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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/852,790	08/02/2022	11403237	21063.0005USC1	5321

52835 7590 07/13/2022

HAMRE, SCHUMANN, MUELLER & LARSON, P.C.
45 South Seventh Street
Suite 2700
Minneapolis, MN 55402-1683

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.

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Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PAIR WEB site http://pair.uspto.gov for additional inventors):

Koen Simon Herman Beel, Eke, BELGIUM;
Yoav Nir, Komen, BELGIUM;
Filip Josephine Johan Louwet, Knesselare, BELGIUM;
Guy Coen, Aalst, BELGIUM;

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

BARCO N.V., Kortrijk, BELGIUM;

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Document Code:WFEE

User :Simret Direta

Sale Adjustment Accounting Date:07/13/2022

Effective Date	Sale Accounting Date	Sale Item Reference Number
05/25/2022	07/13/2022	16852790

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20227CF19421570	1820	RCE- 2ND AND SUBSEQUENT REQUEST	$2,000.00	DA



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Refund Accounting Date:07/13/2022

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/852,790	04/20/2020	Koen Simon Herman Beel	21063.0005USC1	5321

52835 7590 06/29/2022

HAMRE, SCHUMANN, MUELLER & LARSON, P.C.
45 South Seventh Street
Suite 2700
Minneapolis, MN 55402-1683

EXAMINER	
BARTELS, CHRISTOPHER A.	

ART UNIT	PAPER NUMBER
2184	

NOTIFICATION DATE	DELIVERY MODE
06/29/2022	ELECTRONIC

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

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

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

PTOMail@hsml.com

Corrected ***Notice of Allowability***	**Application No.** 16/852,790	**Applicant(s)** Beel et al.	
	Examiner CHRISTOPHER A BARTELS	**Art Unit** 2184	**AIA (FITF) 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 05/25/2022.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

3. ☑ The allowed claim(s) is/are 82-101 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

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

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 05/25/2022.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/C.A.B/ Examiner, Art Unit 2184	/HENRY TSAI/ Supervisory Patent Examiner, Art Unit 2184

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16852790
Filing Date	2020-04-20
First Named Inventor	Koen Simon Herman BEEL
Art Unit	2184
Examiner Name	BARTELS
Attorney Docket Number	21063.0005USC1

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/C.A.B/	1	202334692	CN	U	2012-07-11		With English translation	X

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	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	BARTELS
	Attorney Docket Number	21063.0005USC1

/C.A.B/	1	USB Video device class, vikipedia, last edited on 11 September 2011.	
/C.A.B/	2	Wireless USB, Wikipedia, dated 29 August 2011.	
/C.A.B/	3	Wireless Universal Serial Bus Specification, Agere Systems, Inc., Hewlett-Packard Company, Intel Corporation, Microsoft Corporation, NEC Corporation, Koninklijke Philips Electronics, N.V., Samsung Electronics Co., Ltd, May 12, 2005.	
/C.A.B/	4	Kensington Wireless USB Docking Station, by Nicole Price Fasig, October 22, 2008.	
/C.A.B/	5	IOGEAR Installation Guide, Wireless Audio Video Kit, 2009.	
/C.A.B/	6	Office Action issued in corresponding Chinese Application No. 202010418842.4, dated March 25, 2022, with English translation	X
/C.A.B/	7	Communication issued in European Application No. 16207123.7, dated February 25, 2022	☐

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Examiner Signature	/CHRISTOPHER A BARTELS/	Date Considered	06/23/2022

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	Examiner Name	BARTELS
	Attorney Docket Number	21063.0005USC1

CERTIFICATION STATEMENT

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

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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.

X 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	/Thomas Lee/	Date (YYYY-MM-DD)	2022-05-25
Name/Print	Thomas Lee	Registration Number	66,396

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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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.

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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.

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User :75320

Sale Accounting Date:05/27/2022

Sale Item Reference Number	Effective Date
16852790	05/25/2022

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20225QB24404561	1806	SUBMISSION- INFORMATION DISCLOSURE STMT	$260.00	Deposit Account

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IR103 (Rev. 10/09)

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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First Named Inventor	Koen Simon Herman BEEL
Art Unit	2184
Examiner Name	BARTELS
Attorney Docket Number	21063.0005USC1

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	1	202334692	CN	U	2012-07-11		With English translation	X

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	1	USB Video device class, vikipedia, last edited on 11 September 2011.	
	2	Wireless USB, Wikipedia, dated 29 August 2011.	
	3	Wireless Universal Serial Bus Specification, Agere Systems, Inc., Hewlett-Packard Company, Intel Corporation, Microsoft Corporation, NEC Corporation, Koninklijke Philips Electronics, N.V., Samsung Electronics Co., Ltd, May 12, 2005.	
	4	Kensington Wireless USB Docking Station, by Nicole Price Fasig, October 22, 2008.	
	5	IOGEAR Installation Guide, Wireless Audio Video Kit, 2009.	
	6	Office Action issued in corresponding Chinese Application No. 202010418842.4, dated March 25, 2022, with English translation	X
	7	Communication issued in European Application No. 16207123.7, dated February 25, 2022	☐

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See attached certification statement.

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

X 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	/Thomas Lee/	Date (YYYY-MM-DD)	2022-05-25
Name/Print	Thomas Lee	Registration Number	66,396

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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 inspections or an issued patent.

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

Electronic Patent Application Fee Transmittal

Application Number:	16852790
Filing Date:	20-Apr-2020
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman Beel
Filer:	Thomas Lee
Attorney Docket Number:	21063.0005USC1

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
PETITION FEE- 37 CFR 1.17(H) (GROUP III)	1464	1	140	140
RCE- 2ND AND SUBSEQUENT REQUEST	1820	1	2000	2000
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**2140**



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Decision Date : May 25, 2022

In re Application of :

Koen Simon Herman Beel

DECISION ON PETITION
UNDER CFR 1.313(c)(2)

Application No : 16852790

Filed : 20-Apr-2020

Attorney Docket No : 21063.0005USC1

This is an electronic decision on the petition under 37 CFR 1.313(c)(2), filed May 25, 2022 , to withdraw the above-identified application from issue after payment of the issue fee.

The petition is **GRANTED.**

The above-identified application is withdrawn from issue for consideration of a submission under 37 CFR 1.114 (request for continued examination). See 37 CFR 1.313(c)(2).

Petitioner is advised that the issue fee paid in this application cannot be refunded. If, however, this application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.

Telephone inquiries concerning this decision should be directed to the Patent Electronic Business Center (EBC) at 866-217-9197.

This application file is being referred to Technology Center AU 2184 for processing of the request for continuing examination under 37 CFR 1.114 .

Office of Petitions

Electronic Acknowledgement Receipt	
EFS ID:	45807072
Application Number:	16852790
International Application Number:	
Confirmation Number:	5321
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman Beel
Customer Number:	52835
Filer:	Thomas Lee
Filer Authorized By:	
Attorney Docket Number:	21063.0005USC1
Receipt Date:	25-MAY-2022
Filing Date:	20-APR-2020
Time Stamp:	23:10:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$2140
RAM confirmation Number	E20225ON10454070
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	ePetition Request Form	petition-request.pdf	39850 d9569d8a4381c7f34eff50757f03d834acb32832	no	2
Warnings:					
Information:					
2	Quick Path Information Disclosure Statement	QPIDS_0005USC1.pdf	369233 a64107f77f3bae0c11fe50e3ee4ce66b1d741cf4	no	2
Warnings:					
Information:					
3	Request for Continued Examination (RCE)	RCE_0005USC1.pdf	1667175 195887dfc38fc24eca12a5572c6eec2ee4b6d8c7	no	3
Warnings:					
Information:					
4	Non Patent Literature	NPL5_IOGEAR_Installation_guide_Wireless_Audio-video_kit.pdf	9571336 6f04b4783a0ee5be0a839909512a1604c4cbad26	no	80
Warnings:					
Information:					
5	Non Patent Literature	NPL4_Kensington_Wireless_USB_Docking_Station.pdf	261983 f3780ba393000fccb4e6a5349e7845057eca2fa5	no	6
Warnings:					
Information:					
6	Non Patent Literature	NPL3_Wireless_Universal_Serial_Bus_Specification.pdf	1472543 356f7a481953dc04b503337c3b327df564f08c88	no	37
Warnings:					
Information:					

7	Non Patent Literature	NPL2_Wireless_USB_Wikipedia.pdf	469947 080dff9525bc1359a322106436a587a3cb88feb2	no	6
Warnings:					
Information:					
8	Non Patent Literature	NPL1_USB_Video_Device_Class.pdf	168525 f4d2385d3c1b6e97565f4c6faab2d9c66b87d326	no	3
Warnings:					
Information:					
9	Non Patent Literature	NPL6_OA_CN.pdf	5488312 f0f584527b6c4b25d3222821dc8a2d6d5990f6d1	no	13
Warnings:					
Information:					
10	Non Patent Literature	NPL7_EPOA.pdf	89863 f2af009ff04d320003baf4df3d6a377dd1a13d58	no	4
Warnings:					
Information:					
11	Foreign Reference	FR1_CN202334692U.pdf	3892374 c2b36420b50e6b44d5153ba7eea9c88a7c3f1b11	no	11
Warnings:					
Information:					
12	Quick Path Information Disclosure Statement	SB08_0005USC1.pdf	1035616 eab4ebd026993c26d0e9b7b1cf89ee0cb62e3ab2	no	4
Warnings:					
Information:					
13	Fee Worksheet (SB06)	fee-info.pdf	40465 b1e8a5a8e014198598277f464faefd24beaae86e	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	24567222	

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

Doc Code: PET.AUTO Document Description: Petition automatically granted by EFS-Web	PTO/SB/140 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**PETITION TO WITHDRAW AN APPLICATION FROM ISSUE AFTER PAYMENT OF THE ISSUE FEE UNDER 37 CFR 1.313(c)**
Application Number	16852790
Filing Date	20-Apr-2020
First Named Inventor	Koen Beel
Art Unit	2184
Examiner Name	
Attorney Docket Number	21063.0005USC1
Title	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

An application may be withdrawn from issue for further action upon petition by the applicant. To request that the Office withdraw an application from issue, applicant must file a petition under this section including the fee set forth in § 1.17(h) and a showing of good and sufficient reasons why withdrawal of the application from issue is necessary.

APPLICANT HEREBY PETITIONS TO WITHDRAW THIS APPLICATION FROM ISSUE UNDER 37 CFR 1.313(c).

A grantable petition requires the following items:
(1) Petition fee; and
(2) One of the following reasons:
(a) Unpatentability of one or more claims, which must be accompanied by an unequivocal statement that one or more claims are unpatentable, an amendment to such claim or claims, and an explanation as to how the amendment causes such claim or claims to be patentable;
(b) Consideration of a request for continued examination in compliance with § 1.114 (for a utility or plant application only); or
(c) Express abandonment of the application. Such express abandonment may be in favor of a continuing application, but not a CPA under 37 CFR 1.53(d).

Petition Fee

○	Small Entity
○	Micro Entity
◉	Regular Undiscounted

Reason for withdrawal from issue

◯ One or more claims are unpatentable ◉ Consideration of a request for continued examination (RCE) (List of Required Documents and Fees) ◯ Applicant hereby expressly abandons the instant application (any attorney/agent signing for this reason must have power of attorney pursuant to 37 CFR 1.32(b)).
RCE request,submission, and fee. ☐ I certify, in accordance with 37 CFR 1.4(d)(4) that : The RCE request ,submission, and fee have already been filed in the above-identified application on ☒ Are attached.
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 has been given power of attorney in this application. ◯ An attorney or agent registered to practice before the Patent and Trademark Office, acting in a representative capacity. ◯ 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 e-petition

Signature	/Thomas Lee/
Name	Thomas Lee
Registration Number	66396

Doc Code: QPIDS.REQ
Document Description: Quick Path Information Disclosure Statement

PTO/SB/09 (12-16)

CERTIFICATION AND REQUEST FOR CONSIDERATION OF AN INFORMATION DISCLOSURE STATEMENT FILED AFTER PAYMENT OF THE ISSUE FEE UNDER THE QPIDS PILOT PROGRAM

Non-Provisional Application Number: 16/852790	Filing Date: 2020-04-20
First Named Inventor: Koen Simon Herman BEEL	Title of Invention: ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

THE UNDERSIGNED HEREBY CERTIFIES AND REQUESTS THE FOLLOWING FOR THE ABOVE-IDENTIFIED APPLICATION.

1. Consideration is requested of the information disclosure statement (IDS) submitted herewith, which is being filed after payment of the issue fee.
2. Check the box next to the appropriate selection:

   ☑ Each item of information contained in the IDS 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 IDS. See 37 CFR 1.97(e)(1).

   OR

   ☐ No item of information contained in the IDS 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 IDS was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the IDS. See 37 CFR 1.97(e)(2).

   OR

   ☐ See attached certification statement in compliance with 37 CFR 1.97(e).
3. Please charge the IDS fee set forth in 37 CFR 1.17(p) to Deposit Account No. 503478.
4. A Petition to Withdraw from Issue After Payment of the Issue Fee (37 CFR 1.313(c)(2)), including the petition fee set forth in 37 CFR 1.17(h), is submitted herewith as a **Web-based ePetition**.
   WARNING: Do not submit the petition as a follow-on paper via EFS-Web. Submit the petition as a Web-based ePetition by signing on to EFS-Web as a registered user, selecting the radio button next to "Existing application/patent," and then selecting the radio button next to "ePetition (for automatic processing and immediate grant, if all petitions requirements are met)." Failure to use the Web-based ePetition interface will result in automatic entry of the RCE.
5. A request for continued examination (RCE) under 37 CFR 1.114 and the RCE fee under 37 CFR 1.17(e) are submitted herewith.
6. The RCE will be treated as a "conditional" RCE. In the event the examiner determines that any item of information contained in the IDS necessitates the reopening of prosecution in the application, the undersigned understands that (i) the RCE will be processed and treated as an RCE under 37 CFR 1.114 and therefore (ii) the IDS fee under 37 CFR 1.17(p) will be returned in accordance with 37 CFR 1.97(b)(4). In the event that no item of information in the IDS necessitates reopening prosecution, the undersigned understands that the RCE will not be processed and the RCE fee under 37 CFR 1.17(e) will be returned.
7. This certification and request is being filed as a **Web-based ePetition** and is not accompanied by an amendment to the application. Inclusion of an amendment will result in automatic entry of the RCE.

Signature /Thomas Lee/	Date May 25, 2022
Name (Print/Typed) THOMAS LEE	Practitioner Registration Number (If applicable) 66396

Note: *Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 11.18. Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below.**

☐ *Total of _____ forms are submitted.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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.

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DESCRIPTION CN202334692U

10 A USB digital fax machine with camera

[0001]

14 technical field

[0002]

18 The utility model relates to a facsimile machine, in particular to a USB digital facsimile machine with a camera and a camera.

[0003]

23 Background technique

[0004]

27 At present, fax machines on the market can be divided into paper fax machines and digital fax machines; paper fax machines need to use paper as a medium for sending and receiving, and also need to be equipped with scanners and other equipment, which is costly and consumes a lot of paper.

30 But ordinary digital fax machines have no camera scanning function. If you want to fax documents such as bills and contracts, you need to configure a scanner or other external auxiliary equipment, and you need to have proprietary software on the computer, which is inconvenient to use; and Some digital fax machines use serial ports for data transmission, and the transmission speed is low.

[0005]

37 Utility model content

[0006]

41 In view of the deficiencies of the prior art, the utility model perfectly combines the camera function and the digital fax function. For the handwritten bills, contracts, etc. to be faxed, the camera can scan the fax machine to the computer, and the computer software can simply operate the computer. Send them out in fax format, easy to use.

[0007]

48 In order to achieve the above object, the utility model adopts the following technical solutions:

[0008]

52 A USB digital facsimile machine with a camera, comprising a facsimile device, characterized in that: the facsimile device is provided with a digital camera module, a PC is respectively connected with the digital camera module and the facsimile device, and image data is collected by the digital camera module and processed by the PC Then input it to the fax device for transmission.

[0009]

59 The facsimile device includes an MCU, which is a single-chip microcomputer, and the single-chip computer is communicated and connected with the PC via a USB module.

[0010]

64 The single-chip microcomputer communicates with the Modem chip, and is used for faxing and sending the picture files processed by the PC.

[0011]

69 The digital camera module is connected with the PC via the USB module.

[0012]

73 The HID data communication is between the PC, the digital camera module and the single-chip microcomputer.

[0013]

78 Using the USB digital fax machine with camera after the above scheme is adopted, the data to be faxed is placed under the digital camera of the fax machine, the camera collects image data and transmits it to the computer

through the USB cable, and the user automatically converts the image to be faxed through the computer software. It is the file format of facsimile, and the data is transmitted to the facsimile equipment through the USB cable, and the facsimile equipment automatically transmits the data; the utility model perfectly combines the camera function and the digital facsimile function, and is suitable for faxing handwritten bills, contracts, etc. , Scan to the computer through the camera of the fax machine, and send them in the format of fax through the simple operation of the computer software, which is easy to use and flexible to operate; the communication interface adopts the USB HID protocol to improve reliability and compatibility.

[0014]

90 Description of drawings

[0015]

94 Figure 1 is a schematic diagram of the present invention.

[0016]

98 Detailed ways

[0017]

102 The utility model is further described in detail below in conjunction with the accompanying drawings:

[0018]

106 A USB digital fax machine with a camera as shown in Figure 1; it mainly includes a fax device and a digital camera module. The fax device includes a single-chip microcomputer and a Modem chip. Buttons and status control of LED indicators and buzzer.

[0019]

112 The PC is connected to the digital camera module and the fax device respectively, and after the image data is collected by the digital camera module and processed by the PC, it is input to the fax device and then transmitted through the fax device.

115 The digital camera module and the single-chip microcomputer are connected with the PC through the USB module; the data communication protocol of HID is adopted.

117 The function of the digital camera module is to transmit the image information of the data to be faxed to the PC through the USB chip.

119 After the image is processed by the PC, it is transmitted to the single-chip microcomputer in the form of fax data; the single-chip computer communicates with the Modem module, transmits the data to the Modem chip, and transmits the data through the telephone line.

[0020]

125 When the USB digital fax machine with camera is working, put the data to be faxed under the digital camera of the fax machine, the camera collects the image data and transmits it to the computer through the USB cable, and the user automatically converts the image to be faxed into the fax through the computer software. The file format, through the USB cable, the data is transmitted to the fax device, and the fax device automatically transmits the data.

[0021]

133 Because the USB of the utility model adopts the HID protocol, the driver of the host computer is provided by the system, and there is no need to write the driver program by itself, the transmission speed is fast, and the compatibility is strong.

136 The faxes sent and received by the digital fax machine are stored in the Flash chip of the fax machine, which can save paper, and the office cost is much lower than that of a paper fax machine, which can realize a paperless office.

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CLAIMS CN202334692U

1.

13 A USB digital facsimile machine with a camera, comprising a facsimile device, characterized in that: a digital camera module is arranged on the facsimile device, a PC is respectively connected with the digital camera module and the facsimile device, and image data is collected by the digital camera module and processed by the PC Then input it to the fax device for transmission.

2.

20 The USB digital facsimile machine with camera according to claim 1, wherein the facsimile device comprises an MCU, the MCU is a single-chip microcomputer, and the single-chip microcomputer is communicated and connected with the PC via the USB module.

3.

26 The USB digital facsimile machine with camera according to claim 2, characterized in that: the single-chip microcomputer is connected to the Modem chip for communication, and is used to send the picture file processed by the PC by fax.

4.

32 A USB digital fax machine with a camera according to claim 1, wherein the digital camera module is connected to the PC via a USB module.

5.

37 The USB digital facsimile machine with camera according to claim 1, characterized in that: HID data

communication is between the PC, the digital camera module and the single-chip microcomputer.

(19)中华人民共和国国家知识产权局

(12)实用新型专利

(10)授权公告号 CN 202334692 U
(45)授权公告日 2012.07.11

(21)申请号 201120491716.8

(22)申请日 2011.12.01

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(51)Int.Cl.
H04N 1/00(2006.01)
H04N 1/32(2006.01)
H04N 5/225(2006.01)

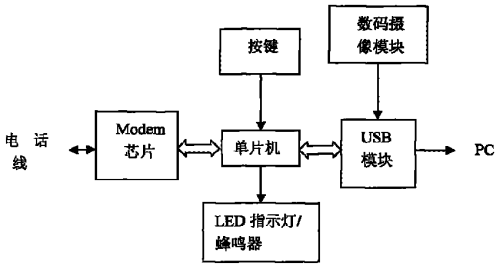
权利要求书 1 页 说明书 2 页 附图 1 页

(54)实用新型名称

一种带摄像头的 USB 数码传真机

(57)摘要

本实用新型公开了一种带摄像头的 USB 数码传真机，包括一传真设备，该传真设备上设置一数码摄像模块，PC 分别与数码摄像模块和传真设备连接，由数码摄像模块采集图像数据经 PC 处理后输入至传真设备传送；本实用新型把摄像功能和数码传真功能完美的结合起来，对于要传真手写的票据，合同等，通过传真机的摄像头扫描到电脑，通过电脑软件的简单操作，就可以把他们以传真的格式发出去，使用简单，操作灵活。通信接口采用 USB HID 协议，提高可靠性和兼容性。



CN 202334692 U

1. 一种带摄像头的USB数码传真机，包括一传真设备，其特征在于：该传真设备上设置一数码摄像模块，PC分别与数码摄像模块和传真设备连接，由数码摄像模块采集图像数据经PC处理后输入至传真设备传送。

2. 根据权利要求1所述的一种带摄像头的USB数码传真机，其特征在于：所述的传真设备包括……MCU，该MCU为……单片机，单片机经USB模块与PC通信连接。

3. 根据权利要求2所述的一种带摄像头的USB数码传真机，其特征在于：所述的单片机与Modem芯片进行通信连接，用以传真发送PC处理的图片文件。

4. 根据权利要求1所述的一种带摄像头的USB数码传真机，其特征在于：所述的数码摄像模块经USB模块与PC连接。

5. 根据权利要求1所述的一种带摄像头的USB数码传真机，其特征在于：所述的PC与数码摄像模块和单片机之间为HID数据通信。

一种带摄像头的 USB 数码传真机

技术领域

[0001] 本实用新型涉及传真机，尤其涉及的是一种兼具摄像功能的带摄像头的 USB 数码传真机。

背景技术

[0002] 目前，市场上的传真机可分为纸质传真机和数码传真机；纸质传真机收发都要以纸为媒介，还需要配备扫描仪等设备，成本高，纸张消耗大。但普通的数码传真机没有摄像扫描功能，如果要传真票据和合同等资料，还需要配置扫描仪或其他的外置辅助设备，电脑上还要有专有软件处理，这样使用不方便；还有一些数码传真机采用串口进行数据传输，传输速度低。

实用新型内容

[0003] 针对现有技术的不足，本实用新型把摄像功能和数码传真功能完美的结合起来，对于要传真手写的票据，合同等，通过传真机的摄像头扫描到电脑，通过电脑软件的简单操作，就可以把他们以传真的格式发出去，使用简单。

[0004] 为了实现上述目的，本实用新型采用以下技术方案：

[0005] 一种带摄像头的 USB 数码传真机，包括一传真设备，其特征在于：该传真设备上设置一数码摄像模块，PC 分别与数码摄像模块和传真设备连接，由数码摄像模块采集图像数据经 PC 处理后输入至传真设备传送。

[0006] 所述的传真设备包括一 MCU，该 MCU 为一单片机，单片机经 USB 模块与 PC 通信连接。

[0007] 所述的单片机与 Modem 芯片进行通信连接，用以传真发送 PC 处理的图片文件。

[0008] 数码摄像模块经 USB 模块与 PC 连接。

[0009] 所述的 PC 与数码摄像模块和单片机之间为 HID 数据通信。

[0010] 采用上述方案后的带摄像头的 USB 数码传真机，把要传真的资料放在传真机的数码摄像头下，摄像头采集图像数据并通过 USB 线传给电脑，用户通过电脑软件自动把要传真的图像转化为传真的文件格式，通过 USB 线，把资料传给传真设备，由传真设备自动把资料传输出去；本实用新型把摄像功能和数码传真功能完美的结合起来，对于要传真手写的票据，合同等，通过传真机的摄像头扫描到电脑，通过电脑软件的简单操作，就可以把他们以传真的格式发出去，使用简单，操作灵活；通信接口采用 USB HID 协议，提高可靠性和兼容性。

附图说明

[0011] 图 1 是本实用新型的原理图。

具体实施方式

[0012] 下面结合附图对本实用新型进一步的详细说明：

[0013] 如图1的一种带摄像头的USB数码传真机；主要包括传真设备和数码摄像模块，传真设备包括一单片机和Modem芯片，单片机和Modem芯片进行通信，用以管理传真的收发和存储，并处理按键和LED指示灯和蜂鸣器的状态控制。

[0014] 利用PC分别与数码摄像模块和传真设备连接，经由数码摄像模块采集图像数据经过PC的处理后，输入传真设备再过经传真设备传送。数码摄像模块和单片机经USB模块与PC连接；采用HID的数据通信协议。其中的数码摄像模块的功能是把要传真的资料的图像信息通过USB芯片传给PC机。由PC机把图像处理后，以传真的数据格式传给单片机；单片机与Modem模块进行通信，把数据传给Modem芯片，通过电话线把数据传出去。

[0015] 带摄像头的USB数码传真机工作时，把要传真的资料放在传真机的数码摄像头下，摄像头采集图像数据并通过USB线传给电脑，用户通过电脑软件自动把要传真的图像转化为传真的文件格式，通过USB线，把资料传给传真设备，由传真设备自动把资料传输出去。

[0016] 由于本实用新型的USB采用HID协议，上位机的驱动是系统自带的，不用自己写驱动程序，传输速度快，兼容性强。数码传真机收发传真都保存到传真机的Flash芯片中，可以节约纸张，办公成本比纸式传真机低很多，可以实现办公无纸化。

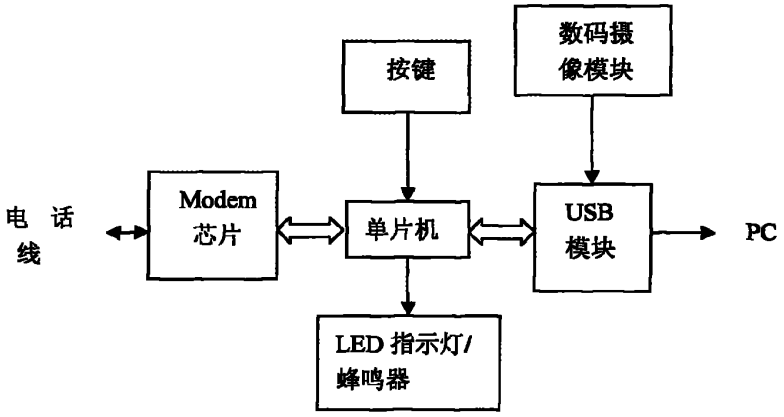


图 1



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Sale Adjustment Accounting Date:05/18/2022

Effective Date	Sale Accounting Date	Sale Item Reference Number
04/05/2022	05/18/2022	16852790

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20225HA31130834	1820	RCE- 2ND AND SUBSEQUENT REQUEST	$2,000.00	DA



United States Patent and Trademark Office

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Refund Accounting Date:05/18/2022

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I20225HA31130834	1820	RCE- 2ND AND SUBSEQUENT REQUEST	$2,000.00	DA	503478

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/852,790	04/20/2020	Koen Simon Herman Beel	21063.0005USC1	5321

52835 7590 05/11/2022

HAMRE, SCHUMANN, MUELLER & LARSON, P.C.
45 South Seventh Street
Suite 2700
Minneapolis, MN 55402-1683

EXAMINER	
BARTELS, CHRISTOPHER A.	

ART UNIT	PAPER NUMBER
2184	

NOTIFICATION DATE	DELIVERY MODE
05/11/2022	ELECTRONIC

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

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

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

PTOMail@hsml.com

Corrected ***Notice of Allowability***	**Application No.** 16/852,790	**Applicant(s)** Beel et al.	
	Examiner CHRISTOPHER A BARTELS	**Art Unit** 2184	**AIA (FITF) 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 04/05/2022.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

3. ☑ The allowed claim(s) is/are 82-101 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

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

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 04/05/2022.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/C.A.B/ Examiner, Art Unit 2184	/HENRY TSAI/ Supervisory Patent Examiner, Art Unit 2184

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	2	"20130198311"	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/24 11:21 PM
L2	3	"16844995"	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/25 09:50 AM
L3	1	"15931825"	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/25 05:51 PM
L4	1	"17061357"	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/26 02:00 PM
L5	106	("20100066806" "20070206088" "20040012669" "2010079783" "20050036509" "2006010116" "5601067" "7584313" "7762470" "8069465" "8327410" "8521926" "8601470" "8717599" "889656" "20030120849" "20060233191" "20070162661" "20080088634" "20080182518" "20090023475" "20090029647" "20090251621" "20100022274" "20100077021" "20100091987" "20100115145" "20100154014" "20100297964" "20100309896" "2011001047" "20110010607" "20110038005" "20110210983" "20110179182" "2005015719" "20090092198" "20050122392" "2009300520" "20120054372" "20090189981" "20110188391" "20100064063" "20110092198" "20060010116" "20070168481" "20020054044" "5966035" "5316138"	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/26 07:52 PM

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L6	73	L5 AND (HID human near2 (interface device) keyboard mouse key ADJ board pointer monitor$3) WITH	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/26 08:23 PM

		(resolution display$3 user near2 interface gui graphics operat$3 ADJ system)					
L7	53	("20080088634"|"20100022274"|"20110210983"|"7762470"|"8601470"|"20070033289"|"20130060662"|"20030120849"|"20050015719"|"20100064063"|"20100154014"|"20110179182"|"8521926"|"20040012669"|"7450149"|"20060080707"|"7853535"|"20090029647"|"20090251621"|"20110010470"|"20110010607"|"20120054372"|"7584313"|"8069465"|"20060101116"|"20090189981"|"20100297964"|"20110188391"|"20070168481"|"20110222556"|"20070162661"|"20080182518"|"20090092198"|"20100115145"|"20100309896"|"20100079783"|"20100149206"|"20090023475"|"20090300520"|"20110038005"|"8327410"|"20040012669"|"20070206088"|"7908401"|"20110092198"|"6601087"|"8896656"|"20020054044"|"20050122392"|"20060233191"|"20100077021"|"20100091987"|"8717599"|"20090247006").PN.	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/27 04:58 PM
L8	60	L5 NOT L7	(US-PGPUB; USPAT)	OR	ON	ON	2022/04/27 04:58 PM
L9	1	"15931825"	(US-PGPUB; USPAT)	OR	ON	ON	2022/05/01 10:06 PM
L10	2	"20120069034"	(US-PGPUB; USPAT)	OR	ON	ON	2022/05/01 10:11 PM

PE2E SEARCH - Search History (Interference)

There are no Interference searches to show.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-22)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16852790
Filing Date	2020-04-20
First Named Inventor	Koen Simon Herman BEEL
Art Unit	2184
Examiner Name	BARTELS, CHRISTOPHER A.
Attorney Docket Number	21063.0005USC1

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.A.B/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16852790
	Filing Date	2020-04-20
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	BARTELS, CHRISTOPHER A.
	Attorney Docket Number	21063.0005USC1

/C.A.B/	1	Office Action issued in the related U.S. Patent Application No. 16/990215, March 31, 2022, 89 pages	

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EXAMINER SIGNATURE

Examiner Signature	/CHRISTOPHER A BARTELS/	Date Considered	05/05/2022

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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	16852790
	Filing Date	2020-04-20
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	BARTELS, CHRISTOPHER A.
	Attorney Docket Number	21063.0005USC1

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).

X See attached certification statement.

X 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	/Thomas Lee/	Date (YYYY-MM-DD)	2022-04-05
Name/Print	Thomas Lee	Registration Number	66396

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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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 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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.A.B/

United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :75381

Sale Accounting Date:04/07/2022

Sale Item Reference Number	Effective Date
16852790	04/05/2022

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I202247635382177	1806	SUBMISSION- INFORMATION DISCLOSURE STMT	$260.00	Deposit Account

PATENT TERM ADJUSTMENT STATEMENT UNDER 37 CFR 1.704(d)

Application Number	16852790
Filing Date	2020-04-20
First Named Inventor	Koen Simon Herman BEEL
Art Unit	2184
Examiner Name	BARTELS, CHRISTOPHER A.
Practitioner Docket No.	21063.0005USC1

APPLICANT HEREBY STATES THE FOLLOWING (please review 37 CFR 1.704(d) before filing this form):

☐ Each item of information contained in the information disclosure statement was first cited in any communication from a patent office in a counterpart foreign or international application or from the Office, and this communication was not received by any individual designated in 37 CFR 1.56(c) more than thirty days prior to the filing of the information disclosure statement.

AND/OR

☒ Each item of information contained in the information disclosure statement is a communication that was issued by a patent office in a counterpart foreign or international application or by the Office, and this communication was not received by any individual designated in 37 CFR 1.56(c) more than thirty days prior to the filing of the information disclosure statement.

INSTRUCTIONS:

- **This form will not satisfy the requirement of 37 CFR 1.97(e).** The present statement is filed under 37 CFR 1.704(d) and will not substitute for compliance with any of the requirements of 37 CFR 1.97 and 1.98. For an information disclosure statement to comply with 37 CFR 1.97(c) or (d), the information disclosure statement must be accompanied by a statement under 37 CFR 1.97(e) notwithstanding any statement filed under 37 CFR 1.704(d).
- The present form (PTO/SB/133) should be filed concurrently with the information disclosure statement to derive benefit under 37 CFR 1.704(d).

Signature	/Thomas Lee/	Date	2022-04-05
Typed or Printed Name	Thomas Lee	Practitioner Registration Number	66396

***Note**: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 11.18. Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below*.*

☐ *Total of _____ forms are submitted.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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.

Electronic Patent Application Fee Transmittal

Application Number:	16852790
Filing Date:	20-Apr-2020
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman Beel
Filer:	Thomas Lee
Attorney Docket Number:	21063.0005USC1

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
PETITION FEE- 37 CFR 1.17(H) (GROUP III)	1464	1	140	140
RCE- 2ND AND SUBSEQUENT REQUEST	1820	1	2000	2000
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**2140**



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Decision Date : April 5, 2022

In re Application of :

Koen Simon Herman Beel

DECISION ON PETITION
UNDER CFR 1.313(c)(2)

Application No : 16852790

Filed : 20-Apr-2020

Attorney Docket No : 21063.0005USC1

This is an electronic decision on the petition under 37 CFR 1.313(c)(2), filed April 5, 2022 , to withdraw the above-identified application from issue after payment of the issue fee.

The petition is **GRANTED.**

The above-identified application is withdrawn from issue for consideration of a submission under 37 CFR 1.114 (request for continued examination). See 37 CFR 1.313(c)(2).

Petitioner is advised that the issue fee paid in this application cannot be refunded. If, however, this application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.

Telephone inquiries concerning this decision should be directed to the Patent Electronic Business Center (EBC) at 866-217-9197.

This application file is being referred to Technology Center AU 2184 for processing of the request for continuing examination under 37 CFR 1.114 .

Office of Petitions

Electronic Acknowledgement Receipt	
EFS ID:	45402246
Application Number:	16852790
International Application Number:	
Confirmation Number:	5321
Title of Invention:	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS
First Named Inventor/Applicant Name:	Koen Simon Herman Beel
Customer Number:	52835
Filer:	Thomas Lee
Filer Authorized By:	
Attorney Docket Number:	21063.0005USC1
Receipt Date:	05-APR-2022
Filing Date:	20-APR-2020
Time Stamp:	17:33:59
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$2140
RAM confirmation Number	E202245H33542605
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	ePetition Request Form	petition-request.pdf	39850 57d0a1c6207ba26d062db61fa0c3fed4529bb1cf	no	2
Warnings:					
Information:					
2	Quick Path Information Disclosure Statement	QPIDS_0005USC1.pdf	196670 7215555291e778b3de5177e0d7f91f615a7e9b7f	no	2
Warnings:					
Information:					
3	Request for Continued Examination (RCE)	RCE_0005USC1.pdf	1349997 31aaa6bfeb28dcf1c10716f6953a211ff6f12ef6	no	3
Warnings:					
Information:					
4	Information Disclosure Statement (IDS) Form (SB08)	IDS_US_Form_SB08_0005USC1.pdf	1263303 6895f25a15c96d1d00401198e413b64c72e19e1d	no	4
Warnings:					
Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
5	Non Patent Literature	OA_US16990215_210630004USC4.pdf	5229319 6197f3ed9114eb6772573965ae9e68337a102a92	no	89
Warnings:					
Information:					

6	Quick Path Information Disclosure Statement	30-Day_Statement_0005USC1.pdf	293084 effee7e707ae67bc3486131af3fd31de27c48d49	no	2
Warnings:					
Information:					
7	Fee Worksheet (SB06)	fee-info.pdf	40465 08c250ff4289c087cb32ea7a745d68813f66c8ee	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	8412688	

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

Doc Code: PET.AUTO Document Description: Petition automatically granted by EFS-Web	PTO/SB/140 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**PETITION TO WITHDRAW AN APPLICATION FROM ISSUE AFTER PAYMENT OF THE ISSUE FEE UNDER 37 CFR 1.313(c)**
Application Number	16852790
Filing Date	20-Apr-2020
First Named Inventor	Koen Beel
Art Unit	2184
Examiner Name	
Attorney Docket Number	21063.0005USC1
Title	ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

An application may be withdrawn from issue for further action upon petition by the applicant. To request that the Office withdraw an application from issue, applicant must file a petition under this section including the fee set forth in § 1.17(h) and a showing of good and sufficient reasons why withdrawal of the application from issue is necessary.

APPLICANT HEREBY PETITIONS TO WITHDRAW THIS APPLICATION FROM ISSUE UNDER 37 CFR 1.313(c).

A grantable petition requires the following items:
(1) Petition fee; and
(2) One of the following reasons:
(a) Unpatentability of one or more claims, which must be accompanied by an unequivocal statement that one or more claims are unpatentable, an amendment to such claim or claims, and an explanation as to how the amendment causes such claim or claims to be patentable;
(b) Consideration of a request for continued examination in compliance with § 1.114 (for a utility or plant application only); or
(c) Express abandonment of the application. Such express abandonment may be in favor of a continuing application, but not a CPA under 37 CFR 1.53(d).

Petition Fee

○	Small Entity
○	Micro Entity
◉	Regular Undiscounted

Reason for withdrawal from issue

◯ One or more claims are unpatentable ◉ Consideration of a request for continued examination (RCE) (List of Required Documents and Fees) ◯ Applicant hereby expressly abandons the instant application (any attorney/agent signing for this reason must have power of attorney pursuant to 37 CFR 1.32(b)).
RCE request,submission, and fee. ☐ I certify, in accordance with 37 CFR 1.4(d)(4) that : The RCE request ,submission, and fee have already been filed in the above-identified application on ☒ Are attached.
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 has been given power of attorney in this application. ◯ An attorney or agent registered to practice before the Patent and Trademark Office, acting in a representative capacity. ◯ 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 e-petition

Signature	/Thomas Lee/
Name	Thomas Lee
Registration Number	66396

Doc Code: QPIDS.REQ
Document Description: QuickPath Information Disclosure Statement

PTO/SB/09 (09-18)

CERTIFICATION AND REQUEST FOR CONSIDERATION OF AN INFORMATION DISCLOSURE STATEMENT FILED AFTER PAYMENT OF THE ISSUE FEE UNDER THE QPIDS PROGRAM

Non-Provisional Application Number: 16/852790	Filing Date: 2020-04-20
First Named Inventor: Koen Simon Herman BEEL	Title of Invention: ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

THE UNDERSIGNED HEREBY CERTIFIES AND REQUESTS THE FOLLOWING FOR THE ABOVE-IDENTIFIED APPLICATION.

1. Consideration is requested of the information disclosure statement (IDS) submitted herewith, which is being filed after payment of the issue fee.
2. Check the box next to the appropriate selection:

   ☐ Each item of information contained in the IDS 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 IDS. See 37 CFR 1.97(e)(1).

   OR

   ☑ No item of information contained in the IDS 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 IDS was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the IDS. See 37 CFR 1.97(e)(2).

   OR

   ☐ See attached certification statement in compliance with 37 CFR 1.97(e).
3. Please charge the IDS fee set forth in 37 CFR 1.17(p) to Deposit Account No. 503478.
4. A Petition to Withdraw from Issue After Payment of the Issue Fee (37 CFR 1.313(c)(2)), including the petition fee set forth in 37 CFR 1.17(h), is submitted herewith as a **Web-based ePetition**. **WARNING:** Do not submit the petition as a follow-on paper via EFS-Web. Submit the petition as a Web-based ePetition by signing on to EFS-Web as a registered user, selecting the radio button next to "Existing application/patent," and then selecting the radio button next to "ePetition (for automatic processing and immediate grant, if all petitions requirements are met)." Failure to use the Web-based ePetition interface will result in automatic entry of the RCE.
5. A request for continued examination (RCE) under 37 CFR 1.114 and the RCE fee under 37 CFR 1.17(e) are submitted herewith.
6. The RCE will be treated as a "conditional" RCE. In the event the examiner determines that any item of information contained in the IDS necessitates the reopening of prosecution in the application, the undersigned understands that (i) the RCE will be processed and treated as an RCE under 37 CFR 1.114 and therefore (ii) the IDS fee under 37 CFR 1.17(p) will be returned in accordance with 37 CFR 1.97(b)(4). In the event that no item of information in the IDS necessitates reopening prosecution, the undersigned understands that the RCE will not be processed and the RCE fee under 37 CFR 1.17(e) will be returned.
7. This certification and request is being filed as a **Web-based ePetition** and is not accompanied by an amendment to the application. Inclusion of an amendment will result in automatic entry of the RCE.

Signature /Thomas Lee/	Date April 5, 2022
Name (Print/Typed) Thomas Lee	Practitioner Registration Number (If applicable) 66396

Note: *Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 11.18. Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below.**

☐ *Total of _____ forms are submitted.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

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

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

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

PTO/SB/08a (01-22)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16852790
Filing Date	2020-04-20
First Named Inventor	Koen Simon Herman BEEL
Art Unit	2184
Examiner Name	BARTELS, CHRISTOPHER A.
Attorney Docket Number	21063.0005USC1

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					

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

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							

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

NON-PATENT LITERATURE DOCUMENTS Remove

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]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16852790
	Filing Date	2020-04-20
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	BARTELS, CHRISTOPHER A.
	Attorney Docket Number	21063.0005USC1

	1	Office Action issued in the related U.S. Patent Application No. 16/990215, March 31, 2022, 89 pages	

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[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	16852790
	Filing Date	2020-04-20
	First Named Inventor	Koen Simon Herman BEEL
	Art Unit	2184
	Examiner Name	BARTELS, CHRISTOPHER A.
	Attorney Docket Number	21063.0005USC1

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	/Thomas Lee/	Date (YYYY-MM-DD)	2022-04-05
Name/Print	Thomas Lee	Registration Number	66396

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.**

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.

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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 record s.

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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.

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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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United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :C46472

Sale Adjustment Accounting Date:04/04/2022

Effective Date	Sale Accounting Date	Sale Item Reference Number
03/17/2022	04/04/2022	16852790

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I202244B28371094	1801	RCE- 1ST REQUEST	$1,360.00	DA



United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :C46472

Refund Accounting Date:04/04/2022

Effective Date	Sale Item Reference Number	Refund Total
03/17/2022	16852790	$1,360.00

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method	Account Number
I202244B28371094	1801	RCE- 1ST REQUEST	$1,360.00	DA	503478

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.
16/852,790	04/20/2020	Koen Simon Herman Beel	21063.0005USC1	5321

52835 7590 03/31/2022

HAMRE, SCHUMANN, MUELLER & LARSON, P.C.
45 South Seventh Street
Suite 2700
Minneapolis, MN 55402-1683

EXAMINER	
BARTELS, CHRISTOPHER A.	

