれ、1がステレオ画像信号、0がモノキュア画像信号に対応する。第7ビット（ビット6）のデータD6には、第2情報であるペアのステレオ画像信号のうちL画像か、R画像かを識別する上記第2の識別信号のL／R識別信号が書き込まれ、0がL画像信号、1がR画像信号に対応する。第6～第1ビット（ビット6～0）のデータD5～D0には、立体画像を特定するための第1情報に対応する上記第1識別信号のステレオ画像のコマ番号が書き込まれる。図3の実例のステレオペアコードでは、当該画像データがステレオ画像信号であって、そのうちのR画像信号であり、ステレオ画像のコマ番号が5番であることを示している。

【0013】以上のように構成された本実施例の画像記録装置により、ステレオ画像を記録する場合は、上記ペアのテイキングレンズ2a、2bを介して取り込まれたステレオ画像データは、上述の各制御回路で処理され、生成されたステレオペアコードと他の管理コードとミキシングされた状態でメモリカード11の所定の領域に記録される。また、モノキュア画像の記録を行う場合は、テイキングレンズ2a、2bのうち1つのレンズを介して取り込まれたモノキュア画像データは、同様に上述の各制御回路で処理され、生成された管理コードとミキシングされた状態でメモリカード11の所定の領域に記録

される。この場合、ステレオペアコードのD7のデータは、0に設定される。このように本実施例のものにあっては、同一のメモリカードにステレオ/モノキュラ画像信号の双方が混在した状態で記録を行ったとしても、再生時には、ステレオ画像のL、R画像データの組み合わせを間違えることなく正確に再生することができる。

【0014】また、前記マルチ画面による大型画面でステレオ画像を記録、再生させる装置に対しても上記ステレオペアコードを適用することが可能であり、マルチ画面を構成する各単位画面毎のL、Rに対応する画像データに対しては、同じステレオペアコマ番号のコードデータ、また、ステレオの識別コード、L/Rの識別コード等を同様にステレオペアコードとして記録し、再生時に多くの構成画面の中から速やかにペアとなる画像をステレオペアコードにより識別して検索し、マルチ画面を再生することができる。なお、本実施例のものは、記録媒体として固体メモリを利用したが、勿論、磁気記録媒体のフロッピーディスクを用いて画像記録を行うようにしてもよい。この場合、上記管理コードのデータは、画像信号に周波数分割多重記録により記録される。また、本記録装置は、撮像光学系を有するものであったが、必ずしも、その撮像光学系を必要とはせず、他の撮像光学系で記録したステレオ画像データを上記フレームメモリに取り込み、上記ステレオペアコードをミキシングしてステレオ画像信号の記録を行う装置にも本発明は適用できる。

【0015】次に、本発明の実施例を示す画像再生装置について図2を用いて説明する。図2は、上記画像再生装置の主要ブロック構成図である。本再生装置は、上記実施例の記録装置により記録したメモリカードを用いるものであって、同様に、2眼式のステレオ画像とモノキュラ画像の信号を混在したメモリカードであってもそれぞれの画像が再生可能な画像再生装置である。ステレオ画像再生の場合は、液晶シャックを用いて画像を観察するものとする。そして、図2に示すように本装置の各制御要素は、システムコントローラ21によってその動作がコントロールされる。また、その動作の制御タイミングは、同期信号発生回路のSSG29を介して制御されるものとする。そして、画像データを再生するに際しては、まず、前記記録装置によりステレオ画像信号が記録されたメモリカード11を本再生装置に装着する。そして、データリーダー・セパレータ22を介してL乃至Rの画像データと管理コードデータの合成データを取り込み、画像データとコードデータを分離する。この管理コードデータは、ステレオ画像に対する前記第1識別信号、および、第2識別信号に基づくステレオペアコードの他に、フィールド/フレームの記録方式を示すコードを含む。そのコードは、管理コード用デコーダ27により解読され、上記識別信号の識別手段であるシステムコントローラ21に取り込まれる。一方、画像データは、

画像データ伸長回路23により圧縮データが伸長されフレームメモリ24に書き込まれる。このフレームメモリ24も1フレーム用に限らず複数のフレーム容量を有するものであってもよい。

【0016】そこで、システムコントローラ21で上記ステレオペアコードを判別し、それがステレオ画像であった場合、対となるべきR、または、L画像のデータであって、ステレオペアコードデータのD5〜D0に記録されたコマ番号が一致する画像データをメモリカード11から検索してフレームメモリ24に取り込む。続いて、フレームメモリ24に取り込まれた該L、R画像データは、それがフィールド記録データであれば、1フィールド毎に交互に時分割制御されて、D/A変換回路25でD/A変換され、ビデオシグナルエンコーダ26で、NTSC方式等の映像信号に変換されて、TVモニタ30に出力される。そのとき、システムコントローラ21は、ステレオ画像信号に対応する立体画像を再現するための信号を得る手段であるLRパルスゼネレータ28を介して、上記L、R画像データの出力に同期してLR液晶シャック31のオンオフを行うパルスを出力し、液晶シャック31をオンオフし、立体画像の観察を可能とする。なお、ステレオペアコードの読み取りにより再生画像がモノキュラ画像であることが判明した場合は、そのまま、ペア画像の検索を行わず、モノキュラ画像の再生を行う。

【0017】次に、以上のように構成された本実施例の再生装置の再生処理を図4のフローチャートによって説明する。メモリカードを挿入して、再生処理をスタートさせ、メモリカードに記録された1画面の画像信号を読み取る。そして、ステップS11にて、その画像信号に記録されているステレオペアコードを読み取り、ステレオ画像かどうかの判断を行う(ステップS12)。ステレオ画像ではなかった場合、ステップS16にジャンプして、通常のモノキュラ画像処理を実行して本ルーチンを終了する。また、ステレオ画像であった場合、ステップS13に進み、メモリカードに記録された画像データ中に上記ステレオコマ番号が等しいL、または、R画像データがあるかどうかの検索を行う(ステップS14)。そして、記録時の状態で片方のデータが記録不完全であって、ペアとなるデータがなかったような場合、ステップS17にジャンプしてペアデータがない旨の警告表示を行い本ルーチンを終了する。ペアのデータがあった場合、その画像データをフレームメモリ24に取り込み、そして、L、Rのペアの画像データを交互に出力し、LR液晶シャックをその画像データの出力タイミングに同期させてオンオフさせて立体画像の観察を可能とする(ステップS15)。

【0018】なお、本装置において、ステレオ画像データの消去の方法について、L、Rのペアのデータを同時に消去する場合は、上記ステレオコマ番号の同一のもの

のみを検索して消去すればよいことになる。また、片方のデータのみを消去する場合、ステレオペアコードのうちステレオ/モノキュラ識別コードを0に書き換えれば、以後、該画像データをモノキュラ画像データとして利用できる。また、ステレオ画像の再生時において、L、R画面を切り替えることからチラツキが生じるが、ステレオペア画像再生時に再生の時分割のサイクル数を高速化することによって、上記チラツキを抑えることができる。

【0019】本再生装置は、液晶プロジェクタによるステレオ画像の再生にも応用することが可能であり、その場合は、プロジェクタ側にL、R画面に応じた偏光光でペア画像を投影し、観察者側ではそれを偏光眼鏡により観察することになる。この場合も、上記ステレオペアコードを適用することによって常に正しいステレオ画像の再生ができる。更に、ホログラフィックテクニックを用いた立体画像の再生においても上記ステレオペアコードをその管理コードに適用することによって正しいステレオ画像の再生ができる。また、上記ステレオペアコードは、立体ビュー装置の原画に上記ステレオ画像を印刷して用いる場合に、上記ステレオペアコードを用いてステレオ画像にステレオ/モノキュラの別、L/Rの別、更に、ステレオ画像のコマ番号を印刷することにより、類似した原画の中からビュー装置に挿入すべき原画を使用者が選ぶときに非常に有用になる。更に、本発明のものは、静止画像用に限らず動画記録再生装置にも適用できることは勿論である。

【0020】

【発明の効果】上述のように本発明の画像記録装置およ

び画像再生装置は、上記記録装置では当該立体画像を特定するための第1識別信号と当該画像信号が上記多眼画像信号のうちどの信号のものであるかを表す第2識別信号とを各画像信号に重畳して記録し、更に、上記再生装置では上記の情報を認識して立体画像を再生するようにしたので、本発明のものによると、画像再生時にステレオ画像のペアとなるL、R画像データを正しく、かつ、速やかに選択することが可能となり、各種の立体画像の再生にも適用できるなど数多くの顕著な効果を有するものである。

【図面の簡単な説明】

【図1】本発明の一実施例を示す画像記録装置のブロック構成図。

【図2】本発明の一実施例を示す画像再生装置のブロック構成図。

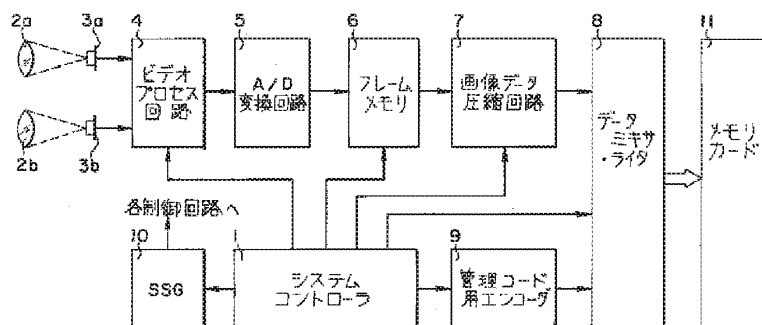
【図3】上記図1の画像記録装置に適用されるステレオペアコードのビットパターンを示す図。

【図4】上記図2の画像再生装置の再生処理のフローチャート。

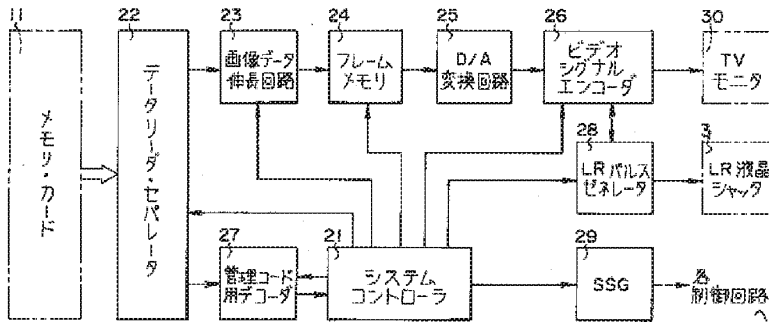
【符号の説明】

8……………データミキサ・ライタ（所定の対応付けを保った態様で記録するための対応付け手段）
9……………管理コード用エンコーダ（識別信号生成手段）
21……………システムコントローラ（識別信号認識手段）
28……………LRパルスゼネレータ（多眼画像信号に対応する立体画像を再現するための信号を得る手段）

【図1】



【図2】

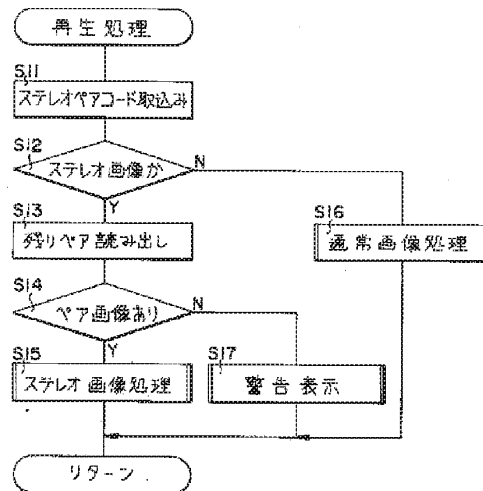


【図3】

ビット	7	6	5	4	3	2	1	0
第nバイト	D7	D6	D5	D4	D3	D2	D1	D0
実例	1	1	0	0	0	1	0	1

ステレオ画像のコマ番号
 L/Rの識別データ(L:0, R:1)
 ステレオ/モノキュラの識別データ {ステレオ: 1
 モノキュラ: 0}

【図4】



Electronic Acknowledgement Receipt	
EFS ID:	28131573
Application Number:	15256839
International Application Number:	
Confirmation Number:	5045
Title of Invention:	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE
First Named Inventor/Applicant Name:	Nicoll Burleigh SHEPHERD
Customer Number:	24737
Filer:	Michael E. Belk/Elissa DeLuccy
Filer Authorized By:	Michael E. Belk
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	2007P01979US01_IDS_2017_Jan_23.pdf	612021 0182eb379e5851fbccbc81605e80e6420af8c97e	no	4

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Patentanmeldung Nr.

Patent application No.

Demande de brevet n°

07123461.1 / EP07123461

The organization code and number of your priority application, to be used for filing abroad under the Paris Convention, is EP07123461.

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office
Le Président de l'Office européen des brevets
p.o.

R.C. van Dijk

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(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.
If no title is shown please refer to the description.
Si aucun titre n'est indiqué se référer à la description.)

Transport of stereoscopic image data over a display interface

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Transport of stereoscopic image data over a display interface

FIELD OF THE INVENTION

This invention relates to transport of image data for the display of stereoscopic images.

5 BACKGROUND TO THE INVENTION

Various schemes for displaying three dimensional images (static, or moving images) are known. One well-known scheme simultaneously displays two images which are encoded for the left eye and right eye by means of different optical polarizations, or colors (e.g. red and green). A viewer wears a pair of special glasses which have lenses in front of
10 the left and right eyes. The lenses are arranged to pass only the image intended for that eye, i.e. a left eye sees only the image intended for that eye. Another stereoscopic display technique sequentially presents an image intended for the left eye, and an image intended for the right eye. A user wears a special pair of glasses which are shuttered in synchronism with the displayed images, such that the left eye shutter is open during the period when the left eye
15 image is displayed, and the right eye shutter is open during the period when the right eye image is displayed.

Auto stereoscopic display techniques remove the need for a viewer to wear special glasses. One known scheme uses a flat panel display with multisided slanted ventricular lenses mounted in front of display elements. An example of this kind of display is
20 described in WO07/069195 A2.

Historically, 3D displays have been limited to specialized applications (e.g. medical imaging) or feature film presentation where it is possible to provide bespoke, high cost, display apparatus. There is now considerable interest in delivering stereoscopic content to a much wider audience, including the consumer electronics market. However, an issue
25 with delivering stereoscopic images in a consumer electronics environment is that conventional displays, and display interfaces which connect displays or projectors to media players, have been designed specifically for the display of conventional 2D images.

Schemes for conveying stereoscopic image data within the confines of existing display interfaces have tended to sacrifice part of the active portion of an image to carry

additional data necessary to render a stereoscopic image. The WOWvx format developed by Koninklijke Philips Electronics N.V. divides the overall display frame into a number of separate regions where different data can be carried. The overall frame is divided into two sub-frames, arranged side-by-side: a first of the sub-frames carries 2D image data and a second of the sub-frames carries depth information. A header is added to the beginning of the upper left-hand corner of the frame. The image data is carried in a normal manner across a display interface. A display extracts depth data from the second sub-frame and creates a 3D image having a resolution of the first sub-frame. This 3D image can then be 'stretched' to occupy the full visible area of the display.

Digital displays and media players are increasingly being equipped with digital display interfaces such as the High Definition Multimedia Interface (HDMI). The present invention seeks to provide an alternative way of delivering stereoscopic image data over a digital display interface.

SUMMARY OF THE INVENTION

A first aspect of the present invention provides a digital display interface part for use in a first audio-visual device for supporting a digital display interface between the first audio-visual device and a second audio-visual device, the interface part comprising:

an input for receiving image data;

a formatter arranged to format the data for transport over the interface, wherein the formatter is operable in:

a first mode in which the formatter generates a stream of first data elements which carry pixel data of a 2D image;

a second mode in which the formatter generates a stream of second data elements which carry a multiplexed combination of components of a stereoscopic image.

An advantage of this arrangement is that the stereoscopic image data can be carried across a digital display interface using the existing capacity of the interface.

Advantageously, where the display interface supports various color depths of image data, such as 48-bit color as well as conventional 24-bit color, the higher capacity transport modes which are intended to transport higher color depth data can be re-used to carry the multiplexed stereoscopic image data. Therefore, no additional capacity is required from the interface to carry the stereoscopic data, while still allowing good color depth for the stereoscopic content. It also has the benefit that little or no changes are required to an existing standard defining the display interface. It also allows stereoscopic image content to be sent

with a resolution which is significantly higher than schemes which sacrifice part of the active image area to carry the stereo image data.

Advantageously, the second data elements have a capacity which is no greater than, and preferably the same as, the first data elements. This allows the stereoscopic data to be carried with minimal modification to the standards defining the interface.

The term “stereoscopic image data components” is intended to include any scheme which sends data to construct a stereoscopic (or autostereoscopic) display to a user, and includes: schemes which send left eye image data and right eye image data; schemes which send 2D image data and image depth data; schemes which send 2D image data and image depth data and occlusion information, indicating which objects in the picture are occluded by other objects.

In the case of a stereoscopic image which uses left eye and right eye image data, the formatter can use a portion of the second data element to carry the left eye image data and another portion of the second data element to carry the right eye image data.

In the case of a stereoscopic image which uses 2D + depth data, the formatter can use a portion of the second data element to carry the 2D image data and another portion of the second data element to carry the image depth data. The depth data may additionally be carried in other parts of a signal, such as periods within horizontal or vertical blanking periods. In HDMI, Data Island Packets are carried within these periods, and certain Data Island Packets can be identified as carrying depth data.

Advantageously, signaling information is sent across the interface identifying which mode the formatter is using and further signaling information can allow the second audio-visual device (e.g. a display or projector) to indicate whether it has the capability to render stereoscopic data sent in that formatting mode.

In a High Definition Multimedia Interface (HDMI), signaling can be carried by packets carried within the Data Islands between image data. The capability of a sink device to handle stereoscopic data can be signaled between interface parts using the HDMI Display Data Channel (DDC) channel, with capability data being stored in an Extended Display Identification Data (EDID) ROM at a sink.

A related aspect of the present invention provides a digital display interface part for use in an audio-visual device for supporting a digital display interface between the audio-visual device and another audio-visual device, the interface part comprising:

an input for receiving formatted image data from the interface;

a processor arranged to extract image data, the processor being operable in:

a first mode in which the processor extracts pixel image data for a 2D image from a stream of first data elements; and,

a second mode in which the processor demultiplexes components of a stereoscopic image from a stream of second data elements which carry a multiplexed combination of components of a stereoscopic image.

A related aspect of the present invention provides a method of formatting image data at a digital display interface part of a first audio-visual device for transport over a digital display interface between the first audio-visual device and a second audio-visual device, the method comprising:

receiving image data;

formatting the image data for transport over the interface by:

in a first mode, generating a stream of first data elements which carry pixel data of a 2D image; and,

in a second mode, generating a stream of second data elements which carry a multiplexed combination of components of a stereoscopic image.

A related aspect of the present invention provides a method of processing image data at a digital display interface part of an audio-visual device, the method comprising:

receiving formatted image data from the interface;

extracting image data by:

in a first mode, extracting pixel image data for a 2D image from a stream of first data elements; and,

in a second mode, demultiplexing components of a stereoscopic image from a stream of second data elements which carry a multiplexed combination of components of a stereoscopic image.

A further aspect of the invention provides a digital display interface part for use in a first audio-visual device for supporting a digital display interface between the first audio-visual device and a second audio-visual device, the interface part comprising:

an input for receiving stereoscopic image data;

a formatter arranged to format the data for transport over the interface, wherein the formatter is operable to send a portion of the stereoscopic image data over a primary image data transport channel of the interface and another portion of the stereoscopic image data over an auxiliary data channel.

The interface part can send signaling information across the interface identifying how stereoscopic data is distributed between the primary data channel and the auxiliary data channel.

Advantageously, the stereoscopic image data comprises 2D image data and image depth data and the formatter is arranged to send depth data across the auxiliary data channel.

The auxiliary data channel can comprise a separate line, or lines, within the same cable as the primary channel; a second cable which is separate from a first cable carrying the primary channel; or a wireless link.

10 A related aspect of the present invention provides a digital display interface part for use in an audio-visual device for supporting a digital display interface between the audio-visual device and another audio-visual device, the interface part comprising:

an input for connecting to a primary image data transport channel of the interface and an auxiliary data channel;

15 a processor arranged to extract a portion of the stereoscopic image data from the primary image data transport channel of the interface and another portion of the stereoscopic image data from the auxiliary data channel.

A related aspect of the present invention provides a method of sending stereoscopic image data over a digital display interface between a first audio-visual device and a second audio-visual device, comprising, at the first audio-visual device:

receiving stereoscopic image data for transport over the interface;

20 sending a portion of the stereoscopic image data over a primary image data transport channel of the interface and another portion of the stereoscopic image data over an auxiliary data channel.

25 A related aspect of the present invention provides a method of processing stereoscopic image data at an audio-visual device for supporting a digital display interface between the audio-visual device and another audio-visual device, the method comprising:

extracting a portion of the stereoscopic image data from a primary image data transport channel of the interface and another portion of the stereoscopic image data from an auxiliary data channel.

30 A further aspect of the invention provides a digital display interface part for use in a first audio-visual device for supporting a digital display interface between the first audio-visual device and a second audio-visual device, the interface part comprising:

an input for receiving stereoscopic image data;

a formatter arranged to generate a stream of image data carrying data elements and auxiliary data carrying data elements at intervals in the stream, and wherein signaling information for use in decoding the stereoscopic image data is carried in at least one of the auxiliary data elements.

5 Where the stereoscopic image data comprises left eye image data and right eye image data, the signaling information can specify what data elements carry the left eye image data and what data elements carry the right eye image data. Where the left eye images and right eye images are interleaved on a line-by-line basis, the signaling information can be sent as often as once for each pair of interleaved lines, although it can be sent much less
10 frequently, such as once per field or frame.

Where the stereoscopic image data comprises 2D image data and depth information, the signaling information can specify at least one of: the transmission location, quantity of the depth information.

Advantageously, where the stereoscopic image data has a plurality of different
15 possible formats, the signaling information specifies the format. One of the formats for the stereoscopic image data can be a scheme which encodes the stereoscopic image data within a conventional 2D image format.

Advantageously, the signaling information is carried in a horizontal or vertical blanking period and for a High Definition Multimedia Interface (HDMI) the signaling
20 information can be sent in a Data Island Packet.

A related aspect of the present invention provides a digital display interface part for use in an audio-visual device for supporting a digital display interface between the audio-visual device and another audio-visual device, the interface part comprising:

an input for receiving, from the interface, a stream of image data carrying data
25 elements and auxiliary data carrying data elements at intervals in the stream;
using signaling information carried in at least one of the auxiliary data elements to decode the stereoscopic image data.

A related aspect of the present invention provides a method of sending stereoscopic image data over a digital display interface between a first audio-visual device
30 and a second audio-visual device comprising, at the first audio-visual device:

receiving stereoscopic image data;
generating a stream of image data carrying data elements and auxiliary data carrying data elements at intervals in the stream, and wherein signaling information for use in decoding the stereoscopic image data is carried in at least one of the auxiliary data elements.

A related aspect of the present invention provides a method of processing stereoscopic image data at a digital display interface part of an audio-visual device, the method comprising:

- receiving, from the interface, a stream of image data carrying data elements
- 5 and auxiliary data carrying data elements at intervals in the stream;
- using signaling information carried in at least one of the auxiliary data elements to decode the stereoscopic image data.

A further aspect of the invention provides a digital display interface part for use in a first audio-visual device for supporting a digital display interface between the first

10 audio-visual device and a second audio-visual device, the interface part comprising:

- an input for receiving stereoscopic image data components;
- a formatter arranged to generate a stream of image data carrying data elements and auxiliary data carrying data elements at intervals in the stream, and wherein the stereoscopic image data is distributed between the image data carrying data elements and the
- 15 auxiliary data carrying data elements.

Advantageously, the stereoscopic image data components are 2D image data and image depth data and wherein the depth data is carried in the auxiliary data carrying data elements. Advantageously, the stream further comprises signaling information, carried within auxiliary data carrying data elements, specifying which part of an image the depth

20 information relates to.

The auxiliary data carrying data elements are sent in a horizontal or vertical blanking period, such as HDMI Data Island Packets.

A related aspect of the present invention provides a digital display interface part for use in an audio-visual device for supporting a digital display interface between the

25 audio-visual device and another audio-visual device, the interface part comprising:

- an input for receiving, from the interface, a stream of image data carrying data elements and auxiliary data carrying data elements;
- a processor arranged to extract stereoscopic image data from the image data carrying data elements and at least part of the stereoscopic image data from the auxiliary data
- 30 carrying data elements.

A related aspect of the present invention provides a method of sending stereoscopic data across a digital display interface between a first audio-visual device and a second audio-visual device, the method comprising, at the first audio-visual device:

- receiving stereoscopic image data components;

generating a stream of image data carrying data elements and auxiliary data carrying data elements at intervals in the stream, and distributing the stereoscopic image data between the image data carrying data elements and the auxiliary data carrying data elements.

5 A related aspect of the present invention provides a method of processing stereoscopic image data at a digital display interface part of an audio-visual device, the method comprising:

receiving, from the interface, a stream of image data carrying data elements and auxiliary data carrying data elements;

10 extracting stereoscopic image data from the image data carrying data elements and at least part of the stereoscopic image data from the auxiliary data carrying data elements.

The functionality described here can be implemented in software, hardware or a combination of these. The invention can be implemented by means of hardware comprising several distinct elements, and by means of a suitably programmed computer. Accordingly,
15 further aspects of the invention provide software for implementing any of the methods. The software may be stored on an electronic memory device, hard disk, optical disk or other machine-readable storage medium. The software may be delivered as a computer program product on a machine-readable carrier or it may be downloaded to the AV device via a network connection.

20 The invention also extends to signals, for transmission over the display interface, which result from any of the methods.

Features of the various aspects of the invention can be combined.

BRIEF DESCRIPTION OF THE DRAWINGS

25 Embodiments of the invention will be described, by way of example only, with reference to the accompanying drawings in which:

Fig. 1 shows a display interface for carrying image data between two AV
device;

Fig. 2 shows a formatting function at one end of the interface;

30 Fig. 3 shows a conventional way of sending 2D image data across a display interface;

Figs. 4 and 5 show ways of sending stereoscopic image data across a display interface;

Fig. 6 shows format of an HDMI video frame; and,

Fig. 7 shows a display interface which includes an auxiliary data channel.

DESCRIPTION OF PREFERRED EMBODIMENTS

Figure 1 shows an example scenario in which the invention can be used. In
5 Figure 1, an AV device 10 which is capable of providing a source of digital AV content is connected to a display (or video projector) 20 via a digital display interface (DDI) 40. Interface parts 12, 22 in devices 10, 20 support the interface 40, and provide functions such as formatting signals into the form required by standards defining the interface 40. The source device 10 can be a device which can retrieve digital AV content from a store 11, such
10 as a hard disk, a solid state memory or an optical disc or any other fixed or removable storage medium or device. Examples of device 10 include a personal video recorder (PVR), an optical disc player such as a DVD player, an HD-DVD player or a Blu-ray player. Alternatively, device 10 can take the form of a set-top box which receives content from a distribution channel (such as a broadcast channel or broadband network or other type of
15 network (e.g. home network)).

There are a variety of methods for displaying stereoscopic (3D) images. The two main methods for transferring 3D image data across an interface are: to transmit two complete, separate, stereoscopic images representing the left and right views as seen by human eyes; and a normal 2D image with associated depth information that can be used to
20 generate the stereoscopic images within the display. The first method generally requires a significantly higher bandwidth (up to twice that needed for a 2D image) over the interface, but needs little processing in the display, while the second method can require a smaller increase in bandwidth, but at the expense of some fast real-time processing in the display to process the depth information.

25 Current digital display interfaces, such as HDMI, offer a very high bandwidth. These interfaces transfer uncompressed pixel information, unlike other transport mechanisms (such as Ethernet, USB, IEEE1394) which have to transfer compressed images because of their bandwidth limitations. Originally, images transferred by HDMI were limited to 8 bits per color per pixel, so-called "24-bit color". Improvements to HDMI from version 1.3 have
30 allowed HDMI to carry more bits per pixel, with the options of carrying 10, 12 and 16 bits per color per pixel, i.e. up to 48-bit color. HDMI describes Deep Color Pixel Packing modes (HDMI 1.3a, section 6.5.3) which allow the higher color depths just described.