ART UNIT	PAPER NUMBER
2184	

NOTIFICATION DATE	DELIVERY MODE
03/31/2022	ELECTRONIC

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

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

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

PTOMail@hsml.com

Corrected ***Notice of Allowability***	**Application No.** 16/852,790	**Applicant(s)** Beel et al.	
	Examiner CHRISTOPHER A BARTELS	**Art Unit** 2184	**AIA (FITF) 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 03/17/2022.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

3. ☑ The allowed claim(s) is/are 82-101 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

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

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 03/17/2022.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/C.A.B/ Examiner, Art Unit 2184	/HENRY TSAI/ Supervisory Patent Examiner, Art Unit 2184

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-22)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16852790
Filing Date	2020-04-20
First Named Inventor	BEEL
Art Unit	2184
Examiner Name	BARTELS
Attorney Docket Number	21063.0005USC1

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
/C.A.B/	1	5897644	A	1999-04-27	Nielsen	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	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]
/C.A.B/	1	2004112638	JP	A	2004-04-08		With English machine translation	☒
/C.A.B/	2	H07123384	JP	A	1995-05-12		With English machine translation	☒
/C.A.B/	3	101009806	CN	A	2007-08-01		With English machine translation	☒

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.A.B/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16852790
	Filing Date	2020-04-20
	First Named Inventor	BEEL
	Art Unit	2184
	Examiner Name	BARTELS
	Attorney Docket Number	21063.0005USC1

/C.A.B/	4	101542459	CN	A	2009-09-23		With English machine translation	☒
/C.A.B/	5	101729850	CN	A	2010-06-09		With English machine translation	☒

If you wish to add additional Foreign Patent Document citation information please click the Add button [Add]

NON-PATENT LITERATURE DOCUMENTS [Remove]

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]
/C.A.B/	1	Foley et al., "Computer Graphics, Principles and Practice Second Edition in C", 1996, with English translation	X

If you wish to add additional non-patent literature document citation information please click the Add button [Add]

EXAMINER SIGNATURE

Examiner Signature	/CHRISTOPHER A BARTELS/	Date Considered	03/26/2022

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.A.B/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16852790
	Filing Date	2020-04-20
	First Named Inventor	BEEL
	Art Unit	2184
	Examiner Name	BARTELS
	Attorney Docket Number	21063.0005USC1

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	/Thomas Lee/	Date (YYYY-MM-DD)	2022-03-17
Name/Print	Thomas Lee	Registration Number	66396

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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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.A.B/



United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :75381

Sale Accounting Date:03/21/2022

Sale Item Reference Number	Effective Date
16852790	03/17/2022

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20223KC55170914	1806	SUBMISSION- INFORMATION DISCLOSURE STMT	$260.00	Deposit Account

Doc Code: QPIDS.REQ
Document Description: Quick Path Information Disclosure Statement

PTO/SB/09 (12-16)

CERTIFICATION AND REQUEST FOR CONSIDERATION OF AN INFORMATION DISCLOSURE STATEMENT FILED AFTER PAYMENT OF THE ISSUE FEE UNDER THE QPIDS PILOT PROGRAM

Non-Provisional Application Number: 16/852790	Filing Date: 2020-04-20
First Named Inventor: Koen Simon Herman BEEL	Title of Invention: ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS

THE UNDERSIGNED HEREBY CERTIFIES AND REQUESTS THE FOLLOWING FOR THE ABOVE-IDENTIFIED APPLICATION.

1. Consideration is requested of the information disclosure statement (IDS) submitted herewith, which is being filed after payment of the issue fee.
2. Check the box next to the appropriate selection:

   ☑ Each item of information contained in the IDS 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 IDS. See 37 CFR 1.97(e)(1).

   OR

   ☐ No item of information contained in the IDS 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 IDS was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the IDS. See 37 CFR 1.97(e)(2).

   OR

   ☐ See attached certification statement in compliance with 37 CFR 1.97(e).
3. Please charge the IDS fee set forth in 37 CFR 1.17(p) to Deposit Account No. 503478.
4. A Petition to Withdraw from Issue After Payment of the Issue Fee (37 CFR 1.313(c)(2)), including the petition fee set forth in 37 CFR 1.17(h), is submitted herewith as a **Web-based ePetition**.
   WARNING: Do not submit the petition as a follow-on paper via EFS-Web. Submit the petition as a Web-based ePetition by signing on to EFS-Web as a registered user, selecting the radio button next to "Existing application/patent," and then selecting the radio button next to "ePetition (for automatic processing and immediate grant, if all petitions requirements are met)." Failure to use the Web-based ePetition interface will result in automatic entry of the RCE.
5. A request for continued examination (RCE) under 37 CFR 1.114 and the RCE fee under 37 CFR 1.17(e) are submitted herewith.
6. The RCE will be treated as a "conditional" RCE. In the event the examiner determines that any item of information contained in the IDS necessitates the reopening of prosecution in the application, the undersigned understands that (i) the RCE will be processed and treated as an RCE under 37 CFR 1.114 and therefore (ii) the IDS fee under 37 CFR 1.17(p) will be returned in accordance with 37 CFR 1.97(b)(4). In the event that no item of information in the IDS necessitates reopening prosecution, the undersigned understands that the RCE will not be processed and the RCE fee under 37 CFR 1.17(e) will be returned.
7. This certification and request is being filed as a **Web-based ePetition** and is not accompanied by an amendment to the application. Inclusion of an amendment will result in automatic entry of the RCE.

Signature /Thomas Lee/	Date March 17, 2022
Name (Print/Typed) THOMAS LEE	Practitioner Registration Number (If applicable) 66396

Note: *Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 11.18. Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below.**

☐ *Total of _____ forms are submitted.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

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PTO/SB/08a (01-22)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

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

Application Number	16852790
Filing Date	2020-04-20
First Named Inventor	BEEL
Art Unit	2184
Examiner Name	BARTELS
Attorney Docket Number	21063.0005USC1

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	5897644	A	1999-04-27	Nielsen	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	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	2004112638	JP	A	2004-04-08		With English machine translation	☓
	2	H07123384	JP	A	1995-05-12		With English machine translation	☒
	3	101009806	CN	A	2007-08-01		With English machine translation	☒

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16852790
	Filing Date	2020-04-20
	First Named Inventor	BEEL
	Art Unit	2184
	Examiner Name	BARTELS
	Attorney Docket Number	21063.0005USC1

	4	101542459	CN	A	2009-09-23		With English machine translation	☒
	5	101729850	CN	A	2010-06-09		With English machine translation	☒

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	Application Number	16852790
	Filing Date	2020-04-20
	First Named Inventor	BEEL
	Art Unit	2184
	Examiner Name	BARTELS
	Attorney Docket Number	21063.0005USC1

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

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

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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	/Thomas Lee/	Date (YYYY-MM-DD)	2022-03-17
Name/Print	Thomas Lee	Registration Number	66396

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ABSTRACT JP2004112638A

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13 PROBLEM TO BE SOLVED: To provide a conference recording method, an apparatus and a program capable of efficiently recording a conference situation as conference information and effectively using the recorded conference information. SOLUTION: An image taken by a camera 2, a material displayed on a projector 4, an image written on an electronic whiteboard 5 and the like are distributed to a client 6 as conference information, and conference information to be recorded based on the viewing rate is distributed. At the same time, when an event such as a statement or writing to the electronic whiteboard 5 occurs in the conference, the event is detected and the conference information corresponding to the event is selected and recorded for a certain period of time. [Selection diagram] Fig. 1

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DESCRIPTION JP2004112638A

10 Meeting recording method and equipment and program

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14 The present invention relates to a conference recording method, an apparatus, and a program, and more particularly to a conference recording method, an apparatus, and a program, which records conference information such as a video of a conference situation in chronological order. .. In recent years, as a method other than saving the minutes of a meeting or the like as a document, the video or audio of the meeting has been recorded and saved. Some techniques for recording the video and audio of a meeting not only record and save the video taken by the camera, but also guarantee that the recording is authentic (for example, patent documents). 1). On the other hand, as a technique for recording a highly useful image when there are a plurality of cameras or the like for photographing, the technique described in the specification of Japanese Patent Application No. 2001-287740 filed by the applicant of the present application is used. be. This technology acquires the selected state of each video when selecting an arbitrary part of a plurality of videos or one video and distributing it as one video that can be viewed, and based on this selected state, each video The audience rating is calculated, and a plurality of images are sequentially rearranged and edited based on the calculated audience rating to generate an image for recording. Japanese Patent Application Laid-Open No. 2001-309366 [0005] [Problems to be Solved by the Invention] However, the technique described in the specification of Japanese Patent Application Laid-Open No. 2001-287740 is applied to the record of the conference. If you try, the image quality may deteriorate because the presentation materials displayed on the projector or large display and the information written on the whiteboard will be shot and recorded once with the camera. Be done. Therefore, an object of the present invention is to provide a conference recording method, an apparatus, and a program capable of efficiently recording the conference situation as conference information and effectively using the recorded conference information. [Means for Solving the Problems] In order to achieve the above-mentioned object, the invention of

claim 1 is selected in a conference recording method for recording a plurality of conference information including at least an image of a conference situation. A plurality of conference participants are allowed to view a possible conference information group, and the audience rate of each conference information of the conference information group is calculated based on the selection by each of the plurality of conference participants, and the calculated audience rate is used. Based on this, one conference information is selected from the conference information group and recorded, and when a predetermined event occurs in the conference, the conference information corresponding to the event is recorded among the conference information of the conference information group. It is characterized by selecting and recording for a certain period of time.

48 Further, in the invention of claim 2, the event is a remark by a conference participant of the conference, and the conference information obtained by photographing the conference participant who made the remark is constant. It is characterized by selecting a time and recording. Further, in the invention of claim 3, the event is the designation of the conference information by the administrator who manages the conference, and is designated by the administrator from the conference information group. It is characterized in that the conference information is selected and recorded for a certain period of time. Further, in the invention of claim 4, the conference information group includes electronic data of the presentation material presented at the conference, and the event is the presentation content of the presentation material. It is characterized by the change of. Further, in the invention of claim 5, the conference information group includes electronic data of an image written on an electronic whiteboard used in the conference, and the event is described in the event. It is characterized by executing writing to the electronic whiteboard. The invention of claim 6 is characterized in that, in the invention of claim 1, the conference information selected from the conference information group is recorded in association with each conference information of the conference information group. The invention according to claim 7 is a conference recording device for recording a plurality of conference information including at least an image of a conference situation, and a conference that distributes a selectable conference information group to a plurality of conference participants. The information distribution means, the selection information acquisition means for acquiring the selection information of the conference information selected by the conference participant among the conference information of the conference information group distributed by the conference information distribution means, and the selection information acquisition means. Based on the acquired selection information, the audience rate calculation means for calculating the audience rate of each conference information in the conference information group, the event detection means for detecting a predetermined event in the conference, and the audience rate calculation means calculated. When one conference information is selected and recorded from the conference information group based on the viewing rate and the event detecting means detects the event, the event among the conference information of the conference information group is described. It is characterized by providing a conference information recording means for selecting and recording conference information corresponding to the above for a certain period of time. Further, in the invention of claim 8, the event detecting means detects the

remarks made by the conference participants of the conference as the event, and the conference information recording means is the preceding. It is characterized in that conference information obtained by photographing a conference participant who made a statement detected by the event detection means is selected and recorded for a certain period of time.

85 Further, in the invention of claim 9, the event detecting means detects the designation of the conference information by the administrator who manages the conference as the event, and records the conference information. The means is characterized in that conference information designated by the administrator from the conference information group is selected and recorded for a certain period of time. Further, in the invention of claim 10, the conference information group includes electronic data of the presentation material presented at the conference, and the event detecting means is the presentation material of the presentation material. The conference record information recording means detects a change in the presentation content as the event, and is characterized in that electronic data of the presentation material is selected and recorded for a certain period of time. Further, in the invention of claim 11, the conference information group includes electronic data of an image written on an electronic whiteboard used in the conference, and the event detection means. Detects the execution of writing on the electronic whiteboard as the event, and the conference information recording means selects and records the electronic data of the image written on the electronic whiteboard for a certain period of time. .. Further, in the invention of claim 12, the conference information recording means records the conference information selected from the conference information group in association with each conference information of the conference information group. It is characterized by that. Further, the invention of claim 13 is a conference recording program in which a computer executes recording of a plurality of conference information including at least a video of a conference situation, and a plurality of conference participants can select a conference information group. The selection information acquisition step for acquiring the selection information of the conference information selected by the conference participant among the conference information of the conference information group distributed in the conference information distribution step and the conference information distribution step, and the selection. A viewing rate calculation step that calculates the viewing rate of each conference information of the conference information group based on the selection information acquired in the information acquisition step, an event detection step that detects a predetermined event in the conference, and the viewing rate calculation. One conference information is selected from the conference information group based on the viewing rate calculated in the step and recorded, and when the event is detected in the event detection step, the conference information of each conference information group is recorded. Among them, it is characterized by including a conference information recording step of selecting and recording conference information corresponding to the event for a certain period of time. Further, in the invention of claim 14, the event detection step detects the remarks made by the conference participants of the conference as the event, and the conference information recording step is the preceding. It is characterized in that conference information obtained by photographing a conference participant who made

a statement detected in the event detection step is selected and recorded for a certain period of time.

124 Further, in the invention of claim 15, in the invention of claim 13, the event detection step detects the designation of the conference information by the administrator who manages the conference as the event, and records the conference information. The step is characterized in that the conference information designated by the administrator from the conference information group is selected and recorded for a certain period of time. Further, in the invention of claim 16, in the invention of claim 13, the conference information group includes electronic data of the presentation material presented at the conference, and the event detection step is the presentation material. The change in the presentation content is detected as the event, and the conference information recording step is characterized in that electronic data of the presentation material is selected and recorded for a certain period of time. Further, in the invention of claim 17, the conference information group includes electronic data of an image written on an electronic whiteboard used in the conference, and the event detection step. Detects the execution of writing on the electronic whiteboard as the event, and the conference information recording step is characterized in that electronic data of an image written on the electronic whiteboard is selected and recorded for a certain period of time. .. Further, in the invention of claim 18, the conference information recording step records the conference information selected from the conference information group in association with each conference information of the conference information group. It is characterized by that. Hereinafter, an embodiment of a conference recording method and apparatus and a program according to the present invention will be described in detail with reference to the accompanying drawings. FIG. 1 is a block diagram showing a schematic configuration of a conference recording system to which the present invention is applied. As shown in the figure, the conference recording system includes a conference recording device 1, a camera 2, a microphone 3, a projector 4, an electronic whiteboard 5, and a client 6. The conference recording device 1 records the status of the conference as conference information such as video and audio. The camera 2 captures the situation of the conference and outputs it as an image, and usually, a plurality of cameras 2 are used. The microphone 3 acquires voice in a conference and outputs it as voice information, and usually, a plurality of microphones 3 are used. The projector 4 displays presentation materials and the like presented at a conference. Since the conference recording device 1 acquires presentation materials in the form of electronic data or video signals, the projector 4 may actually be used as a computer device for projector control (also used as a client 6).).

156 Further, the projector 4 can be replaced with a large display. Furthermore, when a conference is held between remote locations, there may be multiple projectors 4, but even in this case, the same presentation material will be presented to all projectors 4, so that material will be used. It becomes one. The electronic whiteboard 5 is a whiteboard or an equivalent thereof, and is capable of writing arbitrary characters and images and outputting the written images in the form of electronic data. Further, when a conference is held between remote locations, a plurality of electronic whiteboards 5 may be used. In this case, when writing is performed on one electronic whiteboard 5, another electronic whiteboard 5 is used. Use a whiteboard 5

with specifications that display the written contents. The client 6 is a computer device used by the participants of the conference, and is equipped with a browser for viewing conference information such as video delivered from the conference recording device 1. Further, when the client 6 presents the presentation material to the projector 4 or when the client 6 writes to the electronic whiteboard 5, the corresponding software is required. The conference information recording DB 7 is a database that records the conference information acquired by the conference recording device 1 and the edited conference information. The conference information recorded here includes the video signal of the video captured by the camera 2, the audio signal of the audio acquired by the microphone 3, the video signal acquired from the projector 4, the application data of the material, and the electronic whiteboard 5. There are the obtained video signals and the edited results obtained by editing these with the conference recording device 1. The conference information recording DB 7 stores at least the edited result edited by the conference recording device 1. The conference recording device 1, the camera 2, the microphone 3, the projector 4, the electronic whiteboard 5, and the client 6 may be connected by a network such as LAN, WAN, or the Internet, and are not necessarily connected to one conference room. Not everything needs to be placed. Next, the details of the conference recording device 1 will be described. FIG. 2 is a block diagram showing a functional configuration of the conference recording device 1. The conference recording device 1 can be configured by a computer device, and in that case, each part shown in FIG. 2 is configured by software.

184 As shown in the figure, the conference recording device 1 includes a conference information acquisition unit 11, a conference information distribution unit 12, a selection information acquisition unit 13, a viewing rate calculation unit 14, an event detection unit 15, and a conference information editing unit 16. , The conference information storage unit 17 is provided. The conference information acquisition unit 11 acquires video signals, audio signals, and the like as conference information from the camera 2, the microphone 3, the projector 4, and the electronic whiteboard 5. The conference information distribution unit 12 distributes the conference information acquired by the conference information acquisition unit 11 to the client 6 in a format that can be viewed by a browser. Further, if necessary, for example, when the video is distributed to a projector or the like installed in a conference room or the like, in addition to the conference information acquired by the conference information acquisition unit 11, these are edited by the conference information editing unit 16. The edited result is also delivered. The conference information delivered to the client 6 is displayed on the browser, for example, as shown in the screen 60 shown in FIG. The image 61, the image 62, the image 63, the image 64, the image 65, and the image 66 are displayed on the screen 60. The video 61 is an enlarged display of a video selected by a conference participant who operates the browser from any of the video 62, the video 63, the video 64, the video 65, and the video 66. Further, for example, the image 62, the image 63, and the image 64 are images taken by the camera 2, the image 65 is an image of the presentation material displayed on the projector 4, and the image 66 is written on the electronic whiteboard 5. It is a video of the image. In this way, the conference information distribution unit 12 distributes the conference information so that the conference participants can pay

attention to and browse the desired conference information on the client 6. Further, at this time, the sound acquired by the microphone 3 is synthesized or appropriately selected and distributed together with the video. The selection information acquisition unit 13 acquires selection information of the conference information selected by the conference participants in each client 6. The acquired selection information is notified to the conference information distribution unit 12, and is used for distribution of the conference information displayed as a video 61 by the conference information distribution unit 12. Further, this selection information is also notified to the audience rating calculation unit 14. The audience rating calculation unit 14 calculates the audience rating of each conference information based on the selection information acquired from each client 6 by the selection information acquisition unit 13. The event detection unit 11 detects an event that has occurred in the conference. The events to be detected include the remarks of the conference participants based on the voice information acquired by the microphone 3, the switching of the materials presented on the projector 4 (page change, etc.), and the writing on the electronic whiteboard 5. It is detected from the conference information acquired by the conference information acquisition unit 11.

222 In addition to this, as an event, there is a meeting information selection by a meeting manager such as a chairman. This is the case when the conference information in which the decision items in the conference are displayed is selected before the end of the conference, and this event is acquired from the client 6 used by the conference administrator. The conference information editing unit 16 edits the conference information acquired by the conference information acquisition unit 11 in chronological order. In this editing, the audience rating calculated by the audience rating calculation unit 14 and the occurrence of the event detected by the event detection unit 15 are used. For example, normally, the conference information is edited based on the audience rating calculated by the audience rating calculation unit 14, and when the event detection unit 15 detects the occurrence of an event, the conference information corresponding to the event is input for a certain period of time. select. Various methods can be considered for editing conference information based on the audience rating, and one of them is a method of selecting the one having the highest audience rating from a plurality of conference information. In this method, the conference information with the highest audience rating is always selected in conjunction with the ever-changing audience rating, and the conference information of the edited result is obtained by connecting these in chronological order. As another method, a method of calculating the audience rating ratio for a certain period of time and selecting each of the conference information in chronological order according to the audience rating ratio, or usually selecting specific conference information. This is a method of selecting conference information and connecting them in chronological order when there is conference information that exceeds a predetermined audience rating. Further, when an event occurs, the conference information corresponding to the event is inserted for a certain period of time from the occurrence of the event. For example, when the speech by the conference participant is detected as an event from the voice information by the microphone 3, the image (conference information) of the conference participant taken by the corresponding camera 2 is selected and the material

presented to the projector 4 is displayed. When switching or writing to the electronic whiteboard 5, the conference information acquired from the projector 4 and the conference information acquired from the electronic whiteboard 5 are selected, respectively. In addition, when a meeting manager such as a chairman selects predetermined meeting information, for example, when selecting meeting information in which decisions made at the meeting are displayed, by selecting this, the edited version can be selected. The meeting information will include the display of decisions made at the meeting. Although a plurality of methods for editing the conference information are shown here, when actually recording the conference information, the method for editing is set in the conference recording device 1 in advance. It will be.

258 The conference information storage unit 17 stores the conference information edited by the conference information editing unit 16 in the conference information recording DB 7. At this time, each of the conference information acquired by the conference information acquisition unit 11 can be saved together, and when these are saved, the edited conference information and the respective conference information before editing are linked. Equally associate and save. Next, the flow of the conference information editing process in the conference recording device 1 will be described. FIG. 4 is a flowchart showing the flow of the conference information editing process of the conference recording device 1. When the conference recording device 1 starts the operation, the conference information editing unit 16 calculates the audience rating among the plurality of conference information acquired from each unit until the end instruction is given (NO in step 101). The conference information determined based on the audience rating calculated by the unit 14 is selected as the conference information for normal use (step 102). Here, when the event detection unit 15 detects the occurrence of an event (YES in step 103), the conference information editing unit 16 selects the conference information corresponding to the generated event (step 104), and the conference information is set for a certain period of time. Wait for the progress (NO in step 105). Then, when a certain time elapses (YES in step 105), the conference information determined based on the audience rating calculated by the audience rating calculation unit 14 for normal use is selected again (step 102). After that, when an end instruction is input from the administrator or the like (YES in step 101), the conference recording device 1 ends the editing process of the conference information. Next, an application example of the conference recording system including the conference recording device 1 will be described. FIG. 5 is a diagram showing a configuration example of a conference recording system when recording a conference in one conference room. As shown in the figure, a plurality of cameras 2 (2-1 to 2-3), a plurality of microphones 3 (3-1 to 3-3), a projector 4, and an electronic whiteboard are housed in the conference room. 5. A plurality of clients 6 (6-1 to 6-7) and a projector 8 are arranged. Although the conference recording device 1 is not shown in the figure, it is actually connected to the conference recording device 1 to perform processing such as distribution, editing, and recording of conference information. In this configuration, the camera 2-1 and the microphone 3-1 correspond, the camera 2-2 and the microphone 3-2, and the camera 2-3 and the microphone 3-3 correspond to each other, for example, taking a picture of the camera 2-1. The range and the voice acquisition range of the

microphone 3-1 almost match. Further, each client 6 displays a browser screen as shown in FIG. 3, and the operator of each client 6 can select desired conference information.

292 Further, in this configuration, the conference recording device 1 does not need to deliver (record) audio. A presentation material is displayed on the projector 4, and the display of this material can be switched by, for example, an operation of the client 6-4. Arbitrary writing is possible on the electronic whiteboard 5. Further, the projector 8 displays the conference information captured by each of the cameras 2 and the conference information selected based on the audience rating among the conference information in an enlarged manner. When a conference is held with this configuration, it is normally displayed on A, B, C, which is the conference information captured by each of the cameras 2, and D, which is the conference information displayed on the projector 4, and the electronic whiteboard 5. Each of the conference information E is appropriately selected and recorded based on the audience rating. When an event occurs in this state, for example, when a participant operating the client 6-2 makes a statement, the voice is acquired by the microphone 3-1 and the camera 2-1 takes a picture accordingly. A, which is the conference information, is selected and recorded for a certain period of time. Further, when the participant who operates the client 6-4 switches the material to be displayed on the projector 4, the conference information displayed on the projector 4 is selected and recorded for a certain period of time. Further, when another participant writes on the electronic whiteboard 5, the conference information displayed on the electronic whiteboard 5 is selected and recorded for a certain period of time. Further, at the end of the conference, for example, when the operator of the client 6-1 who is the chairman selects the conference information to be displayed on the electronic whiteboard 5 from the browser in a compulsory sense, the electronic whiteboard is accompanied by the selection. If the conference information displayed on the board 5 is selected and recorded for a certain period of time and the decision items in the conference are displayed on the electronic whiteboard 5, this will be recorded. FIG. 6 is a diagram showing a configuration example of a conference recording system in the case of recording a remote conference in which a plurality of conference rooms are connected by a network. As shown in the figure, a camera 2-4, a microphone 3-4, a projector 4-1 and an electronic whiteboard 5-1 and a client 6-8 are arranged in the conference room 201, and the conference room 202 is arranged. The camera 2-5 and the microphone 3-5, the projector 4-2, the electronic whiteboard 5-2, the client 6-9 and the like are arranged in the conference room 203, and the camera 2-6 and the microphone 3-6 are arranged in the conference room 203. A projector 4-3, an electronic whiteboard 5-3, a client 6-10, and the like are arranged.

325 Then, these are connected to each other via the network 210. Although not shown in the figure, the conference recording device 1 is actually connected to the network 210 to perform processing such as distribution, editing, and recording of conference information. In this configuration, the camera 2-4 and the microphone 3-4, the camera 2-5 and the microphone 3-5, and the camera 2-6 and the microphone 3-6 correspond to each other. Further, a browser screen as shown in FIG. 3 is displayed on each client 6 (including those without a reference numeral), and the operator of each client 6 can select desired conference

information. It is possible. Further, in this configuration, the conference recording device 1 also distributes audio. A material for presentation is displayed on each projector 4 (4-1 to 4-3). This material is displayed by, for example, an operation of a client 6-8, and is displayed by the projector 4 -1, The same material is displayed on all of Projector 4-2 and Projector 4-3. Further, arbitrary writing is possible on each of the electronic whiteboard 5-1 and the electronic whiteboard 5-2 and the electronic whiteboard 5-3, and the written contents are shared by the three parties. For example, when writing to the electronic whiteboard 5-1 is performed, the written contents are also displayed on the electronic whiteboard 5-2 and the electronic whiteboard 5-3. When a conference is held with this configuration, it is normally displayed on A, B, C, which is the conference information captured by each of the cameras 2, and D, which is the conference information displayed on the projector 4, and the electronic whiteboard 5. Each of the conference information E is appropriately selected and recorded based on the audience rating. When an event occurs in this state, for example, when a participant operating the client 6-10 makes a statement, the voice is acquired by the microphone 3-6, and the camera 2-6 takes a picture accordingly. C, which is the conference information, is selected and recorded for a certain period of time. Further, when the participant who operates the client 6-8 switches the material to be displayed on the projector 4-1, the conference information (projector 4-2, projector 4-3) displayed on the projector 4-1 is accompanied by the switching. The same conference information is also displayed) is selected and recorded for a certain period of time. Further, when another participant writes on the electronic whiteboard 5-1, the conference information displayed on the electronic whiteboard 5-1 is selected and recorded for a certain period of time.

354 Further, at the end of the meeting, for example, when the operator of the client 6-9, who is the chairman, selects the meeting information to be displayed on the electronic whiteboard 5-2 from the browser in a compulsory sense, the operation thereof is accompanied by this. If the conference information displayed on the electronic whiteboard 5-2 is selected and recorded for a certain period of time and the decision items at the conference are displayed on the electronic whiteboard 5-2, this will be recorded. The configuration of the conference system using the conference recording device 1 is not limited to the example described here, and can be appropriately changed according to the scale of the conference, the venue, and the like. With such a configuration, the contents of the conference can be easily confirmed by referring to the conference information edited and recorded by the conference recording device 1 instead of the minutes. Further, when the conference information before editing is associated and recorded together with the conference information edited by the conference recording device 1, it is possible to confirm the detailed information in the conference. Further, by using the technology and the like shown in Patent Document 1 together, it is possible to use the conference information as a guaranteed conference record. [Effects of the Invention] As described above, according to the present invention, images taken by a camera, materials displayed on a projector, images written on an electronic whiteboard, and the like are distributed as conference information, and the conference information is distributed. The conference information to be recorded is selected based on the viewing rate, and when an event occurs in the conference, the conference information corresponding to the event is

selected and recorded for a certain period of time, so an editor is required. The meeting information can be recorded appropriately, and the edited meeting information can be referred to instead of the minutes. BRIEF DESCRIPTION OF THE DRAWINGS FIG. 1 is a block diagram showing a schematic configuration of a conference recording system to which the present invention is applied. FIG. 2 is a block diagram showing a functional configuration of the conference recording device 1. FIG. 3 is a diagram showing an example of a display screen by a browser on the client 6. FIG. 4 is a flowchart showing a flow of a conference information editing process of the conference recording device 1. FIG. 5 is a diagram showing a configuration example of a conference recording system when recording a conference in one conference room. FIG. 6 is a diagram showing a configuration example of a conference recording system in the case of recording a remote conference in which a plurality of conference rooms are connected by a network. [Explanation of codes] 1 Conference recording device 2, 2-1 to 2-6 Camera 3, 3-1 to 3-6 Mike 4, 4-1 to 4-3 Projector 5, 5-1 to 5-3 Electronic white Board 6, 6-1 to 6-10, client 7, conference information recording DB8, projector 11, conference information acquisition unit 12, conference information distribution unit 13, selection information acquisition unit 14, audience rate calculation unit 15, event detection unit 16, conference information editing unit 17, and conference information storage. Part 60 Screen 61 Video 62 Video 63 Video 64 Video 65 Video 66 Video 201 Meeting Room 202 Meeting Room 203 Meeting Room 210 Network

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CLAIMS JP2004112638A

1.

13 In a conference recording method for recording a plurality of conference information including at least a video of a conference situation, a group of selectable conference information is allowed to be viewed by a plurality of conference participants, and the selection by each of the plurality of conference participants is performed. Based on this, the viewing rate of each meeting information in the meeting information group is calculated, and one meeting information is selected and recorded from the meeting information group based on the calculated viewing rate, and a predetermined event occurs in the meeting. In this case, a conference recording method characterized in that, among the conference information of the conference information group, the conference information corresponding to the event is selected and recorded for a certain period of time.

2.

26 The meeting recording method according to claim 1, wherein the event is a remark by a conference participant of the conference, and the conference information obtained by photographing the conference participant who made the remark is selected and recorded for a certain period of time. ..

3.

33 The event is a designation of conference information by an administrator who manages the conference, and is characterized in that the conference information designated by the administrator from the conference information group is selected and recorded for a certain period of time. The described meeting recording method.

4.

40 The meeting recording method according to claim 1, wherein the meeting information group includes electronic data of the presentation material presented at the meeting, and the event is a change in the presentation content of the presentation material.

5.

46 The conference information group includes electronic data of an image written on an electronic whiteboard used in the conference, and the event is an execution of writing on the electronic whiteboard. The described meeting recording method.

6.

52 The meeting recording method according to claim 1, wherein the meeting information selected from the meeting information group is recorded in association with each meeting information of the meeting information group.

7.

58 In a conference recording device that records at least a plurality of conference information including a video of a conference situation, a conference information distribution means for distributing a selectable conference information group to a plurality of conference participants and a conference information distribution means for distribution. Among the meeting information of the conference information group, the conference information group is based on the selection information acquisition means for acquiring the selection information of the conference information selected by the conference participants and the selection information acquired by the selection information acquisition means. 1 from the conference information group based on the viewing rate calculation means for calculating the viewing rate of each conference information, the event detecting means for detecting a predetermined event in the conference, and the viewing rate calculated by the viewing rate calculation means. In addition to selecting and recording the conference information, when the event detecting means detects the event, the conference information corresponding to the event is selected and recorded for a certain period of time from each conference information in the conference information group. A conference recording device including a conference information recording means.

8.

77 The event detecting means detects the remarks made by the conference participants of the conference as the events, and the conference information recording means takes a picture of the conference participants who made the remarks detected by the event detecting means.

The conference recording device according to claim 7, wherein information is selected and recorded for a certain period of time.

9.

85 The event detecting means detects the designation of the conference information by the administrator who manages the conference as the event, and the conference information recording means constants the conference information designated by the administrator from the conference information group. The conference recording device according to claim 7, wherein the time is selected and recorded.

10.

93 The conference information group includes electronic data of the presentation material presented at the conference, the event detecting means detects a change in the presentation content of the presentation material as the event, and the conference record information recording means The conference recording device according to claim 7, wherein electronic data of the presentation material is selected and recorded for a certain period of time.

11.

101 The conference information group includes electronic data of an image written on the electronic whiteboard used in the conference, and the event detecting means detects the execution of writing on the electronic whiteboard as the event. The conference recording device according to claim 7, wherein the conference information recording means selects and records electronic data of an image written on an electronic whiteboard for a certain period of time.

12.

110 The conference recording device according to claim 7, wherein the conference information recording means records the conference information selected from the conference information group in association with each conference information of the conference information group.

13.

117 In a conference recording program that causes a computer to record a plurality of conference information including at least a video of a conference situation, a conference information distribution step of distributing a selectable conference information group to a plurality of conference participants, and the conference information. Of the conference information of the conference information group delivered in the distribution step, the selection information

acquisition step for acquiring the selection information of the conference information selected by the conference participants and the selection information acquired in the selection information acquisition step are used. The conference information is based on a viewing rate calculation step for calculating the viewing rate of each conference information in the conference information group, an event detection step for detecting a predetermined event in the conference, and a viewing rate calculated in the viewing rate calculation step. When one conference information is selected from the group and recorded, and when the event is detected in the event detection step, the conference information corresponding to the event among the conference information of the conference information group is stored for a certain period of time. A conference recording program comprising a conference information recording step for selecting and recording.

14.

136 The event detection step detects the remarks made by the conference participants of the conference as the events, and the conference information recording step is a conference in which the conference participants who made the remarks detected in the event detection step are photographed. 13. The conference recording program according to claim 13, wherein information is selected and recorded for a certain period of time.

15.

144 The event detection step detects the designation of the conference information by the administrator who manages the conference as the event, and the conference information recording step constants the conference information designated by the administrator from the conference information group. 13. The meeting recording program according to claim 13, wherein the time is selected and recorded.

16.

152 The conference information group includes electronic data of the presentation material presented at the conference, the event detection step detects a change in the presentation content of the presentation material as the event, and the conference information recording step is: The conference recording program according to claim 13, wherein the electronic data of the presentation material is selected and recorded for a certain period of time.

17.

160 The conference information group includes electronic data of an image written on the electronic whiteboard used in the conference, and the event detection step detects the execution of writing on the electronic whiteboard as the event. The conference recording program according to claim 13, wherein the conference information recording step selects

and records electronic data of an image written on an electronic whiteboard for a certain period of time.

18.

169 13. The meeting recording program according to claim 13, wherein the meeting information recording step records the meeting information selected from the meeting information group in association with each meeting information of the meeting information group.

(19)日本国特許庁(JP)　(12)公開特許公報(A)　(11)特許出願公開番号
特開2004-112638
(P2004-112638A)
(43)公開日　平成16年4月8日(2004.4.8)

(51)Int.Cl.[7]	F I			テーマコード（参考）
H04N 7/15	H04N	7/15	610	5C053
H04M 11/00	H04M	11/00	303	5C064
H04N 5/765	H04N	5/91	L	5K101

審査請求 未請求　請求項の数 18　OL　（全 14 頁）

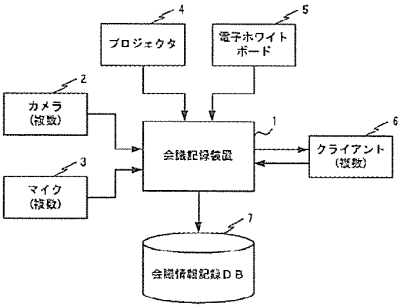
(21)出願番号　特願2002-275248(P2002-275248)
(22)出願日　平成14年9月20日(2002.9.20)

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Fターム(参考)　5C053 FA14 FA29 GB06 HA21 HA29 KA24 LA11 LA14
5C064 AA02 AB03 AB04 AC01 AC06 AC12 AC16 AC18 AC22
5K101 KK04 KK07 LL02 LL05 MM07 NN06 NN07 NN18

(54)【発明の名称】会議記録方法および装置並びにプログラム

(57)【要約】
【課題】会議の状況を会議情報として効率よく記録し、記録した会議情報を有効に利用することのできる会議記録方法および装置並びにプログラムを提供する。
【解決手段】カメラ２で撮影した映像やプロジェクタ４に表示された資料、電子ホワイトボード５に書き込まれた画像等を会議情報としてクライアント６に配信し、その視聴率に基づいて記録する会議情報を選択するとともに、会議において発言や電子ホワイトボード５への書き込み等のイベントが発生した際には、これを検知して当該イベントに対応する会議情報を一定時間選択して記録する。
【選択図】　図1



013

【特許請求の範囲】
【請求項１】
少なくとも会議の状況を撮影した映像を含む複数の会議情報を記録する会議記録方法において、
選択可能な会議情報群を複数の会議参加者に視聴させるとともに、該複数の会議参加者のそれぞれによる選択に基づいて前記会議情報群の各会議情報の視聴率を算出し、該算出した視聴率に基づいて前記会議情報群から１の会議情報を選択して記録し、
前記会議において所定の事象が生じた場合に、前記会議情報群の各会議情報のうち、前記事象に対応する会議情報を一定時間選択して記録する
ことを特徴とする会議記録方法。
【請求項２】
前記事象は、
前記会議の会議参加者による発言であり、該発言を行った会議参加者を撮影した会議情報を一定時間選択して記録することを特徴とする請求項１記載の会議記録方法。
【請求項３】
前記事象は、
前記会議を管理する管理者による会議情報の指定であり、該管理者により前記会議情報群から指定された会議情報を一定時間選択して記録することを特徴とする請求項１記載の会議記録方法。
【請求項４】
前記会議情報群は、
前記会議において提示されるプレゼンテーション資料の電子データを含み、
前記事象は、前記プレゼンテーション資料の提示内容の変化である
ことを特徴とする請求項１記載の会議記録方法。
【請求項５】
前記会議情報群は、
前記会議において使用される電子ホワイトボードに書き込まれた画像の電子データを含み、
前記事象は、前記電子ホワイトボードへの書き込みの実行である
ことを特徴とする請求項１記載の会議記録方法。
【請求項６】
前記会議情報群から選択された会議情報を前記会議情報群の各会議情報と関連付けて記録することを特徴とする請求項１記載の会議記録方法。
【請求項７】
少なくとも会議の状況を撮影した映像を含む複数の会議情報を記録する会議記録装置において、
選択可能な会議情報群を複数の会議参加者に配信する会議情報配信手段と、
前記会議情報配信手段が配信した会議情報群の各会議情報のうち、前記会議参加者が選択した会議情報の選択情報を取得する選択情報取得手段と、
前記選択情報取得手段が取得した選択情報に基づいて、前記会議情報群の各会議情報の視聴率を算出する視聴率算出手段と、
前記会議における所定の事象を検知する事象検知手段と、
前記視聴率算出手段が算出した視聴率に基づいて前記会議情報群から１の会議情報を選択して記録するとともに、前記事象検知手段が前記事象を検知した場合に、前記会議情報群の各会議情報のうち前記事象に対応する会議情報を一定時間選択して記録する会議情報記録手段と
を具備することを特徴とする会議記録装置。
【請求項８】
前記事象検知手段は、
前記会議の会議参加者による発言を前記事象として検知し、

前記会議情報記録手段は、前記事象検知手段により検知された発言を行った会議参加者を撮影した会議情報を一定時間選択して記録する
ことを特徴とする請求項7記載の会議記録装置。
【請求項9】
前記事象検知手段は、
前記会議を管理する管理者による会議情報の指定を前記事象として検知し、
前記会議情報記録手段は、前記管理者により前記会議情報群から指定された会議情報を一定時間選択して記録する
ことを特徴とする請求項7記載の会議記録装置。
【請求項10】
前記会議情報群は、
前記会議において提示されるプレゼンテーション資料の電子データを含み、
前記事象検知手段は、前記プレゼンテーション資料の提示内容の変化を前記事象として検知し、
前記会議記情報録手段は、前記プレゼンテーション資料の電子データを一定時間選択して記録する
ことを特徴とする請求項7記載の会議記録装置。
【請求項11】
前記会議情報群は、
前記会議において使用される電子ホワイトボードに書き込まれた画像の電子データを含み、
前記事象検知手段は、前記電子ホワイトボードへの書き込みの実行を前記事象として検知し、
前記会議情報記録手段は、電子ホワイトボードに書き込まれた画像の電子データを一定時間選択して記録する
ことを特徴とする請求項7記載の会議記録装置。
【請求項12】
前記会議情報記録手段は、
前記会議情報群から選択された会議情報を前記会議情報群の各会議情報と関連付けて記録することを特徴とする請求項7記載の会議記録装置。
【請求項13】
少なくとも会議の状況を撮影した映像を含む複数の会議情報の記録をコンピュータに実行させる会議記録プログラムにおいて、
選択可能な会議情報群を複数の会議参加者に配信する会議情報配信ステップと、
前記会議情報配ステップで配信した会議情報群の各会議情報のうち、前記会議参加者が選択した会議情報の選択情報を取得する選択情報取得ステップと、
前記選択情報取得ステップで取得した選択情報に基づいて、前記会議情報群の各会議情報の視聴率を算出する視聴率算出ステップと、
前記会議における所定の事象を検知する事象検知ステップと、
前記視聴率算出ステップで算出した視聴率に基づいて前記会議情報群から1の会議情報を選択して記録するとともに、前記事象検知ステップで前記事象を検知した場合に、前記会議情報群の各会議情報のうち前記事象に対応する会議情報を一定時間選択して記録する会議情報記録ステップと
を具備することを特徴とする会議記録プログラム。
【請求項14】
前記事象検知ステップは、
前記会議の会議参加者による発言を前記事象として検知し、
前記会議情報記録ステップは、前記事象検知ステップで検知された発言を行った会議参加者を撮影した会議情報を一定時間選択して記録する
ことを特徴とする請求項13記載の会議記録プログラム。

【請求項１５】
前記事象検知ステップは、
前記会議を管理する管理者による会議情報の指定を前記事象として検知し、
前記会議情報記録ステップは、前記管理者により前記会議情報群から指定された会議情報を一定時間選択して記録する
ことを特徴とする請求項１３記載の会議記録プログラム。
【請求項１６】
前記会議情報群は、
前記会議において提示されるプレゼンテーション資料の電子データを含み、
前記事象検知ステップは、前記プレゼンテーション資料の提示内容の変化を前記事象として検知し、
前記会議情報記録ステップは、前記プレゼンテーション資料の電子データを一定時間選択して記録する
ことを特徴とする請求項１３記載の会議記録プログラム。
【請求項１７】
前記会議情報群は、
前記会議において使用される電子ホワイトボードに書き込まれた画像の電子データを含み、
前記事象検知ステップは、前記電子ホワイトボードへの書き込みの実行を前記事象として検知し、
前記会議情報記録ステップは、電子ホワイトボードに書き込まれた画像の電子データを一定時間選択して記録する
ことを特徴とする請求項１３記載の会議記録プログラム。
【請求項１８】
前記会議情報記録ステップは、
前記会議情報群から選択された会議情報を前記会議情報群の各会議情報と関連付けて記録することを特徴とする請求項１３記載の会議記録プログラム。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】
この発明は、会議記録方法および装置並びにプログラムに関し、特に、会議の状況を撮影した映像等の会議情報を時系列で記録する会議記録方法および装置並びにプログラムに関する。
【０００２】
【従来の技術】
近年、会議等の議事録を文書として保存する以外の方法として、会議の映像や音声を記録して保存するといったことが行われている。会議の映像や音声を記録する技術としては、単にカメラで撮影した映像を記録して保存しておくだけでなく、その記録が真正なものであることを保証するものもある（例えば、特許文献１参照）。
【０００３】
一方、撮影を行うカメラ等が複数存在する場合に、利用価値の高い映像を記録する技術としては、本願出願人が出願した特願２００１－２８７７４０号の明細書に記載した技術等がある。この技術は、複数の映像若しくは１の映像の任意の一部分を選択して視聴可能な１つの映像としてを配信する際に、各映像の選択状態を取得し、この選択状態に基づいて各映像の視聴率を算出して、算出した視聴率に基づいて複数の映像を順次並び替える編集を行って記録用の映像を生成するものである。
【０００４】
【特許文献１】
特開２００１－３０９３６６号公報
【０００５】