According to one embodiment of the present invention, the deep color modes are used to transport stereoscopic image data. The stereoscopic image data can be left image

data + right image data or 2D + depth information. Figure 2 shows a formatting function 15 used within an interface part 12. The formatter 15 can selectively operate in one of a number of different modes. This is shown schematically by formatter selecting one of the sets of inputs: 2D image data 31; 2D + depth image data 32, 33; or left eye and right eye image data 34, 35 for processing and selectively connecting 38 to an interface output 39. Formatter 15 can receive conventional 2D image data 31, such as 24-bit color image data 31. Typically this is received in an RGB or component video (Y,Cr,Cb) format. When receiving stereoscopic image data, formatter 15 multiplexes 36, 37 the image data components. For left eye/right eye image data, the left eye data and right eye data will typically be taken from the same pixel in the left eye/right eye frames or fields of the images, although other algorithms for combining pixels are also within the scope of the present invention. For 2D image + depth information, the 2D image data will typically correspond to a single pixel (e.g. RGB or component video format) and the depth information can take a different form, and may correspond to a different region of the image to the pixel of the 2D image. The formatter 15 may only support one of the 3D formats (i.e. just L+R, or just 2D+depth) or both types of 3D format.

Figures 3 to 5 show a range of different ways in which the image data can be multiplexed. Figure 3 shows conventional image data. In HDMI, the three color components (R,G,B or Y,Cr,Cb) are sent simultaneously on three Transition Minimised Differential Signaling (TMDS) channels 41. TMDS refers to line-level coding applied to the data to maintain an approximate DC balance as well as a reduction in the number of transitions in the data stream. Each color component can be sent using a standard color depth (e.g. 8 bits per color per pixel) or an enhanced color depth, such as 16 bits per color per pixel. Figure 4 shows a way in which stereoscopic left eye/right eye data can be multiplexed. The components of the left eye data (R,G,B or Y,Cr,Cb) are sent in a first portion of each data-carrying element, and then immediately followed by the components of the right eye data (R,G,B or Y,Cr,Cb). Both left eye and right eye are either sent within the same packet, consecutive image data packets, or parts of consecutive image data packets. As an example, where a 16-bit per color per pixel mode is used, bits 0-7 can carry the left image Y data and bits 8-15 carry the right image Y data. HDMI 1.3a currently allows a color depth of up to 16-bits per color per pixel (48-bit color). Figure 4 shows how two 24-bit color images can be carried within the existing 48-bit color mode with no additional capacity required from the interface. It will be appreciated that future revisions of HDMI (and other) specifications may

extend the bandwidth to permit a larger color depth, which will allow each of the left eye and right eye images to use more bits per pixel, so allowing richer 3D images.

Figure 5 shows a scheme for sending 2D image data + depth information where the 2D data is sent first, followed by the depth data. Each color component (R,G,B or Y,Cr,Cb) follows the same format. In Figure 6 the capacity of the packet is divided equally between the 2D data and depth information, although any other division is possible. It may be possible to send significantly less depth data than 2D data, which can allow the 2D image to use a wide color palette and/or high resolution. It is also possible to send some – or all – of the depth information in a different part of the transmitted data stream, such as within specific HDMI Data Island Packets carried within the horizontal and vertical line blanking intervals. This is particularly useful for depth data that is not attached directly to a specific pixel, for instance, it applies to a region of the image.

Interface part 12 sends signaling 42 which indicates the format of the image data, e.g. indicating whether the image data is 2D, stereo (L+R) or stereo (2D+depth). The signaling can also indicate further details of the multiplexing scheme, such as which color depth mode is being used to carry the multiplexed data, the number of bits per data element that are allocated to 2D data and the number of bits per data element that are allocated to depth data. This signaling allows flexibility in how the stereo data is allocated to data carrying elements sent across the interface 40 and allows for the amount of Depth information to be changed dynamically, according to the requirements of the content which is to be displayed. In HDMI, Data Island Packets are sent in horizontal and vertical line blanking periods. The signaling information can conveniently be carried within a Data Island Packet. Figure 6 shows the layout of an HDMI video frame, showing a region 61 where pixel data is sent across TMDS channels, a horizontal blanking period 63 and a vertical blanking period. Data Island Packets 64 are sent within Data Island periods positioned within the horizontal and vertical blanking periods 62, 63. The signaling data can be carried in a General Control Packet, an Auxiliary Video InfoFrame (AVI) packet or an InfoFrame Packet specifically designated for this purpose. If depth data is carried both within the pixel data carrying data elements and other places of the stream, the signaling can indicate where the depth data is to be found. The amount of depth data and the location(s) of the depth data can vary on a dynamic basis during an image, or sequence of images, depending on the required color depth, resolution or complexity of the image (e.g. the amount of depth information within an image).

AV device 20 includes a processor 21 applies suitable processing to the data to render a 3D image. In the case of stereoscopic display, where a user is simultaneously or sequentially presented with separate left and right eye images, processor 21 constructs the separate left eye/right eye images and outputs them 24 at the required time. For sequential stereoscopic displays, a further output 23 is provided to synchronize operation of shuttered glasses. In the case of an autostereoscopic display, such as a display using a ventricular screen, processor 21 constructs the image data which is required to be output 24 to the display elements to generate the autostereoscopic display. Interface part 22 and processor 21 use the signaling information sent across the interface to:

- 10 determine if stereoscopic image data is being sent; determine what general stereoscopic image format is being used (e.g. left+right image; 2D+depth; stereo encoded within active image data);
- determine more detail of how the image data is being encoded on the interface, and therefore what decoding scheme should be used at the receiver. This may include
- 15 information about which deep color mode is being used, bit allocation between 2D and depth data, transmission location of depth data (e.g. specific Data Island Packets or auxiliary channel locations).

Further signaling between the AV devices 10, 20 allows the sink device 20 to indicate it's capabilities to receive and process image data. The capability information may indicate the maximum allowed bandwidth for each mode of sending 2D and stereo image data. In HDMI, the capability of a sink device can use the Display Data Channel (DDC) channel, with capability data being stored in an Extended Display Identification Data (EDID) ROM at a sink.

The interface may support other schemes for sending stereoscopic data. A first alternative is to send two separate complete images, carried sequentially (such as a complete left image followed by a complete right image). The indication of the left and right image can be indicated by signaling information carried directly adjacent the position of the image data, such as an HDMI Data Island Packet.

A second alternative is to send two separate images, but with the lines of the two images interleaved. For example, the first line of the left image is sent first, followed by the first line of the right image, and so on.

A third alternative is to send a 2D image in a conventional manner, and to carry depth information in specific Data Island Packets dedicated to carrying depth information.

In each of these alternatives, signaling information carried directly adjacent the position of the image data, such as an HDMI Data Island Packet, can indicate what the image data corresponds to. For the third alternative, the signaling information can specify which part of the image the depth data relates to. As noted above, the HDMI Data Island

5 Packets can be a General Control Packet, an Auxiliary Video InfoFrame (AVI) packet or an InfoFrame Packet specifically designated for this purpose. The information in these packets can identify:

- the current stereoscopic method (field, line or byte) being used (see above);
- whether a Deep Color Pixel Packing mode is being used to carry 3D
- 10 information or a Deep Color Mode 2D image;
- the mapping of left and right images to the current field, line or byte;
- how many of the Data Island Packet packets/sub-packets are being used to
- carry Depth information;
- the location of other stereoscopic image data components.

15 The embodiments above show how the separate stereoscopic image components can be carried over a display interface. For some applications, especially those intended for display on a ventricular screen, the picture received at the interface part 12 may already be encoded with stereoscopic content. As an example, a WOWvx encoded image as described in the background section, comprises a 2D image, depth information and/or

20 occlusion information already embedded into separate regions of a conventional image. In one embodiment, the 2D image is carried in one quarter of the image pixels (e.g. in half a line for half the total lines in the picture). The associated depth and/or occlusion information is carried in the other three-quarters of the presented picture. In this case, the lines of the picture are transported across the HDMI link as though they were a single 2D image occupying all

25 of each line, for all the available lines. In order to identify such a 3D image, an HDMI Data Island Packet (typically a General Control Packet, Auxiliary Video InfoFrame (AVI) packet or specifically designated InfoFrame Packet) indicates this method. The information in this Packet identifies:

- the current stereoscopic method (e.g. 2D+Depth) being used;
- 30 - any information pertaining to this method which is required by the display.

The sink identifies the transmitted picture as using this method and processes the picture accordingly. The sink also carries information in the EDID indicating that it supports this method.

In the above description, stereoscopic image data is carried over a channel of an interface (e.g. an HDMI Transport Stream) either by multiplexing the stereoscopic image data within normal data carrying elements of the channels, or by carrying at least part of the stereoscopic image data within other packets (e.g. Data Island Packets) carried over the same channel. A further embodiment of the invention carries at least some of the stereoscopic image data over an associated high speed auxiliary data link such as Gigabit Ethernet, IEEE 1394 or a high-speed wireless link. Signaling information identifies which information is carried by the primary channels of the interface and which is carried by the associated auxiliary link. In HDMI, the signaling information can be carried in Data Island Packets.

Similar, or complementary, identification information may also be carried on the associated high speed auxiliary link. The sink uses the received Data Island Packets to identify which information is carried on which link and combines the two streams of data in the necessary format for presentation or processing. Depending on the characteristics of the HDMI and associated auxiliary link, it may be necessary to buffer the data contained in the two streams in order to maintain synchronicity between them. In one embodiment using the above embodiment, the associated wires for the auxiliary link are carried within the HDMI cable; this option is shown in Figure 7 by additional line 50 connecting modules 51, 52 in interface parts 12, 22. In other embodiments, the associated auxiliary link is carried in a separate cable connecting the devices 10, 20, or by a high-speed wireless link.

Other variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality. A single processor or other unit may fulfill the functions of several items recited in the claims. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage. Any reference signs in the claims should not be construed as limiting the scope.

CLAIMS:

1. A digital display interface part for use in a first audio-visual device for supporting a digital display interface between the first audio-visual device and a second audio-visual device, the interface part comprising:
 - an input for receiving image data;
 - 5 a formatter arranged to format the data for transport over the interface, wherein the formatter is operable in:
 - a first mode in which the formatter generates a stream of first data elements, which carry pixel data of a 2D image; and,
 - a second mode in which the formatter generates a stream of second
 - 10 data elements which carry a multiplexed combination of components of a stereoscopic image.
2. An interface part according to claim 1 wherein the second data elements have a capacity which is no greater than the first data elements.
- 15 3. An interface part according to claim 1 or 2 wherein the stereoscopic image data components are left eye image data and right eye image data.
4. An interface part according to claim 3 wherein the formatter is arranged to use a portion of the second data element to carry the left eye image data and another portion of
- 20 the second data element to carry the right eye image data.
5. An interface part according to claim 4 wherein the formatter is arranged to multiplex a corresponding pixel of the left eye image data and the right eye image data into the second data element.
- 25 6. An interface part according to claim 1 or 2 wherein the stereoscopic image data components are 2D image data and image depth data.

7. An interface part according to claim 6 wherein the formatter is arranged to use a portion of the second data element to carry the 2D image data and another portion of the second data element to carry the image depth data.
- 5 8. An interface part according to claim 7 wherein the formatter is arranged to multiplex a pixel of the 2D image with depth data from a different part of the image.
9. An interface part according to any one of the preceding claims wherein the formatter is operable in a third mode in which the formatter generates third data elements carrying per pixel data, the third data elements having a capacity which is smaller than each of the first data elements and the second data elements.
- 10 10. An interface part according to any one of the preceding claims which is arranged to send signaling information across the interface identifying which mode the
- 15 formatter is using.
11. An interface part according to any one of the preceding claims which is arranged to receive signaling information across the interface specifying capabilities of the second audio-visual device.
- 20 12. An interface part according to claim 10 wherein the interface is a High Definition Multimedia Interface (HDMI) and the signaling information is sent in a Data Island Packet between image data.
- 25 13. An interface part according to any one of the preceding claims wherein the interface is a High Definition Multimedia Interface (HDMI) and the first mode and the second mode are Deep Color Modes having a capacity of greater than 24-bits of color data per pixel.
- 30 14. A digital display interface part for use in an audio-visual device for supporting a digital display interface between the audio-visual device and another audio-visual device, the interface part comprising:
- an input for receiving formatted image data from the interface;
 - a processor arranged to extract image data, the processor being operable in:

a first mode in which the processor extracts pixel image data for a 2D image from a stream of first data elements; and,

a second mode in which the processor demultiplexes components of a stereoscopic image from a stream of second data elements which carry a multiplexed combination of components of a stereoscopic image.

15. A method of formatting image data at a digital display interface part of a first audio-visual device for transport over a digital display interface between the first audio-visual device and a second audio-visual device, the method comprising:

10 receiving image data;

formatting the image data for transport over the interface by:

in a first mode, generating a stream of first data elements which carry pixel data of a 2D image; and,

in a second mode, generating a stream of second data elements which

15 carry a multiplexed combination of components of a stereoscopic image.

16. A method of processing image data at a digital display interface part of an audio-visual device, the method comprising:

receiving formatted image data from the interface;

20 extracting image data by:

in a first mode, extracting pixel image data for a 2D image from a stream of first data elements; and,

in a second mode, demultiplexing components of a stereoscopic image from a stream of second data elements which carry a multiplexed combination of

25 components of a stereoscopic image.

17. Software for performing the method of claim 15 or 16.

18. A signal resulting from the method of claim 15.

30 19. A digital display interface part for use in a first audio-visual device for supporting a digital display interface between the first audio-visual device and a second audio-visual device, the interface part comprising:

an input for receiving stereoscopic image data;

a formatter arranged to format the data for transport over the interface, wherein the formatter is operable to send a portion of the stereoscopic image data over a primary image data transport channel of the interface and another portion of the stereoscopic image data over an auxiliary data channel.

5

20. An interface part according to claim 19 which is arranged to send signaling information across the interface identifying how stereoscopic data is distributed between the primary data channel and the auxiliary data channel.

10 21. An interface part according to claim 19 or 20 wherein the stereoscopic image data comprises 2D image data and image depth data and the formatter is arranged to send depth data across the auxiliary data channel.

15 22. An interface part according to any of claims 19 to 21 wherein the interface comprises a set of lines within a cable and the auxiliary data channel comprises a separate line, or lines, within the same cable.

20 23. An interface part according to any of claims 19 to 21 wherein the interface comprises a first cable and the auxiliary data channel is carried by a second cable.

24. An interface part according to any of claims 19 to 21 wherein the auxiliary data channel is carried by a wireless connection.

25 25. A digital display interface part for use in an audio-visual device for supporting a digital display interface between the audio-visual device and another audio-visual device, the interface part comprising:

an input for connecting to a primary image data transport channel of the interface and an auxiliary data channel;

30 a processor arranged to extract a portion of the stereoscopic image data from the primary image data transport channel of the interface and another portion of the stereoscopic image data from the auxiliary data channel.

26. A method of sending stereoscopic image data over a digital display interface between a first audio-visual device and a second audio-visual device, comprising, at the first

audio-visual device:

receiving stereoscopic image data for transport over the interface;

5 sending a portion of the stereoscopic image data over a primary image data
transport channel of the interface and another portion of the stereoscopic image data over an
auxiliary data channel.

27. A method of processing stereoscopic image data at an audio-visual device for
supporting a digital display interface between the audio-visual device and another audio-
visual device, the method comprising:

10 extracting a portion of the stereoscopic image data from a primary image data
transport channel of the interface and another portion of the stereoscopic image data from an
auxiliary data channel.

28. A digital display interface part for use in a first audio-visual device for
15 supporting a digital display interface between the first audio-visual device and a second
audio-visual device, the interface part comprising:

an input for receiving stereoscopic image data;

20 a formatter arranged to generate a stream of image data carrying data elements
and auxiliary data carrying data elements at intervals in the stream, and wherein signaling
information for use in decoding the stereoscopic image data is carried in at least one of the
auxiliary data elements.

29. An interface part according to claim 28 wherein the stereoscopic image data
comprises left eye image data and right eye image data and the signaling information
25 specifies what data elements carry the left eye image data and what data elements carry the
right eye image data.

30. An interface part according to claim 28 wherein the stereoscopic image data
comprises 2D image data and depth information and the signaling information specifies at
30 least one of: the transmission location, quantity of the depth information.

31. An interface part according to any one of claims 28 to 30 wherein the
stereoscopic image data has a plurality of different formats and the signaling information
specifies the format.

32. An interface part according to claim 31 wherein one of the formats for the stereoscopic image data is encoding the stereoscopic image data within a conventional 2D image format.

5

33. An interface part according to any one of claims 28 to 32 wherein the signaling information is carried in a horizontal or vertical blanking period.

34. An interface part according to claim 33 wherein the interface is a High Definition Multimedia Interface (HDMI) and the signaling information is sent in a Data Island Packet.

35. A digital display interface part for use in an audio-visual device for supporting a digital display interface between the audio-visual device and another audio-visual device, the interface part comprising:

15

an input for receiving, from the interface, a stream of image data carrying data elements and auxiliary data carrying data elements at intervals in the stream;
using signaling information carried in at least one of the auxiliary data elements to decode the stereoscopic image data.

20

36. A method of sending stereoscopic image data over a digital display interface between a first audio-visual device and a second audio-visual device comprising, at the first audio-visual device:

25

receiving stereoscopic image data;
generating a stream of image data carrying data elements and auxiliary data carrying data elements at intervals in the stream, and wherein signaling information for use in decoding the stereoscopic image data is carried in at least one of the auxiliary data elements.

37. A method of processing stereoscopic image data at a digital display interface part of an audio-visual device, the method comprising:

30

receiving, from the interface, a stream of image data carrying data elements and auxiliary data carrying data elements at intervals in the stream;
using signaling information carried in at least one of the auxiliary data elements to decode the stereoscopic image data.

38. Software for performing the method of claim 36 or 37.
39. A signal resulting from the method of claim 36.
- 5 40. A digital display interface part for use in a first audio-visual device for supporting a digital display interface between the first audio-visual device and a second audio-visual device, the interface part comprising:
- 10 an input for receiving stereoscopic image data components;
a formatter arranged to generate a stream of image data carrying data elements and auxiliary data carrying data elements at intervals in the stream, and wherein the stereoscopic image data is distributed between the image data carrying data elements and the auxiliary data carrying data elements.
- 15 41. An interface part according to claim 40 wherein the stereoscopic image data components are 2D image data and image depth data and wherein the depth data is carried in the auxiliary data carrying data elements.
- 20 42. An interface part according to claim 41 further comprising carrying signaling information within auxiliary data carrying data elements specifying which part of an image the depth information relates to.
43. An interface part according to any one of claims 40 to 42 wherein the auxiliary data carrying data elements are sent in a horizontal or vertical blanking period.
- 25 44. An interface part according to claim 43 wherein the interface is a High Definition Multimedia Interface (HDMI) and the signaling information is sent in a Data Island Packet.
- 30 45. A digital display interface part for use in an audio-visual device for supporting a digital display interface between the audio-visual device and another audio-visual device, the interface part comprising:
- an input for receiving, from the interface, a stream of image data carrying data elements and auxiliary data carrying data elements;

a processor arranged to extract stereoscopic image data from the image data carrying data elements and at least part of the stereoscopic image data from the auxiliary data carrying data elements.

- 5 46. A method of sending stereoscopic data across a digital display interface between a first audio-visual device and a second audio-visual device, the method comprising, at the first audio-visual device:

receiving stereoscopic image data components;

- 10 generating a stream of image data carrying data elements and auxiliary data carrying data elements at intervals in the stream, and distributing the stereoscopic image data between the image data carrying data elements and the auxiliary data carrying data elements.

47. A method of processing stereoscopic image data at a digital display interface part of an audio-visual device, the method comprising:

- 15 receiving, from the interface, a stream of image data carrying data elements and auxiliary data carrying data elements;

extracting stereoscopic image data from the image data carrying data elements and at least part of the stereoscopic image data from the auxiliary data carrying data elements.

20

48. Software for performing the method of claim 46 or 47.

49. A signal resulting from the method of claim 46.

ABSTRACT:

A digital display interface (40) connects a first audio-visual device (10) to a second audio-visual device (20). Stereoscopic image data is transmitter over the display interface (40). Components of stereoscopic image data are multiplexed and inserted into an image data carrying element. An existing deep color mode can be re-used for this purpose.

5 Signaling information to help identify or decode the stereoscopic image data is carried in auxiliary data carrying elements. Stereoscopic image data can be distributed between image data carrying data elements and auxiliary data carrying data elements. Auxiliary data carrying elements can be transmitted in horizontal or vertical blanking periods, and can comprise HDMI Data Island Packets. Stereoscopic image data can be sent over an auxiliary data

10 channel. The auxiliary data channel can form part of the same cable as is used to carry a primary channel of the display interface, a separate cable, or a wireless link.

Fig. 2

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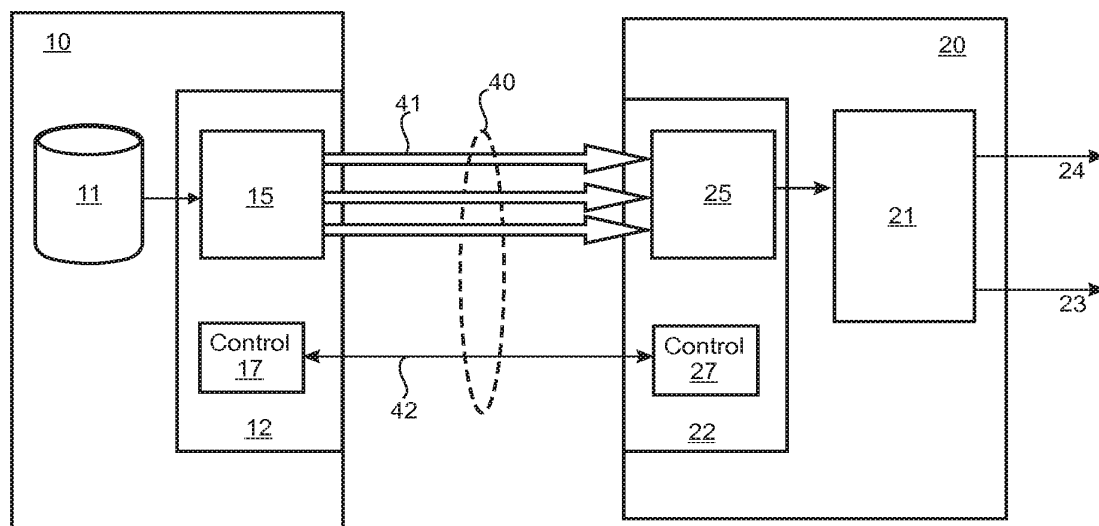


Fig. 1

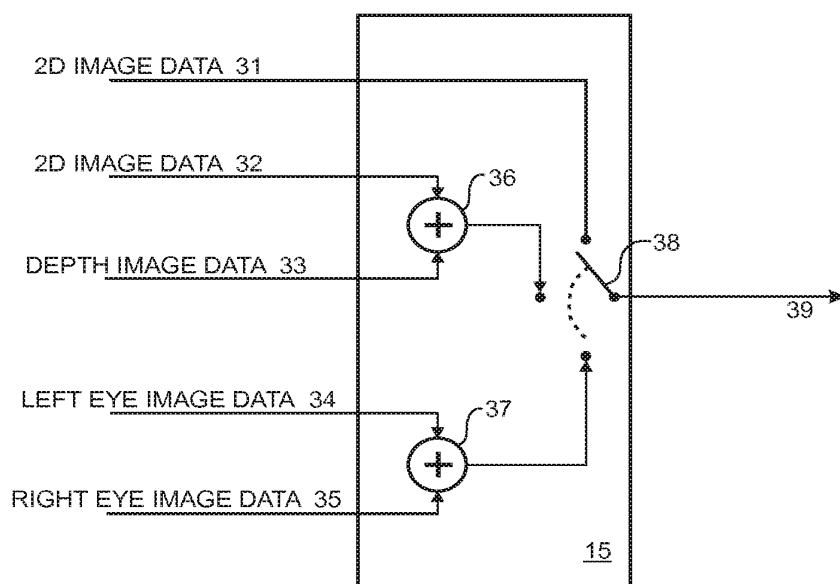


Fig. 2

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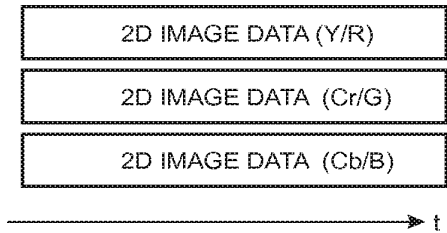


Fig. 3

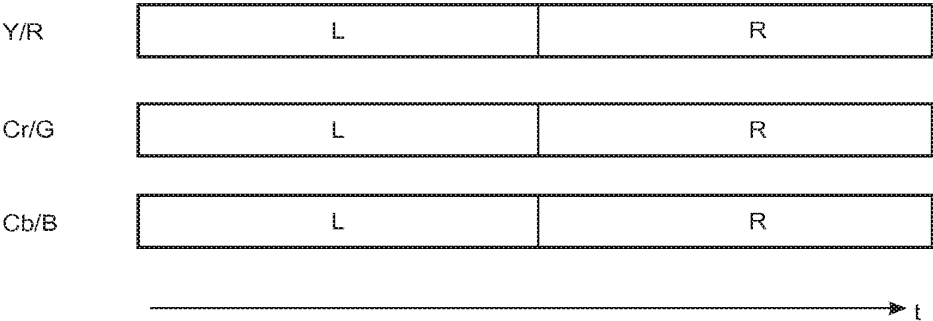


Fig. 4

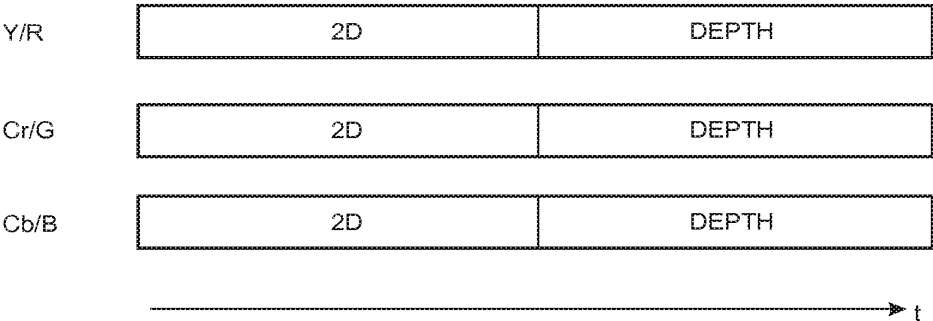


Fig. 5

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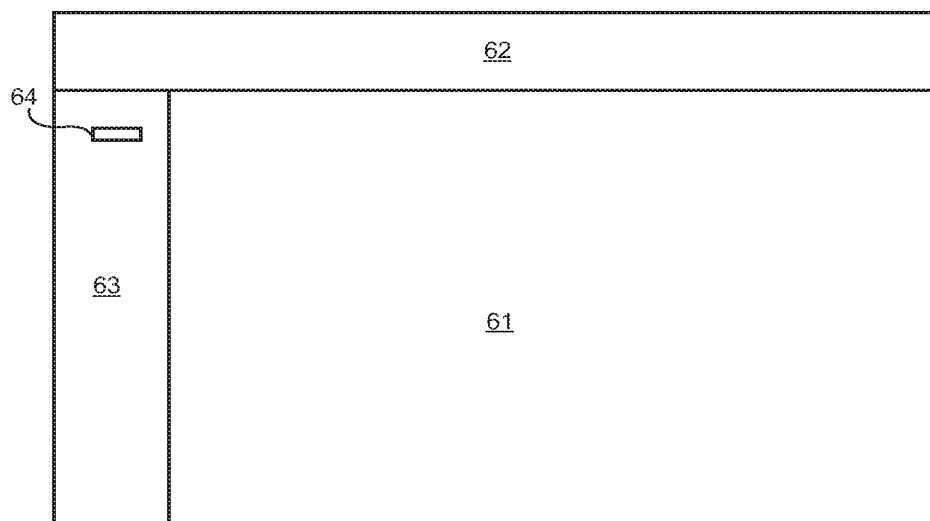