003

【発明が解決しようとする課題】
しかしながら、上述の特願２００１－２８７７４０号の明細書に記載した技術を会議の記録に適用しようとした場合、プロジェクタや大型ディスプレイに表示されたプレゼンテーション用の資料やホワイトボード等に書き出された情報も一旦カメラで撮影して記録することとなるため、その映像品質が劣化することも考えられる。
【０００６】
そこで、この発明は、会議の状況を会議情報として効率よく記録し、記録した会議情報を有効に利用することのできる会議記録方法および装置並びにプログラム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】
上述した目的を達成するため、請求項１の発明は、少なくとも会議の状況を撮影した映像を含む複数の会議情報を記録する会議記録方法において、選択可能な会議情報群を複数の会議参加者に視聴させるとともに、該複数の会議参加者のそれぞれによる選択に基づいて前記会議情報群の各会議情報の視聴率を算出し、該算出した視聴率に基づいて前記会議情報群から１の会議情報を選択して記録し、前記会議において所定の事象が生じた場合に、前記会議情報群の各会議情報のうち、前記事象に対応する会議情報を一定時間選択して記録することを特徴とする。
【０００８】
また、請求項２の発明は、請求項１の発明において、前記事象は、前記会議の会議参加者による発言であり、該発言を行った会議参加者を撮影した会議情報を一定時間選択して記録することを特徴とする。
【０００９】
また、請求項３の発明は、請求項１の発明において、前記事象は、前記会議を管理する管理者による会議情報の指定であり、該管理者により前記会議情報群から指定された会議情報を一定時間選択して記録することを特徴とする。
【００１０】
また、請求項４の発明は、請求項１の発明において、前記会議情報群は、前記会議において提示されるプレゼンテーション資料の電子データを含み、前記事象は、前記プレゼンテーション資料の提示内容の変化であることを特徴とする。
【００１１】
また、請求項５の発明は、請求項１の発明において、前記会議情報群は，前記会議において使用される電子ホワイトボードに書き込まれた画像の電子データを含み、前記事象は、前記電子ホワイトボードへの書き込みの実行であることを特徴とする。
【００１２】
また、請求項６の発明は、請求項１の発明において、前記会議情報群から選択された会議情報を前記会議情報群の各会議情報と関連付けて記録することを特徴とする。
【００１３】
また、請求項７の発明は、少なくとも会議の状況を撮影した映像を含む複数の会議情報を記録する会議記録装置において、選択可能な会議情報群を複数の会議参加者に配信する会議情報配信手段と、前記会議情報配信手段が配信した会議情報群の各会議情報のうち、前記会議参加者が選択した会議情報の選択情報を取得する選択情報取得手段と、前記選択情報取得手段が取得した選択情報に基づいて、前記会議情報群の各会議情報の視聴率を算出する視聴率算出手段と、前記会議における所定の事象を検知する事象検知手段と、前記視聴率算出手段が算出した視聴率に基づいて前記会議情報群から１の会議情報を選択して記録するとともに、前記事象検知手段が前記事象を検知した場合に、前記会議情報群の各会議情報のうち前記事象に対応する会議情報を一定時間選択して記録する会議情報記録手段とを具備することを特徴とする。
【００１４】
また、請求項８の発明は、請求項７の発明において、前記事象検知手段は、前記会議の会

議参加者による発言を前記事象として検知し、前記会議情報記録手段は、前記事象検知手段により検知された発言を行った会議参加者を撮影した会議情報を一定時間選択して記録することを特徴とする。

【００１５】

また、請求項９の発明は、請求項７の発明において、前記事象検知手段は、前記会議を管理する管理者による会議情報の指定を前記事象として検知し、前記会議情報記録手段は、前記管理者により前記会議情報群から指定された会議情報を一定時間選択して記録することを特徴とする。

【００１６】

また、請求項１０の発明は、請求項７の発明において、前記会議情報群は、前記会議において提示されるプレゼンテーション資料の電子データを含み、前記事象検知手段は、前記プレゼンテーション資料の提示内容の変化を前記事象として検知し、前記会議記情報録手段は、前記プレゼンテーション資料の電子データを一定時間選択して記録することを特徴とする。

【００１７】

また、請求項１１の発明は、請求項７の発明において、前記会議情報群は、前記会議において使用される電子ホワイトボードに書き込まれた画像の電子データを含み、前記事象検知手段は、前記電子ホワイトボードへの書き込みの実行を前記事象として検知し、前記会議情報記録手段は、電子ホワイトボードに書き込まれた画像の電子データを一定時間選択して記録することを特徴とする。

【００１８】

また、請求項１２の発明は、請求項７の発明において、前記会議情報記録手段は、前記会議情報群から選択された会議情報を前記会議情報群の各会議情報と関連付けて記録することを特徴とする。

【００１９】

また、請求項１３の発明は、少なくとも会議の状況を撮影した映像を含む複数の会議情報の記録をコンピュータに実行させる会議記録プログラムにおいて、選択可能な会議情報群を複数の会議参加者に配信する会議情報配信ステップと、前記会議情報配ステップで配信した会議情報群の各会議情報のうち、前記会議参加者が選択した会議情報の選択情報を取得する選択情報取得ステップと、前記選択情報取得ステップで取得した選択情報に基づいて、前記会議情報群の各会議情報の視聴率を算出する視聴率算出ステップと、前記会議における所定の事象を検知する事象検知ステップと、前記視聴率算出ステップで算出した視聴率に基づいて前記会議情報群から１の会議情報を選択して記録するとともに、前記事象検知ステップで前記事象を検知した場合に、前記会議情報群の各会議情報のうち前記事象に対応する会議情報を一定時間選択して記録する会議情報記録ステップとを具備することを特徴とする。

【００２０】

また、請求項１４の発明は、請求項１３の発明において、前記事象検知ステップは、前記会議の会議参加者による発言を前記事象として検知し、前記会議情報記録ステップは、前記事象検知ステップで検知された発言を行った会議参加者を撮影した会議情報を一定時間選択して記録することを特徴とする。

【００２１】

また、請求項１５の発明は、請求項１３の発明において、前記事象検知ステップは、前記会議を管理する管理者による会議情報の指定を前記事象として検知し、前記会議情報記録ステップは、前記管理者により前記会議情報群から指定された会議情報を一定時間選択して記録することを特徴とする。

【００２２】

また、請求項１６の発明は、請求項１３の発明において、前記会議情報群は、前記会議において提示されるプレゼンテーション資料の電子データを含み、前記事象検知ステップは、前記プレゼンテーション資料の提示内容の変化を前記事象として検知し、前記会議情報

記録ステップは、前記プレゼンテーション資料の電子データを一定時間選択して記録することを特徴とする。

【００２３】

また、請求項１７の発明は、請求項１３の発明において、前記会議情報群は、前記会議において使用される電子ホワイトボードに書き込まれた画像の電子データを含み、前記事象検知ステップは、前記電子ホワイトボードへの書き込みの実行を前記事象として検知し、前記会議情報記録ステップは、電子ホワイトボードに書き込まれた画像の電子データを一定時間選択して記録することを特徴とする。

【００２４】

また、請求項１８の発明は、請求項１３の発明において、前記会議情報記録ステップは、前記会議情報群から選択された会議情報を前記会議情報群の各会議情報と関連付けて記録することを特徴とする。

【００２５】

【発明の実施の形態】

以下、この発明に係る会議記録方法および装置並びにプログラムの一実施の形態について、添付図面を参照して詳細に説明する。

【００２６】

図１は、この発明を適用した会議記録システムの概略構成を示すブロック図である。同図に示すように、会議記録システムは、会議記録装置１とカメラ２、マイク３、プロジェクタ４、電子ホワイトボード５、クライアント６を具備して構成される。

【００２７】

会議記録装置１は、会議の状況を映像や音声等の会議情報として記録する。カメラ２は、会議の状況を撮影して映像として出力するもので、通常、複数のものが利用される。マイク３は、会議での音声を取得して音声情報として出力するもので、通常、複数のものが利用される。

【００２８】

プロジェクタ４は、会議において提示されるプレゼンテーション資料等を表示するものである。なお、会議記録装置１は、プレゼンテーション用の資料を電子データの形式若しくはビデオ信号の形式で取得するため、プロジェクタ４は、実際には、プロジェクタ制御用のコンピュータ装置（クライアント６と兼用する場合もある）に相当する。また、プロジェクタ４は、大型のディスプレイに置き換えることもできる。さらに、会議を遠隔地間で開催する等の場合に、プロジェクタ４が複数存在する場合もあるが、この場合でも全てのプロジェクタ４に同一のプレゼンテーション資料が提示されることとなるので、その資料は、１つとなる。

【００２９】

電子ホワイトボード５は、ホワイトボード若しくはこれに準ずるもので、任意の文字や画像が書き込み可能であるとともに、書き込まれた画像を電子データの形式で出力できるものである。また、会議を遠隔地間で開催する等の場合には、複数の電子ホワイトボード５が用いられることもあるが、この場合には、１の電子ホワイトボード５に書き込みが行われると他の電子ホワイトボード５にもその書き込み内容が表示される仕様のものを利用する。

【００３０】

クライアント６は、会議の参加者が利用するコンピュータ装置であり、会議記録装置１から配信される映像等の会議情報を閲覧するために、ブラウザが搭載されているものである。また、クライアント６からプロジェクタ４へプレゼンテーション用の資料を提示させる場合や、クライアント６から電子ホワイトボード５への書き込みを行う場合には、それぞれ対応するソフトウェアを必要とする。

【００３１】

会議情報記録ＤＢ７は、会議記録装置１が取得した会議情報と、これを編集した会議情報を記録するデータベースである。ここに記録される会議情報としては、カメラ２で撮影さ

れた映像の映像信号、マイク３が取得した音声の音声信号、プロジェクタ４から取得した映像信号および資料のアプリケーションデータ、電子ホワイトボード５から取得した映像信号、これらを会議記録装置１で編集した編集結果がある。なお、会議情報記録ＤＢ７には、少なくとも会議記録装置１で編集された編集結果が保存される。

【００３２】

なお、会議記録装置１とカメラ２、マイク３、プロジェクタ４、電子ホワイトボード５、クライアント６は、ＬＡＮやＷＡＮ、インターネット等のネットワークにより接続されていればよく、必ずしも一つの会議室に全てが配置される必要はない。

【００３３】

次に、会議記録装置１の詳細について説明する。図２は、会議記録装置１の機能的な構成を示したブロック図である。会議記録装置１は、コンピュータ装置により構成することができ、その場合には、図２に示す各部は、ソフトウェアにより構成する。

【００３４】

同図に示すように、会議記録装置１は、会議情報取得部１１と会議情報配信部１２、選択情報取得部１３、視聴率算出部１４、イベント検知部１５、会議情報編集部１６、会議情報保存部１７を具備して構成される。

【００３５】

会議情報取得部１１は、カメラ２やマイク３、プロジェクタ４、電子ホワイトボード５から映像信号や音声信号等を会議情報として取得する。

【００３６】

会議情報配信部１２は、会議情報取得部１１が取得した会議情報をブラウザにより閲覧できる形式でクライアント６に配信する。また、必要に応じて、例えば、会議室内等に設置するプロジェクタ等に映像を配信する場合等には、会議情報取得部１１が取得した会議情報に加えて、これらを会議情報編集部１６で編集した編集結果も配信する。

【００３７】

クライアント６に配信された会議情報は、そのブラウザに、例えば、図３に示す画面６０のように表示される。この画面６０には、映像６１、映像６２、映像６３、映像６４、映像６５、映像６６が表示されている。映像６１は、当該ブラウザを操作する会議参加者が映像６２、映像６３、映像６４、映像６５、映像６６のいずれかから選択した映像を拡大表示したものである。また、例えば、映像６２、映像６３、映像６４は、カメラ２で撮影された映像であり、映像６５は、プロジェクタ４に表示されているプレゼンテーション資料の映像、映像６６は、電子ホワイトボード５に書き込まれた画像の映像である。このように、クライアント６で、会議参加者が所望の会議情報に注目して閲覧を行うことができるように、会議情報配信部１２は、会議情報を配信する。また、このとき、マイク３が取得した音声は、合成若しくは適宜選択されて、映像とともに配信される。

【００３８】

選択情報取得部１３は、各クライアント６で会議参加者が選択した会議情報の選択情報を取得する。取得した選択情報は、会議情報配信部１２に通知されて、会議情報配信部１２により映像６１として表示する会議情報の配信に利用される。また、この選択情報は、視聴率算出部１４にも通知される。

【００３９】

視聴率算出部１４は、選択情報取得部１３が各クライアント６から取得した選択情報に基づいて、各会議情報の視聴率を算出する。

【００４０】

イベント検知部１１は、会議において発生したイベントを検知する。検知するイベントとしては、マイク３が取得する音声情報に基づく会議参加者の発言や、プロジェクタ４に提示される資料の切り替え（ページ変更等）、電子ホワイトボード５への書き込みがあり、これらは、会議情報取得部１１が取得した会議情報から検知される。また、この他にもイベントとして、議長等の会議管理者による会議情報選択がある。これは、会議の終了前等に会議での決定事項が表示されている会議情報を選択した場合等であり、このイベントは

会議管理者が使用するクライアント６から取得する。

【００４１】

会議情報編集部１６は、会議情報取得部１１が取得した会議情報を時系列で編集する。この編集に際しては、視聴率算出部１４が算出した視聴率とイベント検知部１５が検知したイベントの発生を利用する。例えば、通常は、視聴率算出部１４が算出した視聴率に基づいて会議情報の編集を行い、イベント検知部１５がイベントの発生を検知した場合には、そのイベントに対応する会議情報を一定時間選択する。

【００４２】

視聴率に基づく会議情報の編集方法としては、様々なものが考えられるが、その１つとしては、複数の会議情報のうち、視聴率が最高のものを選択する方法である。この方法では、時々刻々と変化する視聴率に連動して、常に視聴率が最高の会議情報が選択され、これらを時系列に繋ぎ合わせたものが編集結果の会議情報となる。また、別の方法としては、一定時間の視聴率の比を算出し、この視聴率の比に応じて会議情報のそれぞれを時系列で選択する方法や、通常は特定の会議情報を選択しておき、予め定めた視聴率を越える会議情報がある時間には、その会議情報を選択し、これらを時系列に繋ぎ合わせる方法である。

【００４３】

また、イベントが発生した場合には、その発生から一定時間、当該イベントに対応する会議情報を挿入する。例えば、マイク３による音声情報から会議参加者による発言をイベントとして検知した場合には、対応するカメラ２が撮影した会議参加者の映像（会議情報）を選択し、プロジェクタ４に提示される資料の切り替えや電子ホワイトボード５への書き込みがあった場合には、それぞれプロジェクタ４から取得される会議情報、電子ホワイトボード５から取得される会議情報を選択する。また、議長等の会議管理者が所定の会議情報を選択した場合、例えば、会議での決定事項が表示されている会議情報を選択した場合等には、これを選択することで、編集後の会議情報に会議での決定事項の表示が含まれることとなる。

【００４４】

なお、ここでは、会議情報の編集方法を複数示したが、実際に会議情報を記録する際には、予めどのような方法で編集を行うかを会議記録装置１に設定しておくこととなる。

【００４５】

会議情報保存部１７は、会議情報編集部１６により編集された会議情報を会議情報記録ＤＢ７に保存する。このとき、会議情報取得部１１が取得した会議情報のそれぞれを併せて保存することもでき、これらを保存する場合には、編集された会議情報と編集前のそれぞれの会議情報とをリンクを張る等して関連付けて保存する。

【００４６】

次に、会議記録装置１における会議情報の編集処理の流れを説明する。図４は、会議記録装置１の会議情報の編集処理の流れを示すフローチャートである。

【００４７】

会議記録装置１は、動作を開始すると、終了指示があるまでの間（ステップ１０１でＮＯ）、会議情報編集部１６が、各部から取得される複数の会議情報のうち、視聴率算出部１４が算出する視聴率に基づいて決定される会議情報を通常用の会議情報として選択する（ステップ１０２）。

【００４８】

ここで、イベント検知部１５がイベントの発生を検知すると（ステップ１０３でＹＥＳ）、会議情報編集部１６は、発生したイベントに対応する会議情報を選択し（ステップ１０４）、一定時間の経過を待つ（ステップ１０５でＮＯ）。そして、一定時間が経過すると（ステップ１０５でＹＥＳ）、再び、通常用として視聴率算出部１４が算出する視聴率に基づいて決定される会議情報を選択する（ステップ１０２）。

【００４９】

その後、管理者等から終了指示が入力されると（ステップ１０１でＹＥＳ）、会議記録装

置１は、会議情報の編集処理を終了する。

【００５０】

次に、会議記録装置１を含む会議記録システムの適用例を説明する。図５は、１室の会議室内での会議を記録する場合の会議記録システムの構成例を示した図である。

【００５１】

同図に示すように、会議室内には、複数のカメラ２（２－１～２－３）と、複数のマイク３（３－１～３－３）、プロジェクタ４、電子ホワイトボード５、複数のクライアント６（６－１～６－７）、プロジェクタ８が配置される。なお、会議記録装置１は、同図には示していないが、実際には、これらと接続されて、会議情報の配信や編集、記録等の処理を行う。

【００５２】

この構成においては、カメラ２－１とマイク３－１、カメラ２－２とマイク３－２、カメラ２－３とマイク３－３がそれぞれ対応し、例えば、カメラ２－１の撮影範囲とマイク３－１の音声取得範囲がほぼ一致する。また、各クライアント６には、図３に示したようなブラウザ画面が表示され、各クライアント６の操作者は、それぞれ所望の会議情報を選択することが可能である。また、この構成においては、会議記録装置１は、音声の配信は行う必要はない（記録は行う）。

【００５３】

プロジェクタ４には、プレゼンテーション用の資料が表示されるが、この資料は、例えば、クライアント６－４の操作により、その表示が切り替えられる。電子ホワイトボード５には、任意な書き込みが可能である。また、プロジェクタ８には、カメラ２のそれぞれが撮影した会議情報と、この会議情報のうち、視聴率に基づいて選択された会議情報が拡大されて表示される。

【００５４】

この構成で会議を行う場合、通常は、カメラ２のそれぞれが撮影した会議情報であるＡ、Ｂ、Ｃとプロジェクタ４に表示される会議情報であるＤ、電子ホワイトボード５に表示される会議情報であるＥのそれぞれがその視聴率に基づいて適宜選択されて記録される。

【００５５】

この状態でイベントが発生すると、例えば、クライアント６－２を操作する参加者が発言を行うと、その音声がマイク３－１で取得され、これに伴って、カメラ２－１が撮影した会議情報であるＡが一定時間選択されて記録される。また、クライアント６－４を操作する参加者が、プロジェクタ４に表示する資料を切り替えると、これに伴って、プロジェクタ４に表示される会議情報が一定時間選択されて記録される。さらに、別の参加者が電子ホワイトボード５への書き込みを行うと、これに伴って、電子ホワイトボード５に表示される会議情報が一定時間選択されて記録される。また、会議の終了時に、例えば、議長であるクライアント６－１の操作者が、強制的な意味でそのブラウザから電子ホワイトボード５に表示される会議情報を選択すると、これに伴って、電子ホワイトボード５に表示される会議情報が一定時間選択されて記録され、電子ホワイトボード５に会議での決定事項が表示されていれば、これが記録されることとなる。

【００５６】

図６は、複数の会議室をネットワークで接続した遠隔会議を記録する場合の会議記録システムの構成例を示した図である。

【００５７】

同図に示すように、会議室２０１には、カメラ２－４とマイク３－４、プロジェクタ４－１、電子ホワイトボード５－１、クライアント６－８等が配置され、会議室２０２には、カメラ２－５とマイク３－５、プロジェクタ４－２、電子ホワイトボード５－２、クライアント６－９等が配置され、会議室２０３には、カメラ２－６とマイク３－６、プロジェクタ４－３、電子ホワイトボード５－３、クライアント６－１０等が配置されている。そして、これらがネットワーク２１０を介してそれぞれ接続されている。なお、会議記録装置１は、同図には示していないが、実際には、ネットワーク２１０に接続されて、会議情

報の配信や編集、記録等の処理を行う。

【００５８】

この構成においては、カメラ２－４とマイク３－４、カメラ２－５とマイク３－５、カメラ２－６とマイク３－６がそれぞれ対応する。また、各クライアント６（符号を付していないものも含む）には、図３に示したようなブラウザ画面が表示され、各クライアント６の操作者は、それぞれ所望の会議情報を選択することが可能である。また、この構成においては、会議記録装置１は、音声の配信も行う。

【００５９】

各プロジェクタ４（４－１～４－３）には、プレゼンテーション用の資料が表示されるが、この資料は、例えば、クライアント６－８の操作により、表示されるもので、プロジェクタ４－１、プロジェクタ４－２、プロジェクタ４－３の全てに同一の資料が表示される。また、電子ホワイトボード５－１、電子ホワイトボード５－２、電子ホワイトボード５－３には、それぞれ任意な書き込みが可能であり、その書き込み内容は、三者で共有される。例えば、電子ホワイトボード５－１への書き込みが行われると、電子ホワイトボード５－２と電子ホワイトボード５－３へもその書き込み内容が表示される。

【００６０】

この構成で会議を行う場合、通常は、カメラ２のそれぞれが撮影した会議情報であるＡ、Ｂ、Ｃとプロジェクタ４に表示される会議情報であるＤ、電子ホワイトボード５に表示される会議情報であるＥのそれぞれがその視聴率に基づいて適宜選択されて記録される。

【００６１】

この状態でイベントが発生すると、例えば、クライアント６－１０を操作する参加者が発言を行うと、その音声がマイク３－６で取得され、これに伴って、カメラ２－６が撮影した会議情報であるＣが一定時間選択されて記録される。また、クライアント６－８を操作する参加者が、プロジェクタ４－１に表示する資料を切り替えると、これに伴って、プロジェクタ４－１に表示される会議情報（プロジェクタ４－２、プロジェクタ４－３にも同様の会議情報が表示される）が一定時間選択されて記録される。さらに、別の参加者が電子ホワイトボード５－１への書き込みを行うと、これに伴って、電子ホワイトボード５－１に表示される会議情報が一定時間選択されて記録される。また、会議の終了時に、例えば、議長であるクライアント６－９の操作者が、強制的な意味でそのブラウザから電子ホワイトボード５－２に表示される会議情報を選択すると、これに伴って、電子ホワイトボード５－２に表示される会議情報が一定時間選択されて記録され、電子ホワイトボード５－２に会議での決定事項が表示されていれば、これが記録されることとなる。

【００６２】

なお、会議記録装置１を利用した会議システムの構成は、ここで説明した例に限らず、その会議の規模や開催地点等に応じて、適宜変更することが可能である。

【００６３】

このような構成により、会議記録装置１が編集して記録した会議情報を議事録に代えて参照することで、その会議の内容を容易に確認することができる。また、会議記録装置１が編集した会議情報とともに、編集前の会議情報を関連付けて記録した場合には、その会議における詳細な情報をも確認することが可能である。さらに、特許文献１に示した技術等を併用するすることで、会議情報を会議記録として保証のあるものとして利用することが可能である。

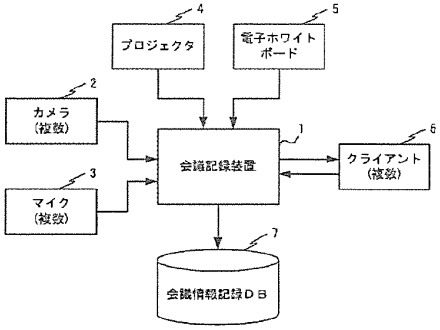
【００６４】

【発明の効果】

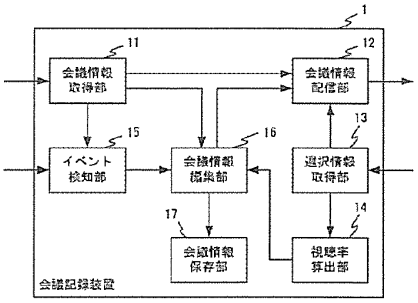
以上説明したように、この発明によれば、カメラで撮影した映像やプロジェクタに表示された資料、電子ホワイトボードに書き込まれた画像等を会議情報として配信し、その視聴率に基づいて記録する会議情報を選択するとともに、会議においてイベントが発生した際には、当該イベントに対応する会議情報を一定時間選択して記録するように構成したので、編集者を要することなく、適切に会議情報を記録することができ、編集後の会議情報を議事録に代えて参照することが可能となる。

【図面の簡単な説明】
【図１】この発明を適用した会議記録システムの概略構成を示すブロック図である。
【図２】会議記録装置１の機能的な構成を示したブロック図である。
【図３】クライアント６でのブラウザによる表示画面例を示した図である。
【図４】会議記録装置１の会議情報の編集処理の流れを示すフローチャートである。
【図５】１室の会議室内での会議を記録する場合の会議記録システムの構成例を示した図である。
【図６】複数の会議室をネットワークで接続した遠隔会議を記録する場合の会議記録システムの構成例を示した図である。
【符号の説明】
１　会議記録装置
２、２－１～２－６　カメラ
３、３－１～３－６　マイク
４、４－１～４－３　プロジェクタ
５、５－１～５－３　電子ホワイトボード
６、６－１～６－１０　クライアント
７　会議情報記録ＤＢ
８　プロジェクタ
１１　会議情報取得部
１２　会議情報配信部
１３　選択情報取得部
１４　視聴率算出部
１５　イベント検知部
１６　会議情報編集部
１７　会議情報保存部
６０　画面
６１　映像
６２　映像
６３　映像
６４　映像
６５　映像
６６　映像
２０１　会議室
２０２　会議室
２０３　会議室
２１０　ネットワーク

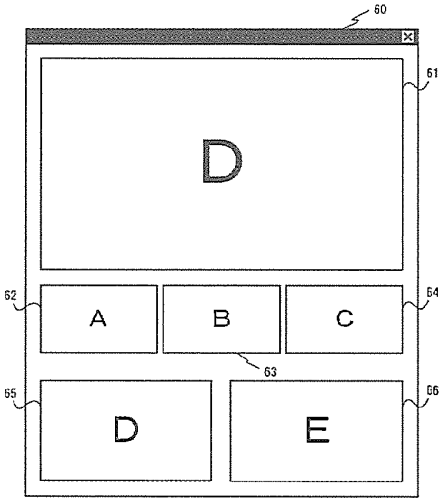
【図１】


プロジェクタ
電子ホワイトボード
カメラ（複数）
会議記録装置
クライアント（複数）
マイク（複数）
会議情報記録ＤＢ

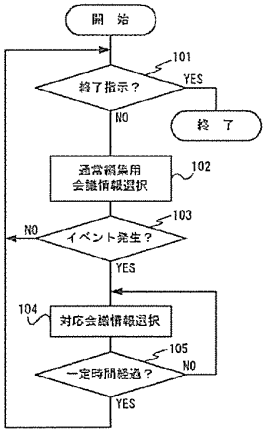
【図２】


会議情報取得部
会議情報配信部
イベント検知部
会議情報編集部
選択情報取得部
会議情報保存部
視聴率算出部
会議記録装置

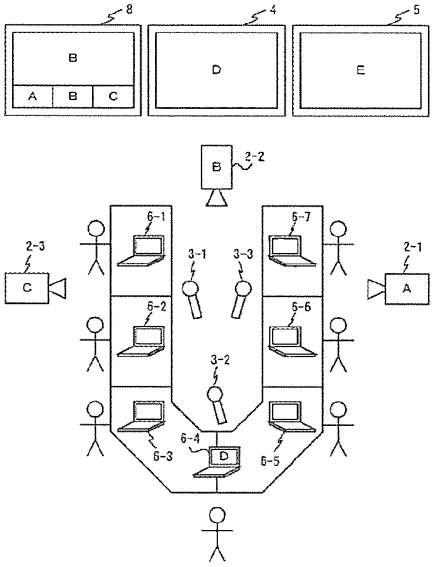
【図３】


D
A
B
C
D
E

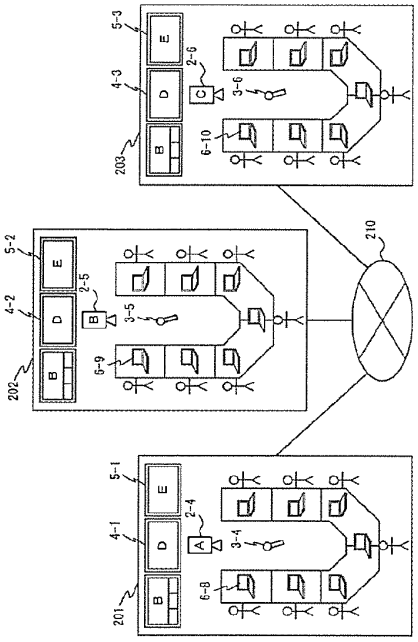
【図４】


開始
終了指示？
YES
NO
終了
通常編集用会議情報選択
イベント発生？
NO
YES
対応会議情報選択
一定時間経過？
NO
YES

【図５】


B
D
E
A
B
C

【図６】



093

（19）日本国特许厅（JP）（12）专利公开公报（A）　（11）专利申请公开号
特开 2004-112638 号
（P2004-112638A）
（43）公开日 平成 16 年 4 月 8 日（2004.4.8）

（51）Int.Cl.[7]		F1			技术标记位置（参考）
H04N	7/15	H04N	7/15	610	5C053
H04M	11/00	H04M	11/00	303	5C064
H04N	5/765	H04N	5/91	L	5K101

审核申请 未申请 权利要求数 18 OL （共 14 页）

（21）申请号　特愿 2002-275248（P2002-275248）
（22）申请日　平成 14 年 9 月 20 日（2002.9.20）

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分类号参考 5C053 FA14 FA29 GB06 HA21 HA29
KA24 LA11 LA14
5C064 AA02 AB03 AB04 AC01 AC06
AC12 AC16 AC18 AC22
5K01 KK04 KK07 LL02 LL05 MM07
NN06 NN07 NN18

（54）【发明名称】一种会议记录方法及装置以及程序

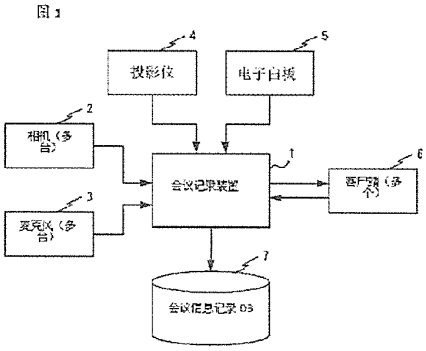
（57）【摘要】

【技术问题】本发明可提供一种可将会议情况作为会议信息高效率地记录下来、并可将所记录的会议信息有效利用的会议记录方法及装置以及程序。

【解决技术问题的方法】将相机 2 拍摄的影像、投影仪 4 放映的资料、在电子白板 5 上画的图像等作为会议信息发送至客户端 6，在基于视听率选择会议信息的同时，当会议中存在发言或在电子白板 5 上存在书写内容时，能够检测到并将相应的信息按一定的时间段记录下来。

【摘要附图】图 1

图 1



JPH07123384A MULTIMEDIA CONFERENCE PROCEEDING PREPARING DEVICEPatent Translate

Bibliographic data

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Classifications

IPC

H04N7/15; H04L12/18; (IPC1-7): H04L12/18; H04N7/15;

Priorities

JP26755793A·1993-10-26

Application

JP26755793A·1993-10-26

Publication

JPH07123384A·1995-05-12

Published as

JPH07123384A

MULTIMEDIA CONFERENCE PROCEEDING PREPARING DEVICE

Abstract

PURPOSE:To provide the multimedia conference proceeding preparing device in a dispersed conference system where a person can participate in a conference in his own seat., he can edit a proceeding in his seat and he can easily prepare, approve and distribute the proceeding. CONSTITUTION:A dispersed conference system performing a multi-spot communication conference is constituted by connecting a conference terminal 40 and a conference server 60 where multimedia information composed of video, sound and data is treated by a communications network 300. In the conference terminal 40 and the conference server 60, a sound and video recorder for recording the sound and video in the conference to prepare a multimedia conference proceeding and a sound and video controller performing instructions on the start and termination of the recording of video and sound are provided.

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DESCRIPTION JPH07123384A

[0001]

13 INDUSTRIAL APPLICABILITY The present invention relates to a distributed conference system in which conference terminals that handle multimedia information including video, audio, and data are connected by a communication line between remote locations and a communication conference is held between multiple points. The present invention relates to a multimedia conference record creating device that creates a conference record of the communication conference using multimedia information such as voice, video, still image, and text.

[0002]

22 BACKGROUND ART Conventionally, as a remote conference system, as shown in FIG. 16, a system in which a conference room between two points is connected via a wide area network 30 is known.

25 The configuration of this system consists of two communication terminals having a video system including a camera 10-3 and a television 10-4 capable of capturing and displaying a plurality of participants, and an audio system including a microphone 10-1 and a speaker 10-2. The devices 10 and 10'are connected by a wide area network 30. Here, the participants can be captured by the camera 10-3, the other participants can be projected on the television 10-4, and opinions can be exchanged and discussed with each other using the microphone 10-1 and the speaker 10-2. With such a configuration, it is possible to hold a conference with a sense of realism even if you are far away.

[0003]

36 It is also possible to display the figure written on the electronic blackboard using the electronic blackboard system 10-5 as an auxiliary device on the television (not displayed in the figure) of

the other party's electronic blackboard system.

39 Further, by using the facsimile 10-6, the materials of the conference can be transmitted. The remote control device 20 controls these elements. And even if such a system is connected via the wide area network 30 and is separated from each other, the conference can be held.

[0004]

45 PROBLEM TO BE SOLVED: To solve a problem. By the way, one of the operational problems of such a conventional remote conference system is the problem of creating and approving minutes.

48 Each time a meeting is held, it is necessary to create a minutes and distribute the minutes to a large number of meeting participants. For the minutes creator, the work of creating and approving the minutes is time-consuming, and the time spent on editing and distribution such as correction and deletion of the minutes is not foolish. Approval of minutes is usually obtained only at the next meeting.

[0005]

56 Therefore, the present invention can create and edit minutes at one's own seat using multimedia information such as voice, video, still image, and text, and can easily create, approve, and distribute the minutes. The purpose is to provide the device.

[0006]

62 Means for Solving the Problems In order to achieve the above object, the present invention connects a conference terminal that handles multimedia information including video, audio, and data via a communication network, and communicates between multiple points. In a multimedia conference record creation device that creates a conference record of a distributed conference system using multimedia information, the instruction means for instructing the start and end of recording of the conference record during the conference and the instruction means are used. It is provided with a conference record creating means for creating a conference record by using the multimedia information by recording the contents of the communication conference from the designated recording start time to the recording end time. It is characterized by doing.

[0007]

75 [Action] According to the present invention, the recording start and recording end of the minutes are instructed during the conference by the instruction means, and the communication conference is performed from the recording start time to the recording end time instructed by the instruction means. Minutes are created using the multimedia information by recording the content using the multimedia information.

80 As a result, the minutes can be created and edited at one's own seat, and the minutes can be easily approved, distributed, and searched.

[0008]

85 Hereinafter, the multi-media conference minutes creating apparatus of the present invention will be described in detail with reference to the accompanying drawings.

[0009]

90 First, a distributed conference system to which the present invention is applied will be described.

[0010]

95 FIG. 1 shows a basic configuration of a distributed conference system to which the present invention is applied. The distributed conference system includes a conference server 60, a plurality of conference terminals 40, and a communication network 300 connecting them. It is composed.

99 Here, as the communication network 300, a wide area network such as a wideband ISDN network or a premises network such as an ATM-LAN or an STM multimedia LAN can be used.

[0011]

104 The plurality of conference terminals 40 include a video system including a camera 41-3 and a terminal device 42, an audio system including a microphone 41-1 and a speaker 41-2, and a conference terminal control device, respectively. 44 is provided.

[0012]

110 The video from the camera 41-3 of each conference terminal 40 and the audio from the microphone 41-1 are sent to the conference server 60 via the conference terminal control device 44, the respective video and audio are synthesized, and the conference terminal 40 is again used. Is sent to, and is reproduced by the speaker 41-2 and the terminal device 42 through the conference terminal control device 44.

115 This allows conference participants to hear the audio and video of other participants.

[0013]

119 Specifically, the terminal device 42 can be realized by a personal computer or a workstation.

120 Since these personal computers and workstations have a built-in video board for displaying images, the images sent from the conference server 60 via the conference terminal control

device 44 can be displayed in the window of the screen. ..

123 In addition, there are electronic blackboard / digitizer 41-5 and facsimile 41-6 as options for peripheral devices, which are used for sending and receiving digital image information and still images.

126 Further, the conference terminal 40 and the conference server 60 are provided with minutes editing devices 45 and 65, respectively, as described later.

[0014]

131 FIG. 2 shows the detailed configuration of the conference server 60 shown in FIG.

132 In FIG. 2, the conference server 60 includes a service control system 61, a state monitoring terminal 62, and a minutes editing device 65, and the minutes editing device 65 includes a recording device 63 for recording voice and images, voice, and It is configured to include a recording control device 64 for controlling the recording of images.

[0015]

139 The service control system 61 receives video signals, voice signals, data, and call control data from the conference terminal 40, multiplexes them, represents them in a fixed format having a plurality of windows, and reconnects them to the conference terminal 40 through the communication network 300. Perform the operation of sending.

143 Further, the condition monitoring terminal 62 is connected to the service control system 61 and manages the operation of the system.

[0016]

148 The recording device 63 constituting the meeting minutes editing device 65 records the multimedia minutes.

150 Further, the recording control device 64 controls the recording device 63 when the minutes editor edits the minutes.

[0017]

155 The configuration of the service control system 61 is shown in FIG.

156 The service control system 61 is composed of modules M1 to Mn, and the same modules M1 to Mn are prepared for each line L1 to Ln or each conference terminal 40.

158 The service control system 61 is connected to the minutes editing device 65, and inputs / outputs video signals, audio signals, data, and call control data to the minutes editing device 65.

[0018]

164 The function of the service control system 61 will be described along with the module M1 of the line 1 (L1).

166 The line interface unit 610-1 receives video signals, voice signals, data, and call control data from the video processing unit 611-1, the voice processing unit 612-1, the data processing unit 614, and the call control unit 613-1 to perform multiplexing. It is transmitted to the network 300.

170 On the contrary, the signal is received from the network 300, separated, and the video signal, the audio signal, and the data are passed to the video processing unit 611-1, the audio processing unit 612-1, and the data processing unit 614.

173 The video processing unit 611-1 outputs the input video signal from the line interface unit 611-1 to the image selection unit 618 after synchronizing with the other lines L2 to Ln, and controls the control unit 615 from the plurality of images flowing there. Under the control of, the minutes editing device 65 selects / synthesizes images and sends them to the network 300 again via the line interface unit 610-1. With the selective composition function of the image processing unit 611-1, it is possible to combine images such as 1 screen, 2 screens, 4 screens, and 9 screens. For example, in the case of two screens, it is composed of a full screen and a small screen. In the case of 4 screens and 9 screens, it will be as shown in FIGS. 6 (a) and 6 (b) described later.

[0019]

185 The voice processing unit 612-1 recovers the input voice signal from the line interface unit 610-1 and outputs it to the voice highway 617.

187 Then, according to the instruction from the control unit 615 via the control highway 619, the conference record editing device 65 performs selective voice addition and coding such as N-1 addition that adds only the own voice, and then performs the line interface unit 610- again. It is sent to the network 300 via 1. Since there is a difference between the audio and video delays, delay the audio by a fixed amount so that it is not unnatural on the terminal.

[0020]

195 The call control unit 613-1 controls / monitors the line interface unit 610-1 and controls the call setting.

197 The connection between the call control unit 613-1 and the control unit 615 is made via the control highway 619. The control unit 615 controls / monitors the entire inside of the service control system 61 and the minutes editing device 65 via the control highway 619. It also interfaces with the condition monitoring terminal 62.

[0021]

204 These operations are performed in exactly the same manner in the modules M2 to Mn of the other lines and the lines 2 to line n (L2 to Ln), and the line interface units 610-2 to 610-n in

each of the line modules M2 to Mn. Similar to the line interface unit 610-1 of the module M1, the video processing unit 611-2-611-n is the same as the video processing unit 611-1 of the module M1, and the audio processing unit 612-2-612-n is the module M1. The call control unit 613-2-613 to n, which is the same as the voice processing unit 612-1 of the above, functions in the same manner as the call control unit 613-1 of the module M1.

[0022]

214 Further, the data processing unit 614 receives the packet data from the arbitrary line interface unit 610-1 to 610-n via the data highway, stores the packet data in the minutes editing device 65, and then again the arbitrary line interface via the data highway. It is transmitted to the conference terminal 40 via the network 300 via the units 610-1 to 610-n.

[0023]

221 FIG. 4 shows a detailed configuration of the conference terminal 40 of the embodiment shown in FIG.

223 In FIG. 4, the conference editing device 45 in the conference terminal 40 instructs a storage device 46 for recording voice and images and its start and stop, that is, start and end of storage of voice or image, as shown in FIG. It is configured to include a storage control device 47, a terminal device 42 for the minutes editor, and a delay device 48.

[0024]

230 FIG. 6 shows an example of displaying the screen of the terminal device 42 in the case where the images of the individual conference participants are displayed in this embodiment.

232 The screen of the terminal device 42 is divided into four according to the number of participants as shown in image 42-11 shown in FIG. 6A, or divided into nine as shown in image 42-12 shown in FIG. 6B. ..

235 You can also open windows 42-13 on a portion of the screen and use it as text to individually send information to participants, for example as e-mail.

[0025]

240 The audio and image storage device 46 may be individually configured with an audio recorder and a video recorder, or may be integrated.

242 The audio and image storage control device 47 controls the recording operation of the audio recorder and the video recorder, or an integrated device, and as a simple example, it can be realized by a device in which a plurality of push switches are arranged.

245 FIG. 7 shows an example of the panel arrangement of each switch of the voice and image storage control device 47 when a plurality of push switches are arranged and realized. In the control of the voice and image storage control device 47 having this panel, the voice and the

image are recorded and controlled at the same time. The voice and image storage control device 47 may control the voice and the image individually, but it is preferable as the conference minutes creating device to synchronize the voice and the image and control the recording at the same time. The operation of the conference editing device 45 in the conference terminal 40 will be briefly described.

[0026]

256 The voice and image signals during the conference are simultaneously input to the conference editor terminal device 42 and the delay circuit 48 via the conference terminal control device 44.

259 The delay device 48 transfers the audio and video during the actual conference to the audio and image storage control device 47, which records the minutes, with a slight delay. During the conference, the minutes editor looks at the screen of the terminal device 42 of the conference terminal 40 of the conference editor and starts and stops the recording of the minutes from the voice and image storage control device 47. Since the recording start signal from the voice and image storage control device 47 is not delayed and the recording stop signal is output delayed by the delay time of the delay device, it is possible to record without missing the information before and after the recording start and the recording stop are applied. ..

[0027]

271 As shown in FIG. 8, the conference editing device 45 in the conference terminal 40 may be provided with two sets of a voice and image storage device 46 and a voice and image storage control device 47.

274 As will be described later, by using such a conference editing device 45, it is possible to easily edit the minutes in one conference terminal 40.

[0028]

279 The configuration of the conference terminal control device 44 is shown in FIG.

280 The line interface unit 44-1 includes a video signal from the video transmission / reception unit 44-2, an audio signal from the audio transmission / reception unit 44-3, call control data from the call control unit 44-4, and data from the data transmission / reception unit 44-5. Is received, multiplexed, and transmitted to the conference server 60 via the network 300. On the contrary, the signal from the conference server 60 is received via the network 300, each signal is separated, and the video transmission / reception unit 44-2, the audio transmission / reception unit 44-3, the call control unit 44-4, and the data transmission / reception unit 44- Send to 5.

[0029]

291 The video transmission / reception unit 44-2 is connected to the video board built in the terminal and the camera 41-3, and the NTSC signal from the camera 41-3 is digitized and sent to the line interface unit 44-1.