Fig. 6

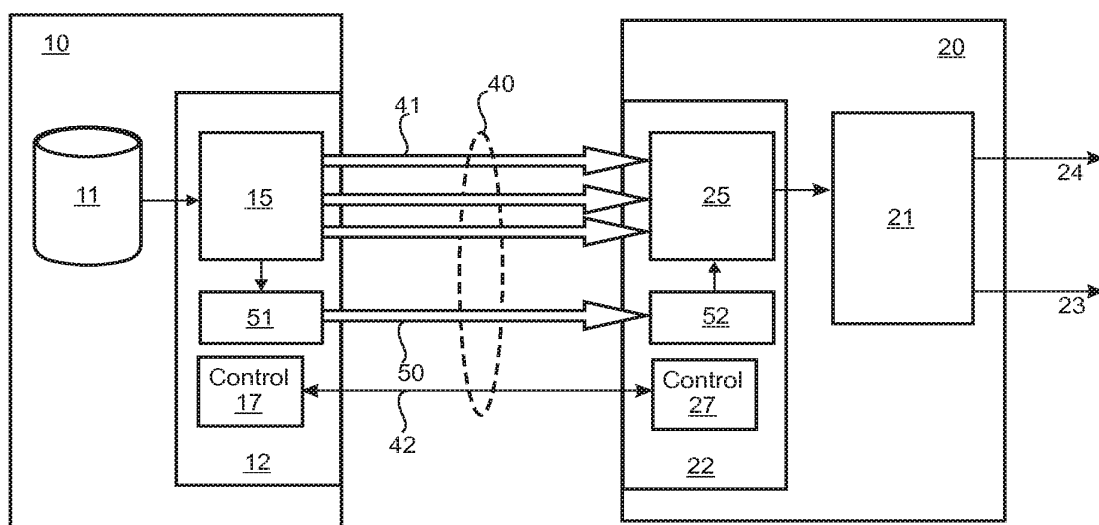


Fig. 7

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 15/256,839				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280			
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	600			
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720			
TOTAL CLAIMS (37 CFR 1.16(i))	22	minus 20 = *	2			x 80 =	160			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	8	minus 3 = *	5			x 420 =	2100			
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		TOTAL	3860			
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE			TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=		x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=		x	=
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE			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 NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/256,839	09/06/2016	2486	3860	2007P01979US01	22	8

CONFIRMATION NO. 5045

FILING RECEIPT



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24737
PHILIPS INTELLECTUAL PROPERTY & STANDARDS
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Suite 340
Valhalla, NY 10595

Date Mailed: 09/16/2016

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Power of Attorney: The patent practitioners associated with Customer Number 24737

Domestic Priority data as claimed by applicant

This application is a CON of 14/629,642 02/24/2015 PAT 9462258
which is a CON of 12/808,685 06/17/2010 PAT 9036010
which is a 371 of PCT/IB2008/055305 12/15/2008

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)
EUROPEAN PATENT OFFICE (EPO) 07123461.1 12/18/2007

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Projected Publication Date: 12/22/2016

Non-Publication Request: No

Early Publication Request: No

Title

TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE

Preliminary Class

348

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

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	Art Unit	
	Examiner Name	
	Attorney Docket Number	2007P01979US01

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	4	20070296859	A1	2007-12-27	SUZUKI		
	5	20050146521	A1	2005-07-07	KAYE ET AL		

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	Examiner Name		
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	6	20020009137	A1	2002-01-24	NELSON ET AL	
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	Attorney Docket Number	2007P01979US01	

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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Michael E. Belk/	Date (YYYY-MM-DD)	2016-09-06
Name/Print	Michael E. Belk	Registration Number	33,357

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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Koninklijke Philips N.V.

Application No./Patent No.: _____ Filed/Issue Date: Concurrently

Titled: TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE

Koninklijke Philips N.V., a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is ____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

- A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 024548, Frame 0639, or for which a copy thereof is attached.
- B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

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[Page 1 of 2]

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STATEMENT UNDER 37 CFR 3.73(c)

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☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Michael E. Marion/

Signature

Michael E. Marion, Authorized Signatory

Printed or Typed Name

September 6, 2016

Date

32,266

Title or Registration Number

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

☒

Practitioners associated with Customer Number:

24737

OR

☐

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number

Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

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24737

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☐	Firm or Individual Name			
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	City	State	Zip	
	Country			
	Telephone	Email		

Assignee Name and Address: Koninklijke Philips N.V.
High Tech Campus 5
Eindhoven, 5656 AE, NL

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	/Michael E. Marion/	Date	September 6, 2016
Name	Michael E. Marion	Telephone	914-333-9641
Title	Authorized Signatory		

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TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE

CLAIM OF PRIORITY

This application claims, pursuant to 35 USC 120, as a Continuation, priority to, and
5 the benefit of the earlier filing date of, of that patent application entitled "Transport of
Stereoscopic Image Data over a Display Interface", filed on February 24, 2015 and afforded
serial number 14/629,642 and patent application filed on June 17, 2010 and afforded serial
number 12/808,685, now U.S. Patent 9,036,010, issued May 19, 2015, which is a National
Stage Filing of that patent application afforded serial number PCT/IB2008/055305, filed on
10 December 15, 2008, which claimed priority to that foreign filed patent application entitled
"Transport of Stereoscopic Image Data over a Display Interface," filed on December 18,
2007 and afforded a EPO serial number EP07123461.1, the contents of all of which are
included in whole by reference herein.

15 FIELD OF THE INVENTION

This invention relates to transport of image data for the display of stereoscopic
images.

BACKGROUND TO THE INVENTION

20 Various schemes for displaying three dimensional images (static, or moving images)
are known. One well-known scheme simultaneously displays two images which are encoded
for the left eye and right eye by means of different optical polarizations, or colors (e.g. red
and green). A viewer wears a pair of special glasses which have lenses in front of the left and
right eyes. The lenses are arranged to pass only the image intended for that eye, i.e. a left eye
25 sees only the image intended for that eye. Another stereoscopic display technique
sequentially presents an image intended for the left eye, and an image intended for the right
eye. A user wears a special pair of glasses which are shuttered in synchronism with the
displayed images, such that the left eye shutter is open during the period when the left eye
image is displayed, and the right eye shutter is open during the period when the right eye
30 image is displayed.

Auto stereoscopic display techniques remove the need for a viewer to wear special
glasses. One known scheme uses a flat panel display with multisided slanted ventricular

lenses mounted in front of display elements. An example of this kind of display is described in WO07/069195 A2.

Historically, 3D displays have been limited to specialized applications (e.g. medical imaging) or feature film presentation where it is possible to provide bespoke, high cost, display apparatus. There is now considerable interest in delivering stereoscopic content to a much wider audience, including the consumer electronics market. However, an issue with delivering stereoscopic images in a consumer electronics environment is that conventional displays, and display interfaces which connect displays or projectors to media players, have been designed specifically for the display of conventional 2D images.

Schemes for conveying stereoscopic image data within the confines of existing display interfaces have tended to sacrifice part of the active portion of an image to carry additional data necessary to render a stereoscopic image. The WOWvx format developed by Koninklijke Philips Electronics N.V. divides the overall display frame into a number of separate regions where different data can be carried. The overall frame is divided into two sub-frames, arranged side-by-side: a first of the sub-frames carries 2D image data and a second of the sub-frames carries depth information. A header is added to the beginning of the upper left-hand corner of the frame. The image data is carried in a normal manner across a display interface. A display extracts depth data from the second sub-frame and creates a 3D image having a resolution of the first sub-frame. This 3D image can then be 'stretched' to occupy the full visible area of the display.

Digital displays and media players are increasingly being equipped with digital display interfaces such as the High Definition Multimedia Interface (HDMI). The present invention seeks to provide an alternative way of delivering stereoscopic image data over a digital display interface.

SUMMARY OF THE INVENTION

A first aspect of the present invention provides a digital display interface part for use in a first audio-visual device for supporting a digital display interface between the first audio-visual device and a second audio-visual device, the interface part comprising:

- an input for receiving image data;
- a formatter arranged to format the data for transport over the interface, wherein the formatter is operable in:
 - a first mode in which the formatter generates a stream of first data elements which carry pixel data of a 2D image;

a second mode in which the formatter generates a stream of second data elements which carry a multiplexed combination of components of a stereoscopic image.

An advantage of this arrangement is that the stereoscopic image data can be carried across a digital display interface using the existing capacity of the interface. Advantageously, where the display interface supports various color depths of image data, such as 48-bit color as well as conventional 24-bit color, the higher capacity transport modes which are intended to transport higher color depth data can be re-used to carry the multiplexed stereoscopic image data. Therefore, no additional capacity is required from the interface to carry the stereoscopic data, while still allowing good color depth for the stereoscopic content. It also has the benefit that little or no changes are required to an existing standard defining the display interface. It also allows stereoscopic image content to be sent with a resolution which is significantly higher than schemes which sacrifice part of the active image area to carry the stereo image data.

Advantageously, the second data elements have a capacity which is no greater than, and preferably the same as, the first data elements. This allows the stereoscopic data to be carried with minimal modification to the standards defining the interface.

The term “stereoscopic image data components” is intended to include any scheme which sends data to construct a stereoscopic (or autostereoscopic) display to a user, and includes: schemes which send left eye image data and right eye image data; schemes which send 2D image data and image depth data; schemes which send 2D image data and image depth data and occlusion information, indicating which objects in the picture are occluded by other objects.

In the case of a stereoscopic image which uses left eye and right eye image data, the formatter can use a portion of the second data element to carry the left eye image data and another portion of the second data element to carry the right eye image data.

In the case of a stereoscopic image which uses 2D + depth data, the formatter can use a portion of the second data element to carry the 2D image data and another portion of the second data element to carry the image depth data. The depth data may additionally be carried in other parts of a signal, such as periods within horizontal or vertical blanking periods. In HDMI, Data Island Packets are carried within these periods, and certain Data Island Packets can be identified as carrying depth data.

Advantageously, signaling information is sent across the interface identifying which mode the formatter is using and further signaling information can allow the second audio-

visual device (e.g. a display or projector) to indicate whether it has the capability to render stereoscopic data sent in that formatting mode.

In a High Definition Multimedia Interface (HDMI), signaling can be carried by packets carried within the Data Islands between image data. The capability of a sink device to
 5 handle stereoscopic data can be signaled between interface parts using the HDMI Display Data Channel (DDC) channel, with capability data being stored in an Extended Display Identification Data (EDID) ROM at a sink.

A related aspect of the present invention provides a digital display interface part for use in an audio-visual device for supporting a digital display interface between the audio-
 10 visual device and another audio-visual device, the interface part comprising:

an input for receiving formatted image data from the interface;

a processor arranged to extract image data, the processor being operable in:

a first mode in which the processor extracts pixel image data for a 2D image from a stream of first data elements; and,

15 a second mode in which the processor demultiplexes components of a stereoscopic image from a stream of second data elements which carry a multiplexed combination of components of a stereoscopic image.

A related aspect of the present invention provides a method of formatting image data at a digital display interface part of a first audio-visual device for transport over a digital
 20 display interface between the first audio-visual device and a second audio-visual device, the method comprising:

receiving image data;

formatting the image data for transport over the interface by:

in a first mode, generating a stream of first data elements which carry pixel
 25 data of a 2D image; and,

in a second mode, generating a stream of second data elements which carry a multiplexed combination of components of a stereoscopic image.

A related aspect of the present invention provides a method of processing image data at a digital display interface part of an audio-visual device, the method comprising:

30 receiving formatted image data from the interface;

extracting image data by:

in a first mode, extracting pixel image data for a 2D image from a stream of first data elements; and,

in a second mode, demultiplexing components of a stereoscopic image from a stream of second data elements which carry a multiplexed combination of components of a stereoscopic image.

5 A further aspect of the invention provides a digital display interface part for use in a first audio-visual device for supporting a digital display interface between the first audio-visual device and a second audio-visual device, the interface part comprising:

an input for receiving stereoscopic image data;

10 a formatter arranged to format the data for transport over the interface, wherein the formatter is operable to send a portion of the stereoscopic image data over a primary image data transport channel of the interface and another portion of the stereoscopic image data over an auxiliary data channel.

The interface part can send signaling information across the interface identifying how stereoscopic data is distributed between the primary data channel and the auxiliary data channel.

15 Advantageously, the stereoscopic image data comprises 2D image data and image depth data and the formatter is arranged to send depth data across the auxiliary data channel.

The auxiliary data channel can comprise a separate line, or lines, within the same cable as the primary channel; a second cable which is separate from a first cable carrying the primary channel; or a wireless link.

20 A related aspect of the present invention provides a digital display interface part for use in an audio-visual device for supporting a digital display interface between the audio-visual device and another audio-visual device, the interface part comprising:

an input for connecting to a primary image data transport channel of the interface and an auxiliary data channel;

25 a processor arranged to extract a portion of the stereoscopic image data from the primary image data transport channel of the interface and another portion of the stereoscopic image data from the auxiliary data channel.

A related aspect of the present invention provides a method of sending stereoscopic image data over a digital display interface between a first audio-visual device and a second audio-visual device, comprising, at the first audio-visual device:

receiving stereoscopic image data for transport over the interface;

30 sending a portion of the stereoscopic image data over a primary image data transport channel of the interface and another portion of the stereoscopic image data over an auxiliary data channel.

A related aspect of the present invention provides a method of processing stereoscopic image data at an audio-visual device for supporting a digital display interface between the audio-visual device and another audio-visual device, the method comprising:

5 extracting a portion of the stereoscopic image data from a primary image data transport channel of the interface and another portion of the stereoscopic image data from an auxiliary data channel.

A further aspect of the invention provides a digital display interface part for use in a first audio-visual device for supporting a digital display interface between the first audio-visual device and a second audio-visual device, the interface part comprising:

10 an input for receiving stereoscopic image data;
a formatter arranged to generate a stream of image data carrying data elements and auxiliary data carrying data elements at intervals in the stream, and wherein signaling information for use in decoding the stereoscopic image data is carried in at least one of the auxiliary data elements.

15 Where the stereoscopic image data comprises left eye image data and right eye image data, the signaling information can specify what data elements carry the left eye image data and what data elements carry the right eye image data. Where the left eye images and right eye images are interleaved on a line-by-line basis, the signaling information can be sent as often as once for each pair of interleaved lines, although it can be sent much less frequently,
20 such as once per field or frame.

Where the stereoscopic image data comprises 2D image data and depth information, the signaling information can specify at least one of: the transmission location, quantity of the depth information.

Advantageously, where the stereoscopic image data has a plurality of different
25 possible formats, the signaling information specifies the format. One of the formats for the stereoscopic image data can be a scheme which encodes the stereoscopic image data within a conventional 2D image format.

Advantageously, the signaling information is carried in a horizontal or vertical blanking period and for a High Definition Multimedia Interface (HDMI) the signaling
30 information can be sent in a Data Island Packet.