294 Further, the signal from the line interface unit 44-1 is converted into an analog signal and sent to the video board built in the terminal and the camera 41-3. The voice transmission / reception unit 44-3 performs coding / recombination processing of the voice signals of the microphone 41-1 and the speaker 41-2 to perform transmission / reception processing between the line interface unit 44-1 and the line interface unit 44-1. The data transmission / reception unit 44-5 is connected to the terminal device 42, and can send the data from the terminal device 42 to the conference server 60 and the data stored in the conference server 60 to the terminal device 42.

[0030]

305 The call control unit 44-4 supports control / monitoring of the line interface unit 44-1 and connection control of lines such as voice, data, and video.

307 The control unit 44-6 is connected to the video transmission / reception unit 44-2, the audio transmission / reception unit 44-3, the call control unit 44-4, and the data transmission / reception unit 44-5 via the control highway 44-7, and each of them is connected. It manages and has an interface with the terminal device 42, and performs cooperative operation with the terminal device 42.

[0031]

315 FIG. 10 shows a display example of the multimedia minutes displayed on the display 42-1 of the terminal device 42 of this embodiment.

317 The conference participants to whom the minutes are distributed can receive the minutes A, B, C in the form of video, still image, audio or text on the display 42-1 displayed in this way. In FIG. 10, 42-1 is a display of the terminal device 42, 42-2, 42-3 and 42-4 are windows for displaying the minutes A, B, and C, and 42-5 is a window for command input.

[0032]

324 In the figure, window 42-2 showing the minutes A is a text screen, which can be used to display text or as a medium for e-mail.

326 In the window 42-3 showing the minutes B, the state of the meeting such as the facial expressions of the meeting participants is displayed by video, and the contents of the conversation are displayed by voice. In this window, the person who is speaking is clarified by displaying such as blinking ● at the conference participants who are speaking at the conference. Window 42-4 displays the minutes C as additional minutes. In addition to displaying supplementary items for meeting records, materials submitted at other meetings

and past meetings are displayed here.

[0033]

336 In FIG. 10, windows 42-2, 42-3, and 42-4 displaying the minutes A, B, and C are all displayed on the display 42-1. However, the windows are individually displayed and have already been viewed. If you close the window of the minutes and read the next minutes, you can get the minutes that are easier to read or read.

[0034]

343 FIG. 11 shows another display example of the multimedia minutes displayed on the display 42-1 of the terminal device 42.

345 In the figure, the text is displayed in the window 42-2 for the minutes A, the conference image is displayed in the window for the minutes B, and the command input screen is displayed in the command window 42-5.

[0035]

351 FIG. 12 shows yet another display example of the multimedia minutes displayed on the display 42-1 of the terminal device 42.

353 In this example, many types of meeting minutes are displayed in one window, and the meeting minutes display menu is selected with a mouse or the like to display the state of the meeting and the contents of the meeting summarized in text as the meeting minutes.

356 Which of FIGS. 10, 11 or 12 should be displayed can be appropriately selected depending on the purpose and content of the minutes.

[0036]

361 Next, the method of editing the minutes after the meeting is described.

[0037]

365 There are two ways for the minutes editor to read the recorded minutes.

366 One is a method of reading the minutes recorded from the conference server 60, and the other is reading from the audio and image storage device 46 in the minutes editing device 45 of the conference terminal 40 in the hands of the conference minutes editor. The method.

[0038]

372 In the former case, the terminal device 42 of the minutes editor and the conference server 60 are connected, the minutes editor reads the minutes from the conference server 60, and the

audio and image storage device 63 stores the read minutes. To edit.

375 The conference record recorded during the conference is always recorded as a master file in the conference server 60.

377 The minutes editor looks at the minutes editor terminal device 42 and if there is a place he wants to record, he presses the recording start button of the voice and image storage control device 47 to record, and when he does not need to record, he presses the recording stop button to record. If you want to record again, stop and press the recording start button again to edit.

[0039]

385 The addition to the minutes is performed by temporarily disconnecting the connection between the minutes editor terminal device 42 and the meeting server 60 and using the camera 41-3, the microphone 41-1 and the terminal device 42 of the own meeting terminal 40.

389 Then, when the editing addition is completed, the minutes editor terminal device 42 and the conference server 60 are reconnected, the play button of the voice and image storage control device 47 is pressed to reproduce the edited contents, and the conference terminal control device 44 is pressed. The edited minutes are transmitted to the conference server 60 via the conference server 60, and recorded separately from the master file.

[0040]

397 On the other hand, in the latter case, as shown in FIG. 8, another audio and image storage device 46-2 and an audio and image storage control device 47-2 are prepared.

399 Then, the contents of the conference are recorded as a master file in the voice and image storage device 46-1 during the conference, and the recorded conference record is recorded in the voice and image storage control device 47-1 with the other voice and the other voice. It is read into the image storage device 46-2, and the recording start button and the recording stop button of the second voice and image storage control device 47-2 are operated to re-record and edit the necessary parts. Editing of Minutes After finishing the recording, if there is an addition, the conference being edited in the second audio and image storage device 46-2 using the camera 41-3, the microphone 41-1 and the terminal device 42. Add to the record.

[0041]

411 Such editing of the minutes can be performed promptly if the audio and image storage control devices 47 and 64 have a fast-forward / fast-rewind function.

413 In addition to manually controlling the buttons of the voice and image storage control device 47, the voice and image storage devices 46 and 63 can also be controlled by using the command input screen 42-5 of the minutes editor terminal device 42. ..

[0042]

419 FIG. 13 shows an example of the editing screen of the minutes editor terminal device 42.

420 On this editing screen, a monitor screen 42-3 for monitoring the minutes when editing the minutes or playing back the minutes and a voice and image storage control screen 42-5 can be displayed. Each function of the voice and image storage control screens 42-5 can be activated by a method such as clicking with a mouse. With reference to FIG. 14, the effect of time reduction by the present invention will be shown. Minutes are recorded by recording audio and images during the meeting. If you want to record the entire time during the meeting, you need to record the same time as the time t1 spent in the meeting, but if you limit the recording of the minutes to the important part or the conclusion part, keep the minutes simple. The time can be shortened accordingly. If the time of these important parts and the conclusion part is t2 · 1, t2 · 2 ... t2 · n, the recording time of the minutes master file is t3 = t2.1 + t2 · 2 + ... + t2 · n <t1. Furthermore, if only the necessary parts t4 · 1, t4 · 2 ... t4 · n are taken up from the master file by editing, the conference record record length t5 of the edited word is t5 = t4 · 1 + t4.2 + ... + t4 · n <t3. You can shorten the time. Assuming that the minutes editor has made additional recordings for t6 hours, the final length t7 of the minutes is t7 = t5 + t6.

[0043]

438 The time loss here can be shortened by playing back the recording at the time of editing by fast-forwarding and fast-rewinding as much as possible.

440 The more concise the edited minutes are, the shorter the time it takes to read the minutes distributed by the meeting participants, and the points and conclusions of the meeting can be clarified. The time t10 required for editing the minutes is the sum of the playback time t8 of the minutes master file, the time t9 for playing and checking the edited minutes, and the additional record t6 of the minutes editor. It can be shortened by fast-forwarding the playback of.

[0044]

449 If the terminal that receives the conference record is also equipped with a voice and image storage device 46 and a voice and image storage control device 47, the receiver can read the conference minutes even faster, skip unnecessary parts, and see what they want to see. Only can be extracted and viewed slowly.

[0045]

456 FIG. 15 shows an example of the connection configuration of the remote conference system.

457 There are two types of conference terminals 40: panela conference terminals 40-1 to 40-4

and floor conference terminals 40-5 to 40-8.

459 The panela conference terminals 40-1 to 40-4 are always connected to the conference server 60 by multimedia bidirectional connections 301 to 304, and can transmit and receive audio, moving images, data, and the like. The user of the panela conference terminals 40-1 to 40-4 is a panela participant who can always speak during the conference, and the appearance is normally displayed on the divided screen 42-3. The conference terminal of the conference editor must be this panela conference terminal 40-1 to 40-4. The floor conference terminals 40-5 to 40-8 are always connected to the conference server 60 by a multimedia connection 310 for one-way downlink, and can receive audio and moving images to see and hear the contents of the conference. In addition to this one-way connection 310, a two-way connection 320 is also prepared, and if necessary, this two-way connection 320 is set up between the conference server 60 and the floor conference terminal 40-5 to 40-8. You can send and receive data, audio, and video. As a result, the voice of the floor participant's speech can be transmitted from the floor conference terminal 40-5 to 40-8 of the floor participant to the panela participant and the moderator via the conference server 60 together with the video of the speaker. However, the user of the floor conference terminal 40-5 to 40-8 can appear on the screen only while speaking.

[0046]

478 INDUSTRIAL APPLICABILITY As described above, according to the present invention, a conference terminal that handles multimedia information is connected by a communication network to form a distributed conference system, and a conference is being held in order to realize multimedia minutes. Since the audio and video recording device for recording audio and video and the audio and video recording control device for instructing the start and end of recording of audio and video are provided, the conference participants participate in the conference at their own seats. And the minutes editor can also create the minutes at his / her own desk.

[0047]

489 In addition, since the minutes are created by the method of recording multimedia, the minutes can be created and edited easily and in a short time, so the time devoted to editing the minutes after the meeting can be shortened, and the approval of the meeting and the meeting can be shortened. The minutes can be distributed within a short time after the meeting is over.

494 In addition, the minutes can be transferred to the minutes server and easily referenced from the terminal at any time.

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CLAIMS JPH07123384A

1.

13 Multimedia conference record that creates a conference record of a distributed conference system that connects conference terminals that handle multimedia information including video, audio, and data via a communication network and conducts communication conferences between multiple points. In the creating device, the content of the communication conference is described between the instruction means for instructing the recording start and recording end of the conference record recording during the conference and the recording start time to the recording end time instructed by the instruction means. A multimedia conference record creating device comprising a conference record creating means for creating a conference record using the multimedia information by recording using the multimedia information.

2.

25 The first aspect of claim 1, wherein the minutes created by the minutes are presented to the meeting participants at the end of the meeting, and the meeting minutes are further provided with the minutes presentation means for modifying and accepting the minutes at the end of the meeting. Multimedia conference recording device.

3.

32 Predetermined: a minutes recording means for recording the minutes created by the minutes, a reading means for reading the minutes stored in the minutes recording means after the end of the meeting, and a predetermined meeting minutes read by the reading means. The multimedia minutes-taking apparatus according to claim 1, further comprising an editing means for editing the minutes by designating the range of.

4.

40 The first aspect of the present invention is characterized in that the meeting minutes creating means further includes a meeting minutes addition / correction means for adding and modifying the minutes by using voice or an image at the same time as recording the minutes. The described multimedia conference recording device.

5.

47 It is characterized in that it is connected to the communication network and records the minutes created by the minutes-making means, and further comprises a minutes server in which the recorded minutes can be read by the conference participants. The multimedia minutes creation device according to claim 1.

6.

54 Editing means for editing the minutes by adding information such as documents, images, and sounds used during the meeting to the minutes after the meeting, and ending the meeting with the minutes edited by the editing means. The multimedia minutes-making apparatus according to claim 1, further comprising means to be referred to later.

7.

61 The multimedia conference record creating device according to claim 6, further comprising a transmission unit for transmitting the conference minutes edited by the editing means to the conference participants.

8.

67 The conference record creating means includes a delay means for delaying multimedia information indicating the contents of the communication conference, a storage means for storing multimedia information delayed by the delay means, and a recording start instruction by the instruction means. , Recording of the conference record is started from the multimedia information stored in the storage means before a predetermined time, and when the instruction means gives a recording end instruction, the conference record is recorded until a predetermined time elapses from the recording end instruction. The multimedia conference recording creation device according to claim 1, further comprising a recording control means for continuing recording.

(19)日本国特許庁（ＪＰ）　(12) 公開特許公報（Ａ）　(11)特許出願公開番号
特開平7－123384
(43)公開日 平成7年(1995)5月12日

(51)Int.Cl.[6]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｈ０４Ｎ 7/15			Ｈ０４Ｌ 11/18	8732-5K
// Ｈ０４Ｌ 12/18				

審査請求　未請求　請求項の数 8ＯＬ（全 11数）

(21)出願番号　特願平5－267557

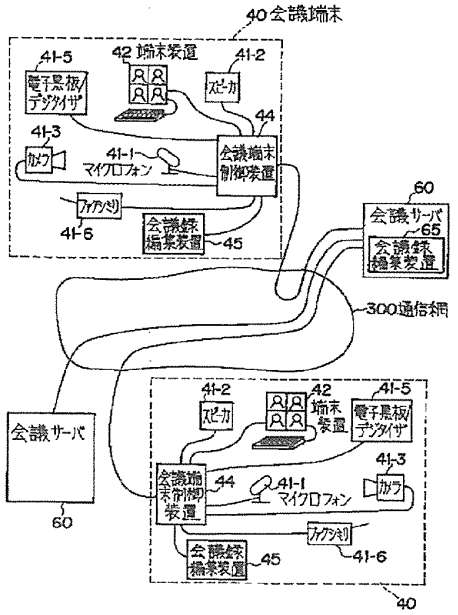
(22)出願日　平成5年(1993)10月26日

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最終頁に続く

(54)【発明の名称】　マルチメディア会議録作成装置

(57)【要約】
【目的】この発明の目的は、自席で会議に参加できると共に自席で会議録の編集ができ、会議録の作成、承認、配布が容易にできる分散会議システムに於けるマルチメデア会議録作成装置を提供することにある。
【構成】この発明では、映像、音声及びデータからなるマルチメディア情報を扱う会議端末（４０）と会議サーバ（６０）を通信網（３００）により接続して多地点間で通信会議を行う分散会議システムを構成し、会議端末（４０）および会議サーバ（６０）中に、マルチメディア会議録を作成するために会議中の音声と映像を記録するための音声および映像記録装置と、音声と映像の記録の開始と終了などの指示を行なう音声および映像記録制御装置を設けてマルチメディア会議録作成装置を構成するようにする。



1

【特許請求の範囲】

【請求項１】　映像、音声およびデータを含むマルチメディア情報を扱う会議端末を通信網を介して接続し、多地点間で通信会議を行う分散会議システムの会議録をマルチメディア情報を用いて作成するマルチメディア会議録作成装置において、

前記会議録の記録の記録開始と記録終了を会議中に指示する指示手段と、

前記指示手段により指示された記録開始時点から記録終了時点までの間、前記通信会議の内容を前記マルチメディア情報を用いて記録することにより会議録を前記マルチメディア情報を用いて作成する会議録作成手段とを具備することを特徴とするマルチメディア会議録作成装置。

【請求項２】　前記会議録作成手段により作成した会議録を会議終了時に会議参加者に提示し、該会議録の修正および承諾を会議終了時に行う会議録提示手段を更に具備することを特徴とする請求項１記載のマルチメディア会議録作成装置。

【請求項３】　前記会議録作成手段により作成した会議録を記録する会議録記録手段と、

前記会議録記録手段に記憶した会議録を会議終了後に読み出す読出手段と、

前記読出手段により読み出された会議録の所定の範囲を指定することにより該会議録の編集を行う編集手段とを更に具備することを特徴とする請求項１記載のマルチメディア会議録作成装置。

【請求項４】　前記会議録作成手段は、

前記会議録の記録と同時に会議録編集者が音声あるいは画像を用いて会議録の追加および修正を行う会議録追加修正手段を更に具備することを特徴とする請求項１記載のマルチメディア会議録作成装置。

【請求項５】　前記通信網に接続され、前記前記会議録作成手段で作成された会議録を記録するとともに、該記録された会議録が会議参加者により読み出し可能な会議録サーバを更に具備することを特徴とする請求項１記載のマルチメディア会議録作成装置。

【請求項６】　前記会議中に使用された文書、画像、音声等の情報を会議終了後に前記会議録に追加することにより該会議録の編集を行う編集手段と、

前記編集手段により編集された会議録を会議終了後に参照する手段とを更に具備することを特徴とする請求項１記載のマルチメディア会議録作成装置。

【請求項７】　前記編集手段により編集された会議録を会議参加者に送信する送信手段をを更に具備することを特徴とする請求項６記載のマルチメディア会議録作成装置。

【請求項８】　前記会議録作成手段は、

前記通信会議の内容を示すマルチメディア情報を遅延させる遅延手段と、

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前記遅延手段により遅延されマルチメディア情報を記憶する記憶手段と、

前記指示手段により記録開始指示があると、前記記憶手段に記憶された所定時間前のマルチメディア情報から前記会議録の記録を開始し、前記指示手段により記録終了指示があると、該記録終了指示から所定時間経過するまで前記会議録の記録を続ける記録制御手段とを具備することを特徴とする請求項１記載のマルチメディア会議録作成装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、遠隔地間で映像、音声およびデータを含むマルチメディア情報を扱う会議端末を通信回線により接続し、多地点間で通信会議を行う分散会議システムに関し、特に、該通信会議の会議録を音声、動画、静止画、テキスト等のマルチメデア情報を用いて作成するマルチメディア会議録作成装置に関する。

【０００２】

【従来の技術】従来、遠隔会議システムとしては、図１６に示すように広域網３０を経由して２地点間の会議室を結ぶ形式のものが知られている。このシステムの構成は、複数の参加者の撮像および表示ができるカメラ１０－３およびテレビ１０－４を含む映像系と、マイクロフォン１０－１およびスピーカ１０－２を含む音声系を有する２つの通信端末装置１０、１０´を広域網３０で結んで構成される。ここで、カメラ１０－３で参加者をとらえ、テレビ１０－４に相手の参加者を映しだし、またマイクロフォン１０－１およびスピーカ１０－２を利用して相互に意見の交換や議論が行える。このような構成により遠方にいても臨場感溢れる会議が開催できる。

【０００３】また補助装置としての電子黒板システム１０－５を用いて電子黒板に書いた図を相手の電子黒板システムのテレビ（図には表示していない）に表示することも可能である。さらにファクシミリ１０－６を利用すれば、会議の資料を伝送することもできる。遠隔制御装置２０はこれらの要素を制御する。そしてこの様なシステムが広域網３０を介して接続され相互に離れていても会議を行うことができる。

【０００４】

【発明が解決しようとする課題】ところで、この様な従来の遠隔会議システムの運用上の問題点の一つとして会議録の作成と承認の問題がある。会議を行うとその都度、会議録を作成して多数の会議参加者に会議録を配布する必要がある。会議録作成者にとって、会議録の作成や承認をとる作業は手間のかかるもので、会議録の訂正や削除などの編集作業や配布に費やされる時間は馬鹿にならない。また会議録の承認は次回の会議開催時に初めて得られるのが普通である。

【０００５】そこで、本発明は、音声、動画、静止画、テキスト等のマルチメディア情報を使って、自席で会議

録の作成、編集ができ、会議録の作成、承認、配布が容易にできるマルチメデア会議録作成装置を提供することを目的とする。

【０００６】

【課題を解決するための手段】上述の目的を達成するため、本発明は、映像、音声およびデータを含むマルチメディア情報を扱う会議端末を通信網を介して接続し、多地点間で通信会議を行う分散会議システムの会議録をマルチメディア情報を用いて作成するマルチメディア会議録作成装置において、前記会議録の記録の記録開始と記録終了を会議中に指示する指示手段と、前記指示手段により指示された記録開始時点から記録終了時点までの間、前記通信会議の内容を前記マルチメディア情報を用いて記録することにより会議録を前記マルチメディア情報を用いて作成する会議録作成手段とを具備することを特徴とする。

【０００７】

【作用】本発明によれば、会議録の記録の記録開始と記録終了を指示手段により会議中に指示し、この指示手段により指示された記録開始時点から記録終了時点までの間、通信会議の内容をマルチメディア情報を用いて記録することにより会議録を前記マルチメディア情報を用いて作成する。これにより、自席で会議録の作成、編集ができ、会議録の承認、配布および検索を容易に行うことができる。

【０００８】

【実施例】以下、本発明のマルチメデア会議録作成装置を添付図面を参照して詳細に説明する。

【０００９】まず、本発明が適用される分散会議システムについて説明する。

【００１０】図１は、本発明が適用される分散会議システムの基本構成を示すもので、この分散会議システムは、会議サーバ６０と、複数の会議端末４０と、それらを接続する通信網３００を具備して構成される。ここで、通信網３００としては、広帯域ＩＳＤＮ網などの広域網またはＡＴＭ－ＬＡＮ又はＳＴＭマルチメディアＬＡＮなどの構内網が使用できる。

【００１１】複数の会議端末４０は、それぞれ、カメラ４１－３および端末装置４２を含んで構成される映像系と、マイクロフォン４１－１およびスピーカ４１－２を含んで構成される音声系と、会議端末制御装置４４を具備している。

【００１２】各会議端末４０のカメラ４１－３からの映像とマイクロフォン４１－１からの音声は会議端末制御装置４４を経て会議サーバ６０に送られ、それぞれの映像と音声の合成が行われ、再び会議端末４０に送られ、会議端末制御装置４４を通ってスピーカ４１－２、端末装置４２で再生される。これにより会議参加者は他の参加者の音声を聞いたり映像を見ることができる。

【００１３】端末装置４２は、具体的にはパーソナルコンピュータやワークステーションで実現できる。これらのパーソナルコンピュータやワークステーションは映像表示用のビデオボードを内蔵しているので、会議サーバ６０から会議端末制御装置４４を経由して送られてきた映像を画面のウィンドウ内に表示することができる。このほか周辺機器のオプションとして電子黒板／デジタイザ４１－５やファクシミリ４１－６が有り、デジタル画像情報や静止画の送受に使われる。また、会議端末４０および会議サーバ６０には、後述するようにそれぞれ会議録編集装置４５、６５が設けられる。

【００１４】図２は、図１に示した会議サーバ６０の詳細構成を示したものである。図２において、会議サーバ６０は、サービス制御システム６１、状態監視端末６２、会議録編集装置６５を具備して構成され、会議録編集装置６５は、音声及び画像を記録する記録装置６３、音声及び画像の記録を制御する記録制御装置６４を具備して構成される。

【００１５】サービス制御システム６１は、会議端末４０からの映像信号、音声信号、データ、呼制御データを受取り、これを多重化して複数のウィンドウを持つ一定のフォーマットに表して再び通信網３００を通じて会議端末４０に送信する動作を行う。また、状態監視端末６２は、サービス制御システム６１に接続されており、システムの運用管理を行なう。

【００１６】会議録編集装置６５を構成する記録装置６３はマルチメディア会議録の記録を行なう。また記録制御装置６４は会議録編集者が会議録の編集を行なうとき記録装置６３の制御を行なう。

【００１７】サービス制御システム６１の構成を図３に示す。サービス制御システム６１はモジュールＭ１～Ｍｎで構成され、各回線Ｌ１～Ｌｎ若しくは各会議端末４０ごとに同一のモジュールＭ１～Ｍｎが用意されている。なお、サービス制御システム６１は、会議録編集装置６５と接続しており、この会議録編集装置６５に対して映像信号、音声信号、データ、呼制御データの入出力を行っている。

【００１８】サービス制御システム６１の機能を回線１（Ｌ１）のモジュールＭ１に添って説明する。回線インタフェース部６１０－１は映像処理部６１１－１、音声処理部６１２－１、データ処理部６１４、呼制御部６１３－１から、映像信号、音声信号、データ、呼制御データを受取り多重化を行ない網３００に送信する。またこの反対に網３００から信号を受信し分離を行ない映像処理部６１１－１、音声処理部６１２－１、データ処理部６１４に映像信号、音声信号、データを渡す。映像処理部６１１－１は回線インタフェース部６１０－１からの入力映像信号を他の回線Ｌ２～Ｌｎとの同期を行った後に画像選択部６１８へ出力し、そこを流れる複数の映像から制御部６１５の制御の下に、会議録編集装置６５で映像の選択／合成を行ない再び回線インタフェース部６

１０－１を経由して網３００に送出する。映像処理部６１１－１の選択合成機能により１画面、２画面、４画面、９画面等の映像を合成する事ができる。例えば２画面の場合はフル画面と小画面で構成される。４画面、９画面の場合は、後述する図６（ａ）、図６（ｂ）のようになる。

【００１９】音声処理部６１２－１は回線インタフェース部６１０－１からの入力音声信号の復合化を行ない音声ハイウェー６１７に出力する。ついで制御ハイウエー６１９経由の制御部６１５からの指示により、会議録編集装置６５で自己の音声のみを除いて加算するＮ－１加算等の選択音声加算と符号化を行ない、再び回線インタフェース部６１０－１を経由して網３００へ送出する。音声と映像の遅延に差があるため、音声を固定量遅延させて端末上で不自然でないようにする。

【００２０】呼制御部６１３－１は回線インタフェース部６１０－１の制御／監視と呼設定制御を行なう。呼制御部６１３－１と制御部６１５との接続は制御ハイウエー６１９を経由して行われる。制御部６１５は制御ハイウエー６１９を経由してサービス制御システム６１内部全体および会議録編集装置６５の制御／監視を行なう。また状態監視端末６２とのインタフェースを行なう。

【００２１】これらの動作は他の回線、回線２～回線ｎ（Ｌ２～Ｌｎ）のモジュールＭ２～Ｍｎでも全く同様に行われ、それぞれの回線モジュールＭ２～Ｍｎで回線インタフェース部６１０－２～６１０－ｎは、モジュールＭ１の回線インタフェース部６１０－１と同様の、映像処理部６１１－２～６１１～ｎはモジュールＭ１の映像処理部６１１－１と同様の、音声処理部６１２－２～６１２－ｎはモジュールＭ１の音声処理部６１２－１と同様の、呼制御部６１３－２～６１３～ｎはモジュールＭ１の呼制御部６１３－１と同様の働きをする。

【００２２】また、データ処理部６１４は任意の回線インタフェース部６１０－１～６１０－ｎからのパケットデータをデータハイウエー経由で受信し、会議録編集装置６５で蓄積した後、再びデータハイウエー経由で任意の回線インタフェース部６１０－１～６１０－ｎを経由して会議端末４０に網３００経由で送出する。

【００２３】図４は、図１に示した実施例の会議端末４０の詳細構成を示したものである。図４において、会議端末４０内の会議編集装置４５は、図５に示すように音声及び画像を記録する記憶装置４６とその起動と停止、つまり音声あるいは画像の記憶の開始と終了等を指示する記憶制御装置４７、会議録編集者の端末装置４２、遅延装置４８を具備して構成される。

【００２４】図６は、この実施例において、端末装置４２の画面の表示例を個々の会議参加者の映像が表示された場合で示したものである。端末装置４２の画面は、図６（ａ）に示す画像４２－１１のように参加者の数に応じて４分割、あるいは図６（ｂ）に示す画像４２－１２のように９分割される。また画面の一部にウィンドウ４２－１３を開き、それをテキストとして使用して、参加者へ個別に情報を送信し、例えば電子メールとして利用できる。

【００２５】音声及び画像記憶装置４６は音声レコーダとビデオレコーダで個別に構成するか、或いは一体化したものを用いても良い。音声及び画像記憶制御装置４７はこの音声レコーダとビデオレコーダ、或いは一体化されたものの記録動作の制御を行うもので、簡単な例としては、プッシュ・スイッチを複数配置した装置で実現できる。プッシュ・スイッチを複数配置して実現した場合の音声及び画像記憶制御装置４７の各スイッチのパネル配置の一例を図７に示す。このパネルを持つ音声及び画像記憶制御装置４７の制御では音声と画像は同時に記録制御される。音声及び画像記憶制御装置４７は音声と画像を個別に制御するものでも良いが、音声と画像を同期して同時に記録制御するほうが会議録作成装置としては好ましい。　会議端末４０内の会議編集装置４５の動作に付いて簡単に説明する。

【００２６】会議中の音声及び画像信号は会議端末制御装置４４を経て会議編集者端末装置４２と遅延回路４８に同時に入力される。遅延装置４８は会議録を記録する音声及び画像記憶制御装置４７に、実際の会議中の音声と映像を多少遅らせたものを転送する。会議中に会議録編集者は会議編集者の会議端末４０の端末装置４２の画面を見て音声及び画像記憶制御装置４７より会議録の記録スタートとストップをかける。音声及び画像記憶制御装置４７からの記録スタート信号は遅れずに、記録ストップ信号は遅延装置の遅延時間分遅れて出力されるので記録スタートと記録ストップをかけた前後の情報が欠けること無く記録できる。

【００２７】会議端末４０内の会議編集装置４５には、図８に示すように、音声及び画像記憶装置４６と音声及び画像記憶制御装置４７を２組設けたものを用いることもできる。後述するように、このような会議編集装置４５を用いると、１会議端末４０内で会議録の編集が容易に実現できる。

【００２８】会議端末制御装置４４の構成を図９に示す。回線インタフェース部４４－１は映像送受信部４４－２からの映像信号と音声送受信部４４－３からの音声信号、呼制御部４４－４からの呼制御データ、データ送受信部４４－５からのデータを受信し多重化して網３００を経由して会議サーバ６０に送信する。また反対に会議サーバ６０からの信号を網３００経由で受信して各々の信号を分離して映像送受信部４４－２、音声送受信部４４－３、呼制御部４４－４、データ送受信部４４－５に送信する。

【００２９】映像送受信部４４－２は端末に内蔵されたビデオボードとカメラ４１－３に接続されており、カメラ４１－３からのＮＴＳＣ信号をデジタル化して回線イ

ンタフェース部４４－１に送っている。また回線インタフェース部４４－１からの信号をアナログ化し端末に内蔵されたビデオボードとカメラ４１－３に送っている。

音声送受信部４４－３はマイクロフォン４１－１とスピーカ４１－２の音声信号の符号化／復合化処理を行って回線インタフェース部４４－１との送受信処理を行なっている。データ送受信部４４－５は端末装置４２と接続されており、端末装置４２からのデータを会議サーバ６０に送ったり、会議サーバ６０に蓄積されているデータを端末装置４２に送ることができる。

【００３０】呼制御部４４－４は回線インタフェース部４４－１の制御／監視と音声、データ、映像等の回線の接続制御をサポートする。制御部４４－６は制御ハイウエー４４－７を経由して映像送受信部４４－２や音声送受信部４４－３、呼制御部４４－４、データ送受信部４４－５と接続されており、それぞれの管理を行なうとともに端末装置４２とのインターフェースも持っており端末装置４２との協調動作を行なう。

【００３１】図１０に、本実施例の端末装置４２のディスプレイ４２－１上に表示されたマルチメディア会議録の表示例を示す。会議録を配布される会議参加者は、この様に表示されたディスプレイ４２－１上で会議録Ａ、Ｂ、Ｃを映像、静止画、音声或いはテキストの形式で受け取ることができる。図１０で４２－１は端末装置４２のディスプレイ、４２－２、４２－３及び４２－４は会議録Ａ、Ｂ、Ｃを表示するウィンドウ、４２－５はコマンド入力用のウィンドウである。

【００３２】図中、会議録Ａを現すウィンドウ４２－２はテキスト画面で、テキストを表示するために、或いは電子メールの媒体として使用できる。会議録Ｂを現すウィンドウ４２－３には会議参加者の表情など会議の様子を映像で表示し、会話の内容を音声で表示する。このウィンドウでは会議で発言中の会議参加者のところに◉が点滅するなどの表示をして発言中の人物を明確にしている。ウィンドウ４２－４は追加議事録としての会議録Ｃを表示する。ここには会議の記録の補助的な事項を表示するほか、他の会議、過去の会議で提出された資料などを表示する。

【００３３】図１０では会議録Ａ、Ｂ、Ｃを表示するウィンドウ４２－２、４２－３及び４２－４が一斉にディスプレイ４２－１上に表示されているが、ウィンドウを個別に表示し、既に見終わった会議録のウィンドウは閉じて次の会議録を読んで行くようにすれば、さらに読みやすい或いは見易い会議録が得られる。

【００３４】図１１に、端末装置４２のディスプレイ４２－１上に表示されたマルチメディア会議録の他の表示例を示す。図では会議録Ａ用のウィンドウ４２－２にテキストが、会議録Ｂ用のウィンドウに会議画像が、コマンド用のウィンドウ４２－５にコマンド入力画面が表示されている。

【００３５】図１２に、端末装置４２のディスプレイ４２－１上に表示されたマルチメディア会議録の更に別の表示例を示す。この例では１つのウィンドウ内に多種類の会議録が表示され、会議録表示メニューをマウス等で選択し、会議の様子やテキストにまとめられた会議の内容を会議録として表示している。図１０、図１１或いは図１２のうちどの表示にするかは会議録の目的や内容により適宜選択できる。

【００３６】次に会議終了後の会議録の編集方法について述べる。

【００３７】会議録編集者が記録された会議録を読み出すには２通りの方法がある。１つは会議サーバ６０から記録してある会議録を読み出す方法であり、もう１つは会議録編集者の手元にある会議端末４０の会議録編集装置４５内の音声及び画像記憶装置４６から読み出す方法である。

【００３８】前者の場合、会議録編集者の端末装置４２と会議サーバ６０を接続し、会議録編集者が会議録を会議サーバ６０から読みだし、音声及び画像記憶装置６３に読み出した会議録を記憶させながら編集する。会議サーバ６０には常に会議中に記録した会議録をマスタファイルとして記録しておく。会議録編集者は会議録編集者端末装置４２を眺めて記録したい場所があれば音声及び画像記憶制御装置４７の記録スタートボタンを押して記録し、記録する必要のないところでは記録ストップボタンを押して記録を止め、再度記録したいところがあれば再度記録スタートボタンを押すという方法で編集していく。

【００３９】会議録に対しての追加は会議録編集者端末装置４２と会議サーバ６０の接続を一旦切断して、自会議端末４０のカメラ４１－３、マイクロフォン４１－１及び端末装置４２を使って行なう。そして編集追加が終わった時点で、会議録編集者端末装置４２と会議サーバ６０を再度接続して、音声及び画像記憶制御装置４７の再生ボタンを押して編集内容を再生させ、会議端末制御装置４４を介して会議サーバ６０に編集後の会議録を送信し、マスタファイルとは別に記録する。

【００４０】一方、後者の場合は、図８に示すように、もう１つ別の音声及び画像記憶装置４６－２と音声及び画像記憶制御装置４７－２を用意しておく。そうして音声及び画像記憶装置４６－１に会議中に会議の内容をマスタファイルとして記録し、記録されている会議録を、音声及び画像記憶制御装置４７－１を使ってもう一方の音声及び画像記憶装置４６－２に読み出し、第２の音声及び画像記憶制御装置４７－２の記録スタートボタンと記録ストップボタンを操作して必要なところを記録し直して編集する。会議録の編集記録を一応終了した後で、追加があれば、カメラ４１－３、マイクロフォン４１－１及び端末装置４２を使って第２の音声及び画像記憶装置４６－２内の編集中の会議録に追加する。

【００４１】この様な会議録の編集は音声及び画像記憶制御装置４７、６４に早送り早戻しの機能があれば速やかに実行できる。音声及び画像記憶装置４６、６３の制御は音声及び画像記憶制御装置４７のボタンを手動で制御するほかに、会議録編集者端末装置４２のコマンド入力画面４２－５を使って実施することもできる。

【００４２】図１３に、会議録編集者端末装置４２の編集画面の１例を示す。この編集画面には会議録編集時或るいは会議録の再生時に会議録をモニタするモニタ画面４２－３や音声及び画像記憶制御画面４２－５が表示出来る。音声及び画像記憶制御画面４２－５の各機能はマウスを用いてクリックするなどの方法で起動できる。図１４を参考にして、この発明による時間短縮の効果について示す。会議録は会議中の音声や画像を記録することで行なう。もし会議開催中の全時間について記録するとすると会議に費やした時間ｔ１と同じ時間の記録が必要になるが、会議録の記録を重要な部分とか結論の部分などに限れば会議録を簡潔にして、その分、時間を短くできる。これらの重要な部分や結論の部分の時間をｔ２・１、ｔ２・２…ｔ２・ｎとすると会議録マスターファイルの記録時間はｔ３＝ｔ２・１＋ｔ２・２＋…＋ｔ２・ｎ＜ｔ１となる。さらに編集によってマスターファイルから必要な部分ｔ４・１、ｔ４・２…ｔ４・ｎだけを取り上げたとすると、編集語の会議録記録長ｔ５はｔ５＝ｔ４・１＋ｔ４・２＋…＋ｔ４・ｎ＜ｔ３で一層時間を縮めることができる。これに更に会議録編集者が追加記録をｔ６時間行ったとして最終的な会議録の長さｔ７はｔ７＝ｔ５＋ｔ６になる。

【００４３】編集時の記録の再生を、出来るだけ早送り、早戻しで行なうことで、ここでの時間ロスは短くできる。そうして編集後の会議録が簡潔になっていればそれだけ会議参加者が配布した会議録を読む場合も短時間ですみ、会議のポイントや結論を明確にできる。会議録編集に要する時間ｔ１０は、会議録マスターファイルの再生時間ｔ８と、編集された会議録を再生してチエックする時間ｔ９と、会議録編集者の追加記録ｔ６の和となり、編集時の記録の再生を早送りで行なうことで短縮できる。

【００４４】会議録を受信する端末にも音声及び画像記憶装置４６や音声及び画像記憶制御装置４７を具備させれば、受信者が会議録をさらに早送りして読め、不要なところは読み飛ばし、見たいところだけを抽出してゆっくり見ることができる。

【００４５】遠隔会議システムの接続構成の一例を図１５に示す。会議端末４０にはパネラ会議端末４０－１～４０－４とフロア会議端末４０－５～４０－８の２つの種類がある。パネラ会議端末４０－１～４０－４は会議サーバ６０と常時、マルチメディアの双方向のコネクション３０１～３０４で接続されており、音声、動画像、データ等を送受信することができる。パネラ会議端末4*50*０－１～４０－４の使用者がパネラ参加者で会議中に常時発言が可能で、その姿は分割された画面４２－３上に通常表示されている。会議編集者の会議端末はこのパネラ会議端末４０－１～４０－４でなくては成らない。フロア会議端末４０－５～４０－８は会議サーバ６０と下り片方向同報のマルチメディアコネクション３１０で常時接続されており、音声と動画像を受信して会議の内容を見聞きすることができる。この片方向のコネクション３１０のほかに双方向のコネクション３２０も用意されており、必要に応じてこの双方向のコネクション３２０を会議サーバ６０とフロア会議端末４０－５～４０－８の間に張り、データ、音声、動画を送受信できる。これによりフロア参加者のフロア会議端末４０－５～４０－８からフロア参加者の発言の音声が発言者の映像と共に会議サーバ６０を経てパネラ参加者や司会者に送信できる。ただしフロア会議端末４０－５～４０－８の使用者が画面に登場できるのは発言中だけである。

【００４６】

【発明の効果】以上説明したように、本発明によれば、マルチメディア情報を扱う会議端末を通信網により接続して分散会議システムを構成し、マルチメディア会議録を実現するために会議中の音声と映像を記録するための音声および映像記録装置と音声と映像の記録の開始と終了などの指示を行なう音声および映像記録制御装置を設けるようにしたので、会議参加者は自席で会議に参加することができ、会議録編集者も自席で会議録を作成することができる。

【００４７】またマルチメディアを記録する方式で会議録を作成するので、会議録の作成、編集が容易で短時間にできるため、会議後の会議録編集に割かれる時間を短くでき、会議録の承認、会議録の配布を、会議終了後時間を置かずに実施することができる。また会議録は会議録サーバに転送しておいて、端末から何時でも簡単に参照することができる。

【図面の簡単な説明】

【図１】本発明が実施される分散会議システムの基本構成。

【図２】本発明が実施される分散会議システムの会議サーバの構成。

【図３】本発明が実施される分散会議システムのサービス制御システムの構成。

【図４】本発明の実施例の会議端末の構成。

【図５】本発明の実施例の会議録編集装置の構成。

【図６】本発明が実施される会議端末での画面の表示例。

【図７】本発明の実施例の音声及び画像記憶制御装置のスイッチパネルの１例。

【図８】本発明の実施例の会議録編集装置の他の構成。

【図９】本発明が実施される会議端末の会議端末制御装置の構成。

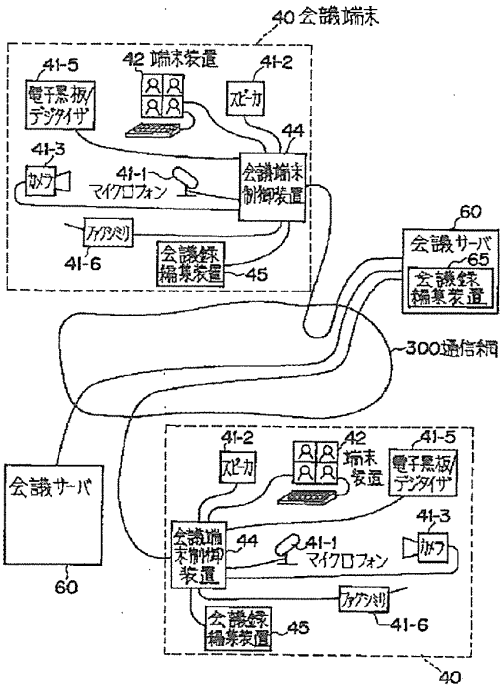
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【図１０】本発明の実施例の端末装置各ウィンドウ上のマルチメディア会議録の表示例。
【図１１】本発明の実施例の端末装置各ウィンドウ上のマルチメディア会議録の他の表示例。
【図１２】本発明の実施例の端末装置各ウィンドウ上のマルチメディア会議録の他の表示例。
【図１３】本発明の実施例の会議録編集装置の端末装置上の会議録編集画面の１例。
【図１４】本発明の実施例に於ける時間短縮効果の説明図。
【図１５】本発明が実施される分散会議システムでの会議端末の接続構成の１例。
【図１６】従来の遠隔会議システムの構成。
【符号の説明】
４０　　会議端末

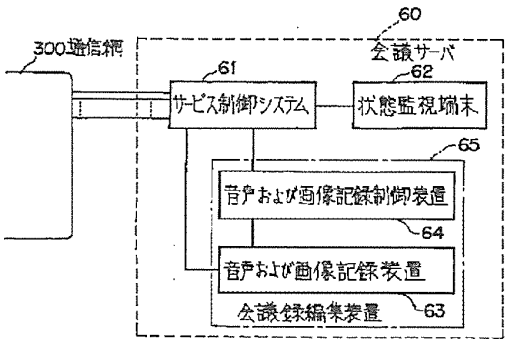
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＊４１－１　　マイクロフォン
４１－２　　スピーカ
４１－３　　カメラ
４１－５　　デジタイザ
４１－６　　ファクシミリ
４２　　端末装置
４４　　会議端末制御装置
４５　　会議録編集装置
４６、６３　　音声及び画像記録装置
４７、６４　　音声及び画像記録制御装置
６０　　会議サーバ
６１　　サービス制御システム
６２　　状態監視端末
回線　　Ｌ１～Ｌｎ
＊　　モジュール　　Ｍ１～Ｍｎ