A related aspect of the present invention provides a digital display interface part for use in an audio-visual device for supporting a digital display interface between the audio-visual device and another audio-visual device, the interface part comprising:

an input for receiving, from the interface, a stream of image data carrying data elements and auxiliary data carrying data elements at intervals in the stream;

using signaling information carried in at least one of the auxiliary data elements to decode the stereoscopic image data.

5 A related aspect of the present invention provides a method of sending stereoscopic image data over a digital display interface between a first audio-visual device and a second audio-visual device comprising, at the first audio-visual device:

receiving stereoscopic image data;

generating a stream of image data carrying data elements and auxiliary data carrying
10 data elements at intervals in the stream, and wherein signaling information for use in decoding the stereoscopic image data is carried in at least one of the auxiliary data elements.

A related aspect of the present invention provides a method of processing stereoscopic image data at a digital display interface part of an audio-visual device, the method comprising:

15 receiving, from the interface, a stream of image data carrying data elements and auxiliary data carrying data elements at intervals in the stream;

using signaling information carried in at least one of the auxiliary data elements to decode the stereoscopic image data.

A further aspect of the invention provides a digital display interface part for use in a
20 first audio-visual device for supporting a digital display interface between the first audio-visual device and a second audio-visual device, the interface part comprising:

an input for receiving stereoscopic image data components;

a formatter arranged to generate a stream of image data carrying data elements and auxiliary data carrying data elements at intervals in the stream, and wherein the stereoscopic
25 image data is distributed between the image data carrying data elements and the auxiliary data carrying data elements.

Advantageously, the stereoscopic image data components are 2D image data and image depth data and wherein the depth data is carried in the auxiliary data carrying data elements. Advantageously, the stream further comprises signaling information, carried within
30 auxiliary data carrying data elements, specifying which part of an image the depth information relates to.

The auxiliary data carrying data elements are sent in a horizontal or vertical blanking period, such as HDMI Data Island Packets.

A related aspect of the present invention provides a digital display interface part for use in an audio-visual device for supporting a digital display interface between the audio-visual device and another audio-visual device, the interface part comprising:

- an input for receiving, from the interface, a stream of image data carrying data elements and auxiliary data carrying data elements;
- a processor arranged to extract stereoscopic image data from the image data carrying data elements and at least part of the stereoscopic image data from the auxiliary data carrying data elements.

A related aspect of the present invention provides a method of sending stereoscopic data across a digital display interface between a first audio-visual device and a second audio-visual device, the method comprising, at the first audio-visual device:

- receiving stereoscopic image data components;
- generating a stream of image data carrying data elements and auxiliary data carrying data elements at intervals in the stream, and distributing the stereoscopic image data between the image data carrying data elements and the auxiliary data carrying data elements.

A related aspect of the present invention provides a method of processing stereoscopic image data at a digital display interface part of an audio-visual device, the method comprising:

- receiving, from the interface, a stream of image data carrying data elements and auxiliary data carrying data elements;
- extracting stereoscopic image data from the image data carrying data elements and at least part of the stereoscopic image data from the auxiliary data carrying data elements.

The functionality described here can be implemented in software, hardware or a combination of these. The invention can be implemented by means of hardware comprising several distinct elements, and by means of a suitably programmed computer. Accordingly, further aspects of the invention provide software for implementing any of the methods. The software may be stored on an electronic memory device, hard disk, optical disk or other machine-readable storage medium. The software may be delivered as a computer program product on a machine-readable carrier or it may be downloaded to the AV device via a network connection.

The invention also extends to signals, for transmission over the display interface, which result from any of the methods.

Features of the various aspects of the invention can be combined.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will be described, by way of example only, with reference to the accompanying drawings in which:

- Fig. 1 shows a display interface for carrying image data between two AV devise;
- 5 Fig. 2 shows a formatting function at one end of the interface;
- Fig. 3 shows a conventional way of sending 2D image data across a display interface;
- Figs. 4 and 5 show ways of sending stereoscopic image data across a display interface;
- Fig. 6 shows format of an HDMI video frame; and,
- 10 Fig. 7 shows a display interface which includes an auxiliary data channel.

DESCRIPTION OF PREFERRED EMBODIMENTS

Figure 1 shows an example scenario in which the invention can be used. In Figure 1, an AV device 10 which is capable of providing a source of digital AV content is connected to a display (or video projector) 20 via a digital display interface (DDI) 40. Interface parts 12, 22 in devices 10, 20 support the interface 40, and provide functions such as formatting signals into the form required by standards defining the interface 40. The source device 10 can be a device which can retrieve digital AV content from a store 11, such as a hard disk, a solid state memory or an optical disc or any other fixed or removable storage medium or device. Examples of device 10 include a personal video recorder (PVR), an optical disc player such as a DVD player, an HD-DVD player or a Blu-ray player. Alternatively, device 10 can take the form of a set-top box which receives content from a distribution channel (such as a broadcast channel or broadband network or other type of network (e.g. home network)).

25 There are a variety of methods for displaying stereoscopic (3D) images. The two main methods for transferring 3D image data across an interface are: to transmit two complete, separate, stereoscopic images representing the left and right views as seen by human eyes; and a normal 2D image with associated depth information that can be used to generate the stereoscopic images within the display. The first method generally requires a significantly higher bandwidth (up to twice that needed for a 2D image) over the interface, but needs little processing in the display, while the second method can require a smaller increase in bandwidth, but at the expense of some fast real-time processing in the display to process the depth information.

Current digital display interfaces, such as HDMI, offer a very high bandwidth. These interfaces transfer uncompressed pixel information, unlike other transport mechanisms (such as Ethernet, USB, IEEE1394) which have to transfer compressed images because of their bandwidth limitations. Originally, images transferred by HDMI were limited to 8 bits per color per pixel, so-called “24-bit color”. Improvements to HDMI from version 1.3 have allowed HDMI to carry more bits per pixel, with the options of carrying 10, 12 and 16 bits per color per pixel, i.e. up to 48-bit color. HDMI describes Deep Color Pixel Packing modes (HDMI 1.3a, section 6.5.3) which allow the higher color depths just described.

According to one embodiment of the present invention, the deep color modes are used to transport stereoscopic image data. The stereoscopic image data can be left image data + right image data or 2D + depth information. Figure 2 shows a formatting function 15 used within an interface part 12. The formatter 15 can selectively operate in one of a number of different modes. This is shown schematically by formatter selecting one of the sets of inputs: 2D image data 31; 2D + depth image data 32, 33; or left eye and right eye image data 34, 35 for processing and selectively connecting 38 to an interface output 39. Formatter 15 can receive conventional 2D image data 31, such as 24-bit color image data 31. Typically this is received in an RGB or component video (Y,Cr,Cb) format. When receiving stereoscopic image data, formatter 15 multiplexes 36, 37 the image data components. For left eye/right eye image data, the left eye data and right eye data will typically be taken from the same pixel in the left eye/right eye frames or fields of the images, although other algorithms for combining pixels are also within the scope of the present invention. For 2D image + depth information, the 2D image data will typically correspond to a single pixel (e.g. RGB or component video format) and the depth information can take a different form, and may correspond to a different region of the image to the pixel of the 2D image. The formatter 15 may only support one of the 3D formats (i.e. just L+R, or just 2D+depth) or both types of 3D format.

Figures 3 to 5 show a range of different ways in which the image data can be multiplexed. Figure 3 shows conventional image data. In HDMI, the three color components (R,G,B or Y,Cr,Cb) are sent simultaneously on three Transition Minimised Differential Signaling (TMDS) channels 41. TMDS refers to line-level coding applied to the data to maintain an approximate DC balance as well as a reduction in the number of transitions in the data stream. Each color component can be sent using a standard color depth (e.g. 8 bits per color per pixel) or an enhanced color depth, such as 16 bits per color per pixel. Figure 4 shows a way in which stereoscopic left eye/right eye data can be multiplexed. The

components of the left eye data (R,G,B or Y,Cr,Cb) are sent in a first portion of each data-carrying element, and then immediately followed by the components of the right eye data (R,G,B or Y,Cr,Cb). Both left eye and right eye are either sent within the same packet, consecutive image data packets, or parts of consecutive image data packets. As an example, where a 16-bit per color per pixel mode is used, bits 0-7 can carry the left image Y data and bits 8-15 carry the right image Y data. HDMI 1.3a currently allows a color depth of up to 16-bits per color per pixel (48-bit color). Figure 4 shows how two 24-bit color images can be carried within the existing 48-bit color mode with no additional capacity required from the interface. It will be appreciated that future revisions of HDMI (and other) specifications may extend the bandwidth to permit a larger color depth, which will allow each of the left eye and right eye images to use more bits per pixel, so allowing richer 3D images.

Figure 5 shows a scheme for sending 2D image data + depth information where the 2D data is sent first, followed by the depth data. Each color component (R,G,B or Y,Cr,Cb) follows the same format. In Figure 6 the capacity of the packet is divided equally between the 2D data and depth information, although any other division is possible. It may be possible to send significantly less depth data than 2D data, which can allow the 2D image to use a wide color palette and/or high resolution. It is also possible to send some – or all – of the depth information in a different part of the transmitted data stream, such as within specific HDMI Data Island Packets carried within the horizontal and vertical line blanking intervals. This is particularly useful for depth data that is not attached directly to a specific pixel, for instance, it applies to a region of the image.

Interface part 12 sends signaling 42 which indicates the format of the image data, e.g. indicating whether the image data is 2D, stereo (L+R) or stereo (2D+depth). The signaling can also indicate further details of the multiplexing scheme, such as which color depth mode is being used to carry the multiplexed data, the number of bits per data element that are allocated to 2D data and the number of bits per data element that are allocated to depth data. This signaling allows flexibility in how the stereo data is allocated to data carrying elements sent across the interface 40 and allows for the amount of Depth information to be changed dynamically, according to the requirements of the content which is to be displayed. In HDMI, Data Island Packets are sent in horizontal and vertical line blanking periods. The signaling information can conveniently be carried within a Data Island Packet. Figure 6 shows the layout of an HDMI video frame, showing a region where pixel data is sent across TMDS channels, a horizontal blanking period 63 and a vertical blanking period. Data Island Packets are sent within Data Island periods positioned within the horizontal and vertical blanking

periods 62, 63. The signaling data can be carried in a General Control Packet, an Auxiliary Video InfoFrame (AVI) packet or an InfoFrame Packet specifically designated for this purpose. If depth data is carried both within the pixel data carrying data elements and other places of the stream, the signaling can indicate where the depth data is to be found. The amount of depth data and the location(s) of the depth data can vary on a dynamic basis during an image, or sequence of images, depending on the required color depth, resolution or complexity of the image (e.g. the amount of depth information within an image).

AV device 20 includes a processor 21 applies suitable processing to the data to render a 3D image. In the case of stereoscopic display, where a user is simultaneously or sequentially presented with separate left and right eye images, processor 21 constructs the separate left eye/right eye images and outputs them 24 at the required time. For sequential stereoscopic displays, a further output 23 is provided to synchronize operation of shuttered glasses. In the case of an autostereoscopic display, such as a display using a ventricular screen, processor 21 constructs the image data which is required to be output 24 to the display elements to generate the autostereoscopic display. Interface part 22 and processor 21 use the signaling information sent across the interface to:

- determine if stereoscopic image data is being sent; determine what general stereoscopic image format is being used (e.g. left+right image; 2D+depth; stereo encoded within active image data);
- determine more detail of how the image data is being encoded on the interface, and therefore what decoding scheme should be used at the receiver. This may include information about which deep color mode is being used, bit allocation between 2D and depth data, transmission location of depth data (e.g. specific Data Island Packets or auxiliary channel locations).

Further signaling between the AV devices 10, 20 allows the sink device 20 to indicate its capabilities to receive and process image data. The capability information may indicate the maximum allowed bandwidth for each mode of sending 2D and stereo image data. In HDMI, the capability of a sink device can use the Display Data Channel (DDC) channel, with capability data being stored in an Extended Display Identification Data (EDID) ROM at a sink.

The interface may support other schemes for sending stereoscopic data. A first alternative is to send two separate complete images, carried sequentially (such as a complete left image followed by a complete right image). The indication of the left and right image can

be indicated by signaling information carried directly adjacent the position of the image data, such as an HDMI Data Island Packet.

5 A second alternative is to send two separate images, but with the lines of the two images interleaved. For example, the first line of the left image is sent first, followed by the first line of the right image, and so on.

A third alternative is to send a 2D image in a conventional manner, and to carry depth information in specific Data Island Packets dedicated to carrying depth information.

10 In each of these alternatives, signaling information carried directly adjacent the position of the image data, such as an HDMI Data Island Packet, can indicate what the image data corresponds to. For the third alternative, the signaling information can specify which part of the image the depth data relates to. As noted above, the HDMI Data Island Packets can be a General Control Packet, an Auxiliary Video InfoFrame (AVI) packet or an InfoFrame Packet specifically designated for this purpose. The information in these packets can identify:

- 15 the current stereoscopic method (field, line or byte) being used (see above);
- whether a Deep Color Pixel Packing mode is being used to carry 3D information or a Deep Color Mode 2D image;
- the mapping of left and right images to the current field, line or byte;
- how many of the Data Island Packet packets/sub-packets are being used to carry
- 20 Depth information;
- the location of other stereoscopic image data components.

The embodiments above show how the separate stereoscopic image components can be carried over a display interface. For some applications, especially those intended for display on a ventricular screen, the picture received at the interface part 12 may already be

25 encoded with stereoscopic content. As an example, a WOWvx encoded image as described in the background section, comprises a 2D image, depth information and/or occlusion information already embedded into separate regions of a conventional image. In one embodiment, the 2D image is carried in one quarter of the image pixels (e.g. in half a line for half the total lines in the picture). The associated depth and/or occlusion information is

30 carried in the other three-quarters of the presented picture. In this case, the lines of the picture are transported across the HDMI link as though they were a single 2D image occupying all of each line, for all the available lines. In order to identify such a 3D image, an HDMI Data Island Packet (typically a General Control Packet, Auxiliary Video InfoFrame (AVI) packet

or specifically designated InfoFrame Packet) indicates this method. The information in this Packet identifies:

- the current stereoscopic method (e.g. 2D+Depth) being used;
- any information pertaining to this method which is required by the display.

5 The sink identifies the transmitted picture as using this method and processes the picture accordingly. The sink also carries information in the EDID indicating that it supports this method.