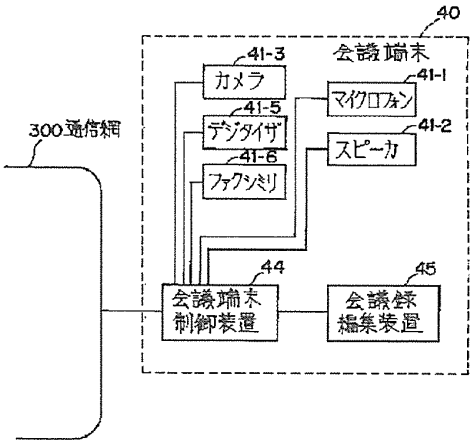
【図１】



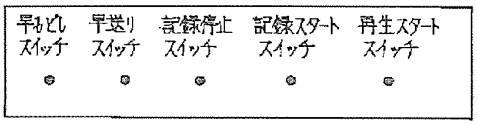
【図２】



【図４】

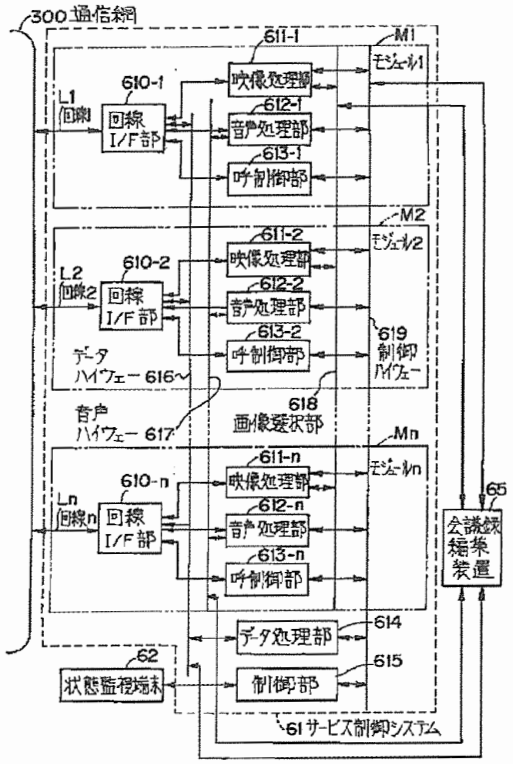


【図７】

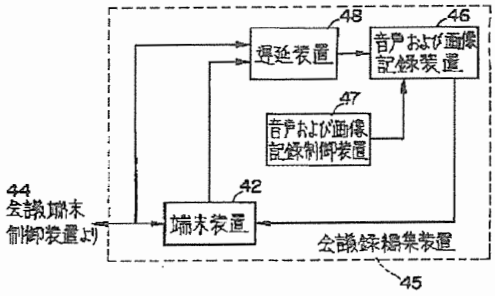


音声および画像記憶制御装置のスイッチの一例

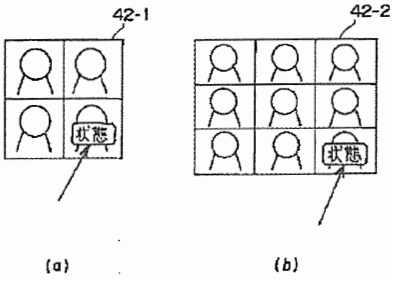
【図3】


300 通信網
611-1
M1
モジュール1
映像処理部
610-1
回線 I/F部
L1 回線1
612-1
音声処理部
613-1
呼制御部
M2
611-2
モジュール2
映像処理部
610-2
回線 I/F部
L2 回線2
612-2
音声処理部
613-2
呼制御部
619 制御ハイウェー
データハイウェー 616
音声ハイウェー 617
618 画像変状部
Mn
611-n
モジュールn
映像処理部
610-n
回線 I/F部
Ln 回線n
612-n
音声処理部
613-n
呼制御部
65 会議録編集装置
614
データ処理部
62
状態監視端末
615
制御部
61 サービス制御システム

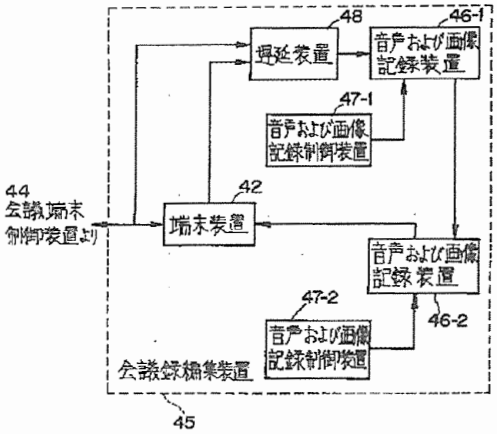
【図5】


48
46
遅延装置
音声および画像記録装置
47
音声および画像記録制御装置
44 会議端末制御装置より
42
端末装置
会議録編集装置
45

【図6】

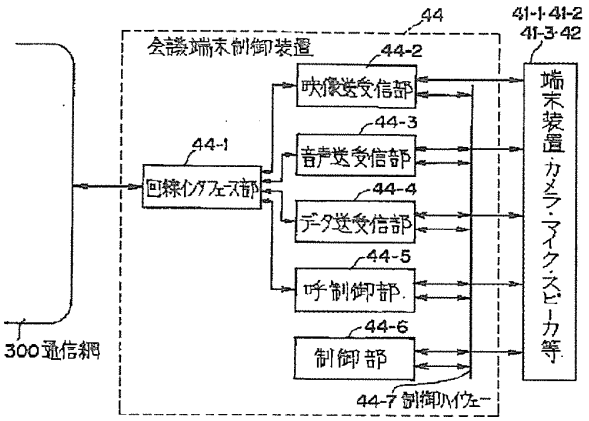

42-1
状態
42-2
状態
(a)
(b)

【図8】

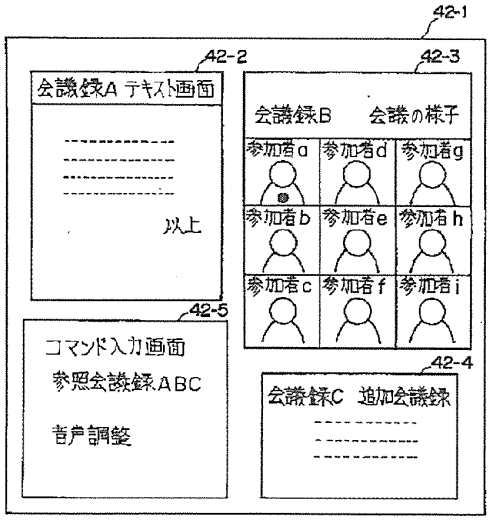

48
46-1
遅延装置
音声および画像記録装置
47-1
音声および画像記録制御装置
44 会議端末制御装置より
42
端末装置
音声および画像記録装置
46-2
47-2
音声および画像記録制御装置
会議録編集装置
45

033

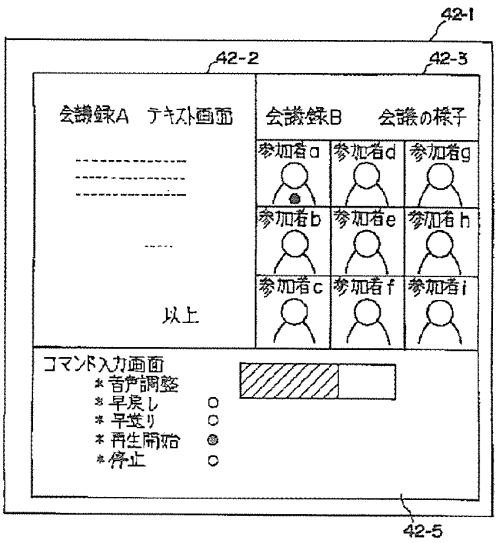
【図９】



【図１０】

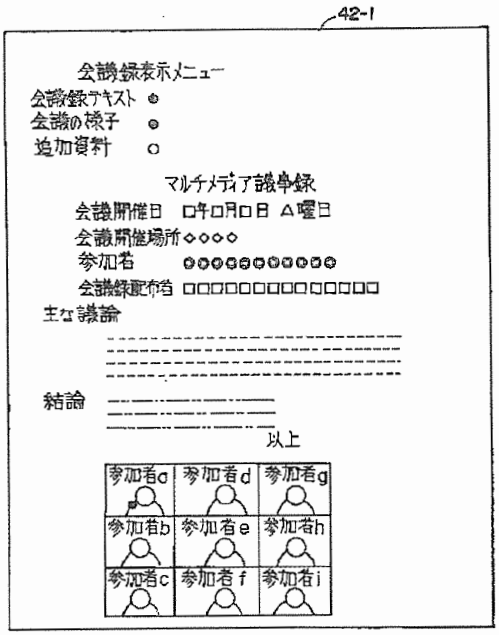


【図１１】

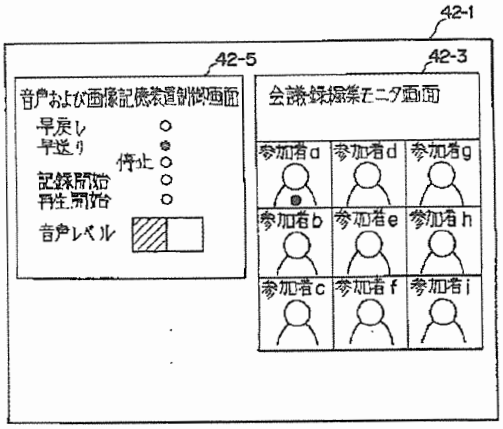


043

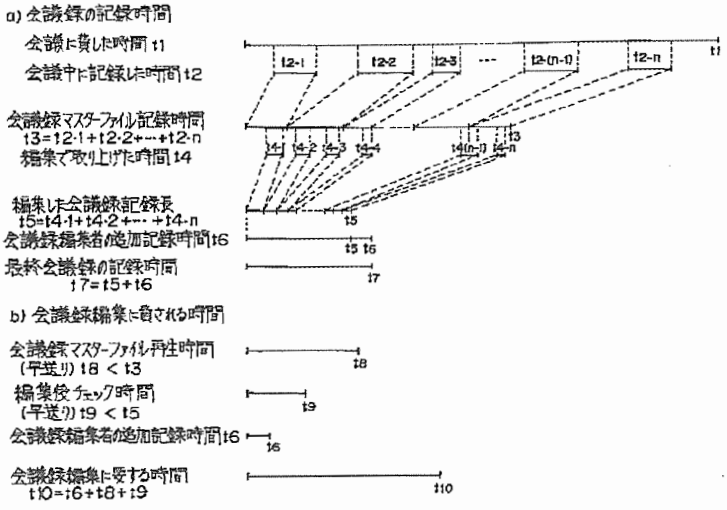
【図１２】



【図１３】

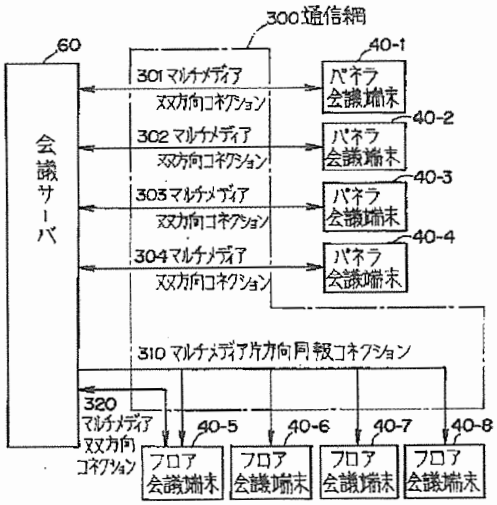


【図１４】

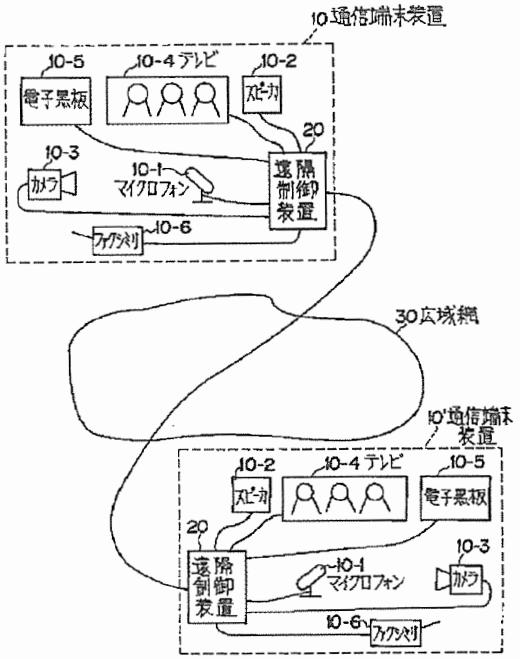


053

【図１５】



【図１６】



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ABSTRACT CN101009806A

[1]

13 A video conference system includes a touch screen device and a video conference unit. A display device displays video data for a video conference and generates touch data based on user selections relative to the touch screen. For example, a videoconferencing unit is operably coupled to the touch screen device through a video connection and a data interface connection. The units establish and conduct video conferences with one or more endpoints over the network. The unit sends video data to a display device and receives touch data from the device. The received touch data is used to control the operation of the video conferencing system. Received touch data can be used to initiate video conference calls, change operating parameters, change camera orientation, initiate picture-in-picture displays, access menus, access memory, change video data sources, initiate whiteboard displays, and access connected devices screen.

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DESCRIPTION CN101009806A

10 System and method for controlling a video conference using a touch screen interface

[0001]

14 technical field

[0002]

18 The subject matter of the present disclosure relates to a system and method for controlling a video conference using a touch screen interface.

[0003]

23 Background technique

[0004]

27 Typically, a user of a videoconferencing system uses a remote control to operate and control the system.

28 Additionally, a control panel, tablet input device, keypad, or network interface may be used to operate and control the system. When using a handheld remote control, the user aims the remote control at the videoconferencing system and navigates through the many selections and menus of the user interface to operate and control the system. Typically, the tablet input device and keyboard must be properly connected to the videoconferencing system, which may be difficult for the user. For video conferences, users also want to set up a document camera or computer with annotation tools to enable users to add recordings and annotations to the video conference. Unfortunately, document cameras and computers with annotation tools can be difficult to set up and use with videoconferencing systems.

[0005]

39 One prior art videoconferencing system known in the art is available from Polycom.

40 3000iPower acquired by Inc. 3000iPower includes Polycom iPower 9800 and SMART Technology's Rear Projection SMART BoardTM 3000i interactive whiteboard. The iPower9800 has a PC-based design, thereby essentially operating as a computer. 3000iPower allows projection and viewing of computer images in a video conferencing phone, and the 3000iPower provides touchscreen controls for accessing conferencing applications. Users can use the pens on the 3000iPower's pen tray to take notes on the whiteboard to highlight important information.

[0006]

49 The presently disclosed subject matter is intended to overcome, or at least reduce, the effects of one or more of the problems raised above.

[0007]

54 SUMMARY OF THE INVENTION

[0008]

58 The video conference system includes a touch screen display device and a video conference unit.

59 The display device displays video data for the video conference and generates touch data based on user selections relative to the touch screen.

61 The videoconferencing unit is operatively coupled with the touch screen device through, for example, a video connection and a data interface connection.

63 The unit establishes and conducts video conferences with one or more endpoints over the network.

64 The unit sends video data to the display device and receives touch data from the device.

65 The received touch data is used to control the operation of the video conferencing system.

66 Received touch data can be used to initiate video conference calls, change operating parameters, change camera orientation, initiate picture-in-picture displays, access menus, access memory, change video data sources, initiate whiteboard displays, and access connected devices' Screen.

[0009]

72 The foregoing summary is not intended to summarize every possible embodiment, or every aspect of the present disclosure.

[0010]

77 Description of drawings

[0011]

81 The foregoing summary, preferred embodiments, and other aspects of the disclosed subject matter will be best understood by reference to the detailed description of specific embodiments taken in conjunction with the accompanying drawings, in which:

[0012]

87 FIG. 1 illustrates an embodiment of a videoconferencing system according to specific instructions of the present disclosure.

[0013]

92 Figure 2A shows a schematic diagram of an embodiment of a videoconferencing system.

[0014]

96 Figure 2B shows a schematic diagram of another embodiment of a videoconferencing system.

[0015]

100 Figure 3 schematically shows the components of the videoconferencing unit.

[0016]

104 FIG. 4 shows an embodiment of a control panel of a touch screen display device.

[0017]

108 FIG. 5 shows an embodiment of a menu function of a video conferencing system.

[0018]

112 Figure 6 shows an embodiment of the videoconferencing system camera functionality.

[0019]

116 Figure 7 shows an embodiment of the annotation function of a video conferencing system.

[0020]

120 Figure 8 shows an embodiment of the whiteboard functionality of a videoconferencing system.

[0021]

While the disclosed subject matter is capable of various modifications and alternative forms, specific embodiments of the disclosed subject matter are shown by way of example in the drawings and are described in detail.

The drawings and written description are not intended to limit the scope of the inventive concept in any way.

Rather, as required by 35 U.S.C. § 112, the drawings and written description are provided to illustrate the inventive concept to those skilled in the art by reference to specific examples.

[0022]

detailed description

[0023]

Referring to FIG. 1, an embodiment of a videoconferencing system 10 according to specific instructions of the present disclosure is shown.

The video system 10 includes a video conference unit 100 and a touch screen display device 200 .

The videoconferencing system 10 may also include one or more peripheral devices, such as a computer (laptop or desktop) 50 , a video cassette recorder (VCR) 70 , and a digital versatile disk (DVD) player 80 .

In one embodiment, the videoconferencing unit 100 is available from Polycom.

The VSX 8000 available from Inc, the assignee of the present disclosure, and the touch screen display device 200 are the 3000i model SMARTBoard available from SMART Technologies of Canada.

In an alternative embodiment, the videoconferencing unit 100 and the touch screen display device 200 may be integrated together for the videoconferencing system 10 .

[0024]

The video conference unit 100 is used to establish and conduct video conferences with remote endpoints (not shown) over a network.

The videoconferencing unit 100 has a camera 102 and a microphone 104 .

Depending on the implementation, the unit 100 may have other common components, such as an infrared (IR) detector 106 .

The touch screen display device 200 is capable of both displaying video to the user and receiving touches and annotations from the user.

In one embodiment, touch screen display device 200 is a video monitor or the like with a light sensor surrounding screen 202 for detecting when a user touches, or writes on, an area of screen 202 .

For example, the video monitor may be part of a conventional television display, flat panel display, or other display known in the art.

The touch screen display device 200 may also use other touch screen technologies known in the art.

[0025]

165 As a 3000i model SMARTBoard, device 200 includes projection screen 202, integrated extended graphics array (XGA) projector 220, control panel 230, and tray 240.

167 Device 200 also includes an audio system (not shown).

168 To detect when the user touches the screen, the device 200 uses a digital camera (not shown) to detect objects and movement relative to the display screen 202 .

170 As discussed below, the control panel 230 of the display device 200 includes buttons configured to operate in conjunction with the videoconferencing unit 100 .

172 Tray 240 has various tools 242, such as pens and erasers.

173 A light sensor (not shown) on the tray 140 is used to detect when the user picks up a particular pen or eraser tool 242 from the tray 140 .

[0026]

178 2A and 2B, a schematic diagram of the embodiment of the video conferencing system 10 of FIG. 1 is shown.

179 In the embodiment of FIG. 2A , the videoconferencing unit 100 of the system 10 is directly coupled to the touch screen display device 200 .

181 Subsequent discussions focus on video conferencing system 10 video connections.

182 However, it will be appreciated that the videoconferencing system 10 may have an audio connection.

183 For example, the videoconferencing unit 100 may have an audio connection with the display device 200 and may transmit audio data to speakers of the display device 200 .

[0027]

188 For the video connection of the system 10, the camera 102 is coupled to the input 114 of the unit 100, eg, an S-video connection.

190 Videoconferencing unit 100 has video output 112 coupled to video input 212 of display device 200 .

191 For example, an XGA cable may be used to connect the XGA output 112 of the unit 100 with the RGB input 212 of the display device 200 .

193 The videoconferencing unit 100 also has a serial port 113 coupled to the serial port (COM1) 213 of the display device 200 .

195 Unit 100 and display device 200 use serial ports 113 and 213 to transfer data between each other.

196 This data includes touch data obtained by the display device 200 and transmitted to the unit 100, which uses the touch data for the operations discussed below.

198 The transmitted data also includes data generated by a user selecting a button configured on a control panel (not shown) of the display device 200 .

[0028]

203 Videoconferencing system 10 may also include a number of optional components that may be used with some implementations or functions of system 10 .

205 For example, one or more optional VCR or DVD players 70 or 80 may be coupled to one or more inputs 118

of unit 100 .

207 Additionally, an optional laptop or other computer 50 may be coupled to touch screen device 200 through serial port (COM2) 215 .

209 The coupling of the computer 50 to the serial port (COM2) 215 of the device 200 may allow the display device 200 to operate as a stand-alone component, separate from the videoconferencing unit 100, if the computer 50 has appropriate software.

[0029]

215 The computer 50 may also be coupled to an extended graphics array (XGA) splitter 60 , which is coupled to the input 116 of the videoconferencing unit 100 and to the RGB input 216 of the display device 200 .

217 The coupling of computer 50 and splitter 60 to unit 100 and device 200 allows computer 50 to provide content, images on the computer to be displayed by device 200, processed by videoconferencing unit 100 and forwarded to a remote endpoint (not shown) Wait.

220 In one embodiment, the computer 50 may have a graphical user interface for controlling the operation of the videoconferencing unit 100 if the computer 50 has appropriate software to integrate the computer 50 with the unit 100 .

223 A GUI for controlling the unit 100 using the computer 50 may be displayed on the display device 200 when operating in the "PC indication" mode of operation discussed below.

[0030]

228 In the embodiment of the videoconferencing system 10 in FIG. 2B , the videoconferencing unit 100 again has a video output 112 coupled directly to the RGB input 212 of the display device 200 .

230 However, the serial port 113 of the unit 100 is coupled to the A/V controller 150 , which is coupled to the serial port (COM1) 213 of the display device 200 .

232 Using A/V controller 150, unit 100 and device 200 can use serial ports 113 and 213 to transfer data between each other.

[0031]

237 In one embodiment, A/V controller 150 is a POINTMAKER(R) PVI video marker, which is a programmable device for controlling audio and video equipment and is available from Boeckeler Instruments. of Tucson, Arizona.

240 Inc obtained.

241 The serial connection of the videoconferencing unit 100 to the A/V controller 150 via the serial port 113 allows the unit 100 to control the operation of the A/V controller 150 .

[0032]

246 The camera 102 is coupled directly to the camera input 114 of the unit 100 as described in the previous embodiment.

248 However, optional components such as VCR/DVD 70/80, document camera 90, computer 50, and XGA splitter 60 are coupled to A/V controller 150.

250 A/V controller 150 provides first video data 152 from personal computer 50, second video data 154 from VCR/DVD 70/80, and video data from document camera 90 to one or more inputs 115 of videoconferencing unit 100 Third video data 156 .

[0033]

256 In this embodiment, the document camera 90 may be connected to the S-video input of the A/V controller 150 through an S-video cable.

258 The S-video cable from the S-video input of the A/V controller 150 can be connected to the second camera input of the unit 100 .

260 The VCR/DVD70/80 can be connected to the composite video input of the A/V controller 150 via an RCA or BNC cable from the composite video output of the VCR/DVD 70/80.

262 A BNC or S-video cable from the composite video output of the A/V controller 150 can be connected to the VCR/DVD video input of the videoconferencing unit 100 .

264 The video from the A/V controller 150 can be connected to the VGA input of the video conferencing unit 100 through an XGA/VGA cable from the VGA output of the A/V controller 150 .

[0034]

269 3, additional components of the videoconferencing system 10 are schematically shown in greater detail.

270 The videoconferencing unit 100 has a controller 120, which may include any conventional encoders, processors, and other electronic components known in the art and used in videoconferencing units.

272 The controller 120 is coupled to the video output 112, the serial port 113 of the data interface, and the memory 130 of the storage functions 131-135.

274 Controller 120 is also coupled to input 114 for video from near camera 102 and may be coupled to interface 115 to control near camera 102 .

276 Video output 112 is coupled to video input 212 of display device 200 , and serial port 113 exchanges data with serial port 213 of display device 200 .

278 For example, the serial port 113 receives touch data from the display device 200 , and the serial port 113 can exchange control data with the display device 200 .

[0035]

283 The controller 120 includes a video codec 122 and a data processor 124 .

284 Video codec 112 is responsible for processing video data to be displayed by display device 200 and sent to the videoconferencing endpoint.

286 Typically, video data may include images captured by a camera (not shown) of unit 100, video from a remote endpoint of a video conference, content from peripheral devices (eg, VCRs, DVD players, computers, document cameras, etc.), Annotations from display device 200, and other visual data.

289 The operation of such a video codec 122 in a videoconferencing environment is well known in the art and will

not be described here.

[0036]

294 The data processor 124 is responsible for processing the data of the videoconferencing unit 100 .

296 The data includes touch data, communication data, commands, video conference information, and the like from the display device 200 .

297 The controller 120 is also coupled to a network interface 140 (eg, commonly used with videoconferencing units), and the network interface 150 is coupled to a videoconferencing network 142 as known in the art.

[0037]

302 Controller 120 uses operational functions 131 - 135 stored in memory 130 to control the operation of at least some features of videoconferencing system 10 .

304 These operational functions include an on-screen graphical user interface (GUI) function 131 , a camera function 132 , an annotation function 133 , a whiteboard function 134 , and an auxiliary device function 135 .

306 Each of these operational functions 131-135 is discussed in greater detail later, but a general overview of these functions 131-135 is provided here.

[0038]

311 The on-screen GUI function 131 allows the videoconferencing unit 100 to display a graphical user interface on the display device 200 for controlling the operation of the system 10 .

313 The graphical user interface of videoconferencing unit 100 may include a number of touch controls, menus, and dialogs that may be displayed on display device 200 for a user to operate and control system 10 .

315 For example, the graphical user interface of unit 100 may allow the user to make video conference calls through a directory, speed dial, or manual dial menu; answer incoming video conference calls; hang up video conference calls; mute or change audio Volume; select cameras and content sources, swap near and far video in picture-in-picture (PIP), and other operations disclosed here.

[0039]

322 Camera functionality 132 allows videoconferencing unit 100 to display visual touch controls on display device 200 to control the operation of one or more cameras (eg, near-end cameras 102).

324 In one embodiment, the near-end camera 102 is a pan-tilt-zoom camera capable of pan, tilt and zoom.

325 One or more of the pan, tilt and zoom capabilities of the near-end camera 102 may be achieved by one or more mechanical actuators 103 as used in the art to operate pan-tilt-zoom cameras of videoconferencing units.

328 Interface 115 is coupled to actuator 103 and controller 120 uses control signals through interface 115 to control the operation of the pan, tilt and zoom capabilities of near-end camera 102 .

330 A user utilizing visual touch controls on the display device 200 may generate control signals to control the pan, tilt and zoom of the near-end camera 102 .

[0040]

335 Optionally, the pan, tilt and zoom capabilities of the near-end camera 102 may be obtained electronically.

336 For example, near-end camera 102 may have processing capabilities for pan, tilt, and zoom, and controller 120 may use control signals through interface 115 to control this processing.

338 In another example, controller 120 may instead have processing capabilities for pan, tilt, and zoom, and controller 120 may perform those operations based on video received from near-end camera 102 via video input 114 .

[0041]

344 In addition to controlling the near-end camera 102 , the camera function 132 allows the videoconferencing unit 100 to display visual touch controls on the display device 200 for controlling the operation of the far-end camera 114 on the network 142 .

347 For example, far end camera 144 may be associated with a remote endpoint participating in a video conference.

349 Using the network interface 140 , the controller can use the control signals to control the pan, tilt and zoom capabilities of the far end camera 144 .

351 For example, far end camera 144 may be a pan-tilt-zoom camera with one or more mechanical actuators, or with electronic processing capabilities.

353 The controller 120 may control the far-end camera 144 through the network interface 140 using a far-end camera control protocol (eg, H.224 described in Appendix Q of H.323).

[0042]

358 The annotation function 133 allows the user to annotate the video displayed on the display device 200 , and the whiteboard function 134 allows the user to annotate on the whiteboard displayed on the display device 200 .

361 Finally, auxiliary device functionality 135 allows videoconferencing unit 100 to display video from other auxiliary devices such as computers, laptops, VCRs, DVD players, and the like.

[0043]

366 As will be apparent from the general description above, the operating functions 131-135 allow the videoconferencing unit 100 to operate the touch screen display device 200 in the annotation mode and in the touch control mode.

369 The determination of the mode may depend on whether the pen or eraser tool 242 is picked up from the tray 240 of the display device 200 .

371 For example, if the pen or eraser tool 242 is picked up from the tray, the videoconferencing unit 100 can operate the display device 200 in an annotation mode so that a user can annotate on the video displayed on the device 200 .

374 The video may be a video conference or other content, and may come from the video conference unit 100, a computer, a laptop, a VCR, a DVD player, a document camera, or the like.

378 When all of the tools 242 are placed in the tray 240, the videoconferencing unit 100 can operate the display device 200 in a touch control mode so that a user can interact with the graphical user interface, touch controls, menus, dialogs, etc. of the unit 100 by touch The corresponding display 200 area is used to control the operation of the video system 10 .

[0044]

383 Having provided a general overview of how videoconferencing unit 100 controls the operation of videoconferencing system 10, reference is now made to Figures 4-8 for a more detailed discussion of the operational functions of videoconferencing unit 100.

[0045]

389 As described above, the videoconferencing unit 100 uses the auxiliary device function 135 to control the operation of the touch screen display device 200 .

391 One way of implementing the control is by integrating the control on the control panel (230; Fig. 1) of the display device 200 with the videoconferencing unit 100.

393 4, an embodiment of a control panel 230 of a touch screen display device (not shown) is shown.

394 As previously discussed, preferably the touch screen display device is a 3000i model SMARTBoard.

395 Likewise, the control panel 230 of the 3000i model SMART Board has buttons configured to control the volume level, brightness level and contrast level of the display device.

397 However, as part of the integration between the videoconferencing unit and the display device of the disclosed videoconferencing system, as shown in the embodiment of FIG. 4, the buttons on the control panel 230 of the display device (for convenience, in FIG. 4 , also refer to the reference numerals of the components in FIG. 1 of the present disclosure).

[0046]

404 The control panel 230 includes a first button 231 configured to initiate a video conference mode of operation.

405 In this mode, the videoconferencing unit (100) establishes a videoconferencing connection with a remote endpoint via the network, sends the video of the videoconference to the RGB input of the display device (200), and communicates between the display device (200) and the unit (200). 100) to transfer graphical user interface and touch data, establish and conduct video conferences.

[0047]

412 The second button 232 of the panel 230 is configured to initiate control of the personal computer (50) if the personal computer (50) is coupled to the disclosed videoconferencing system.

414 In this mode, content from the computer (50) can be shown during the video conference.

415 The content may include the computer's screen, video or other images stored on the computer, PowerPoint

presentations, documents, and the like.

417 During the video conference, the content from the computer (50) is processed by the video conference unit (10) and sent to the display device (200).

419 The content can also be sent to the remote endpoint of the video conference.

[0048]

423 The third button 233 of the panel 230 is configured to initiate the PC indication mode of operation.

424 In this mode, the video data from the computer (50) is sent directly from the XGA output of the splitter (60) to the RGB input of the display device (200), not from the video codec of the videoconferencing unit (100). send.

427 This can be done whether or not in a video conference call, or whether or not computer content is being sent to other endpoints.

429 The fourth button 234 of the panel 230 is configured to initiate a video mode of operation in which the display device (200) operates to receive video from the connected source over the S-video connection.

[0049]

434 In addition to the buttons on the control panel 230, the display device (200) also includes other buttons 235 and 236 on the device tray (240).

436 For convenience, these buttons 235 and 236 are shown in FIG. 4 separately from the tray (240).

437 The first tray button 235 is initially configured to access an on-screen keyboard on the display device (200) screen when the display device (200) is operated with the software of the coupled computer or laptop computer.

440 However, for the videoconferencing system (10) of the present disclosure, pressing this keyboard button 235 is reconfigured for: if all pens (242) on the tray (240) of the display device (200) are dropped, and if the unit (100)) generates the appropriate screen for displaying the keyboard, then accesses the on-screen keyboard of the videoconferencing unit (100).

444 However, if the pen (242) is picked up from the tray (240), the button 235 is configured to: access if the A/V controller (150; FIG. 2A) is a component of an embodiment of the videoconferencing system (10). Calibration screen of the A/V controller (150; Figure 2A).

447 With the menu screen accessed, the user can use the touch screen display device (200) to calibrate the A/V controller (150; Figure 2A).

[0050]

452 The second tray button 236 is initially configured to operate as a right mouse click when operating the display device (200) with the software of the coupled computer or laptop (50).

454 However, for the videoconferencing system (10) of the present disclosure, pressing the button 236 is reconfigured to start and stop the videoconferencing unit if the pen (242) on the tray (240) of the display device (200) is dropped (100) VGA graphics.

457 If the pen (242) is picked up from the tray (240), the button 236 is configured to: access the A/V controller

(150; Figure 2B) if it is part of an implementation; Figure 2B) menu.

459 With the menu screen accessed, the user can use the touch screen display device (200) to control the operation of the A/V controller (150; Figure 2B).

[0051]

464 Returning briefly to FIG. 3 , as previously discussed, the videoconferencing unit 100 has on-screen GUI functionality 131 to display user interfaces, menus, touch controls, dialogs, etc. on the display device 200 used to control the operation of the system 10 .

467 Part of the on-screen GUI functionality 131 includes displaying touch controls on the display device 200 and, for those touch controls, receiving touch data from the display device 200 at the videoconferencing unit 100 to control the operation of the system 10 .

470 In other words, the display device 200 is used to detect information, selections, annotations from user touches, electronic pens, etc. on the touch screen display device 200 .

472 The detected touch data is sent to the video conference unit 100 .

473 The touch data is used to operate the videoconferencing system 10 .

[0052]

477 For example, a touch or release in a touch screen area of display device 200 causes an event corresponding to a touch and/or release of a user interface feature configured for videoconferencing unit 100 .

479 If the user's touch is on an area of the screen not designated as a touch control of the user interface of the unit 100, the touch data may be processed by a supervisory algorithm that can access camera controls or bring up a main menu, or the like.

482 Accordingly, the unit 100 determines whether a graphical user interface (GUI) and/or video is currently displayed on the display device 200 .

484 For example, if the unit 100 is displaying a GUI, the user will be able to use a finger or electronic pen 242 to touch the screen of the display device 200 and generate input to the videoconferencing unit 100 .

[0053]

489 Referring to Figure 5, an embodiment of a menu 310 generated by the videoconferencing unit (100) is shown on the touch screen 202 of the display device (200).

491 The menu 310 may be invoked when the user selects the button 302 displayed on the upper left corner of the screen 202 while the video is being displayed.

493 Preferably, the button 302 is transparent or hidden and available from all screens of those videos including those of the participants and content.

495 Once the menu 310 is invoked, the menu 310 allows the user to control the videoconferencing system by using interactive touch directly on the screen 202 .

497 Preferably, menu 310 is transparent and displayed over the video currently displayed on screen 202 .

[0054]

501 Menu 310 includes a number of touch controls 312 similar to buttons available on a remote control.

502 These touch controls 312 include a Home button, a Call button, a hang up button, a volume button, a mute button, a camera button, a picture-in-picture (PIP) button, a near-end button, a far-end button, a preset button, and close button.

505 These and other buttons may be provided in menu 310 depending on the implementation.

506 For example, some other possible buttons include buttons for eliciting help and buttons for on-screen keyboards.

[0055]

511 Touch controls 312 may operate similarly to corresponding controls found on an actual remote control.

512 Here, the difference is that the designated areas of video data displayed on screen 202 are associated with touch controls for controlling and operating the video system.

514 For example, selecting the call button on menu 310 may initiate a video conference call.

515 To initiate a call, a speed dial dialog or an address book dialog can be accessed on screen 202 to select which remote endpoint to establish a video conference with.

517 Selecting the hang up button on menu 310 can end the video conference call, or, if there is more than one currently active call, can lead to a hang up dialog on screen 202.

519 Selecting the volume button on menu 310 can bring up a volume bar on screen 202, and the user can then touch the volume bar displayed on screen 202 to control the volume.

521 Mute and PIP on menu 310 may be toggle buttons for muting audio and producing picture-in-picture on screen 202 .

[0056]

526 Selecting the presets button on menu 310 can bring up a presets dialog on screen 202, and the user can select from a number of stored presets, or touch and hold to store presets.

528 Selecting the camera button on menu 310 can bring up a dialog on screen 202 that lists video sources (eg. cameras, computers, etc.) and the user can touch the appropriate button on the list to select the desired video source.

531 The near-end and far-end buttons on menu 310 allow the user to select and control the near-end camera (ie. the camera coupled to the videoconferencing unit (100)), or one or more of the far-end cameras associated with the endpoints of the videoconference .

[0057]

537 As previously discussed, the videoconferencing unit 100 of FIG. 3 also has a camera function 132 for controlling the camera.

539 Part of the camera functionality 132 includes displaying camera controls on the display device 200 and receiving touch data from the user relative to those camera controls to control camera operation.

541 Referring to Figure 6, an embodiment of the camera controls 350 generated by the videoconferencing unit is

shown on the touch screen 202 of the display device.

543 Camera controls 350 allow the user to control the pan-tilt-zoom camera using intuitive touch on screen 202 .

544 When a full screen video is being displayed on the screen 202, touching anywhere on the screen when the pen or eraser tool (242; FIG. 1) is down will bring up the watermark grid 360 displayed over the active video.

546 Control icons 364 and 368 are located in areas 362 and 366 of the watermark grid 360 .

547 By touching a pair of upper and lower areas 362 of grid 360 associated with control icons 364, the user can pan-tilt-zoom a connected videoconferencing unit's pan-tilt-zoom camera, or a remote endpoint participating in a videoconference. The camera is tilted.

550 By touching a pair of left and right areas 363 of grid 360 associated with control icons 365, the user can pan-tilt-zoom a connected videoconferencing unit's pan-tilt-zoom camera, or a remote endpoint participating in a videoconference. The camera pans.

553 By touching a pair of interior areas 366 of grid 360 associated with other control icons 368, the user can zoom the camera of a connected videoconferencing unit, or a camera of a remote endpoint participating in a videoconference.

[0058]

559 Depending on which video is currently being displayed on screen 202, which camera (eg, near end or far end) associated with the video conference is controlled is determined.

561 For example, if the video of the far end camera associated with the videoconferencing endpoint is currently being displayed on the screen, touching areas 362, 363 and 366 associated with grid 360 will control the panning of the far end camera using the techniques disclosed herein Lens, tilt and zoom.

564 If the near-end camera video connected to the videoconferencing unit associated with screen 202 is currently being displayed, touching areas 362, 363 and 366 associated with grid 360 will control the panning of the near-end camera using the techniques disclosed herein , tilt and zoom.

[0059]

570 As previously discussed, the videoconferencing unit 100 of FIG. 3 has an annotation function 133 that adds annotations to the displayed video.

572 7, a portion of the videoconferencing system 10 operating in the annotation mode 400 is shown.

573 In the annotation mode 400 , the user may make an annotation 410 on top of the video currently being displayed on the screen 202 .

575 Annotations 410 can be made using the electronic pen 242, and can be made when an active video conference call is turned on or off.

577 If the user wants to write on an object 402 displayed on the screen 202 (eg, a displayed document from a connected document camera or computer), as soon as the user picks up the electronic pen 242 from the tray 420, the videoconferencing system 10 automatically to enter annotation mode 400.

580 As previously discussed, a light sensor on the tray 240 of the display device 200 can be used to detect when the user picks up the pen 242 from the tray 240 .

582 This data is sent from the display device 200 via the data interface with the videoconferencing unit 100, where the controller (120; Figure 3) of the unit 100 accesses the annotation function (133; Figure 3).

[0060]

587 In the annotation mode, the user can make annotations 410 on various videos or images displayed on the screen 202 of the device 200 .

589 The video and images may include videoconferencing video from the videoconferencing unit 100, video from a document camera, video from a VCR or DVD player, or computer screen images from a connected computer.

592 Video from document cameras, VCRs and DVD players can conform to National Television Standards Committee (NTSC) or Phase Alternation Line (PAL) standards.

594 The computer screen image may be XGA with 1024x768 resolution.

[0061]

598 When the annotation 410 is made on the screen 202, the graphical elements of the annotation 410 are combined with the displayed video.

600 By combining the annotations 410 with the displayed video, the annotations 410 are easily sent to the remote endpoints of the videoconference as part of the compressed video bitstream sent from the unit 100 to the remote endpoints over the videoconferencing network.

[0062]

606 In one embodiment, the user may make annotations 410 to the computer-provided content.

607 Preferably, the content from the computer is annotated.

608 The content may be the content of a whiteboard, a computer screen, an image, or visual media from a computer.

610 For example, a computer (50 ; FIGS. 2A-2B) may be designated as the source of content displayed on screen 202 of touch screen device 200 .

612 During a video conference, the user can pick up the user tool 242 from the tray 240 of the touch screen device 200, and the video conference system 10 automatically switches to annotation mode operation.

614 Once in annotation mode operation, the computer (50) receives touch data from the touch screen device 200 and assembles the received touch data as an annotation to the computer content.

616 The computer (50) sends the annotation content to the touch screen device 200 to display the annotation content, and sends the annotation content to the video conference unit 100 .

618 The videoconferencing unit 100 receives the annotation content from the computer (50) and sends the received annotation content to the videoconferencing endpoint (not shown) through the unit's network interface (140; Figure 3).

621 Thus, content can be annotated and automatically sent over the network to remote endpoints.

[0063]

625 Preferably, sending the annotation content includes combining the annotation data with the content data so

that the combination can be sent over the network in accordance with the H.239 standard.

627 In addition, by utilizing the computer (50) to process the annotations and content displayed on the touch screen device 200, the delay problem that conventionally occurs when users make annotations during a video conference can be avoided.

630 Specifically, utilizing the computer (50) to process the annotations and content no longer requires the videoconferencing unit to process the annotation content and send the annotation content to the touch screen device 200 for display.

633 Typically, this feedback setting creates a delay between what annotations the user is currently making on the screen 202 of the display device 200 and how many annotations 410 are displayed.

635 Generally, any significant delay is not expected.

[0064]

639 As discussed above, the videoconferencing unit 100 of FIG. 3 also has a whiteboard function 134 that allows the display device 200 to function as a whiteboard.

641 8, a portion of videoconferencing system 10 operating in whiteboard mode 450 is shown.

642 To access this mode 450, the user picks up the electronic pen 242 from the tray 240 of the display device 100, and if another video source (eg, document camera, computer, VCR, DVD player, etc.) has not been selected, the videoconferencing system 10 automatically whiteboard operation mode 450 is entered.

645 The user can then begin writing a note 460 on the whiteboard content 452 displayed on the screen 202 .

646 Preferably, the whiteboard content 452 is an XGA image with a resolution of 1024x768.

647 The user can make annotations 460 on the whiteboard content 452 regardless of whether the system 10 is in a video conference call.

649 However, whiteboard content 452 with annotations 460 may be sent through videoconferencing unit 100 to a remote endpoint when in a videoconferencing call.

[0065]

654 As previously discussed with reference to Figures 2A-2B, system 10 may not include a computer.

655 In the absence of a computer, the videoconferencing unit 100 can generate a whiteboard by itself.

656 When the system 10 is currently displaying the graphical user interface or video data of the camera on the display device 200 , the videoconferencing unit 100 automatically enters the annotation mode operation when the user picks up the pen 242 from the tray 420 .

659 In annotation mode, videoconferencing unit 100 generates whiteboard content 452 .

660 Videoconferencing unit 100 receives touch data from the display device and assembles the touch data as annotations 460 to whiteboard content 452 .

662 The video conferencing unit 100 then sends the annotated whiteboard to the display device 200 and sends the annotated whiteboard as H.239 content to one or more remote endpoints of the video conference.

664 However, in alternative embodiments, system 10 may use an optional computer (50; Figures 2A-2B) to process whiteboard content 452 and annotations 460 so that videoconferencing unit 100 may use the annotated whiteboard as H .239 content is sent to one or more remote endpoints of a video conference.

[0066]

670 As previously described, an optional computer (50 ; FIGS. 2A-2B) may be connected to system 10 .

671 Picking the pen 242 from the tray 240 may cause the system 10 to automatically select a VGA or video source to display full screen on the display device 200 and send to the remote endpoint of the video conference.

673 For example, instead of showing the whiteboard 452 as a background to the display, a computer screen from an optionally connected computer (50) could be shown.

675 The selection of the VGA or video source is based on the source currently selected by the system 10 .

676 For example, behaviors related to video annotation may be controlled by A/V controller 150 integrated into system 10, and A/V controller 150 may be configured to provide the methods disclosed herein for annotating video and switching between sources. feature.

[0067]

682 The foregoing description of preferred and other embodiments is not intended to limit or limit the scope or applicability of the inventive concepts contemplated by the applicant.

684 By disclosing the inventive concepts contained herein, and in doing so, the applicant claims all patent rights afforded by the appended claims.

686 Accordingly, the appended claims are intended to cover all modifications and changes that come within the scope of the appended claims and their equivalents.

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CLAIMS CN101009806A

1.

13 1、A video conference system, comprising:

14 at least one camera capable of at least one of pan, tilt or zoom;

15 a touch screen device configured to display video data and generate touch data; and

16 a videoconferencing unit operatively coupled to the touch screen device and the at least one camera, the videoconferencing unit configured to:

18 Establish a video conference with one or more endpoints over the network,

19 sending video data to the touch screen for display,

20 designating at least one area of the transmitted video data as at least one touch control for user selection, the at least one touch control for controlling pan, tilt or zoom of the at least one camera,

22 receiving touch data from the touch screen device,

23 associating the received touch data with the at least one touch control, and

24 Based on the associated touch controls, operation of the at least one camera is controlled.

2.