10 In the above description, stereoscopic image data is carried over a channel of an interface (e.g. an HDMI Transport Stream) either by multiplexing the stereoscopic image data within normal data carrying elements of the channels, or by carrying at least part of the stereoscopic image data within other packets (e.g. Data Island Packets) carried over the same channel. A further embodiment of the invention carries at least some of the stereoscopic image data over an associated high speed auxiliary data link such as Gigabit Ethernet, IEEE 1394 or a high-speed wireless link. Signaling information identifies which information is

15 carried by the primary channels of the interface and which is carried by the associated auxiliary link. In HDMI, the signaling information can be carried in Data Island Packets. Similar, or complementary, identification information may also be carried on the associated high speed auxiliary link. The sink uses the received Data Island Packets to identify which information is carried on which link and combines the two streams of data in the necessary

20 format for presentation or processing. Depending on the characteristics of the HDMI and associated auxiliary link, it may be necessary to buffer the data contained in the two streams in order to maintain synchronicity between them. In one embodiment using the above embodiment, the associated wires for the auxiliary link are carried within the HDMI cable; this option is shown in Figure 7 by additional line 50 connecting modules 51, 52 in interface

25 parts 12, 22. In other embodiments, the associated auxiliary link is carried in a separate cable connecting the devices 10, 20, or by a high-speed wireless link.

30 Other variations to the disclosed embodiments can be understood and effected by those skilled in the art in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality. A single processor or other unit may fulfill the functions of several items recited in the claims. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage. Any reference signs in the claims should not be construed as limiting the scope.

35

What is claimed is:

1. An interface part for a digital display, for use in a first audio-visual device for supporting a digital display transmission interface between the first audio-visual device and a second audio-visual device, the interface for transmitting uncompressed pixel information, the interface part comprising:

an input for receiving image data;

a formatter configured to format the received digital data for transport over a transmission interface, wherein the formatter is operable in:

a first mode in which the formatter generates a stream of first data elements comprising pixel data of a 2D image; and;

a second mode, different from the first mode, operating at different times than the first mode, in which the formatter generates a stream of second data elements comprising a multiplexed combination of components of a stereoscopic image;

wherein the interface part is configured to send signaling information across the transmission interface, the signaling information identifying which mode the formatter is using;

wherein the signaling information comprises information with respect to a multiplexing scheme used in a second mode for enabling the second audio-visual device to determine a decoding scheme to be used to decode a stereoscopic image format being used in the second mode;

wherein the formatter is configured to generate a stream of data elements comprising either the first or second data elements and auxiliary data carrying data elements at intervals in the stream; and

the signaling information being carried in the auxiliary data elements.

2. The interface part of claim 1, wherein the signaling information comprises information for enabling the second audio-visual device to determine a stereoscopic image format being used in the second mode on which the decoding scheme is based.

3. The interface part of claim 1, wherein the signaling information is carried in a horizontal or vertical blanking period.

4. The interface part according claim 1, wherein the interface is a High Definition Multimedia Interface (HDMI) and the signaling information is sent in a Data Island Packet between image data.
5. The interface part of claim 4, which is arranged to receive signaling information across the interface specifying capabilities of the second audio-visual device.
6. The interface part of claim 1, wherein the stereoscopic image data components include left eye image data and right eye image data.
7. The interface part of claim 6 arranged for sending the left eye image data and the right eye image data sequentially,
8. The interface part of claim 7 wherein an indication of the left and right image data being indicated by signaling information carried directly adjacent a position of the image data.
9. The interface part of claim 6 arranged for sending the left eye image data and the right eye image data by line interleaving.
10. The interface part of claim 1, wherein the stereoscopic image data components are 2D image data and image depth data.
11. The interface part of claim 9 wherein the formatter is arranged to use a portion of the second data element to carry the 2D image data and another portion of the second data element to carry the image depth data.
12. An interface part for a digital display, for use in an audio-visual device for supporting a digital display transmission interface between a first audio-visual device and a second audio-visual device, the digital display interface for receiving uncompressed pixel information, the interface part comprising:
 - an input for receiving formatted image data from the transmission interface;
 - a processor arranged to extract image data, the processor being operable in:

a first mode in which the processor extracts pixel image data for a 2D image from a stream of first data elements; and;

a second mode, different from the first mode, operating at different times than the first mode, in which the processor de-multiplexes components of a stereoscopic image from a stream of second data elements comprising a multiplexed combination of components of a stereoscopic image;

wherein the interface part is configured to receive signaling information across the transmission interface, the signaling information identifying which mode the formatter is using;

wherein the signaling information comprises information with respect to a multiplexing scheme used in a second mode for enabling the second audio-visual device to determine a decoding scheme to be used to decode a stereoscopic image format being used in the second mode;

wherein the stream of data elements comprising either the first or second data elements and auxiliary data carrying data elements at intervals in the stream; and

the signaling information being carried in the auxiliary data elements.

13. The interface part of claim 12, wherein the signaling information comprises information for enabling the second audio-visual device to determine a stereoscopic image format being used, the interface part arranged to determine a stereoscopic image format being used on which the decoding scheme is based.

14. The interface part according claim 12, wherein the interface is a High Definition Multimedia Interface (HDMI) and the signaling information is received in a Data Island Packet between image data.

15. The interface part of claim 12 wherein the stereoscopic image data components are left eye image data and right eye image data.

16. A method of operating an interface part of a digital display for formatting image data at a digital display transmission interface of a first audio-visual device for transport over the digital display transmission interface between the first audio-visual device and a second audio-visual device, the digital display transmission interface for transmitting uncompressed pixel information, the method comprising:

in an interface part;
receiving image data;
formatting the image data for transport over the transmission interface by:
in a first mode, generating a stream of first data elements comprising pixel data of a 2D image; and;
in a second mode, different from the first mode, operating at different times than the first mode, generating a stream of second data elements comprising a multiplexed combination of components of a stereoscopic image;
wherein the interface part sends signaling information across the transmission interface, the signaling information identifying which mode the formatter is using;
wherein the signaling information comprises information with respect to a multiplexing scheme used in a second mode for enabling the second audio-visual device to determine a decoding scheme to be used to decode a stereoscopic image format being used in the second mode;
wherein the formatting generates a stream of data elements comprising either the first or second data elements and auxiliary data carrying data elements at intervals in the stream; and
wherein the signaling information being carried in the auxiliary data elements.

17. The interface part of claim 1, wherein the signaling information comprises information for enabling the second audio-visual device to determine a stereoscopic image format being used.

18. A method of operating an interface part of a digital display transmission interface of an audio-visual device, the interface part processing image data at the digital display transmission interface of the audio-visual device, the digital display transmission interface for receiving uncompressed pixel information, the method comprising:

in an interface part;
receiving formatted image data from the interface;
extracting image data by:
in a first mode, extracting pixel image data for a 2D image from a stream of first data elements; and;

in a second mode, demultiplexing components of a stereoscopic image from a stream of second data elements comprising a multiplexed combination of components of a stereoscopic image;

wherein the interface part sends signaling information across the interface, the signaling information identifying which mode the formatter is using;

wherein the signaling information comprises information with respect to a multiplexing scheme used in a second mode for enabling the second audio-visual device to determine a decoding scheme to be used to decode a stereoscopic image format being used in the second mode;

wherein the stream of data elements comprising either the first or second data elements and auxiliary data carrying data elements at intervals in the stream; and

the signaling information being carried in the auxiliary data elements.

19. A computer-readable storage-medium that is not a transitory propagating signal or wave, the medium comprising control information for controlling an operation of an interface part of a digital display for formatting image data at a digital display transmission interface of a first audio-visual device for transport over the digital display transmission interface between the first audio-visual device and a second audio-visual device, the digital display transmission interface for transmitting uncompressed pixel information, the method comprising:

in an interface part;

receiving image data;

formatting the image data for transport over the interface by:

in a first mode, generating a stream of first data elements comprising pixel data of a 2D image; and

in a second mode, different from the first mode, operating at different times than the first mode, generating a stream of second data elements comprising a multiplexed combination of components of a stereoscopic image;

wherein the interface part sends signaling information across the transmission interface, the signaling information identifying which mode the formatter is using;

wherein the signaling information comprises information with respect to a multiplexing scheme used in a second mode for enabling the second audio-visual device to determine a decoding scheme to be used to decode a stereoscopic image format being used in the second mode;

wherein the formatting generates a stream of data elements comprising either the first or second data elements and auxiliary data carrying data elements at intervals in the stream; and

wherein the signaling information being carried in the auxiliary data elements.

20. A computer-readable storage-medium that is not a transitory propagating signal or wave, the medium comprising control information for controlling an operation of an interface part of a digital display transmission interface of an audio-visual device, the interface part processing image data at the digital display transmission interface of the audio-visual device, the digital display transmission interface for receiving uncompressed pixel information, the method comprising:

in an interface part;

receiving formatted image data from the interface;

extracting image data by:

in a first mode, extracting pixel image data for a 2D image from a stream of first data elements; and;

in a second mode, different from the first mode, operating at different times than the first mode, demultiplexing components of a stereoscopic image from a stream of second data elements comprising a multiplexed combination of components of a stereoscopic image;

wherein the interface part sends signaling information across the interface, the signaling information identifying which mode the formatter is using;

wherein the signaling information comprises information with respect to a multiplexing scheme used in a second mode for enabling the second audio-visual device to determine a decoding scheme to be used to decode a stereoscopic image format being used in the second mode;

wherein the stream of data elements comprising either the first or second data elements and auxiliary data carrying data elements at intervals in the stream; and

the signaling information being carried in the auxiliary data elements.

21. Control structures encoded in a computer-readable storage-medium that is not a transitory propagating signal or wave, for controlling the operation of an interface part of a digital display for formatting image data at a digital display transmission interface of a first audio-visual device for transport over the digital display transmission interface between the

first audio-visual device and a second audio-visual device, the digital display interface for transmitting uncompressed pixel information, the method comprising:

in an interface part;

receiving image data;

formatting the image data for transport over the interface by:

in a first mode, generating a stream of first data elements comprising pixel data of a 2D image; and;

in a second mode, different from the first mode, operating at different times than the first mode, generating a stream of second data elements which carry comprising a multiplexed combination of components of a stereoscopic image;

wherein the interface part sends signaling information across the interface, the signaling information identifying which mode the formatter is using;

wherein the signaling information comprises information with respect to a multiplexing scheme used in a second mode for enabling the second audio-visual device to determine a decoding scheme to be used to decode a stereoscopic image format being used in the second mode;

wherein the formatting generates a stream of data elements comprising either the first or second data elements and auxiliary data carrying data elements at intervals in the stream; and

wherein the signaling information being carried in the auxiliary data elements.

22. Control structures encoded in a computer-readable storage-medium that is not a transitory propagating signal or wave, for controlling the operation of an interface part of a digital display transmission interface of an audio-visual device, the interface part processing image data at the digital display interface of the audio-visual device, the digital display transmission interface for receiving uncompressed pixel information, the method comprising:

in an interface part;

receiving formatted image data from the interface;

extracting image data by:

in a first mode, extracting pixel image data for a 2D image from a stream of first data elements; and;

in a second mode, different from the first mode, operating at different times than the first mode, demultiplexing components of a stereoscopic image from a stream

of second data elements comprising a multiplexed combination of components of a stereoscopic image;

wherein the interface part sends signaling information across the interface, the signaling information identifying which mode the formatter is using;

wherein the signaling information comprises information with respect to a multiplexing scheme used in a second mode for enabling the second audio-visual device to determine a decoding scheme to be used to decode a stereoscopic image format being used in the second mode;

wherein the stream of data elements comprising either the first or second data elements and auxiliary data carrying data elements at intervals in the stream; and

the signaling information being carried in the auxiliary data elements.

ABSTRACT

A digital display interface (40) connects a first audio-visual device (10) to a second audio-visual device (20). Stereoscopic image data is transmitter over the display interface (40). Components of stereoscopic image data are multiplexed and inserted into an image data carrying element. An existing deep color mode can be re-used for this purpose. Signaling information to help identify or decode the stereoscopic image data is carried in auxiliary data carrying elements. Stereoscopic image data can be distributed between image data carrying data elements and auxiliary data carrying data elements. Auxiliary data carrying elements can be transmitted in horizontal or vertical blanking periods, and can comprise HDMI Data Island Packets. Stereoscopic image data can be sent over an auxiliary data channel. The auxiliary data channel can form part of the same cable as is used to carry a primary channel of the display interface, a separate cable, or a wireless link.