28 2、The system of claim 1, wherein the at least one camera includes a mechanical brake for panning, tilting or zooming the at least one camera; and for controlling the at least one camera based on the associated touch controls operation, the videoconferencing unit is configured to send a control signal to the mechanical brake.

3.

34 3、The system of claim 1, wherein the at least one camera includes electronic processing functionality to pan, tilt, or zoom video data captured by the at least one camera, and for controlling based on associated touch controls Operation of the at least one camera, the videoconferencing unit is configured to send control signals to the at least one camera causing it to perform the electronic processing function.

4.

41 4、The system of claim 1, wherein the at least one camera comprises a far end camera coupled to one of the endpoints, and wherein the video is used to control operation of the far end camera based on associated touch controls The conference unit is configured to send control signals to the far-end cameras over the network.

5.

47 5、The system of claim 1, wherein the at least one camera includes a pan, tilt, or zoom function implemented mechanically or digitally.

6.

52 6、The system of claim 1, wherein the at least one camera comprises a pan-tilt-zoom camera, and to designate at least one area of the transmitted video data as at least one touch control for user selection, the The videoconferencing unit is configured to generate a grid for display in conjunction with video data sent to the touch screen device, the grid having at least one area corresponding to the at least one touch control for controlling the at least one camera pan, tilt or zoom.

7.

60 7、6. The system of claim 6, wherein the grid includes a first pair of regions corresponding to a first touch control for panning the pan-tilt-zoom camera; a second pair of areas corresponding to a second touch control for tilting the pan-tilt-zoom camera; and a third pair of areas corresponding to a third touch control, the first Three touch controls are used to zoom the pan-tilt-zoom camera.

8.

67 8、The system of claim 1, wherein the at least one camera includes first and second cameras, and wherein the videoconferencing unit is configured to control operation of the first and second cameras based on associated touch controls is configured to:

70 determining which of the first and second cameras currently has video data being sent to the touch screen device, and

72 Based on the associated touch control, the operation of the determined one of the cameras is controlled.

9.

76 9、The system of claim 1, wherein the first camera includes a near-end camera associated with the videoconferencing unit, and the second camera includes a near-end camera associated with one of the endpoints of the videoconference remote camera.

10.

82 10、A video conference system, comprising:

83 Multiple video data sources;

84 a touch screen device configured to display video data and generate touch data; and

85 a videoconferencing unit operatively coupled to the touch screen device and the video data source, the videoconferencing unit configured to:

87 Establish a video conference with one or more endpoints over the network,

88 receiving video data from one or more of the video data sources,

89 sending the received video data to the touch screen for display,

90 receiving control data from the touch screen device,

91 In response to the control data, switching from one source of video data to another source of video data is performed automatically.

11.

96 11、11. The system of claim 10, wherein the video data source is from a network interface, a video camera, a video cassette recorder, a digital versatile disc player, a laptop computer coupled to the one or more endpoints via a network Selected from the group of Computers, Personal Computers, Visual Source Programmable Controllers, and Extended Graphics Array Splitters.

12.

103 12、11. The system of claim 10, wherein the touch screen device includes a user tool having a sensor that generates control data when the user tool is moved, and in response to the control data, to automatically from the One video data source is switched to another video data source, the video conferencing unit is configured to:

107 determining whether the user tool has been moved based on the control data;

108 In response to the user tool being moved, one of the video data sources is selected.

13.

112 13、13. The system of claim 12, wherein, in order to automatically switch from one source of video data to another source of video data, the videoconferencing unit is configured to:

114 generating a whiteboard in response to the moved user tool,

115 receiving touch data from the touch screen device, and

116 combining the received touch data as a note to the whiteboard, and

117 The annotated whiteboard is sent to the touch screen device for display and sent over the network to the one or more endpoints of the video conference.

14.

122 14、 The system of claim 10, wherein,

123 The touch screen device includes a first data interface,

124 the videoconferencing unit includes a second data interface coupled to the first data interface, and

125 The second data interface receives touch data from the first data interface of the touch screen device.

15.

129 15、 The system of claim 14, further comprising:

130 a computer having a video output and having a data interface coupled to another data interface of the touch screen device; and

132 an extended graphics array splitter having a video input coupled to the video output of the computer, the splitter having a video output coupled to a video input of the videoconferencing unit, and having a video output coupled to the touch screen device Another video output is coupled to another video input.

16.

138 16、 15. The system of claim 14, further comprising a visual controller having data coupled between the videoconferencing unit and the first and second data interfaces of the touch screen device interface.

17.

143 17、 17. The system of claim 16, wherein one or more of the video data sources are coupled to one or more video inputs of the visual controller, and wherein the visual controller includes a link to the video One or more video outputs to which one or more video inputs of the conference unit are coupled.

18.

149 18、 A video conference system, comprising:

150 a touch screen device configured to display video data and generate touch data, the touch screen device including first and second video inputs and first and second data interfaces;

152 a computer coupled to the first video input and the first data interface of the touch screen device, the computer having a video output for content; and

154 A video conferencing unit, coupled to the video output of the computer, and to the second video input and the second data interface of the touch screen device, the video conferencing unit having the ability to communicate with one or more The endpoint establishes a network interface for the video conference;

157 wherein, in the annotation mode of operation, the computer is configured to:

158 receive touch data from touch screen devices,

159 combine the received touch data as an annotation to the content, and

160 sending the annotated content to the touch screen device for display and to the video conferencing unit,

161 wherein, in the annotation mode of operation, the videoconferencing unit is configured to:

162 receive the annotated content from the computer, and

163 The received annotated content is sent to the endpoint over the network.

19.

167 19、 19. The system of claim 18, wherein, in the annotation mode of operation, the content sent from the computer includes a whiteboard, a computer screen, images, and visual media.

20.

172 20、 19. The system of claim 18, wherein the touch screen device includes a user tool having a sensor that generates control data when the user tool is moved, and the videoconferencing system is configured to respond to the generated control data, automatically switch to the annotation operation mode.

21.

178 21、 The system of claim 18, further comprising:

179 an extended graphics array splitter having a video input coupled to the video output of the computer; the splitter having a video output coupled to a video input of the videoconferencing unit and having a video input coupled to the touch screen device The first video input is coupled to another video output.

22.

185 22、 21. The system of claim 21, further comprising a visual controller having data coupled between a data interface of the videoconferencing unit and the second data interface of the touch screen device interface.

23.

190 23、 23. The system of claim 22, wherein at least one source of video data is coupled to a video input of the visual controller, and wherein the visual controller includes a video output coupled to the video input of the videoconferencing unit.

24.

196 24、 24. The system of claim 23, wherein the at least one video data source is selected from the group consisting of a video camera, a video cassette recorder, and a digital versatile disc player.

[19] 中华人民共和国国家知识产权局

[12] 发明专利申请公布说明书

[21] 申请号 200710007201.4

[51] Int. Cl.
H04N 7/15 (2006.01)
H04N 5/232 (2006.01)
G06F 3/041 (2006.01)
G06F 3/14 (2006.01)

[43] 公开日 2007 年 8 月 1 日

[11] 公开号 CN 101009806A

[22] 申请日 2007.1.25
[21] 申请号 200710007201.4
[30] 优先权
[32] 2006.1.26 [33] US [31] 11/307,194
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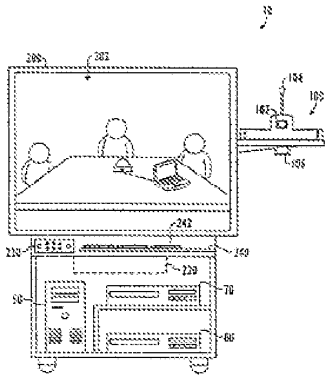
[74] 专利代理机构 中科专利商标代理有限责任公司
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权利要求书 5 页 说明书 15 页 附图 5 页

[54] 发明名称

使用触摸屏界面控制视频会议的系统和方法

[57] 摘要

视频会议系统包括触摸屏设备和视频会议单元。显示设备显示用于视频会议的视频数据，并基于相对所述触摸屏的用户选择来生成触摸数据。例如，视频会议单元通过视频连接和数据接口连接，与触摸屏设备可操作地耦合。所述单元通过网络，建立并进行与一个或多个端点的视频会议。所述单元将视频数据发送至显示设备，并接收来自所述设备的触摸数据。所接收的触摸数据用于控制视频会议系统的操作。所接收的触摸数据可以用于发起视频会议呼叫、改变操作参数、改变摄像机的定向、发起画中画显示、访问菜单、访问存储器、改变视频数据源、发起白色书写板显示、以及访问所连接设备的屏幕。



1、 一种视频会议系统，包括：

至少一个摄像机，能够进行摇镜头、倾斜或变焦中的至少一种；

触摸屏设备，被配置来显示视频数据和生成触摸数据；以及

视频会议单元，与所述触摸屏设备和所述至少一个摄像机操作性地耦合，所述视频会议单元被配置来：

通过网络与一个或多个端点建立视频会议，

将视频数据发送至所述触摸屏以用于显示，

将所发送视频数据的至少一个区域指定作为针对用户选择的至少一个触摸控制，所述至少一个触摸控制用于控制所述至少一个摄像机的摇镜头、倾斜或变焦，

接收来自所述触摸屏设备的触摸数据，

将所接收的触摸数据于所述至少一个触摸控制相关联，以及

基于所关联的触摸控制，控制所述至少一个摄像机的操作。

2、 如权利要求 1 所述的系统，其中，所述至少一个摄像机包括机械制动器，用于使所述至少一个摄像机摇镜头、倾斜或变焦；以及为了基于所关联的触摸控制来控制所述至少一个摄像机的操作，所述视频会议单元被配置来将控制信号发送至所述机械制动器。

3、 如权利要求 1 所述的系统，其中，所述至少一个摄像机包括对由所述至少一个摄像机捕获的视频数据进行摇镜头、倾斜或变焦的电子处理功能，以及为了基于所关联的触摸控制来控制所述至少一个摄像机的操作，所述视频会议单元被配置来将控制信号发送至所述至少一个摄像机，使其执行所述电子处理功能。

4、 如权利要求 1 所述的系统，其中，所述至少一个摄像机包括与所述端点之一耦合的远端摄像机，以及为了基于所关联的触摸控制来控制所述远端摄像机的操作，所述视频会议单元被配置来将控制信号通过所述网络发送至所述远端摄像机。

5、 如权利要求 1 所述的系统，其中，所述至少一个摄像机包括

由机械制动或者数字实现的摇镜头、倾斜或变焦功能。

6、 如权利要求 1 所述的系统，其中，所述至少一个摄像机包括摇镜头-倾斜-变焦摄像机，以及为了将所发送的视频数据的至少一个区域指定作为针对用户选择的至少一个触摸控制，所述视频会议单元被配置来生成与发送至所述触摸屏设备的视频数据结合显示的网格，所述网格具有与相对应的至少一个区域，所述至少一个触摸控制用于控制所述至少一个摄像机的摇镜头、倾斜或变焦。

7、 如权利要求 6 所述的系统，其中，所述网格包括与第一触摸控制相对应的第一区域对，所述第一触摸控制用于使所述摇镜头-倾斜-变焦摄像机摇镜头；与第二触摸控制相对应的第二区域对，所述第二触摸控制用于使所述摇镜头-倾斜-变焦摄像机倾斜；以及与第三触摸控制相对应的第三区域对，所述第三触摸控制用于使所述摇镜头-倾斜-变焦摄像机变焦。

8、 如权利要求 1 所述的系统，其中，所述至少一个摄像机包括第一和第二摄像机，以及为了基于所关联的触摸控制来控制所述第一和第二摄像机的操作，所述视频会议单元被配置来：

确定所述第一和第二摄像机中的哪个当前具有正发送至所述触摸屏设备的视频数据，以及

基于所关联的触摸控制，控制所确定的一个摄像机的操作。

9、 如权利要求 1 所述的系统，其中，所述第一摄像机包括与所述视频会议单元相关联的近端摄像机，以及所述第二摄像机包括与所述视频会议的所述端点之一相关联的远端摄像机。

10、 一种视频会议系统，包括：

多个视频数据源；

触摸屏设备，被配置来显示视频数据并生成触摸数据；以及

视频会议单元，与所述触摸屏设备和所述视频数据源操作性地耦合，所述视频会议单元被配置来：

通过网络与一个或多个端点建立视频会议，

接收来自所述视频数据源中的一个或多个的视频数据，

将所接收的视频数据发送至所述触摸屏以用于显示，

接收来自所述触摸屏设备的控制数据，

响应于所述控制数据，自动地从一个视频数据源切换至另一视频数据源。

11、 如权利要求 10 所述的系统，其中，所述视频数据源是从包括通过网络与所述一个或多个端点耦合的网络接口、摄像机、视频盒式磁带录像机、数字通用盘播放器、膝上计算机、个人计算机、可视源的可编程控制器、以及扩展图形阵列分路器的组中选择的。

12、如权利要求 10 所述的系统，其中，所述触摸屏设备包括具有传感器的用户工具，当移动所述用户工具时，所述传感器生成控制数据，以及为了响应于所述控制数据，以自动地从一个视频数据源切换至另一视频数据源，所述视频会议单元被配置来：

根据所述控制数据，确定是否移动了所述用户工具；

响应于所移动的用户工具，选择所述视频数据源之一。

13、 如权利要求 12 所述的系统，其中，为了自动地从一个视频数据源切换至另一视频数据源，所述视频会议单元被配置来：

响应于所移动的用户工具，生成白色书写板，

接收来自所述触摸屏设备的触摸数据，以及

将所接收的触摸数据作为注释组合到所述白色书写板，以及

将注释后的白色书写板发送至所述触摸屏设备以用于显示，并通过所述网络发送至所述视频会议的所述一个或多个端点。

14、 如权利要求 10 所述的系统，其中，

所述触摸屏设备包括第一数据接口，

所述视频会议单元包括与所述第一数据接口耦合的第二数据接口，以及

所述第二数据接口接收来自所述触摸屏设备的所述第一数据接口的触摸数据。

15、 如权利要求 14 所述的系统，还包括：

计算机，具有视频输出、并具有与所述触摸屏设备的另一数据接口耦合的数据接口；以及

扩展图形阵列分路器，具有与所述计算机的所述视频输出耦合的

视频输入，所述分路器具有与所述视频会议单元的视频输入耦合的视频输出、并具有与所述触摸屏设备的另一视频输入耦合的另一视频输出。

16、 如权利要求 14 所述的系统，还包括可视控制器，所述可视控制器具有在所述视频会议单元和所述触摸屏幕设备的所述第一和第二数据接口之间耦合的数据接口。

17、 如权利要求 16 所述的系统，其中，所述视频数据源中的一个或多个与所述可视控制器的一个或多个视频输入耦合，以及所述可视控制器包括与所述视频会议单元的一个或多个视频输入耦合的一个或多个视频输出。

18、 一种视频会议系统，包括：

触摸屏设备，被配置来显示视频数据并生成触摸数据，所述触摸屏设备包括第一和第二视频输入、以及第一和第二数据接口；

计算机，与所述触摸屏设备的所述第一视频输入和所述第一数据接口耦合，所述计算机具有针对内容的视频输出；以及

视频会议单元，与所述计算机的所述视频输出耦合、并与所述触摸屏设备的所述第二视频输入和所述第二数据接口耦合，所述视频会议单元具有通过网络与一个或多个端点建立视频会议的网络接口；

其中，在注释操作模式中，所述计算机被配置来：

接收来自触摸屏设备的触摸数据，

将所接收的触摸数据作为注释组合到内容，以及

将注释后的内容发送至所述触摸屏设备以用于显示、并发送至所述视频会议单元，

其中，在所述注释操作模式中，所述视频会议单元被配置来：

接收来自所述计算机的注释后的内容，以及

通过网络，将所接收的注释后的内容发送至所述端点。

19、 如权利要求 18 所述的系统，其中，在所述注释操作模式中，从所述计算机中发送的所述内容包括白色书写板、计算机屏幕、图像和可视媒体。

20、 如权利要求 18 所述的系统，其中，所述触摸屏设备包括具

有传感器的用户工具，当移动所述用户工具时，所述传感器生成控制数据，以及所述视频会议系统被配置来响应于所生成的控制数据，自动地切换至所述注释操作模式。

21、 如权利要求 18 所述的系统，还包括：

扩展图形阵列分路器，具有与所述计算机的所述视频输出耦合的视频输入；所述分路器具有与所述视频会议单元的视频输入耦合的视频输出，并具有与所述触摸屏设备的所述第一视频输入耦合的另一视频输出。

22、 如权利要求 21 所述的系统，还包括可视控制器，所述可视控制器具有在所述视频会议单元的数据接口与所述触摸屏幕设备的所述第二数据接口之间耦合的数据接口。

23、 如权利要求 22 所述的系统，其中，至少一个视频数据源与所述可视控制器的视频输入耦合，以及所述可视控制器包括与所述视频会议单元的视频输入耦合的视频输出。

24、 如权利要求 23 所述的系统，其中，所述至少一个视频数据源是从包括摄像机、视频盒式磁带录像机和数字通用盘播放器的组中选择的。

使用触摸屏界面控制视频会议的系统和方法

技术领域

本公开的主题涉及一种使用触摸屏界面控制视频会议的系统和方法。

背景技术

典型地，视频会议系统的用户使用遥控器来操作和控制系统。此外，控制面板、写字板输入设备、小键盘、或者网络接口可以用于操作和控制系统。当使用手持遥控器时，用户将遥控器瞄准视频会议系统，并通过用户界面的许多选择和菜单来导航以操作和控制系统。典型地，写字板输入设备和键盘必须适当地与视频会议系统连接，而适当连接对用户来说可能比较难。对于视频会议，用户还希望设置具有注释工具的文档摄像机（document camera）或计算机，以使用户能够将记录和注释添加至视频会议。不幸地，可能难以设置并与视频会议系统一起使用具有注释工具的文档摄像机和计算机。

本领域公知的一种现有技术的视频会议系统是可从 Polycom.Inc 公司获得的 3000iPower。3000iPower 包括 Polycom iPower 9800 和 SMART 技术公司的后投影（Rear Projection）SMART Board™ 3000i 交互式白色书写板（whiteboard）。iPower 9800 具有基于 PC 的设计，从而实质上作为计算机来操作。3000iPower 允许在视频会议电话中对计算机图像进行投影和观看，以及 3000iPower 提供用于访问会议应用的触摸屏控制。用户可以使用 3000iPower 的笔托盘（tray）上的笔，在白色书写板上做笔记高亮突出重要信息。

本公开的主题意在克服、或者至少减小以上提出的一个或多个问题的影响。

发明内容

视频会议系统包括触摸屏显示设备和视频会议单元。显示设备显示了用于视频会议的视频数据，并基于相对触摸屏的用户选择来生成触摸数据。视频会议单元通过例如视频连接和数据接口连接，来与触摸屏设备操作性地耦合。该单元通过网络与一个或多个端点建立和进行视频会议。该单元将视频数据发送至显示设备，并接收来自该设备的触摸数据。所接收的触摸数据用于控制视频会议系统的操作。所接收的触摸数据可以用于发起视频会议呼叫、改变操作参数、改变摄像机定向、发起画中画显示、访问菜单、访问存储器、改变视频数据源、发起白色书写板显示、以及访问所连接设备的屏幕。

前述概要并不意在总结每个可能实施例、或者本公开的每个方面。

附图说明

结合附图，参照特定实施例的详细描述，将最佳地理解本公开主题的上述概要、优选实施例、以及其它方面，其中：

图 1 示出了根据本公开特定说明的视频会议系统的实施例。

图 2A 示出了视频会议系统实施例的示意图。

图 2B 示出了视频会议系统另一实施例的示意图。

图 3 示意性地示出了视频会议单元的组件。

图 4 示出了触摸屏显示设备的控制面板的实施例。

图 5 示出了视频会议系统菜单功能的实施例。

图 6 示出了视频会议系统摄像机功能的实施例。

图 7 示出了视频会议系统注释功能的实施例。

图 8 示出了视频会议系统白色书写板功能的实施例。

尽管本公开的主题可以有不同的修改和可选形式，但是在附图中，作为示例示出了本公开主题的特定实施例，并进行了详细地描述。附图和文字描述并不意在以任何方式限制本发明构思的范围。而是，如 35 U.S.C. § 112 所要求的，提供附图和文字描述，以通过参考特定示例来向本领域技术人员示出本发明构思。

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具体实施方式

参照图 1，示出了根据本公开特定说明的视频会议系统 10 的实施例。视频系统 10 包括视频会议单元 100 和触摸屏显示设备 200。视频会议系统 10 还可以包括一个或多个外围设备，如，计算机（膝上或台式）50、视频盒式磁带录像机（VCR）70、和数字通用盘（DVD）播放器 80。在一个实施例中，视频会议单元 100 是可从 Polycom.Inc（本公开的受让人）获得的 VSX 8000，以及触摸屏显示设备 200 是可从加拿大的 SMARTTechnologies 获得的 3000i model SMARTBoard。在可选实施例中，视频会议单元 100 和触摸屏显示设备 200 可以集成在一起用于视频会议系统 10。

视频会议单元 100 用于通过网络与远程端点（未示出）建立和进行视频会议。视频会议单元 100 具有摄像机 102 和麦克风 104。依据实施方式，单元 100 可以具有其它共有组件，如，红外（IR）检测器 106。触摸屏显示设备 200 能够既向用户显示视频、又接收来自用户的触摸和注释。在一个实施例中，触摸屏显示设备 200 是具有环绕屏幕 202 的光传感器的视频监视器等，用于检测何时用户触摸屏幕 202 的区域、或在屏幕 202 的区域上书写。例如，视频监视器可以是传统电视显示器、平板显示器、或本领域公知的其它显示器的一部分。触摸屏显示设备 200 还可以使用本领域公知的其它触摸屏技术。

作为 3000i model SMARTBoard，设备 200 包括投影屏幕 202、集成扩展图形阵列（XGA）投影仪 220、控制面板 230 和托盘 240。设备 200 还包括音频系统（未示出）。为了检测何时用户触摸屏幕，设备 200 使用数字摄像机（未示出）来检测目标和相对显示屏幕 202 的运动。如以下所讨论的，显示设备 200 的控制面板 230 包括配置以结合视频会议单元 100 操作的按钮。托盘 240 具有多种工具 242，如笔和擦除器。托盘 140 上的光传感器（未示出）用于检测用户何时从托盘 140 中拾取特定的笔或擦除器工具 242。

参照图 2A 和 2B，示出了图 1 视频会议系统 10 实施例的示意图。在图 2A 的实施例中，系统 10 的视频会议单元 100 直接与触摸屏显示设备 200 耦合。随后的讨论集中于视频会议系统 10 的视频连接。然而，

将会理解，视频会议系统 10 可以具有音频连接。例如，视频会议单元 100 可以具有与显示设备 200 的音频连接，并可以将音频数据发送至显示设备 200 的扬声器。

对于系统 10 的视频连接，摄像机 102 与单元 100 的输入 114 耦合，如，S-视频连接。视频会议单元 100 具有与显示设备 200 的视频输入 212 耦合的视频输出 112。例如，XGA 电缆可以用于将单元 100 的 XGA 输出 112 与显示设备 200 的 RGB 输入 212 连接。视频会议单元 100 还具有与显示设备 200 的串口（COM1）213 耦合的串口 113。单元 100 和显示设备 200 使用串口 113 和 213，在彼此之间传输数据。该数据包括通过显示设备 200 获得、并传输至单元 100 的触摸数据，单元 100 使用用于以下所讨论的操作的触摸数据。所传输的数据还包括通过用户选择显示设备 200 控制面板（未示出）上配置的按钮而生成的数据。

视频会议系统 10 还可以包括多个可选组件，这些可选组件可用于系统 10 的一些实施方式或功能。例如，一个或多个可选 VCR 或 DVD 播放器 70 或 80 可以与单元 100 的一个或多个输入 118 耦合。此外，可选的膝上或其它计算机 50 可以通过串口（COM2）215，与触摸屏设备 200 耦合。如果计算机 50 具有适当软件，则计算机 50 与设备 200 的串口（COM2）215 的耦合可以允许显示设备 200 作为独立组件，与视频会议单元 100 相分离地操作。

计算机 50 还可以与扩展图形阵列（XGA）分路器 60 耦合，该 XGA 分路器 60 与视频会议单元 100 的输入 116 耦合，并与显示设备 200 的 RGB 输入 216 耦合。计算机 50 和分路器 60 与单元 100 和设备 200 的耦合允许计算机 50 提供要由设备 200 显示、以及要由视频会议单元 100 处理和转发至远程端点（未示出）的计算机上的内容、图像等。在一个实施例中，如果计算机 50 具有将计算机 50 与单元 100 集成的适当软件，则计算机 50 可以具有用于控制视频会议单元 100 的操作的图形用户界面。当在以下讨论的“PC 指示”操作模式中进行操作时，可以在显示设备 200 上显示使用计算机 50 来控制单元 100 的 GUI。

在图 2B 中的视频会议系统 10 的实施例中，视频会议单元 100 再

次具有直接与显示设备 200 的 RGB 输入 212 耦合的视频输出 112。然而，单元 100 的串口 113 与 A/V 控制器 150 耦合，A/V 控制器 150 与显示设备 200 的串口（COM1）213 耦合。使用 A/V 控制器 150，单元 100 和设备 200 可以使用串口 113 与 213，在彼此之间传输数据。

在一个实施例中，A/V 控制器 150 是 POINTMAKER®PVI 视频标记器，这是用于控制音频和视频设备的可编程设备，并且可从 Arizona，Tucson 的 Boeckeler Instruments.Inc 获得。视频会议单元 100 通过串口 113 与 A/V 控制器 150 的串行连接允许单元 100 控制 A/V 控制器 150 的操作。

如先前的实施例中所述，摄像机 102 直接与单元 100 的摄像机输入 114 耦合。然而，例如 VCR/DVD 70/80、文档摄像机 90、计算机 50、以及 XGA 分路器 60 等可选组件与 A/V 控制器 150 耦合。A/V 控制器 150 向视频会议单元 100 的一个或多个输入 115 提供来自个人计算机 50 的第一视频数据 152、来自 VCR/DVD 70/80 的第二视频数据 154、以及来自文档摄像机 90 的第三视频数据 156。

在本实施例中，文档摄像机 90 可以通过 S-视频电缆与 A/V 控制器 150 的 S-视频输入连接。来自 A/V 控制器 150 的 S-视频输入的 S-视频电缆可以与单元 100 的第二摄像机输入连接。可以通过来自 VCR/DVD 70/80 的复合视频输出的 RCA 或 BNC 电缆，将 VCR/DVD 70/80 连接至 A/V 控制器 150 的复合视频输入。来自 A/V 控制器 150 的复合视频输出的 BNC 或 S-视频电缆可以与视频会议单元 100 的 VCR/DVD 视频输入连接。可以通过来自 A/V 控制器 150 的 VGA 输出的 XGA/VGA 电缆，将来自 A/V 控制器 150 的视频与视频会议单元 100 的 VGA 输入连接。

参照图3，更加详细地示意性示出了视频会议系统10的附加组件。视频会议单元 100 具有控制器 120，该控制器 120 可以包括任何常规的编码器、处理器和本领域公知、并用于视频会议单元的其它电子组件。控制器 120 与视频的输出 112、数据接口的串口 113、以及存储功能 131-135 的存储器 130 耦合。控制器 120 还与来自近端（near）摄像机 102 的视频的输入 114 耦合，并且可以与接口 115 耦合，以控制

近端摄像机 102。视频输出 112 与显示设备 200 的视频输入 212 耦合，以及串口 113 与显示设备 200 的串口 213 交换数据。例如，串口 113 接收来自显示设备 200 的触摸数据，串口 113 可以与显示设备 200 交换控制数据。

控制器 120 包括视频编解码器 122 和数据处理器 124。视频编解码器 112 负责处理要由显示设备 200 显示、并要发送至视频会议端点的视频数据。通常，视频数据可以包括由单元 100 的摄像机（未示出）所捕获的图像、来自视频会议远程端点的视频、来自外围设备（例如，VCR、DVD 播放器、计算机、文档摄像机等）的内容、来自显示设备 200 的注释、以及其它可视数据。在视频会议环境中的这种视频编解码器 122 的操作是本领域公知的，不在这里进行描述。

数据处理器 124 负责处理视频会议单元 100 的数据。该数据包括来自显示设备 200 的触摸数据、通信数据、命令、视频会议信息等。控制器 120 还与网络接口 140（如，普遍用于视频会议单元的）耦合，以及网络接口 150 与本领域公知的视频会议网络 142 耦合。

控制器 120 使用存储于存储器 130 中的操作功能 131-135，来控制视频会议系统 10 的至少一些特征的操作。这些操作功能包括在屏图形用户界面（GUI）功能 131、摄像机功能 132、注释功能 133、白色书写板功能 134、以及辅助设备功能 135。之后更加详细地讨论这些操作功能 131-135 中的每个，但是在这里提供这些功能 131-135 的一般性概述。

在屏 GUI 功能 131 允许视频会议单元 100 在显示设备 200 上显示图形用户界面，该图形用户界面用于控制系统 10 的操作。视频会议单元 100 的图形用户界面可以包括可以在显示设备 200 上显示的多个触摸控制、菜单、以及对话，以便用户操作和控制系统 10。例如，单元 100 的图形用户界面可以允许用户通过目录、速度拨号（speed dial）、或者手动拨号菜单来进行视频会议呼叫；应答呼入的视频会议呼叫；挂断视频会议呼叫；静音或改变音频的音量；选择摄像机和内容源，交换画中画（PIP）中的远近视频，以及这里公开的其它操作。

摄像机功能 132 允许视频会议单元 100 在显示设备 200 上显示可

视触摸控制，以控制一个或多个摄像机（如，近端摄像机 102）的操作。在一个实施例中，近端摄像机 102 是摇镜头-倾斜-变焦（pan-tilt-zoom）摄像机，能够摇镜头、倾斜和变焦。近端摄像机 102 的摇镜头、倾斜和变焦能力中的一个或多个可以通过如用于本领域中的操作视频会议单元的摇镜头-倾斜-变焦摄像机的一个或多个机械制动器 103 来实现。接口 115 与制动器 103 耦合，以及控制器 120 通过接口 115，使用控制信号来控制近端摄像机 102 的摇镜头、倾斜和变焦能力的操作。利用显示设备 200 上的可视触摸控制的用户可以生成控制信号来控制近端摄像机 102 的摇镜头、倾斜和变焦。

可选地，可以电子地获得近端摄像机 102 的摇镜头、倾斜和变焦能力。例如，近端摄像机 102 可以具有摇镜头、倾斜和变焦的处理能力，以及控制器 120 可以通过接口 115，使用控制信号来控制该处理。在另一示例中，作为替代，控制器 120 可以具有摇镜头、倾斜和变焦的处理能力，以及控制器 120 可以基于通过视频输入 114 从近端摄像机 102 中接收的视频，来执行那些操作。

除了控制近端摄像机 102 之外，摄像机功能 132 允许视频会议单元 100 在显示设备 200 上显示可视触摸控制，用于控制网络 142 上的远端摄像机 114 的操作。例如，远端摄像机 144 可以与参与视频会议的远程端点相关联。使用网络接口 140，控制器可以使用控制信号来控制远端摄像机 144 的摇镜头、倾斜和变焦能力。例如，远端摄像机 144 可以是具有一个或多个机械制动器、或者具有电子处理能力的摇镜头-倾斜-变焦摄像机。控制器 120 可以使用远端摄像机控制协议（如，在 H.323 的附录 Q 中描述的 H.224），通过网络接口 140 来控制远端摄像机 144。

注释功能 133 允许用户对在显示设备 200 上显示的视频进行注释，以及白色书写板功能 134 允许用户在显示设备 200 上显示的白色书写板上进行注释。最后，辅助设备功能 135 允许视频会议单元 100 显示来自如计算机、膝上计算机、VCR、DVD 播放器等的其它辅助设备的视频。

如将从以上的大体描述中显而易见的，操作功能 131-135 允许视

频会议单元 100 在注释模式和在触摸控制模式中操作触摸屏显示设备 200。模式的确定可以依据是否从显示设备 200 的托盘 240 中拾取了笔或擦除器工具 242。例如，如果从托盘拾起笔或擦除器工具 242，则视频会议单元 100 可以在注释模式中操作显示设备 200，从而用户可以在设备 200 上显示的视频上作出注释。视频可以是视频会议或其它内容，以及可以来自视频会议单元 100、计算机、膝上计算机、VCR、DVD 播放器、文档摄像机等。当将工具 242 中的所有工具放置在托盘 240 内时，视频会议单元 100 可以在触摸控制模式中操作显示设备 200，从而用户可以通过触摸与单元 100 的图形用户界面、触摸控制、菜单、对话等相对应的显示器 200 区域，来控制视频系统 10 的操作。

提供了视频会议单元 100 怎样控制视频会议系统 10 的操作的大体概述，现在参考图 4 至 8，以更加详细地讨论视频会议单元 100 的操作功能。

如上所述，视频会议单元 100 使用辅助设备功能 135 来控制触摸屏显示设备 200 的操作。通过集成显示设备 200 的控制面板（230；图 1）上的控制与视频会议单元 100，来实现所述控制的一种方式。参照图 4，示出了触摸屏显示设备（未示出）的控制面板 230 的实施例。如先前所讨论的，优选地，触摸屏显示设备是 3000i model SMART Board。同样，3000i modelSMART Board 的控制面板 230 具有多个按钮，配置用于控制显示设备的音量等级、亮度等级和对比度等级。然而，作为视频会议单元与所公开的视频会议系统的显示设备之间集成的一部分，如图 4 的实施例中所示，重新配置显示设备的控制面板 230 上的按钮（为了方便，在图 4 中，同时参考本公开图 1 中组件的参考数字）。

控制面板 230 包括第一按钮 231，配置来发起视频会议操作模式。在该模式中，视频会议单元（100）通过经由网络来建立与远程端点的视频会议连接、将视频会议的视频发送至显示设备（200）的 RGB 输入、以及在显示设备（200）与单元（100）之间传输图形用户界面和触摸数据，建立和进行视频会议。

面板 230 的第二按钮 232 配置用于：如果个人计算机（50）与所

公开的视频会议系统耦合，则发起个人计算机（50）的控制。在该模式中，可以在视频会议期间示出来自计算机（50）的内容。该内容可以包括计算机的屏幕、存储于计算机上的视频或其它图像、PowerPoint展示、文件等。在视频会议期间，由视频会议单元（10）处理来自计算机（50）的内容，并将其发送至显示设备（200）。还可以将该内容发送至视频会议的远程端点。

面板 230 的第三按钮 233 配置来发起 PC 指示操作模式。在该模式中，将来自计算机（50）的视频数据直接从分路器（60）的 XGA 输出发送至显示设备(200)的 RGB 输入，而不是从视频会议单元(100)的视频编解码器发送。无论是否在视频会议呼叫中、或者无论是否在将计算机内容发送至其它端点，都可以进行以上操作。面板 230 的第四按钮 234 配置来发起视频操作模式，其中，显示设备（200）操作来通过 S-视频连接来接收来自连接源的视频。

除了控制面板 230 上的按钮之外，显示设备（200）还包括设备托盘(240)上的其它按钮 235 和 236。为了方便，在图 4 中与托盘(240)相分离地示出了这些按钮 235 和 236。第一托盘按钮 235 最初配置用于：当利用所耦合的计算机或膝上计算机的软件操作显示设备（200）时，访问显示设备（200）屏幕上的在屏键盘。然而，对于本公开的视频会议系统（10），将按下该键盘按钮 235 重新配置用于：如果放下显示设备（200）的托盘（240）上所有的笔（242）、以及如果单元（100）生成键盘的显示适当的屏幕，则访问视频会议单元(100)的在屏键盘。然而，如果从托盘（240）中拾起笔（242），则该按钮 235 配置用于：如果 A/V 控制器（150；图 2A）是视频会议系统（10）的实施方式的组件，则访问该 A/V 控制器（150；图 2A）的校准屏幕。利用所访问的菜单屏幕，用户可以使用触摸屏显示设备（200）来对 A/V 控制器（150；图 2A）进行校准。

第二托盘按钮 236 最初配置来在利用所耦合的计算机或膝上型计算机（50）的软件操作显示设备（200）时，作为鼠标右键点击而操作。然而，对于本公开的视频会议系统（10），将按下该按钮 236 重新配置用于：如果放下显示设备（200）的托盘（240）上的笔（242），则开

始和停止视频会议单元（100）的 VGA 图形。如果从托盘（240）中拾起笔（242），则该按钮 236 配置用于：如果 A/V 控制器（150；图 2B）是实施方式的一部分，则访问该 A/V 控制器（150；图 2B）的菜单。利用所访问的菜单屏幕，用户可以使用触摸屏显示设备（200）来控制 A/V 控制器（150；图 2B）的操作。

暂时返回图 3，如先前所讨论的，视频会议单元 100 具有在屏 GUI 功能 131，以在用于控制系统 10 操作的显示设备 200 上显示用户界面、菜单、触摸控制、对话等。在屏 GUI 功能 131 的一部分包括在显示设备 200 上显示触摸控制，以及针对那些触摸控制，在视频会议单元 100 处从显示设备 200 中接收触摸数据，以控制系统 10 的操作。换言之，显示设备 200 用于检测来自触摸屏显示设备 200 上的用户触摸、电子笔等的信息、选择、注释。将检测到的触摸数据发送至视频会议单元 100。触摸数据用于操作视频会议系统 10。

例如，显示设备 200 的触摸屏区域中的触摸或释放引起了与配置用于视频会议单元 100 的用户界面特征的触摸和/或释放相对应的事件。如果用户的触摸是在未指定为单元 100 的用户界面的触摸控制的屏幕区域上，则可以通过可访问摄像机控制或引出主菜单等的监督算法来处理触摸数据。因此，单元 100 确定图形用户界面（GUI）和/或视频当前是否在显示设备 200 上显示。例如，如果单元 100 正在显示 GUI，则用户将能够使用手指或电子笔 242 来触摸显示设备 200 的屏幕，并产生视频会议单元 100 的输入。

参照图 5，在显示设备（200）的触摸屏 202 上示出了由视频会议单元（100）生成的菜单 310 的实施例。当正在显示视频时，用户选择显示在屏幕 202 左上角上的按钮 302 时，可以调用菜单 310。优选地，按钮 302 是透明的或隐藏的，并可从包括参与者和内容的视频的那些视频的所有屏幕中得到。一旦调用了菜单 310，则菜单 310 允许用户通过直接在屏幕 202 上使用交互触摸，来控制视频会议系统。优选地，菜单 310 是透明的，并显示在屏幕 202 上当前显示的视频之上。

菜单 310 包括与遥控器上可用的按钮类似的多个触摸控制 312。这些触摸控制 312 包括返回（Home）按钮、呼叫（Call）按钮、挂断

按钮、音量按钮、静音按钮、摄像机按钮、画中画（PIP）按钮、近端按钮、远端按钮、预先设置按钮、以及关闭按钮。可以依据实施方式，在菜单 310 中设置这些和其它按钮。例如，一些其它可能按钮包括用于引出帮助的按钮和用于在屏键盘的按钮。

触摸控制 312 可以类似于在实际遥控器上找到的相应控制来进行操作。这里，差别在于，在屏幕 202 上显示的视频数据的指定区域与用于控制和操作视频系统的触摸控制相关联。例如，选择菜单 310 上的呼叫按钮可以发起视频会议呼叫。为了发起呼叫，可以在屏幕 202 上访问速度拨号对话或地址簿对话，以选择与哪个远程端点建立视频会议。选择菜单 310 上的挂断按钮可以结束视频会议呼叫，或者，如果存在多于一个的当前有效的呼叫，则可以在屏幕 202 上引出挂断对话。选择菜单 310 上的音量按钮可以在屏幕 202 上引出音量条，然后用户可以触摸显示在屏幕 202 上的音量条来控制音量。菜单 310 上的静音和 PIP 可以是拨动（toggle）按钮，用于对音频消音和在屏幕 202 上产生画中画。

选择菜单 310 上的预先设置按钮可以引出屏幕 202 上的预先设置对话，以及用户可以从多个所存储的预先设置中进行选择、或者触摸和保持以存储预先设置。选择菜单 310 上的摄像机按钮可以在屏幕 202 上引出对话，该对话列出了视频源（例如，摄像机、计算机等），以及用户可以触摸在列表上的适当按钮，以选择所期望的视频源。菜单 310 上的近端和远端按钮允许用户选择和控制近端摄像机（即，与视频会议单元（100）耦合的摄像机）、或者与视频会议的端点相关联的远端摄像机的一个或多个。

如先前所讨论的，图 3 的视频会议单元 100 还具有用于控制摄像机的摄像机功能 132。摄像机功能 132 的一部分包括：在显示设备 200 上显示摄像机控制，以及相对于那些摄像机控制，接收来自用户的触摸数据，以控制摄像机操作。参照图 6，在显示设备的触摸屏 202 上示出了由视频会议单元生成的摄像机控制 350 的实施例。摄像机控制 350 允许用户在屏幕 202 上使用直观触摸来控制摇镜头-倾斜-变焦摄像机。当正在屏幕 202 上显示全屏视频时，当笔或擦除器工具（242；

图 1）是放下的时触摸屏幕上的任何地方将引出在有效视频之上显示的水印网格 360。控制图标 364 和 368 位于水印网格 360 的区域 362 和 366 中。通过触摸与控制图标 364 相关联的网格 360 的上下区域 362 对，用户可以使所连接的视频会议单元的摇镜头-倾斜-变焦摄像机、或者参与视频会议的远程端点的摇镜头-倾斜-变焦摄像机进行倾斜操作。通过触摸与控制图标 365 相关联的网格 360 的左右区域 363 对，用户可以使所连接的视频会议单元的摇镜头-倾斜-变焦摄像机、或者参与视频会议的远程端点的摇镜头-倾斜-变焦摄像机摇镜头。通过触摸与其它控制图标 368 相关联的网格 360 的内部区域 366 对，用户可以使所连接的视频会议单元的摄像机、或者参与视频会议的远程端点的摄像机进行变焦操作。

依据在屏幕 202 上当前正显示哪个视频，来确定对与视频会议相关联的哪个摄像机（例如，近端或远端）进行控制。例如，如果与视频会议端点相关联的远端摄像机的视频当前正在屏幕上显示，则触摸与网格 360 相关联的区域 362、363 和 366 将会使用这里公开的技术来控制远端摄像机的摇镜头、倾斜和变焦。如果当前正在显示与屏幕 202 相关联的视频会议单元连接的近端摄像机视频，则触摸与网格 360 相关联的区域 362、363 和 366 将会使用这里公开的技术来控制近端摄像机的摇镜头、倾斜和变焦。

如先前所讨论的，图 3 的视频会议单元 100 具有向所显示的视频添加注释的注释功能 133。参照图 7，示出了在注释模式 400 中操作的视频会议系统 10 的一部分。在注释模式 400 中，用户可以在当前正在屏幕 202 上显示的视频之上作出注释 410。可以使用电子笔 242 作出注释 410，以及可以在开启或关闭有效视频会议呼叫时作出注释 410。如果用户想在屏幕 202 上所显示的对象 402 上（例如，来自所连接的文档摄像机或计算机的显示文档）进行写操作，则用户一从托盘 420 中拾取电子笔 242，则视频会议系统 10 自动地进入注释模式 400。如先前所讨论的，显示设备 200 的托盘 240 上的光传感器可以用于检测用户何时从托盘 240 中拾取笔 242。通过与视频会议单元 100 的数据接口，从显示设备 200 中发送该数据，其中，在视频会议单元 100 中，

单元 100 的控制器（120；图 3）访问注释功能（133；图 3）。

在注释模式中，用户能够在设备 200 的屏幕 202 上显示的多种视频或图像上作出注释 410。视频和图像可以包括来自视频会议单元 100 的视频会议视频、来自文档摄像机的视频、来自 VCR 或 DVD 播放器的视频、或者来自所连接的计算机的计算机屏幕图像。来自文档摄像机、VCR 和 DVD 播放器的视频可以符合国家电视标准委员会(NTSC)或逐行倒相（PAL）标准。计算机屏幕图像可以是具有 1024×768 分辨率的 XGA。

当在屏幕 202 上作出注释 410 时，注释 410 的图形元素与所显示的视频组合。通过将注释 410 与所显示的视频组合，易于将注释 410 作为在视频会议网络上从单元 100 发送至远程端点的压缩视频比特流的一部分，发送至视频会议的远处端点。

在一个实施例中，用户可以对计算机提供的内容作出注释 410。优选地，对来自计算机的内容进行注释。内容可以是白色书写板、计算机屏幕、图像、或来自计算机的可视媒体的内容。例如，计算机（50；图 2A-2B)可以指定为在触摸屏设备 200 的屏幕 202 上显示的内容源。在视频会议期间，用户可以从触摸屏设备 200 的托盘 240 中拾取用户工具 242，以及视频会议系统 10 自动地切换至注释模式操作。一旦在注释模式操作中，则计算机（50）接收来自触摸屏设备 200 的触摸数据，并将所接收的触摸数据组合作为对计算机内容的注释。计算机(50)将该注释内容发送至触摸屏设备 200，以显示该注释内容，并将该注释内容发送至视频会议单元 100。视频会议单元 100 接收来自计算机（50)的注释内容，并将所接收的注释内容通过单元的网络接口（140；图 3）发送至视频会议的端点（未示出）。因此，可以对内容作出注释，并通过网络自动发送至远端端点。

优选地，发送注释内容包括将注释数据与内容数据组合在一起，从而该组合可以通过网络按照 H.239 标准发送。此外，利用计算机(50)处理显示在触摸屏设备 200 上的注释和内容，可以避免常规上用户在视频会议期间作出注释时出现的时延问题。具体地，利用计算机（50）来处理注释和内容不再需要视频会议单元处理注释内容、并将该注释

内容发送至触摸屏设备 200 用于显示。典型地，这种反馈设置在用户当前在显示设备 200 的屏幕 202 上作出什么注释与显示多少注释 410 之间产生时延。通常，不希望有任何显著的时延。

如以上所讨论的，图 3 的视频会议单元 100 还具有允许显示设备 200 用作白色书写板的白色书写板功能 134。参照图 8，示出了在白色书写板模式 450 中操作的视频会议系统 10 的一部分。为了访问该模式 450，用户从显示设备 100 的托盘 240 中拾取电子笔 242，如果还未选择另一视频源（例如，文档摄像机、计算机、VCR、DVD 播放器等），则视频会议系统 10 自动地进入白色书写板操作模式 450。然后，用户可以在屏幕 202 上显示的白色书写板内容 452 上开始书写注释 460。优选地，白色书写板内容 452 是具有 1024×768 的分辨率的 XGA 图像。用户可以在白色书写板内容 452 上作出注释 460，而不考虑系统 10 是否处于视频会议呼叫中。然而，当处于视频会议呼叫中时，可以将具有注释 460 的白色书写板内容 452 通过视频会议单元 100 发送至远程端点。

如先前参照图 2A-2B 所讨论的，系统 10 可以不包括计算机。缺少计算机，视频会议单元 100 可以自身生成白色书写板。当系统 10 当前正在显示设备 200 上显示图形用户界面或者摄像机的视频数据时，视频会议单元 100 在用户从托盘 420 中拾取笔 242 时，自动进入注释模式操作。在注释模式中，视频会议单元 100 生成白色书写板内容 452。视频会议单元 100 接收来自显示设备的触摸数据，并将触摸数据作为注释 460 组合到白色书写板内容 452。然后，视频会议单元 100 将注释后的白色书写板发送至显示设备 200，并将注释后的白色书写板作为 H.239 内容发送至视频会议的一个或多个远程端点。然而，在可选实施例中，系统 10 可以使用可选计算机（50；图 2A-2B）来处理白色书写板内容 452 和注释 460，从而视频会议单元 100 可以将注释后的白色书写板作为 H.239 内容发送至视频会议的一个或多个远程端点。

如先前所述，可选计算机（50；图 2A-2B）可以与系统 10 连接。从托盘 240 中拾取笔 242 可以使系统 10 自动地选出 VGA 或视频源，

以在显示设备 200 上全屏显示并发送至视频会议的远程端点。例如，不是将白色书写板 452 作为显示的背景示出，而是可以示出来自可选连接的计算机（50）中的计算机屏幕。VGA 或视频源的选择依据系统 10 当前所选择的源。例如，可以通过集成到系统 10 的 A/V 控制器 150 来控制与视频注释相关的行为，以及 A/V 控制器 150 可以配置来提供这里公开的对视频进行注释和在源之间切换的特征。

优选的和其它实施例的前述描述并不意在局限或限制申请人构想的发明构思的范围或适用性。公开这里所包含的发明构思，以此易彼，申请人要求由所附权利要求提供的所有专利权。因此，所附权利要求意在包括对于落入所附权利要求及其等同物范围内的所有修改和改变。



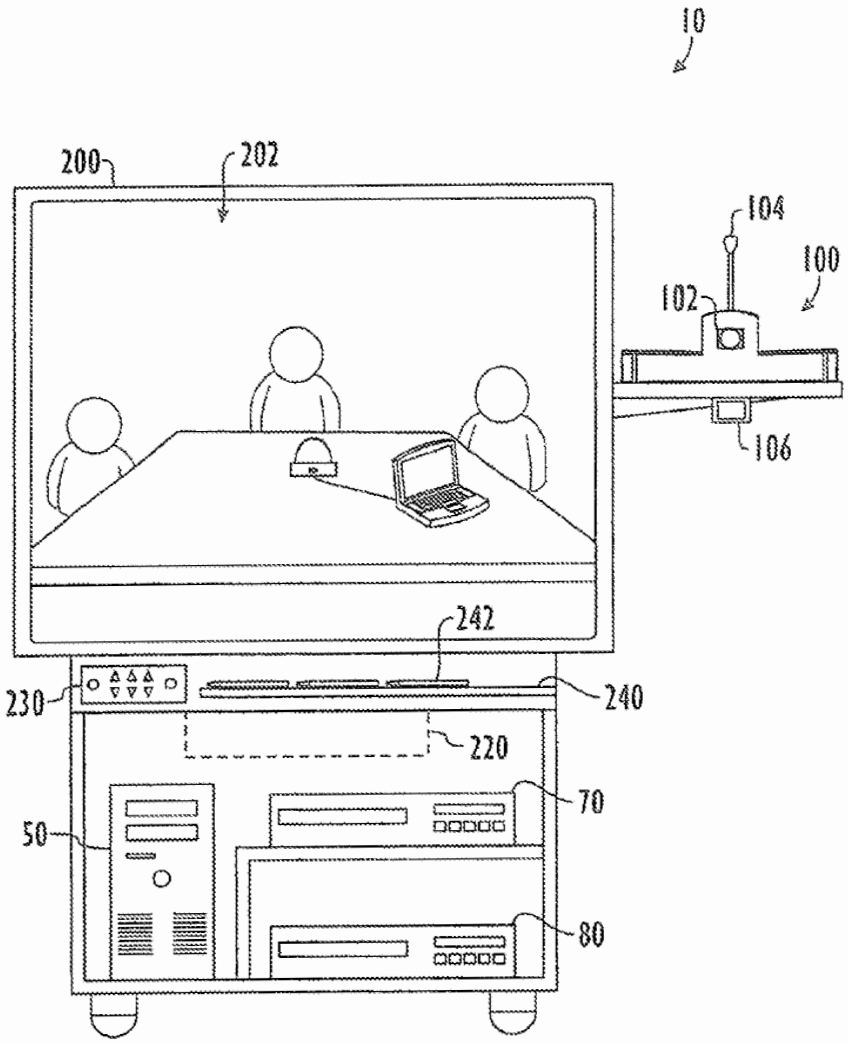


图 1

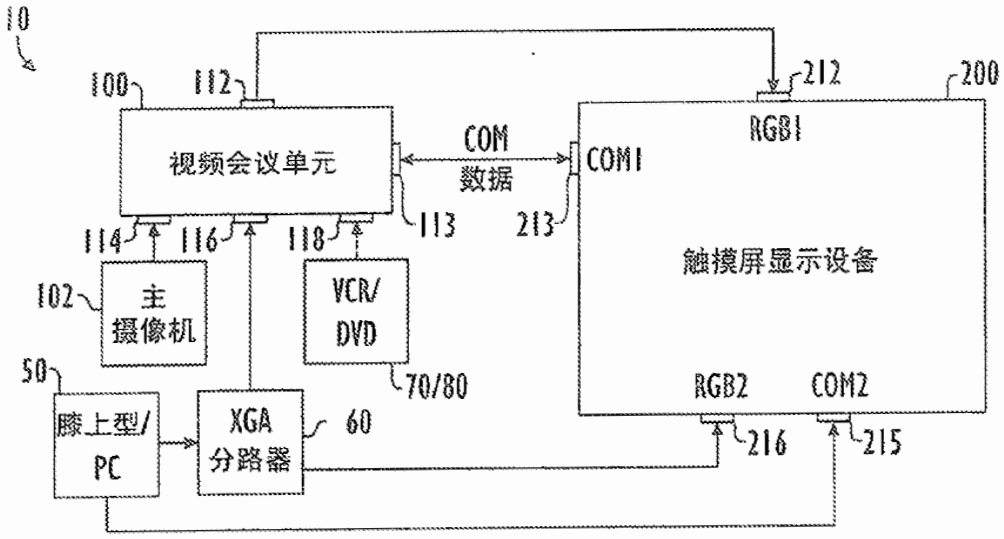

10
100
112
212
200
视频会议单元
COM
数据
COM1
RGB1
113
213
114
116
118
触摸屏显示设备
102
主
摄像机
VCR/
DVD
50
70/80
膝上型/
PC
XGA
分路器
60
RGB2
COM2
216
215

图 2A

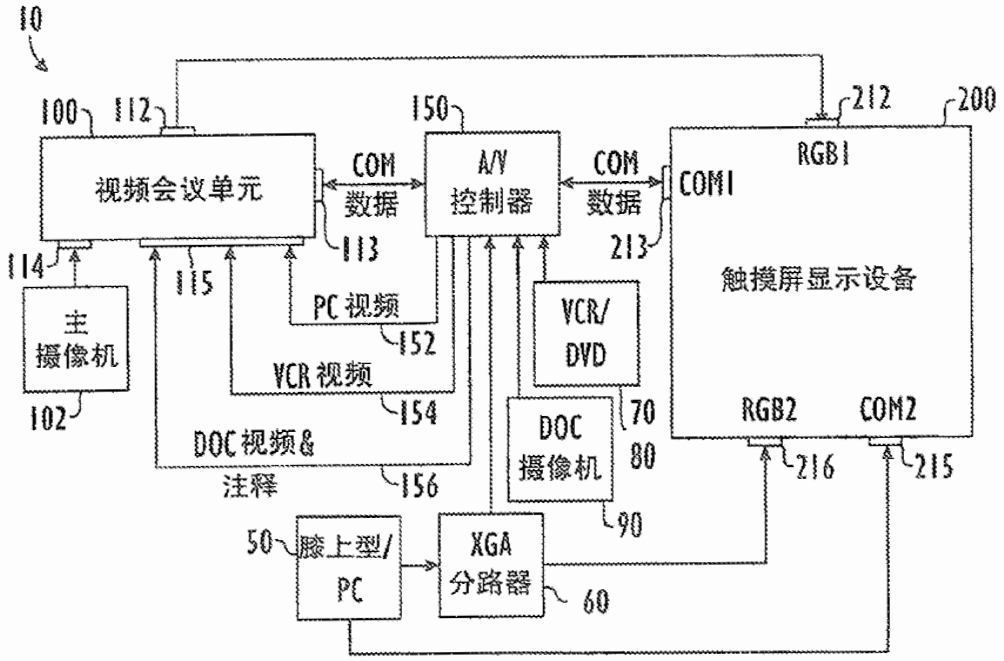

10
100
112
150
212
200
视频会议单元
COM
数据
A/V
控制器
COM
数据
COM1
RGB1
113
213
114
115
触摸屏显示设备
主
摄像机
PC 视频
152
VCR/
DVD
VCR 视频
154
70
102
DOC
摄像机
80
RGB2
COM2
DOC 视频&
注释
156
216
215
90
50
膝上型/
PC
XGA
分路器
60

图 2B

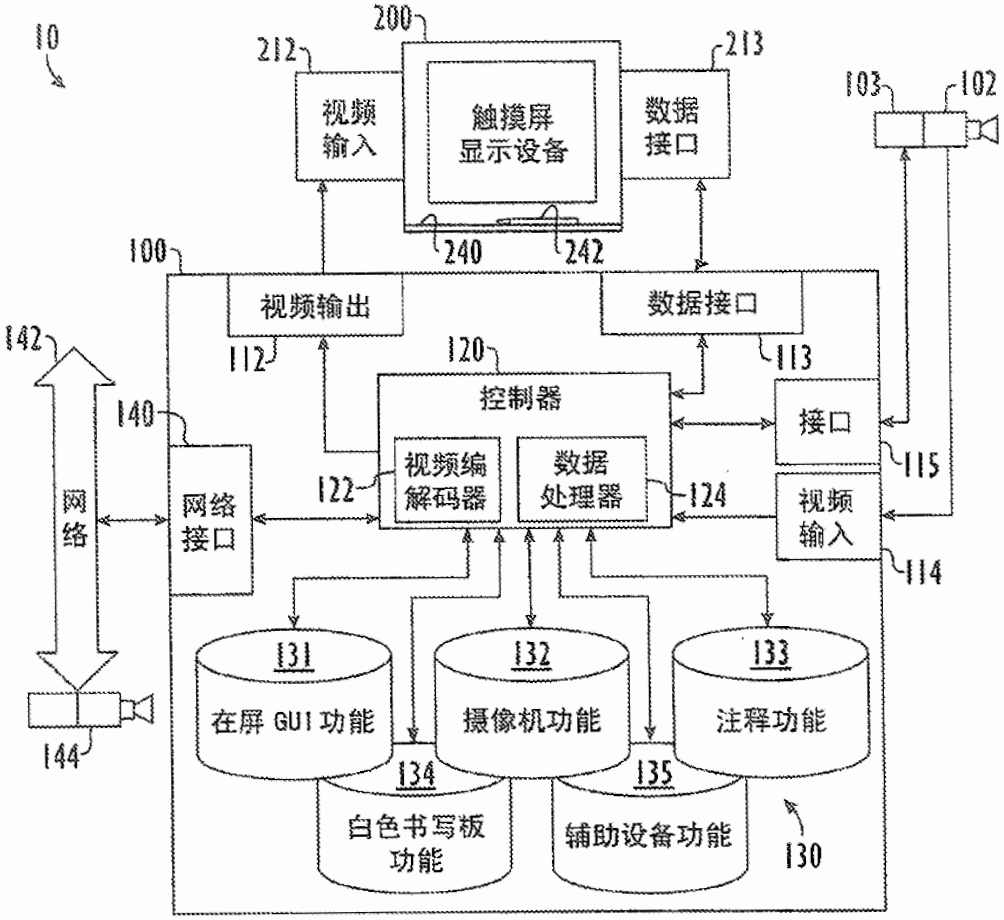

10
200
212
213
视频输入
触摸屏显示设备
数据接口
103
102
240
242
100
视频输出
数据接口
142
112
120
113
控制器
140
接口
115
网络
网络接口
122
视频编解码器
数据处理器
124
视频输入
114
131
132
133
在屏 GUI 功能
摄像机功能
注释功能
144
134
135
白色书写板功能
辅助设备功能
130

图 3

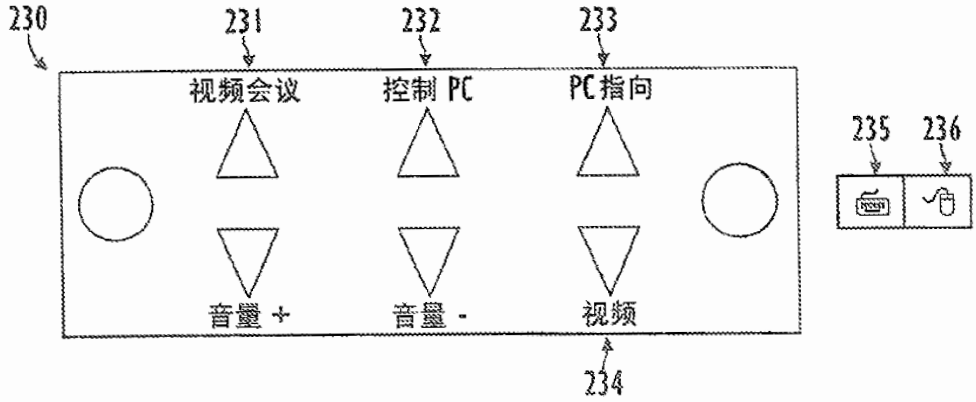

230
231
232
233
视频会议
控制 PC
PC指向
235
236
音量 +
音量 -
视频
234

图 4

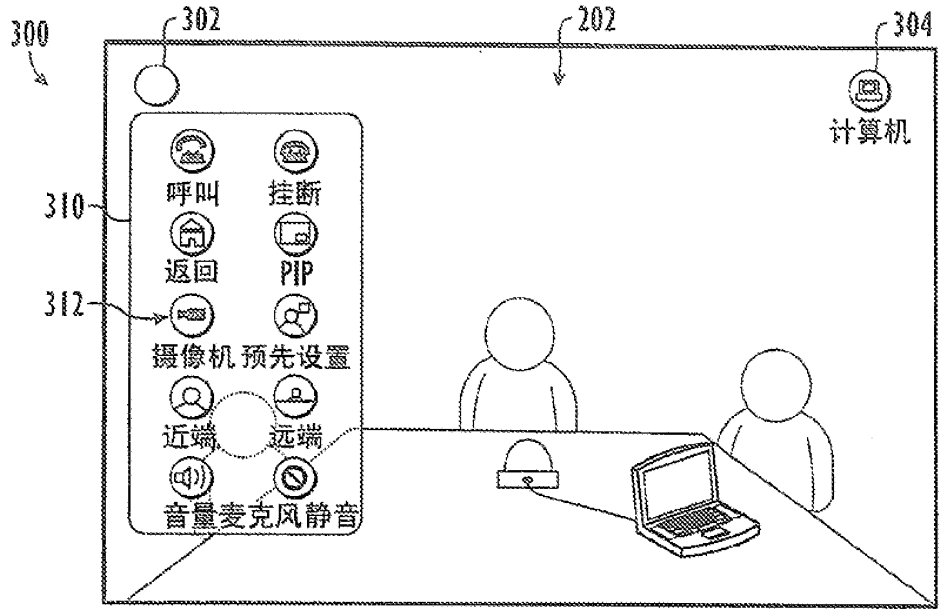

300
302
202
304
计算机
310
呼叫
挂断
返回
PIP
312
摄像机预先设置
近端
远端
音量麦克风静音

图 5

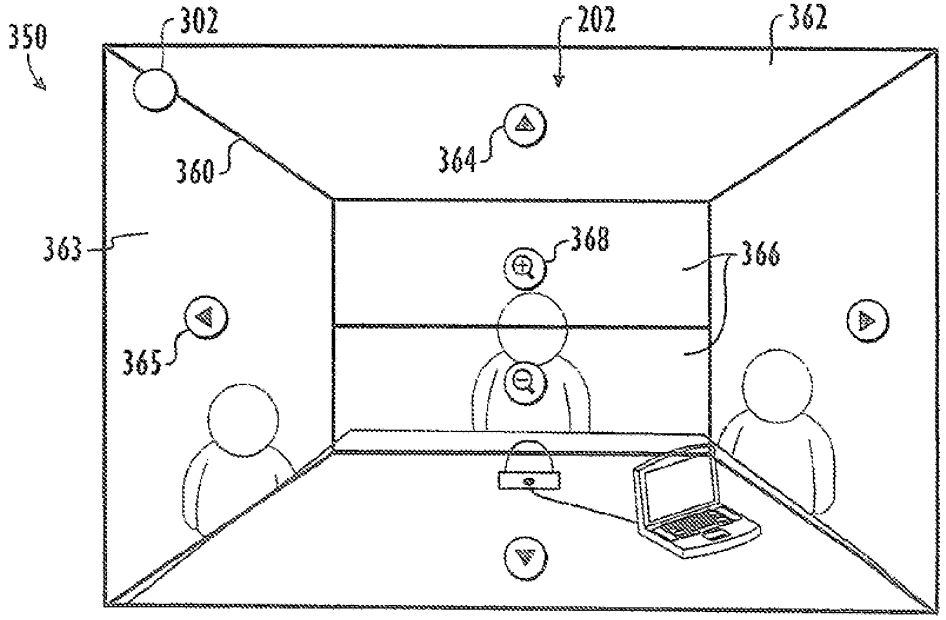

350
302
202
362
360
364
363
368
366
365

图 6

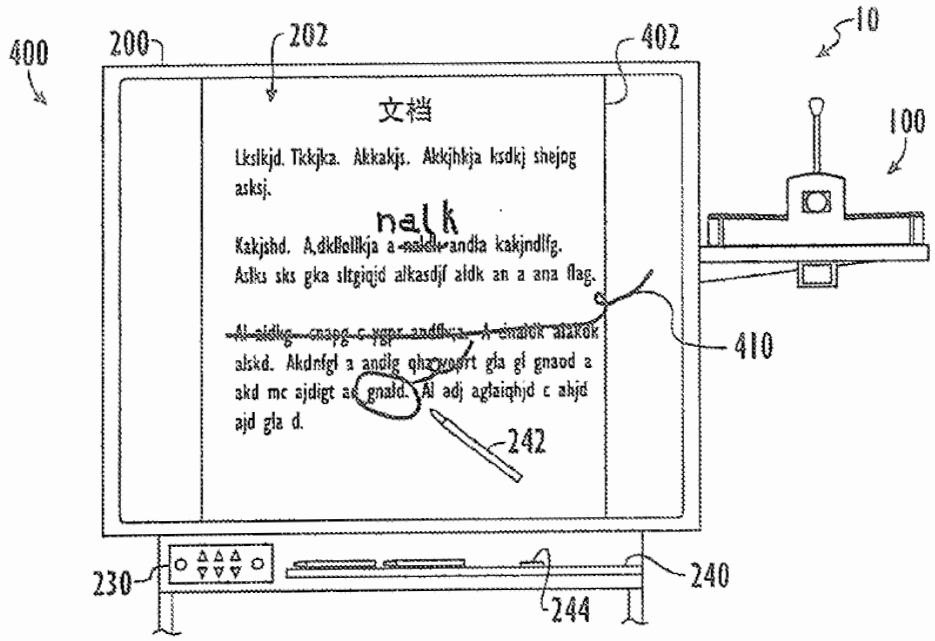

400
200
202
402
10
100
文档
Lksikjd. Tkkjka. Akkakjs. Akkjhkja ksdkj shejog asksj.
nalk
Kakjshd. A,dkflallkja a-sadlwandla kakjndlfg.
Asiks sks gka sltgiqjd alkasdjf aldk an a ana flag.
Al aidlg cnapg c ygpr andlwa k cnaick alzkok alskd. Akdnfgl a andlg qhzwoart gla gl gnaod a akd mc ajdigt as gnald. Al adj aglaiqhjd c ahjd ajd gla d.
410
242
230
240
244

图 7

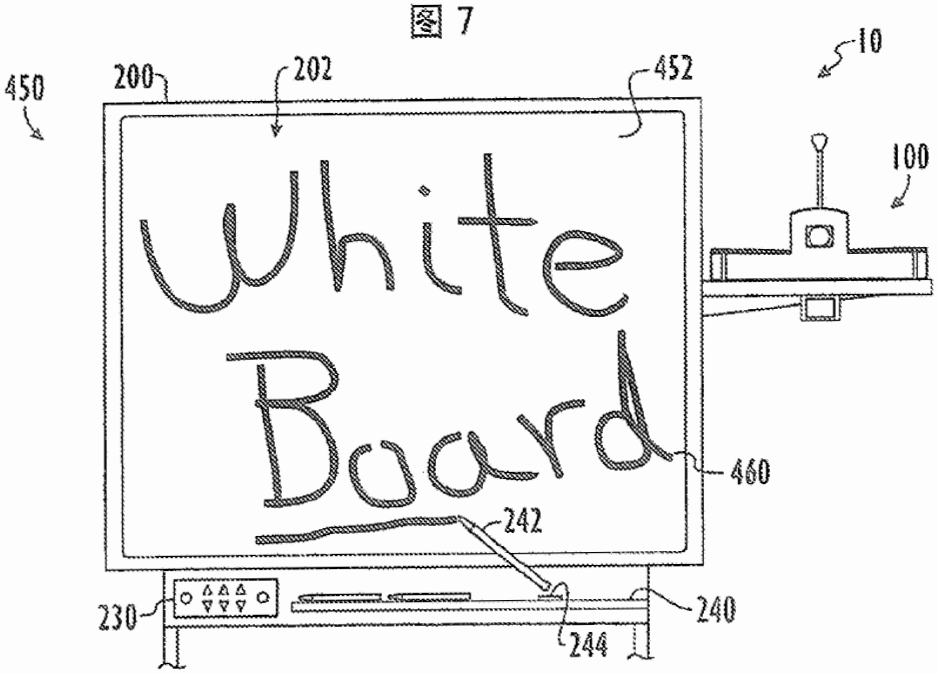

450
200
202
452
10
100
White
Board
460
242
230
240
244

图 8

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ABSTRACT CN101542459A

[1]

13 Embodiments provide a shared space for communicating information. In an embodiment, multiple users associated with a computing environment may use a shared space to communicate information with each other. Each computing device of the computing environment may include a shared space application. The shared space application includes a plurality of interactive tools that can be used to persistently store various communications between associated computing devices of the computing environment.

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DESCRIPTION CN101542459A

10 Shared space for passing information

[0001]

14 background

[0002]

18 People try to communicate and stay connected using a variety of communication methods, such as mail, phone calls, digital photos, whiteboards, email, instant messaging (IM) applications.

20 However, each technology has associated limitations and can lead to an unsatisfactory user experience. For example, instant messaging, networked digital photo frames, and e-mail may be out of date and constrain the amount of information that can be delivered. Certain communication methods like telephony and IM communication can be intrusive by forcing a party to respond in real time. Passive communication methods like email and mail communication allow for delayed responses, but are generally less intrusive because one party can wait for a response. However, passive approaches can be impersonal and insufficient in emotional expressiveness because they utilize turn-based systems (eg, email and instant messaging) that employ a statement/reply/statement/reply communication structure.

[0003]

31 Other communication methods lack fidelity, expressiveness, or are limited to providing information in ad hoc conversations (eg, instant messaging, virtual whiteboards).

33 Once the session ends, the information is lost. For example, whiteboards are often used as a medium to convey spontaneous handwritten ideas and concepts. However, the information displayed on the whiteboard is not ideal for remote interaction and collaboration. Due in part to limitations associated with video teleconferencing equipment, it is difficult for remote users to read and focus on relevant portions of the whiteboard. For example, ink strokes written on a whiteboard may be difficult to see and may not be erased or

edited by a remote user. Therefore, real-time multi-user physical whiteboard collaboration is limited and often an unsatisfactory experience for remote participants.

[0004]

43 Overview

[0005]

47 This summary is provided to introduce some concepts in a simplified form that are further described below in the Detailed Description.

49 This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter.

[0006]

54 Embodiments provide a "shared space" for communicating information.

55 The shared space may be configured to allow multiple users to communicate using the shared space.

56 In one embodiment, the shared space application is configured to provide a persistent space that can be shared and interacted by two or more users.

58 Users may have multiple separate spaces to share and communicate with other individuals and/or groups.

59 In various embodiments, a shared space can be populated and interacted with using a flexible collection of simple communication tools for sharing and communicating various information.

61 The communication tools and shared spaces provide users with a persistent means of interacting and communicating naturally and conveniently.

[0007]

66 These and other features and advantages will be apparent from a reading of the following detailed description and a review of the associated drawings.

68 It is to be understood that both the foregoing general description and the following detailed description are illustrative only and do not limit the invention as claimed.

[0008]

73 Brief Description of Drawings

[0009]

77 1 is a block diagram of a computing environment.

[0010]

81 2 is a block diagram of a computing environment.

[0011]

85 3 is a block diagram of a shared space architecture.

[0012]

89 FIG. 4 is a flowchart illustrating the use of a shared space.

[0013]

93 5A-5K illustrate user interfaces for interacting with a shared space.

[0014]

97 6 is a block diagram illustrating a computing environment for implementing various embodiments described herein.

[0015]

102 A detailed description

[0016]

106 Embodiments provide a shared space that multiple users can use to communicate information.

107 The shared space may be configured to allow multiple users to communicate using the shared space.

108 In one embodiment, the shared space application is configured to provide a persistent space that can be shared and used by two or more users to communicate using various tools.

110 The display of the computing device may be used to present the shared space to users using the shared space application to share this space.

112 Users can interact with the shared space in real-time or at their convenience using the various tools provided by the shared space application.

[0017]

117 In one embodiment, multiple shared spaces may be presented on one or more displays, allowing a user to interact with various individuals and/or groups simultaneously.

119 That is, users may have separate spaces to keep in touch and communicate with different individuals and/or groups.

121 In various embodiments, the shared space may be populated with a flexible collection of simple

communication tools that allow sharing of various information.

123 For example, a user may use a communication tool to populate a shared space with images, text, audio, hand-drawn and handwritten text (eg, digital ink), and/or other data.

125 These communication tools are configured to provide natural and convenient communication and interaction.

[0018]

130 In one embodiment, the shared space is persistent and always remains available to the associated participant, even when the participant is not using the space and/or not logged in (eg, offline).

132 Users can invite one or more participants to share one or more spaces.

133 Participants in a shared space may add to, delete from, and/or otherwise modify the space.

134 Thereafter, all participants of the shared space see or will see the same result of the interaction.

135 The Shared Spaces application is configured to allow participants to save content to a private scrapbook, as the nature of Shared Spaces can be highly transient.

137 Additionally, shared space applications are configured to use shared and proprietary data, but are not so limited.

139 In one embodiment, the shared space application is also configured to enable "live connections".

140 The live connection enables multiple participants to participate in live audio and/or video communications using the shared space application.

[0019]

145 FIG. 1 is a block diagram of a computing environment 100 under one embodiment.

146 Computing environment 100 may be described as a network of components, where associated components are communicatively coupled in a manner that provides operational functionality.

148 A plurality of computing devices 102-106 communicate with each other to provide a network of computing devices.

150 The plurality of computing devices 102 - 106 may also communicate with the serving computing device 107 .

151 Each computing device 102-107 includes networking and security components configured to provide communication functionality between the computing devices 102-107.

153 Computing devices 102-106 may include desktop computers, laptop computers, tablet computers, handheld devices, and other communication devices.

[0020]

158 As shown in FIG. 1, each computing device 102-106 includes a shared space application 108-112, described in detail below.

160 The service computing device 107 includes, but is not limited to, the space manager component 114 .

161 The space manager component 114 may be configured and used to manage aspects of one or more shared spaces, but is not so limited.

163 For example, the space manager component 114 may maintain read-write master data files associated with the

shared space.

165 In one embodiment, each of the shared spaces 108-112 and the space manager component 114 includes a software application that executes in conjunction with the processors of the computing devices 102-107.

167 As described below, each shared space application 108-112 is configured to provide persistent space to a plurality of users associated with the shared space.

169 To simplify the following discussion, reference is made to computing device 102 and the associated shared space application 108 in describing the functionality and use of the shared space application.

[0021]

174 As described below, a user may use the computing device 102 and associated shared space 108 to communicate and interact with other users of the shared space.

176 A shared space can be described as a persistent canvas or interactive window that can be used by one or more users to communicate in various ways.

178 That is, the shared space application 108 is configured to persistently store user interactions, including various expressions, with respect to an associated shared space.

180 Accordingly, all users associated with the shared space, regardless of their physical location, see the user interaction.

182 In various embodiments, any content (ink, video files, audio files, text, pictures, etc.) created, placed, or otherwise located in the shared space is persistently stored in the shared space until deleted or otherwise modified.

[0022]

188 A user may use the shared space application 108 to interact with multiple separate spaces and/or users.

189 For example, a user may use the shared space application 108 to create multiple shared spaces that enable the user to stay in touch with various individuals and/or groups.

191 A user's interaction with a shared space is called an expression.

192 The shared space application 108 is configured to persist the expression in the shared space until the expression is deleted or otherwise modified by a user associated with the shared space.

194 For example, if a user draws a picture or posts a photo in a shared space, the item remains in the shared space even if it is covered by other items.

[0023]

199 The shared space application 108 may be installed on the computing device 102 .

200 For example, the shared space application 108 may be installed as part of an operating system (OS) installation process.

202 As described above, a user may use the shared space application 108 to communicate with one or more users or participants of a shared space.

204 Additionally, the delivery of the shared space may be provided to multiple associated computing devices.

205 The communication of a shared space to multiple computing devices makes collaboration and interaction a

joyful experience even for users in remote locations.

207 Accordingly, the shared space application 108 provides businesses, families, friends, and other parties with a convenient medium for communication interactions.

[0024]

212 For example, delivery of a shared space may be provided to multiple ultra-mobile computing devices and associated users communicating over a network such as the Internet.

214 In one embodiment, the delivery of the shared space is provided over the Internet using an online file storage service.

216 In another embodiment, the delivery of the shared space is provided to multiple computing devices using a peer-to-peer service, such as, for example, a peer-to-peer synchronization service.

[0025]

221 Delivery of the shared space may be provided to computing devices 102-107 of a computing network, such as a wireless local area network (WLAN), local area network (LAN), wide area network (WAN), a combination thereof, and/or some other type of computing and/or or communication network.

224 In one embodiment, computing environment 100 is a distributed computer network that allows one or more computing devices, communication devices, databases, etc. to communicate according to a desired implementation.

[0026]

230 The components of computing environment 100 may be communicatively coupled to each other using wired, wireless, combinations of wired and wireless, and other communication technologies.

232 The delivery of the shared space may also include a combination of various communication methods.

233 Other examples of delivering shared spaces include file/folder sharing methods and/or synchronization schemes.

235 For example, a file/folder sharing program such as FOLDERSHARE (folder sharing) can be used to deliver the shared space and associated displayed content.

[0027]

240 In an embodiment, the shared space application 108 is configured to manipulate, persistently store, and/or display the contents of a master file, such as, for example, a read-only copy of the master file.

242 The master file may be updated when the shared space is modified or otherwise changed.

243 That is, the shared space application uses the master file to track and maintain changes to the shared space.

244 In one embodiment, a master file is associated with each shared space.

245 Each computing device 102-106 may use the master file to display the contents of the shared space, including recent changes and modifications to the shared space.

[0028]

250 In one embodiment, each computing device 102-106 is associated with a peer-to-peer network and uses a master file associated with the shared space.

252 When the computing devices 102-106 associated with the shared space are connected and online, the master data file changes state from read-only to read-write.

254 Thereafter, the local master data files are synchronized in real time as additions, deletions, and other changes are made to the associated shared space.

256 When the computing device is disconnected (eg, the user is offline), the local master data file is reconfigured to be read-only.

258 Thereafter, the next time the user logs into the shared space and the shared space application 108 connects to the read-write master file, the read-write master file is copied over (eg, replacing) the local read-only master file so that all read-only master files can be used while the user is disconnected. All additions and changes made to update the master file.

[0029]

265 Thus, as updates to the shared space occur, each master file is updated and/or synchronized with other associated master files for that shared space.

267 Thus, the shared space application 108 is used to ensure that users currently communicating with each other (eg, connected or logged in) see the same information.

269 The shared space application 108 is configured to modify the master file, and the delivery of the shared space is provided by using the master file when the user communicates with another participant and the associated master file.

272 For example, delivery of the shared space may be provided when the user has a connection to the associated master file and/or directly to another associated computing device (eg, peer-to-peer) through an online storage service.

[0030]

278 As described above, the shared space application 108 may be configured to maintain a read-only copy of the last version of the master file in the local storage of the associated computing device.

280 If the user is offline, the shared space application 108 does not provide access to read-only master files.

281 However, the user can view the read-only copy of the master file, but cannot make changes to the master file.

282 As described below, the user can also save one or more expressions stored in this read-only master file to the clipboard.

284 If another user changes the home file associated with a shared space while a user is offline, the offline user will not see those changes until they log back into the associated shared space.

286 Therefore, the user must log into the shared space so that the shared space application 108 can access and use the read-write master file to update the shared space with any changes since the user was offline.

[0031]

291 As an example, assume that User A and User B own a shared space.

292 User A is online.

293 When user A opens the shared space, the shared space application accesses the main file.

294 As an example, a shared space application may access home files from a virtual hard drive.

295 Subsequently, user A adds a picture to the shared space.

296 The Shared Spaces application adds pictures to the main file and to User A's local read-only file.

297 User B is offline and the shared space is opened, which shows that User B is offline.

298 User B cannot see the picture that User A just added.

299 Thereafter, user B goes online, eg, connected to the Internet.

300 Once User B is online, the shared space application accesses and reads the master file and updates the local read-only file on User B's machine.

302 Now user B sees the picture that user A added to the shared space.

[0032]

306 In one embodiment, the read and write master files are stored and maintained on the serving computing device 107 .

308 Therefore, users associated with a shared space need to have a network connection and be online to make changes to the shared space and associated read-write master files.

310 In other embodiments, master files may be stored and maintained on peer machines and/or users' computing devices using web services.

312 Then when all the participants associated with the shared space are communicating, the master file can be copied to all the participants.

314 In an alternate embodiment, the user can make additions and/or changes to his local files at any time.

315 Thereafter, when each participant reconnects to the shared space (eg, logged in) or connects to another participant (eg, peer-to-peer), a synchronization is performed to aggregate all offline changes made by each participant so that each participant The person "sees" the same space.

[0033]

321 FIG. 2 is a block diagram of a computing environment 200 under one embodiment.

322 Computing environment 200 includes computing device 202 in communication with serving computing device 204 .

324 The components of computing environment 200 may be communicatively coupled to each other using wired, wireless, combinations of wired and wireless, and other communication and networking technologies.

326 Although one computing device 202 and one computing device 204 are shown, other embodiments may include multiple such computing and serving computing devices.

328 In an embodiment, a shared space may be created and defined between at least two users using two computing devices, such as ultra-mobile computing devices.

[0034]

333 As shown in FIG. 2 , computing device 202 includes shared space application 206 .

334 The shared space application 206 is configured as a persistent space that can be shared by multiple users for interaction.

336 According to this embodiment, the shared space application 206 includes a number of associated components for maintaining the space.

338 Shared space applications 206 include, but are not limited to: launch component 208; authentication component 210; contacts component 212; canvas dispatch component 214; media recorder component 216; frame capture component 218; history/clipbook manager component 220; Program component 222; content object creator component 224; data synchronization program component 226; file creator component 228; response/request handler component 230;

343 In various alternative embodiments, the functions and operations of the various components may be combined to provide fewer components and/or required implementations.

[0035]

348 Activation component 208 can be configured as a user interface and used to provide user authentication, space selection and/or participant selection, and authentication component 210 can be configured and used as an authentication service, such as a PASSPORT service.

351 Contacts component 212 may be configured and used to locate and/or maintain a user contact list.

352 For example, the contacts component 212 can be configured to connect to an MSN service to present a list of MSN contacts of users who are participants in the shared space.

354 The canvas dispatch component 214 can be configured and used to create a new space canvas and display objects in the space.

356 The media recorder component 216 may be configured and used to record audio, images, video, and other objects/expressions.

358 For example, the media recording program component 216 may use local cameras, microphones, and/or other components to record images, audio, and video as representations in space.

[0036]

363 With continued reference to FIG. 2, the frame capture component 218 can be configured and used to capture a "snapshot" image of the space for history and/or scrapbooking.

365 History/Scrapbook Manager Component 220 may be configured and used to manage a chronological collection of "snapshots" of a space and provide the user with reviewing selected expressions and/or storing them in a private local storage known as a scrapbook mechanism in the library.

368 The history/clipbook manager component 220 can record every event that occurs in the space.

369 Therefore, the user does not have to constantly use the save operation, which allows for a more informal interaction with the space.

371 The space manager component 222 may be configured and used to manage various aspects of the space.

372 For example, space manager component 222 may be configured and used to manage local copies of master files.

374 The content object creator component 224 may be configured and used to manage objects and other representations in the space.

376 For example, content object creator component 224 may be configured and used to manage images, ink, text, and/or other user expressions.

[0037]

381 The data synchronization program component 226 may be configured and used to synchronize data files between the user computing device 202 and the serving computing device 204 .

383 For example, the data synchronization program component 226 may be configured and used to synchronize master data files between the user computing device 202 and the serving computing device.

385 The file creator component 228 may be configured and used to manage shared space data files, including but not limited to: creating, opening, and saving shared space data files.

387 The response/request handler component 230 may be configured and used to manage communications between computing devices.

389 For example, response/request handler component 230 may be configured and used to manage communications between computing device 202 and serving computing device 204 .

391 The space canvas component 232 can be configured and used as a user interface that enables user interaction with the space.

[0038]

396 According to this embodiment, the service computing device 204 includes a plurality of shared space components.

398 As shown in FIG. 2, the serving computing device 204 includes, but is not limited to: a data synchronization program component 234; a response/request handler component 236; and a space management program component 238.

401 The data synchronization program component 234 may be configured and used to synchronize data files between the serving computing device 202 and one or more user computing devices.

403 For example, data synchronization program component 234 may be configured and used to synchronize master data files between serving computing device 204 and user computing device 202 .

405 The response/request handler component 236 may be configured and used to manage communications between a serving computing device and one or more other computing devices, including with other serving computing devices.

408 The space manager component 238 may be configured and used to manage various aspects of the space.

409 For example, space manager component 238 may be configured and used to manage read-write master copies of master files.

411 Other embodiments are also available.

[0039]

415 The shared space application 206 is configured to use and provide various objects in the shared space.

416 In one embodiment, the shared space application 206 uses and provides: participant indicators (eg, icons, digital images, etc.) representing other users who are sharing a space; expressions in the space (eg, ink, text, photos, videos, live connections, etc.); and multiple interactive tools.

419 For example, icons (eg, default people or group icons) or digital images may be used to represent individuals or groups that are sharing a space.

421 Digital images or photos can be imported or discarded using the contacts component 212 along with a name or group name associated with the individual.

423 Contacts component 212 may be configured to propagate name/photo updates/changes to shared space application 206 .

425 Individual participant indicators may include indications of participant status or status (eg, present, busy, absent, etc.).

427 The group participant indicator may also include a count of participants in each state (4 out of 12 present, etc.).

429 As described below, when the user taps a participant indicator, a live connection (eg, audio and/or video - depending on available device hardware and service features) is established.

[0040]

434 Expressions include any items that participants create in the space, including ink, images, text, video, live connections, and more.

436 For example, participants can use a graphics tablet pen to draw a picture or write some text.

437 For example, users can also use their fingers and a touchscreen to write ink in space.

438 In one embodiment, the expression may include 3 states: normal, focused, and magnified, but is not limited thereto.

440 In the normal expression state, new expressions appear on top of old expressions (except for live connections, which always appear on top).

442 A previously maintained live connection may be represented by a live connection indicator such as a live connection icon.

444 Text expressions can be scrolled by touching and dragging up and down in the text area.

445 Focusing an expression (or expression group) in a shared space displays a marquee around the item.

[0041]

449 Table 1 below lists the various expressions and how each expression received focus.

[0042]

453 Table 1

[0044]

457 In the focused state, individual expressions (single selection) or groups of expressions (group selection) can

have focus.

459 When an expression (or group of expressions) has focus, it is temporarily displayed on top of other expressions, including surrounding marquees, zoom buttons, and movement handles.

461 Losing focus returns the expression (or group) to its previous position in viewing order.

462 The user can drag the marquee to move the representation (eg, drag from the center or move handle), resize the representation (eg, drag from the edges and corners), and rotate the representation (eg, drag the move handle or rotation handle).

[0045]

468 In one embodiment, any changes to the representation (eg, moving, resizing, rotating) are used to move the changed representation to the top of the viewing order.

470 Changing the focus on an expression without making any changes to the expression is used to return the expression to its previous position in viewing order.