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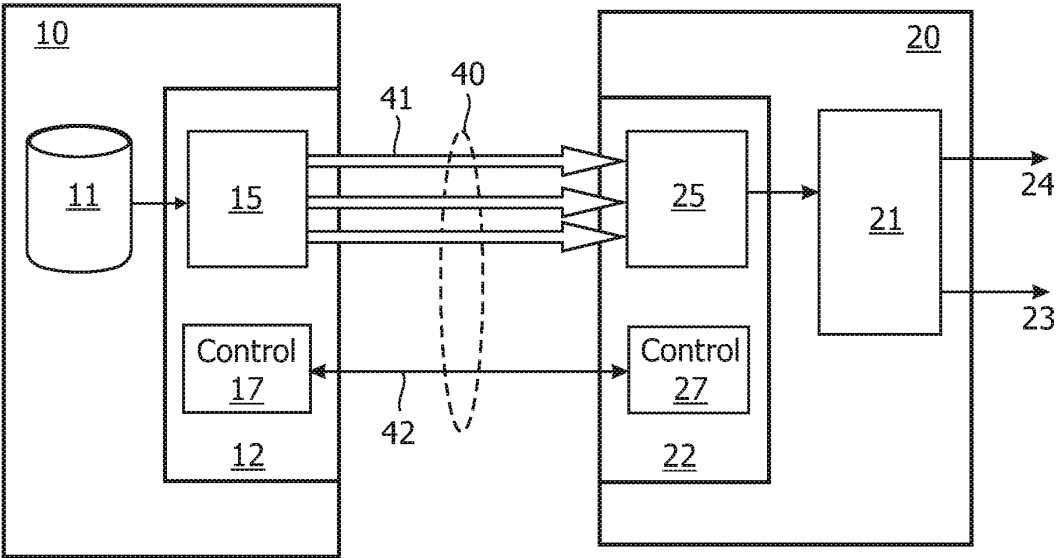


FIG. 1

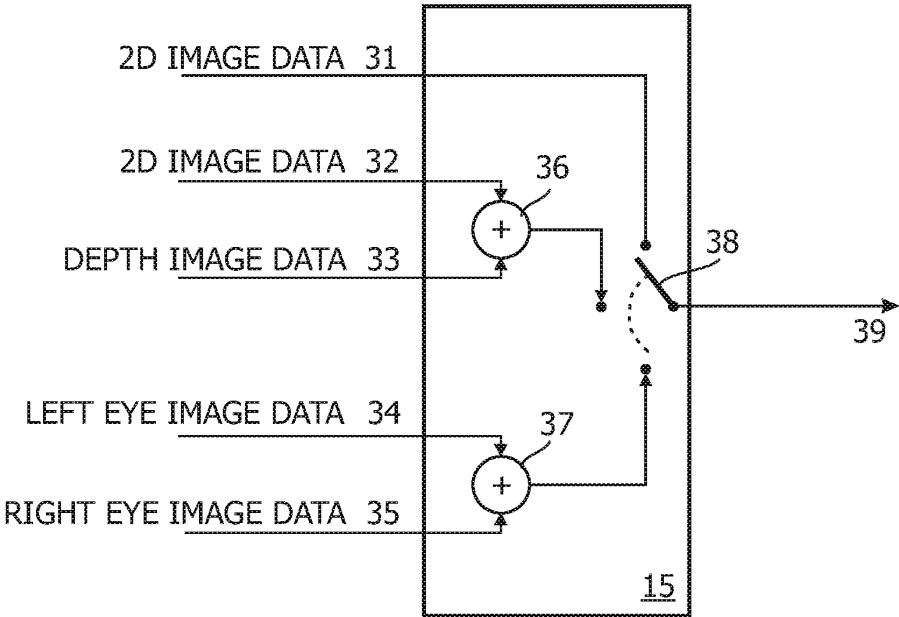


FIG. 2

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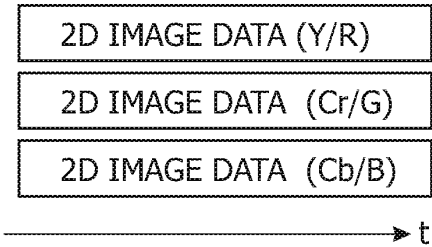


FIG. 3

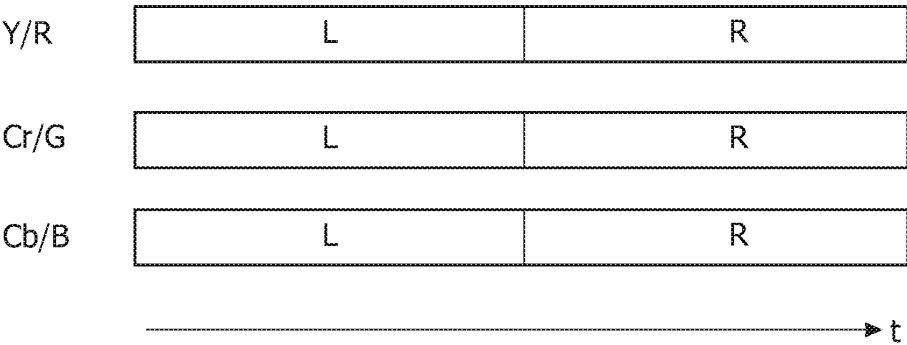


FIG. 4

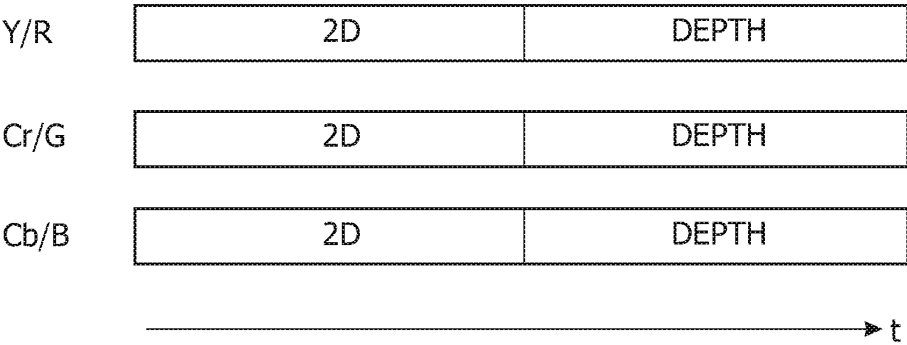


FIG. 5

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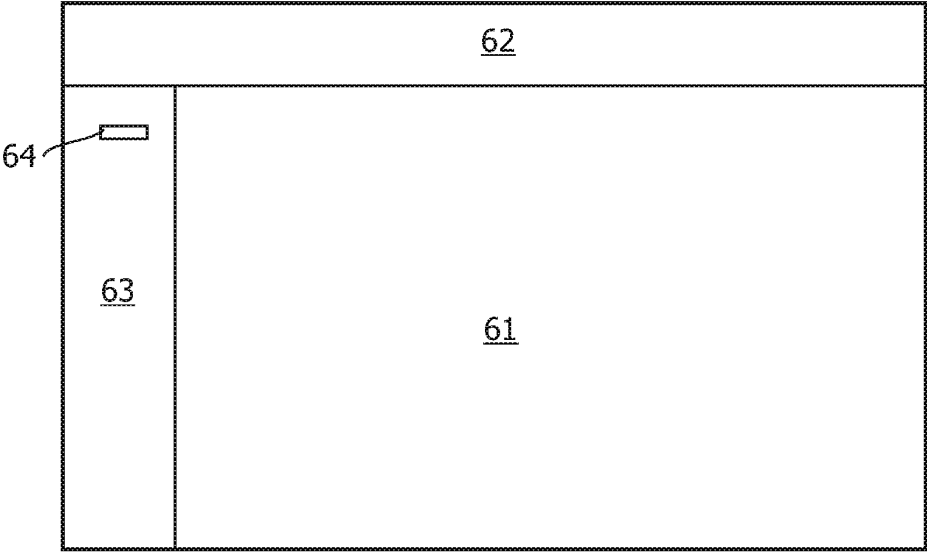


FIG. 6

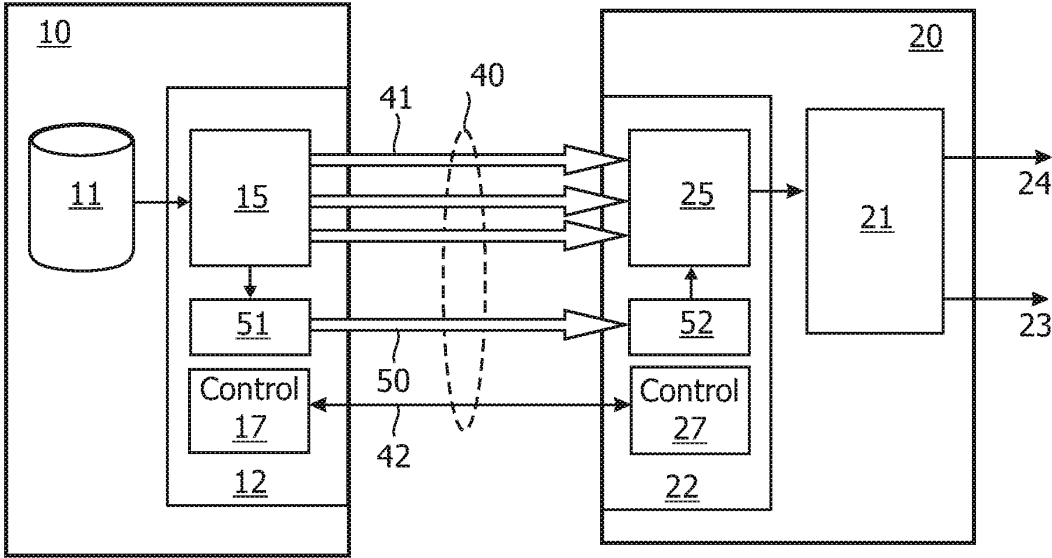


FIG. 7

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
 APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE
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 <u>14/629,642</u> filed on <u>February 24, 2105</u> 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: <u>Nicoll Burleigh Shepherd</u> Date (Optional): _____	
Signature: <u><i>NBS</i></u>	
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.	

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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.

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE		
First Named Inventor/Applicant Name:		Nicoll Burleigh SHEPHERD		
Filer:		Michael E. Belk/Elissa DeLuccy		
Attorney Docket Number:		2007P01979US01		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Pages:				
Claims:				
Claims in Excess of 20	1202	2	80	160
Independent claims in excess of 3	1201	3	420	1260
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				3020

Electronic Acknowledgement Receipt	
EFS ID:	26836680
Application Number:	15256839
International Application Number:	
Confirmation Number:	5045
Title of Invention:	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE
First Named Inventor/Applicant Name:	Nicoll Burleigh SHEPHERD
Customer Number:	24737
Filer:	Michael E. Belk/Elissa DeLuccy
Filer Authorized By:	Michael E. Belk
Attorney Docket Number:	2007P01979US01
Receipt Date:	06-SEP-2016
Filing Date:	
Time Stamp:	11:38:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 3020
RAM confirmation Number	090616INTEFSW00011046141270
Deposit Account	141270
Authorized User	Michael Belk
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 1.21 (Miscellaneous fees and charges)					
File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	WebADS.pdf	124187	no	8
			7c3c61c6cca9eeb73cf89b65632c30088ea24a06		
Warnings:					
Information:					
2	Miscellaneous Incoming Letter	2007P01979US01_IDS_Cover_Letter.pdf	34669	no	1
			5defa8344966d571e27d4674d2b0c32ca7a0bb7d		
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	2007P01979US01_IDS.pdf	612567	no	5
			747ed4d392a5195e55d646ca47a332a176416592		
Warnings:					
Information:					
4	Assignee showing of ownership per 37 CFR 3.73	2007P01979US01_373c_Stmt.pdf	80984	no	2
			f44c8f8db2f955e9fb34176e855cb2930577c747		
Warnings:					
Information:					
5	Power of Attorney	2007P01979US01_POA.pdf	52661	no	1
			4cd735151755bbad192e30576254c755696de9d9		
Warnings:					
Information:					
6		2007P01979US01_Specification.pdf	138611	yes	23
			1b77364e2b5f647a39b6bf5b20f75b3fe6d3c788		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	

	Specification		1	14			
	Claims		15	22			
	Abstract		23	23			
Warnings:							
Information:							
7	Drawings-only black and white line drawings	2007P01979US01_Drawings.pdf	16485	no	3		
			2ab6bb062f90a45253f5f03dbe0073e9448db745				
Warnings:							
Information:							
8	Oath or Declaration filed	2007P01979US01_Declaration.pdf	408808	no	2		
			713409282c3a4c01a2d3f24847e8cd119f26b297				
Warnings:							
Information:							
9	Fee Worksheet (SB06)	fee-info.pdf	38307	no	2		
			2c3c04216ce0bd5e54956f0f96679c1852f15c18				
Warnings:							
Information:							
Total Files Size (in bytes):			1507279				
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. <u>New Applications Under 35 U.S.C. 111</u> 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. <u>National Stage of an International Application under 35 U.S.C. 371</u> 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. <u>New International Application Filed with the USPTO as a Receiving Office</u> 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.							

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	2007P01979US01
		Application Number	
Title of Invention	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE		
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				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Nicoll	Burleigh	SHEPHERD	
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service				
City	Coulsdon	Country of Residence ⁱ	GB	
Mailing Address of Inventor:				
Address 1	High Tech Campus			
Address 2	Building 44			
City	Eindhoven	State/Province		
Postal Code	5656 AE	Country ⁱ	NL	
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	24737	
Email Address		Add Email Remove Email

Application Information:

Title of the Invention	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE		
Attorney Docket Number	2007P01979US01	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	3	Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	2007P01979US01
		Application Number	
Title of Invention	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE		

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	24737		
Prefix	Given Name	Middle Name	Family Name
Registration Number Prefix Given Name Middle Name Family Name Suffix Remove			
Registration Number Prefix Given Name Middle Name Family Name Suffix Remove			
Registration Number			
Additional Representative Information blocks may be generated within this form by selecting the Add button.			

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	2007P01979US01
		Application Number	
Title of Invention	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE		

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 this 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 blank.

Prior Application Status		Pending		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation of	14629642	2015-02-24		
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14629642	Continuation of	12808685	2010-06-17	9036010	2015-05-19
Prior Application Status				Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12808685	a 371 of international	PCT/IB2008/055305	2008-12-15		
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					

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) 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).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
07123461.1	EP	2007-12-18	
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

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

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	2007P01979US01
		Application Number	
Title of Invention	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE		

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	2007P01979US01
		Application Number	
Title of Invention	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE		

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	2007P01979US01
		Application Number	
Title of Invention	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE		

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			
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	
☐ 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	KONINKLIJKE PHILIPS N.V.		
Mailing Address Information For Applicant:			
Address 1	HIGH TECH CAMPUS 5		
Address 2			
City	EINDHOVEN	State/Province	OT
Country ¹	NL	Postal Code	5656 AE
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button.			

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	2007P01979US01
		Application Number	
Title of Invention	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE		

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.

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.				
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.				

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	2007P01979US01
		Application Number	
Title of Invention	TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE		

Signature:

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	/Michael E. Belk/			Date (YYYY-MM-DD)	
First Name	Michael E.	Last Name	Belk	Registration Number	33357
Additional Signature may be generated within this form by selecting the Add button.					

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of
Nicoll Burleigh Shepherd
Serial No.
Filed: CONCURRENTLY

Atty. Docket
2007P01979US01
Customer No. 24737

TRANSPORT OF STEREOSCOPIC IMAGE DATA OVER A DISPLAY INTERFACE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT TRANSMITTAL

Sir:

The foreign and non-patent literature references cited in the accompanying Information Disclosure Statement were previously provided in U.S. Patent Application Nos. 14/629,642 AND 12/808,685 ("the parent applications"), which is identified and relied on for an earlier effective filing date in the present application. As such, it is believed that copies of the foreign and non-patent literature references are not required under 37 CFR §1.98 and specifically are not required under 37 CFR §1.98(d), for consideration of the foreign references and non-patent literature references.

Respectfully submitted,

By /Michael E. Belk/
Michael E. Belk, Reg. 33,357
Attorney for Applicant(s)
(914) 333-9643

Document code: WFEE

United States Patent and Trademark Office
Sales Receipt for Accounting Date: 09/15/2016

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		01	FC : 1201	840.00	DA	