472 The user can clear focus by tapping an empty area of the shared space or selecting another expression.

473 Expressions pasted into the shared space are automatically given focus.

[0046]

477 The user can tap a zoom-in button for changing the presentation view to a zoomed-in state.

478 In the magnified state, the representation is magnified to encompass a substantial portion of the display (tools remain visible).

480 In the magnified state, the representation cannot be moved, resized, or rotated.

481 The user can hit the close button that returns the expression to the focused state.

[0047]

485 Table 2 below lists a number of contextual controls and information associated with each expression.

[0048]

489 Table 2

[0051]

493 The tools of the Shared Spaces application are configured to facilitate the sharing of photos, video, audio, ink, text, and other user expressions.

495 These tools can be used to create, select, modify and save representations.

496 In one embodiment, these tools are provided via the spatial canvas component 232 and are configured as buttons (eg, touch screen buttons, tablet buttons, icons, etc.).

498 Button types include, but are not limited to: Toolbox tray buttons: expand/collapse the toolbox tray; toolbox buttons that select a tool and then collapse the toolbox tray; activate controls (for modal buttons) or

expand/collapse palettes (for palettes); and a palette button to select an item/mode/select from a palette and close that palette.

502 The appearance of tool buttons can be changed to reflect the current palette selection.

[0052]

506 Table 3 below shows each toolbox, tool and palette under one embodiment.

[0053]

510 table 3

[0056]

514 The shared space application 206 and associated tools allow participants to interact with the space and locate expressions at any desired location in the space.

516 Furthermore, space participants are free to interact with the space at their convenience.

517 There are no rigid communication requirements or protocols (eg, User 1 communication followed by User 2 communication followed by User 3 communication, etc.).

[0057]

522 As described above, the shared space application 206 is configured to provide live connections between the various participants of the shared space.

524 In one embodiment, the live connection is configured to be equivalent to an expression with a few exceptions.

525 A live connection can be used to participate in (and store) a live audio/video session (eg, like a video conference), or to record a message to another participant (eg, like an audio mail or video mail).

527 In either case, the methods and controls are the same.

528 Upon opening a live connection by tapping the participant icon, the user is prompted to select a type of live connection.

530 The type of live connection depends on the type of service subscription.

[0058]

534 Table 4 below lists subscription types for live connections of an embodiment.

[0059]

538 Table 4

[0061]

542 Live connections are configured to provide both local ("me") and remote ("you") views.
543 In a group live connection, each member of the group has a "you" view.
544 While opening a live connection, several controls and information are provided.
545 Provides duration information to show the duration of the live connection (eg minutes:seconds).
546 Provides (both audio and video) a mute button for muting the device microphone and camera so that others cannot hear or see you.
548 The close button, when tapped, prompts the user to choose Cancel, Hold, or Erase.
549 Select Cancel to return to the live connection as if the close button had not been hit.
550 Selecting Keep places the live connection in the associated space, represented by a live connection icon.
551 Select Wipe to discard the cached live connection.

[0062]

555 Shared space application 206 is also configured to provide scrapbooks using history/clipbook manager component 220 .
557 Scrapbook provides convenient private storage for expressive and spatial snapshots.
558 Scrapbooks can be opened by tapping the Scrapbook tool.
559 The scrapbook is configured to provide multiple views (eg, lists, icons, thumbnails, etc.) and grouping/sorting (eg, by participant, by date, by expression type, by location, etc.).
561 The scrapbook also includes search/filtering tools for locating expressions and other items in the scrapbook.

[0063]

565 Any expression or spatial snapshot can be stored in the scrapbook.
566 The Scrapbook includes a "Save Space" button for saving a snapshot copy of the current space as an image in the Scrapbook.
568 The contents of the scrapbook are stored in a folder called "My Scrapbook" in the operating file system.
569 "My Scrapbook" is the equivalent of "My Pictures", "My Notes" and "My Music".
570 A "My Scrapbook" folder can be created when the Shared Spaces application is installed.
571 Expressions in clipboard also have 3 states (normal, focused, zoomed in) and also all corresponding controls and their behavior in space, except the following controls are changed and added: move, resize, rotate not available ; "Save copy to clipboard" is replaced by "Copy to Space"; "Print" button prints an expression or space snapshot.

[0064]

578 The Get Materials toolbox is configured to provide a convenient way to browse items and import items into a space from the operating file system.
580 The Get Materials toolbox can be used to browse and import projects from various folders such as My Pictures, My Videos, and My Music.
582 Tap the My <Material> tool from the Get Materials toolbox to open a viewer that browses the contents of the corresponding <Material> folder in the operating file system.

584 Multiple views (eg, lists, icons, thumbnails, etc.) and grouping/sorting (eg, by participant, by date, by expression type, by location, etc.) are provided.

586 Search/filter tools are also provided.

587 The expression also has 3 states (normal, focused, zoomed in), and also all corresponding controls and their behavior in space, except the following controls are changed and added: move, resize, rotate not available; "will "Copy to clipboard" was replaced by "Copy to Space".

[0065]

593 Shared space application 206 is also configured to provide history using history/clipbook manager component 220 .

595 In one embodiment, the history is maintained in and accessed from the serving computing device 204 .

596 History can be configured as a simple read-only temporary view of the space.

597 In one embodiment, the spatial history can be displayed full screen, with the following controls: individual selection (default); group selection (bounded representation); and copy.

599 In another embodiment, the history may be displayed as a list, thumbnails, or the like.

600 The history view includes a horizontal scroll bar that can be used to control time (eg occupying tool tray space).

602 The expressions in the history also have 3 states (normal, focused, zoomed in), and also all the corresponding information displayed, but without any modification controls.

604 Also, "save a copy to clipboard" was replaced by "copy to space".

[0066]

608 In one embodiment, the shared space application 206 may be configured to provide three interfaces for accessing automatically stored strokes, segments, and other expressions.

610 The first is infinite undo and redo.

611 Using undo and redo, the user can access any past state of the fragment.

612 The second is the time slider.

613 Using the time slider, the user can directly specify time points, or use the jump buttons to reach discrete "interesting" time points.

615 The third is context-based search, which can be implemented as behavior.

616 The search behavior allows users to retrieve previous strokes, segments, and other expressions based on contextual information such as time, segment, location, segment size, ink color, etc.

618 The search results are shown on the screen as a set of thumbnails, and the user can click on the thumbnails to access points in the history.

[0067]

623 FIG. 3 is a block diagram of a shared space architecture 300 under one embodiment.

624 Shared space architecture 300 may be configured as a layered architecture including core layer 302 .

625 The core layer includes a service and configuration component 302a, an event handling component 302b, and

a display context component 302c.

[0068]

630 Model layer 304 defines the basic interface for documents, user interfaces, tools, and interaction styles.

631 The model layer 304 includes a spatial model component 304a, a user interface model 304b, a tool model 304c, an interaction component 304d, and a physics component 304e.

633 Model layer 304 includes abstract interfaces and abstract classes that define shared space components.

634 Model layer 304 may be separated from generic layer 306 to ensure extensibility, flexibility, reusability and interoperability of modules and components.

[0069]

639 The space model component 304a defines the base classes and object functions that can be part of a space.

640 User interface model 304b defines alternative user interface concepts suitable for roomware components.

641 The tool model 304c provides additional functionality to the space.

642 Prominent examples are toolbars or browsers.

643 The space browser has the role of providing a connection between the user interface and the space.

644 Additionally, the tool model 304c controls possible modes of operation, such as the degree of coupling.

645 A physical model is a representation of the parts of the "real" world associated with a shared space.

646 For example, the term "station" refers to a computer running a shared space application.

647 Interaction component 304d supports different styles of interaction, including defining different interaction styles.

[0070]

652 The general layer 306 may provide functionality for interaction and communication, such as teamwork, meetings, and other situations.

654 The general layer 306 includes a link and reference component 306a, a display area component 306b, a toolbar component 306c, a click component 306d, a drag and drop component 306e, a space component 306f, an interaction component 306g, a browser component 306h, a gesture component 306i, and a station component 306h.

658 The general layer 306 includes standard data types like text, graphics, and informal handwriting input, as well as private and public workspaces for, for example, general collaboration support.

[0071]

663 Instances of hypermedia data model classes are included as part of the shared object space.

664 Therefore, users can access these objects at the same time.

665 Common document elements include workspaces (the equivalent of pages), handwriting (doodles), text, and images.

667 The main elements of the user interface include fragments and overlays.

668 Interactions can be divided into "segments" that define the space available to tools such as the document browser.

670 In addition, the "cover" can be placed freely.

671 The document browser and toolbar are provided by the common layer 306 .

[0072]

675 For interaction with the various components, there are available interaction techniques other than using the mouse and keyboard.

677 These techniques include gestures for writing with a pen or finger, as well as support for drag and drop.

678 To generate the gesture events described above, each stroke drawn can be sent to a gesture recognition program.

680 The shared space architecture 300 also includes a base layer 308 having a synchronization component 308a, a replication component 308b, an authentication component 308c, and a security component 308d.

[0073]

685 Figure 4 is a flow diagram illustrating a process for using a shared space application under one embodiment.

686 As mentioned above, a shared space can be shared between two or more users.

687 As the users are online and the corresponding computing devices communicate with each other, the shared space can be updated according to any participant changes.

689 As described above, once a user becomes a participant in a shared space, the user can interact and communicate with one or more other participants in the shared space in various ways.

[0074]

694 At 400, a shared space application is installed on a user's computing device.

695 At 402, the user is prompted to register prior to using the shared space application.

696 Profile information associated with the user is collected and can be stored on the serving computing device or locally as part of the registration process.

698 At 404, after registration, the registered user can create or join a space to share with other registered users.

699 Each space can have a unique name that identifies the space.

700 After a space is created, the space originator can invite multiple other users to join the created space.

701 The user may use a repository of contacts (eg, messenger contacts ("buddies"), OUTLOOK contacts, WINDOWS VISTA contacts, etc., or a collection of contacts) to identify potential users to share the created space.

704 Once the user has invited another user to join the space, the shared space application is configured to send an invite message to the invitee.

706 The invitee may receive the invitation message via email, IN, SMS, the shell application on the ultra-mobile PC, and/or via the shared space application the next time the invitee opens and communicates to receive.

708 Each invited user can accept the invitation to create the replicated space file locally.

[0075]

712 At 406, the shared space is opened and the persistent whiteboard canvas is presented to the user.

713 If the user is online, any participant changes made to the canvas are automatically updated and presented to the user.

715 At 408, the participant may use a number of shared space tools to add expressions, modify expressions, or otherwise interact with the canvas of the shared space.

717 Each online participant sees other participants' interactions and an updated spatial canvas.

718 If the user goes offline but comes back online after another participant has made changes, the participant's canvas is then updated to show the changes.

720 Additionally, each participant can save any object in the space to the local clipboard.

721 In one embodiment, the scrapbook is space independent, but can be used with any space.

722 As mentioned above, the shared space application also uses the history or history to track and maintain the space modification process.

724 Participants can use this history to remember any step at any time.

[0076]

728 As described above, real-time data synchronization (eg, after participant interaction, after going online and opening a shared space, etc.) may be provided by the shared space application and associated components so that all online participants can "see the "The same, persistent storage space in the form of a space canvas.

731 This synchronization process depends in part on the type of communication network the participants are using to communicate.

733 For example, a peer-to-peer communication network uses a different synchronization process than that between multiple participant computing devices and a serving computing device.

735 At 410, the user closes the space, and the connection between the user's computing device and the other participant computing devices is automatically closed.

737 Thereafter, the graphical user interface (GUI) and other utility resources associated with the spatial canvas are released.

[0077]

742 Referring now to Figures 5A-5K, block diagrams illustrate a user interface for accessing and interacting with a shared space, under one embodiment.

744 As shown in FIG. 5A, user interface 500 depicts a plurality of shared spaces associated with the current user of the shared spaces application.

746 User interface 500 is shown after the user successfully completes the authentication process (eg, username, password, and other login credentials).

748 User interface 500 shows that a user has multiple contacts associated with one or more shared spaces.

749 As shown, the user has a shared space with contacts including Peter 502, Rose 504, Robin 506, and Mary 508, among others.

751 User interface 500 also includes boxes for defining new spaces for associated contacts 510 .

752 As described above, each of the contacts 502-508 associated with the shared space may include participant pictures or other identifying indicia that the user may use to personalize the space.

[0078]

757 5B is a block diagram illustrating a user interface 500 of multiple shared spaces.

758 Wires between contacts define multiple shared spaces.

759 For example, Robin 506 and Tom 512 define a shared space with the user.

760 Jacky 514 defines a shared space with this user.

761 Peter 502, Rose 504, Maggie 516, and Frank 518 define another shared space with the user.

762 As described above, users can use the Shared Spaces application to define multiple shared spaces to stay in touch with or otherwise interact with selected participants.

[0079]

767 As shown in Figure 5B, the user has selected Tom 512 ("x" highlights the user selection) to interact in the shared space.

769 The user has not selected Robin 506, so the interaction will only be with Tom 512 until the user invites Robin 506 to join the space or opens a different space.

771 After selecting Tom 512, the user can use button 520 to enter the space.

772 At this point, if Tom is online, a notification to join the associated space is sent to Tom 512.

773 If Tom is offline or has not opened his room app, the notification will be delivered when Tom opens the room and goes online.

[0080]

778 Figure 5C shows the user interface 500 after the user has selected to share the space with Tom 512.

779 Status indicator 522 shows that Tom 512 is "online."

780 As shown in Figure 5C, the spatial canvas 524 is blank.

781 That is, neither Tom 512 nor the user has added anything to the spatial canvas 524.

782 A number of tools 526 for interacting with the spatial canvas 524 are presented to the user.

[0081]

786 5D shows the user interface 500 in a state in which the user can select an object to be included in the shared space with Tom 512 from a plurality of objects (eg, pictures, video, audio, etc.).

788 Objects 528-538 may be selected from local storage, a peer-to-peer source, or some online source.

789 As shown in FIG. 5D , the user has selected object 528 to insert onto spatial canvas 524 .

790 That is, the inserted object 528 is an expression provided by the user.

791 Tom 512 sees object 528 on his spatial canvas in real time because it is online.

792 In one embodiment, the user may also use the slideshow button 540 to insert a slideshow onto the spatial canvas 524 .

794 Once the user selects one more object, the user can use the insert button 542 to insert one or more objects onto the spatial canvas 524 .

[0082]

799 FIG. 5E shows the user interface 500 after the user has selected the object 528 and inserted the object on the spatial canvas 524 .

801 Once the user has positioned the object 528 on the spatial canvas 524, the user is made available to interact with the inserted object 528 using a number of additional context-sensitive tools 544.

803 Additionally, a user may use handles 546 and 548 to expand/contract and/or rotate object 528 .

804 FIG. 5F shows the user interface 500 after Tom 512 draws an ink drawing 550 on the spatial canvas 524.

805 At each stage in which Tom 512 creates an ink drawing 550, the user is able to see the drawing.

806 5G shows the user interface 500 after Tom 512 has inserted object 552 on the spatial canvas 524.

807 Tom also types some text 554 under the object 552 he inserted.

808 As mentioned above, the user and Tom 512 see the same interaction and information on their respective displays, such as touch screen interactive displays.

[0083]

813 As mentioned above, a shared space application allows a participant to freely interact with a shared space.

814 FIG. 5H shows the user interface 500 after the user has moved the Tom inserted object 552 to a new location on the spatial canvas 524 .

816 The ink 550 is now partially covered by the repositioned object 552 .

817 Figure 5I shows Tom 512 writing in ink a question asking the user why the object 552 was moved (why?

818) after the user interface 500.

[0084]

822 FIG. 5J shows user interface 500 in scrapbook view 558 .

823 The user has saved multiple items 560-568 to the clipboard.

824 In one embodiment, the content of the scrapbook is stored locally to the user's computing device.

825 User interface 500 also includes a button 570 that the user can click to go to the history view.

826 FIG. 5K shows user interface 500 in history view 559 .

827 The history includes a number of historical details 572-582 recorded by the shared space application that represent changes and interactions by the participants to the space and the space canvas 524.

829 The user may also use the user interface 500 to mark times in the history for saves other than auto saves.

830 In one embodiment, the history is saved to the serving computing device and available to the user when the user is connected and online.

[0085]

835 As described above, in one embodiment, a shared space application may be included or installed on a

computing device and associated with a service computer for managing aspects of the shared space.

837 For example, a shared space application can be installed on an ultra-mobile personal computer.

838 The portability of ultra-mobile PCs enables users to use shared space applications in an instant, convenient, and easily accessible manner.

840 A shared space application may be configured to provide a shared space to allow multiple users to communicate and interact with each other.

842 A space can always be available to all participants in that space, regardless of whether there is a network connection.

844 That is, once a space is created, the participant is free to interact with the space even when the participant is not currently connected or online.

846 Any changes are updated to other participant spaces as participants connect and/or go online.

[0086]

850 Additionally, the Shared Spaces app enables any space participant to add, modify, create expressions at any time without requiring other participants to join the session.

852 Thus, shared space applications allow a degree of freedom, allowing all participants to express themselves whenever they choose.

854 Likewise, shared space applications allow expressive recipients the freedom to respond whenever they choose.

855 There is no immediate or implied obligation to respond immediately.

[0087]

859 Shared space applications can provide a persistent canvas where all participant expressions are visible on a single display.

861 For example, a display of an ultra-mobile personal computing device may be used to display a shared space, where user expressions may be persistently stored in the display.

863 The user does not have to scroll back and forth to find the desired information because the expressions (including hidden expressions) are contained in the spatial canvas and the viewable area of the display.

865 The shared space is configured to be substantially the same visually to all participants who are online and open the space.

[0088]

870 Additionally, the shared space application is configured to make edits and other modifications to the shared space visible to all participants in real-time or substantially real-time (eg, depending on connection, bandwidth, and other factors).

873 A user can use a pen or finger to draw any handwritten stroke anywhere in space by dragging the pen or finger (called a "swipe") across the space canvas.

875 The user can erase by pressing the modifier button of the stylus or by drawing a scribble stroke (called "metastroking") with the finger.

877 The Shared Spaces application is configured to allow all participants to see the editing process as it occurs.

878 For example, participants can see characters as they are typed (eg, you see corrections), ink as they are drawn (and erased), etc.

880 Thus, shared space applications create a sense of presence that is missing in many other applications.

[0089]

884 As described herein, shared space applications provide, but are not limited to, mechanisms for users to stay connected using emotionally expressive and/or passive communications.

886 As business relationships, family and friends are spread over greater distances, shared spaces provide a convenient and non-intrusive and compulsory means of communication.

888 For example, consider households, where family members live in different parts of the country.

889 The entire family can communicate and engage with each other through the use of shared spaces.

890 Siblings can post photos of important life events or just ordinary everyday events.

891 Other family members can also use the shared space to comment on photos, ask for advice, and/or share opinions.

893 Naturally added by each participant as an interactive stream of annotations, drawings, personal notes, videos, and/or audio clips, etc.

895 Multiple participants can also occasionally participate in a live connection whenever they view the shared space.

[0090]

900 In another example, consider an enterprise composed of multiple enterprise units that depend on each other to provide important services to consumers.

902 Enterprise units are located in different parts of the world.

903 Rather than using unreliable email or telephone communications, each employee of the business runs the coworking space application on an ultra-mobile personal computing device.

905 Employees can strategically set up and monitor one or more shared spaces among the enterprise's key counterparts.

907 For example, a product group can set up a shared space to communicate with a strategic business planner to bring new equipment to market.

909 Naturally added by each participant as an interactive stream of annotations, ink, drawings, images, personal notes, videos, and/or audio clips, etc.

911 Users can also use the Shared Spaces application to participate in a live audio and/or video session if all parties happen to be available at the same time.

[0091]

916 Exemplary Operating Environment

[0092]

920 Referring now to FIG. 6, the following discussion is intended to provide a brief general description of a suitable computing environment in which embodiments of the present invention may be implemented.

922 Although the invention will be described in the general context of program modules executed in connection with application programs running on an operating system on a personal computer, those skilled in the art will recognize that the invention may also be incorporated into other types of computing systems and programs Module implementation.

[0093]

929 Generally, program modules include routines, programs, objects, components, data structures, and other types of structures that perform particular task roles or implement particular abstract data types.

931 Moreover, those skilled in the art will appreciate that the methods of the present invention may be implemented using other computer system configurations, including hand-held devices, multiprocessor, microprocessor-based or programmable consumer electronics, minicomputers, mainframe computers, and the like.

935 The invention can also be practiced in distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network.

937 In a distributed computing environment, program modules may be located in both local and remote memory storage devices.

[0094]

942 Referring now to FIG. 6, an exemplary operating environment for various embodiments of the present invention will be described.

944 As shown in FIG. 6, computer 2 includes a general purpose desktop, laptop, handheld computer, or other type of computer capable of executing one or more application programs.

946 Computer 2 includes at least one central processing unit 8 ("CPU"), system memory 12 including random access memory 18 ("RAM") and read only memory ("ROM") 20, and a system coupling the memory to CPU 8 bus 10.

949 The basic input/output system contains basic routines that help transfer information between elements in the computer, such as during startup, and is stored in ROM 20.

951 Computer 2 also includes mass storage device 14 for storing operating system 32, application programs, and other program modules.

[0095]

956 Mass storage device 14 is connected to CPU 8 through a mass storage controller (not shown) connected to bus 10.

958 Mass storage device 14 and its associated computer-readable media provide non-volatile storage for computer 2 .

960 Although the description of computer-readable media contained herein refers to mass storage devices, such as hard disks or CD-ROM drives, those skilled in the art will understand that computer-readable media may be

accessible or utilized by computing system 2 any available medium.

[0096]

966 By way of example and not limitation, computer-readable media may include computer storage media and communication media.

968 Computer storage media includes volatile and nonvolatile, removable and non-removable media implemented in any method or technology for storage of information such as computer readable instructions, data structures, program modules or other data.

971 Computer storage media include, but are not limited to, RAM, ROM, EPROM, EEPROM, flash memory or other solid state memory technology, CD-ROM, digital versatile disk (DVD) or other optical storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic A storage device, or any other medium that can be used to store the required information and that can be accessed by the computing device 2 .

[0097]

979 According to various embodiments of the present invention, computer 2 may operate in a networked environment using logical connections to remote computers through network 4, such as a local area network, the Internet, or the like.

982 The computer 2 may be connected to the network 4 through a network interface unit 16 connected to the bus 10 .

984 It should be understood that the network interface unit 16 may also be used to connect to other types of networks and remote computer systems.

986 Computer 2 may also include an input/output controller 22 for receiving and processing input from a variety of input types including keyboard, mouse, pen, finger, and/or other means.

988 Similarly, input/output controller 22 may provide output to a display, printer, or other type of output device.

989 Additionally, a touch screen can be used as an input and output mechanism.

[0098]

993 As briefly described above, a number of program modules and data files may be stored within the mass storage device 14 and RAM 18 of the computer 2, including an operating system 32 suitable for controlling the operation of networked personal computers, such as from Redmond, Washington Microsoft's WINDOWS XP operating system.

997 Mass storage device 14 and RAM 18 may also store one or more program modules.

998 In particular, mass storage device 14 and RAM 18 may store applications such as word processing application 28, imaging application 30, email application 34, drawing application, and the like.

[0099]

1003 It should be appreciated that the logical operations of the various embodiments may be implemented (1) as a

series of computer-implemented acts or program modules running on a computer system, and/or (2) as interconnected machine logic circuits or circuits within a computer system module.

1006 The implementation is chosen depending on the performance requirements of the computer system implementing the invention.

1008 Thus, logical operations including associated algorithms may be variously referred to as operations, structural devices, acts, or modules.

1010 Those skilled in the art will recognize that these operations, structural devices, acts and modules may be implemented in software, firmware, special purpose digital logic, and any combination thereof without departing from the spirit and scope of the invention as set forth in the claims set forth herein .

[0100]

1016 While the invention has been described in conjunction with various exemplary embodiments, those of ordinary skill in the art will appreciate that many modifications are possible within the scope of the appended claims.

1019 Therefore, it is not intended that the scope of the present invention be limited in any way to the above description, but should be determined with full reference to the appended claims.

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CLAIMS CN101542459A

1.

13 A system for sharing data through the following steps:

14 creating a shared space (500) including a space canvas (524) and a plurality of tools (526);

15 associating one or more users as one or more participants (502-510) of the shared space (500);

16 interacting with the spatial canvas (524) using one of the plurality of tools (526), including using representations such as digital images, digital text, and digital ink (528); and

18 The expression (528) is persisted in the shared space (500).

2.

22 The system of claim 1, wherein data is shared using one of the tools (526) to deliver a video representation onto the spatial canvas (524).

3.

27 The system of claim 1, wherein data is shared by implementing a live connection to deliver audio expressions to one or more communication participants (502-510).

4.

32 The system of claim 1, wherein data is shared by updating the shared space (500) to expose the expression (528) to communication participants (502-510).

5.

37 The system of claim 4, wherein data is shared by updating the shared space (500) to expose the expression

(528) to communication participants (502-510), wherein the expression (528)) is synchronized with the shared spatial data of the communication participants (502-510).

6.

43 5. The system of claim 4, wherein the shared space (500) is updated with the representation (528) by sharing data using a master file.

7.

48 The system of claim 1, further comprising a history manager component (220) that stores the expression (528) to a scrapbook (558).

8.

53 The system of claim 1, further comprising a history manager component (220) that maintains a history of the shared space (500).

9.

58 A user interface for sharing data, including:

59 A spatial canvas (524) showing multiple expressions (528-538);

60 A plurality of tools (526) that interact with a shared space (500) that can be shared by a plurality of users, wherein the plurality of tools (526) enable users to include on the space canvas (524), which may be digital ink, digital text , and representations of digital images (528); and

63 An indicator (522) indicating the participant and the participant's current status associated with the shared space (500).

10.

68 The user interface of claim 9, wherein the plurality of tools (526) can be used to create, modify and save one or more representations on the spatial canvas (524).

11.

73 9. The user interface of claim 9, wherein the plurality of tools (526) can include a toolbox tray button, a toolbox button, a tool button, or a palette button.

12.

78 The user interface of claim 9, wherein the spatial canvas (524) can receive input from a stylus, a keyboard, and a finger.

13.

83 9. The user interface of claim 9, wherein the indicator (522) is configured to specify a live connection with another participant (502-510).

14.

88 The user interface of claim 9, wherein the spatial canvas (524) is configured to display one or more expressions made by remote participants (502-510).

15.

93 9. The user interface of claim 9, wherein the user interface includes zooming in and focusing to interact with the expression (528).

16.

98 A method of sharing data with a computing device, comprising:

99 associating a plurality of users with a shared space (500), wherein the shared space (500) includes a canvas (524);

101 interacting with the shared space (500) by adding an expression (528) to the canvas (524), wherein the expression (528) is selectable from digital images, digital text, and digital ink; and

103 The shared space (500) is passed so that each user's canvas (524) includes the added expression (528).

17.

107 17. The method of claim 16, further comprising updating the shared space (500) to display other expressions added by the remote user using the computing device (102).

18.

112 17. The method of claim 16, further comprising storing the added expression (530) to local storage (012).

19.

118 19. The method of claim 18, further comprising communicating the shared space (500) using a peer-to-peer communication service.

20.

121 The method of claim 17, further comprising communicating the shared space (500) to a networked

computing c

[19] 中华人民共和国国家知识产权局

[51] Int. Cl.
G06F 15/16 (2006.01)

[12] 发明专利申请公布说明书

[21] 申请号 200780042038.3

[43] 公开日 2009 年 9 月 23 日

[11] 公开号 CN 101542459A

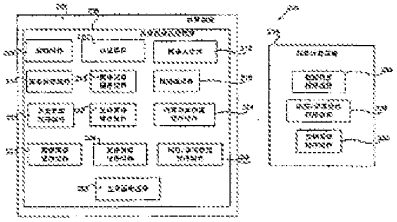
[22] 申请日 2007.10.30
[21] 申请号 200780042038.3
[30] 优先权
[32] 2006.11.13 [33] US [31] 11/599,599
[86] 国际申请 PCT/US2007/083024 2007.10.30
[87] 国际公布 WO2008/063833 英 2008.5.29
[85] 进入国家阶段日期 2009.5.12
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权利要求书 2 页 说明书 23 页 附图 16 页

[54] 发明名称

用于传递信息的共享空间

[57] 摘要

各实施例提供用于传递信息的共享空间。在一实施例中，与计算环境相关联的多个用户可以使用共享空间来彼此传递信息。该计算环境的每一计算设备都可以包括共享空间应用程序。该共享空间应用程序包括可被用来持久存储计算环境的相关联的计算设备之间的各种通信的多个交互式工具。



1. 一种通过以下步骤来共享数据的系统：

创建包括空间画布（524）和多个工具（526）的共享空间（500）；

将一个或多个用户作为所述共享空间（500）的一个或多个参与者（502-510）来进行关联；

使用所述多个工具（526）的一个来与所述空间画布（524）交互，包括使用诸如数字图像、数字文本和数字墨水等表达（528）；以及

将所述表达（528）持久存储在所述共享空间（500）中。

2. 如权利要求 1 所述的系统，其特征在于，通过使用所述工具（526）的一个来共享数据，以将视频表达传递到所述空间画布（524）上。

3. 如权利要求 1 所述的系统，其特征在于，通过实现实况连接来共享数据，以将音频表达传递到一个或多个通信参与者（502-510）。

4. 如权利要求 1 所述的系统，其特征在于，通过更新所述共享空间（500）来共享数据，以将所述表达（528）展示给通信参与者（502-510）。

5. 如权利要求 4 所述的系统，其特征在于，通过更新所述共享空间（500）来共享数据以将所述表达（528）展示给通信参与者（502-510），其中所述表达（528）与所述通信参与者（502-510）的共享空间数据同步。

6. 如权利要求 4 所述的系统，其特征在于，通过使用主文件来共享数据，以用所述表达（528）更新所述共享空间（500）。

7. 如权利要求 1 所述的系统，其特征在于，还包括将所述表达（528）存储到剪贴簿（558）的历史管理程序组件（220）。

8. 如权利要求 1 所述的系统，其特征在于，还包括维护所述共享空间（500）的历史的历史管理程序组件（220）。

9. 一种共享数据的用户界面，包括：

显示多个表达（528-538）的空间画布（524）；

与可由多个用户共享的共享空间（500）交互的多个工具（526），其中所述多个工具（526）使用户能够在所述空间画布（524）上包括可以是数字墨水、数字文本、和数字图像的表达（528）；以及

指示参与者和与所述共享空间（500）相关联的该参与者的当前状况的

033

指示符（522）。

10. 如权利要求 9 所述的用户界面，其特征在于，所述多个工具（526）可被用来在所述空间画布（524）上创建、修改和保存一个或多个表达。

11. 如权利要求 9 所述的用户界面，其特征在于，所述多个工具（526）可以包括工具箱托盘按钮、工具箱按钮、工具按钮或选项板按钮。

12. 如权利要求 9 所述的用户界面，其特征在于，所述空间画布（524）可以接收来自指示笔、键盘和手指的输入。

13. 如权利要求 9 所述的用户界面，其特征在于，所述指示符（522）被配置成指定与另一参与者（502-510）的实况连接。

14. 如权利要求 9 所述的用户界面，其特征在于，所述空间画布（524）被配置成展示远程参与者（502-510）所做出的一个或多个表达。

15. 如权利要求 9 所述的用户界面，其特征在于，所述用户界面包括放大和聚焦以与所述表达（528）交互。

16. 一种用计算设备共享数据的方法，包括：

将多个用户与共享空间（500）进行关联，其中所述共享空间（500）包括画布（524）；

通过向所述画布（524）添加表达（528）来与所述共享空间（500）交互，其中所述表达（528）可以从数字图像、数字文本和数字墨水中选择；以及

传递所述共享空间（500）以使得每一用户的画布（524）都包括所添加的表达（528）。

17. 如权利要求 16 所述的方法，其特征在于，还包括更新所述共享空间（500）来展示远程用户使用计算设备（102）所添加的其它表达。

18. 如权利要求 16 所述的方法，其特征在于，还包括将所添加的表达（530）存储到本地存储（012）。

19. 如权利要求 18 所述的方法，其特征在于，还包括使用对等通信服务来传递所述共享空间（500）。

20. 如权利要求 17 所述的方法，其特征在于，还包括将所述共享空间（500）传递到连网的计算设备（102-106）。

用于传递信息的共享空间

背景

人们尝试使用多种通信方法来通信和保持联系，如邮件、电话、数字照片、白板、电子邮件、即时消息传送（IM）应用程序。然而，每一种技术都具有相关联的限制并可能导致用户不满意的体验。例如，即时消息、联网的数字相框、和电子邮件可能是不合时的，并约束可以传递的信息量。像电话和 IM 通信等某些通信方法可能由于迫使一方实时响应而造成侵入。像电子邮件和邮件通信等被动的通信方法允许延迟响应，但通常由于一方可以等待响应而较不具侵入性。然而，被动的方法在情感表达性中可能是非个性的和不足的，因为它们利用采用陈述/回复/陈述/回复通信结构的回合制（例如，电子邮件和即时消息传送）。

其它通信方法缺少逼真度、各种表达性，或限于在临时会话（例如，即时消息传送、虚拟白板）中提供信息。一旦会话结束，则信息丢失。例如，白板通常被用作传递自发的手写观点和概念的媒介。然而，白板上显示的信息对于远程交互和协作而言并不是理想的。部分地由于与视频电话会议设备相关联的限制，远程用户难以阅读和集中在白板的相关部分。例如，写在白板上的墨水笔划可能难以看到，且可能不能由远程用户擦除或编辑。因此，实时多用户物理白板协作是受限的，并且对远程参与者而言通常是不令人满意的体验。

概述

提供本概述以便以简化的形式介绍将在以下详细描述中进一步描述的一些概念。该概述不旨在标识所要求保护的主题的关键特征或本质特征，也不旨在用于帮助确定所要求保护的主题的范围。

各实施例提供用于传递信息的“共享空间”。该共享空间可被配置成允许多个用户通过使用该共享空间来通信。在一实施例中，共享空间应用程序被配置成提供可由两个或更多个用户共享来交互的持久空间。用户可

以具有多个分开的空间来与其它个人和/或群体进行共享和通信。在各实施例中，可以使用用于共享和传递各种信息的简单通信工具的灵活聚集来填充共享空间并与其交互。该通信工具和共享空间向用户提供自然且方便地交互和通信的持久手段。

通过阅读以下详细描述和审阅相关联附图，这些和其他特征和优点将是显而易见的。可以理解，前述一般描述和以下详细描述均仅是说明性，且不限制所要求保护的本发明。

附图简述

图 1 是计算环境的框图。

图 2 是计算环境的框图。

图 3 是共享空间体系结构的框图。

图 4 是示出使用共享空间的流程图。

图 5A-5K 示出用于与共享空间交互的用户界面。

图 6 是示出用于实现本文中所述的各个实施例的计算环境的框图。

详细描述

各实施例提供共享空间，其中多个用户可以使用该共享空间来传递信息。该共享空间可被配置成允许多个用户通过使用该共享空间来通信。在一实施例中，共享空间应用程序被配置成提供可由两个或更多个用户共享和使用以便使用各种工具来通信的持久空间。计算设备的显示器可被用来向使用该共享空间应用程序的用户呈现共享空间以共享这一空间。用户可以使用该共享空间应用程序所提供的各种工具来与该共享空间实时地或在其方便时进行交互。

在一实施例中，多个共享空间可被呈现在一个或多个显示器上，从而允许用户同时与各个个人和/或群体进行交互。即，用户可以拥有分开的空间来与不同的个人和/或群体保持联系和通信。在各实施例中，共享空间可以使用允许共享各种信息的简单通信工具的灵活聚集来填充。例如，用户可以使用通信工具来用图像、文本、音频、手绘图和手写文字（例如，数

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字墨水）和/或其它数据来填充共享空间。这些通信工具被配置成提供自然和方便的通信和交互。

在一实施例中，共享空间是持久的且总是对相关联的参与者保持可用，即使是在参与者未在使用该空间和/或未登录（例如离线）时。用户可以邀请一个或多个参与者共享一个或多个空间。共享空间的参与者可向其添加、从中删除和/或以其它方式来修改该空间。其后，该共享空间的所有参与者看到或将看到该交互的同一结果。共享空间应用程序被配置成允许参与者将内容保存到私有剪贴簿，因为共享空间的特性可以是高度瞬时的。此外，共享空间应用程序被配置成使用共享的和专有的数据，但并不受限于此。在一实施例中，共享空间应用程序还被配置成启用“实况连接”。该实况连接使多个参与者能够使用该共享空间应用程序来参加实况音频和/或视频通信。

图 1 是一实施例下的计算环境 100 的框图。计算环境 100 可以被描述为各组件的网络，其中相关联的组件以提供操作功能的方式通信地耦合。多个计算设备 102-106 彼此通信，以提供计算设备的网络。多个计算设备 102-106 还可以与服务计算设备 107 通信。每一计算设备 102-107 都包括被配置成在计算设备 102-107 之间提供通信功能的连网和安全组件。计算设备 102-106 可以包括台式计算机、膝上型计算机、图形输入板计算机、手持式设备和其它通信设备。

如图 1 所示，每一计算设备 102-106 包括共享空间应用程序 108-112，以下详细描述。服务计算设备 107 包括空间管理程序组件 114，但并不限于此。空间管理程序组件 114 可被配置并用于管理一个或多个共享空间的各方面，但并不受限于此。例如，空间管理程序组件 114 可以维护与共享空间相关联的读写主数据文件。在一实施例中，每一共享空间 108-112 和空间管理程序组件 114 都包括结合计算设备 102-107 的处理器执行的软件应用程序。如下所述，每一共享空间应用程序 108-112 被配置成向与该共享空间相关联的多个用户提供持久空间。为简化以下讨论，在描述共享空间应用程序的功能和使用时，引用计算设备 102 和相关联的共享空间应用程序 108。

如下所述，用户可以使用计算设备 102 和相关联的共享空间 108 来与共享空间的其他用户进行通信和交互。共享空间可以被描述为可由一个或多个用户以各种方式用来通信的持久画布或交互式窗口。即，共享空间应用程序 108 被配置成持久存储关于相关联的共享空间的用户交互，包括各种表达。相应地，不管其物理位置，与该共享空间相关联的所有用户都看到该用户交互。在各实施例中，在共享空间中所创建的、放置的、或以其它方式定位的任何内容（墨水、视频文件、音频文件、文本、图片等）都被持久存储在该共享空间中，直到被删除或以其它方式被修改为止。

用户可以使用共享空间应用程序 108 来与多个分开的空间和/或用户进行交互。例如，用户可以使用共享空间应用程序 108 来创建使该用户能够与各个个人和/或群体保持联系的多个共享空间。用户与共享空间的交互被称为表达。共享空间应用程序 108 被配置成将表达持久存储在该共享空间中，直到该表达被与该共享空间相关联的用户删除或以其它方式修改为止。例如，如果用户在共享空间中绘制了图片或张贴了照片，则该项目保持在该共享空间中，即使其被其它项目覆盖。

共享空间应用程序 108 可被安装在计算设备 102 上。例如，共享空间应用程序 108 可作为操作系统（OS）安装过程的一部分来安装。如上所述，用户可以使用共享空间应用程序 108 来与共享空间的一个或多个用户或参与者进行通信。另外，共享空间的传递可被提供给多个相关联的计算设备。共享空间向多个计算设备的通信使得协作和交互即使对远程位置的用户而言也成为快乐的体验。因此，共享空间应用程序 108 向企业、家庭、朋友以及其它各方提供用于通信交互的方便的媒介。

例如，共享空间的传递可被提供给通过诸如因特网等网络通信的多个超移动计算设备和相关联的用户。在一实施例中，共享空间的传递是使用在线文件存储服务来通过因特网提供的。在另一实施例中，共享空间的传递是使用诸如例如点对点同步服务等点对点服务来向多个计算设备提供的。

共享空间的传递可被提供给计算网络的计算设备 102-107，计算网络诸如无线局域网（WLAN）、局域网（LAN）、广域网（WAN）、其组合、

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和/或某种其它类型的计算和/或通信网络。在一实施例中，计算环境 100 是允许一个或多个计算设备、通信设备、数据库等根据所需实现来通信的分布式计算机网络。

计算环境 100 的各组件可以使用有线、无线、有线和无线的组合、以及其它通信技术来彼此通信地耦合。共享空间的传递还可以包括各种通信方法的组合。传递共享空间的其它实施例包括文件/文件夹共享方法和/或同步方案。例如，诸如 FOLDERSHARE（文件夹共享）等文件/文件夹共享程序可被用来传递共享空间和相关联的所显示的内容。

在一实施例中，共享空间应用程序 108 被配置成操作、持久存储和/或显示主文件的内容，诸如例如主文件的只读副本。在共享空间被修改或以其它方式改变时主文件可被更新。即，共享空间应用程序使用主文件来跟踪和维护对共享空间的改变。在一实施例中，主文件与每一共享空间相关联。每一计算设备 102-106 都可以使用主文件来显示共享空间的内容，包括最近对共享空间的改变和修改。

在一实施例中，每一计算设备 102-106 与对等网络相关联并使用与共享空间相关联的主文件。在与共享空间相关联的计算设备 102-106 连接并在线时，主数据文件将状态从只读状态改变为读写状态。此后，在对相关联的共享空间进行添加、删除、和其它改变时，本地主数据文件实时地同步。在计算设备断开连接（例如，用户离线）时，本地主数据文件被重新配置成只读。此后，在下一次用户登录共享空间并且共享空间应用程序 108 连接到读写主文件时，该读写主文件被复制覆盖（例如替换）本地只读主文件，以便在用户断开连接的同时用所发生的所有添加和改变来更新该主文件。

因此，由于发生对共享空间的更新，所以每一主文件被更新和/或与该共享空间的其它相关联的主文件同步。因此，共享空间应用程序 108 用于确保当前彼此通信（例如，连接的或登录的）的用户看到同一信息。共享空间应用程序 108 被配置成修改主文件，且共享空间的传递在用户与另一参与者和相关联的主文件通信时通过使用该主文件来提供。例如，共享空间的传递可以在用户具有通过在线存储服务到相关联的主文件的和/或直接

到另一相关联的计算设备（例如对等）的连接时提供。

如上所述，共享空间应用程序 108 可被配置成维护相关联的计算设备的本地存储中的最后版本主文件的只读副本。如果用户离线，则共享空间应用程序 108 不提供对只读主文件的访问。然而，用户可以查看该主文件的只读副本，但不能对该主文件进行改变。如下所述，用户还可以将存储在该只读主文件中的一个或多个表达保存到剪贴簿中。如果在一用户离线时另一用户改变了与共享空间相关联的主文件，则该离线用户将看不到这些改变，直到他们登录回相关联的共享空间为止。因此，用户必须登录到共享空间以便共享空间应用程序 108 可以访问并使用该读写主文件来用该用户离线以来的任何改变更新共享空间。

作为示例，假定用户 A 和用户 B 拥有一共享空间。用户 A 在线。在用户 A 打开该共享空间时，共享空间应用程序访问主文件。作为一个示例，共享空间应用程序可以从虚拟硬盘驱动器来访问主文件。随后，用户 A 向该共享空间添加图片。共享空间应用程序向主文件和用户 A 的本地只读文件添加图片。用户 B 是离线的，且打开该共享空间，其示出用户 B 是离线的。用户 B 不能看到用户 A 刚刚添加的图片。此后，用户 B 上线，如连接到因特网。一旦用户 B 上线，则共享空间应用程序访问并读取主文件，并更新用户 B 的机器上的本地只读文件。现在用户 B 看到用户 A 添加到共享空间的图片。

在一实施例中，读写主文件是在服务计算设备 107 上存储并维护的。因此，与共享空间相关联的用户需要具有网络连接并在线以对该共享空间和相关联的读写主文件进行改变。在其它实施例中，主文件可以使用 web 服务来在对等机器和/或用户的计算设备上存储和维护。随后当与共享空间相关的所有参与者在通信时，主文件可以复制到全部的参与者。在一替换实施例中，用户可以在任何时候对其本地文件进行添加和/或改变。此后，在每一参与者重新连接到共享空间（例如登录）或连接到另一参与者（例如对等）时，进行同步以聚集每一参与者所进行的所有离线改变，以使得每一参与者“看到”同一空间。

图 2 是一实施例下的计算环境 200 的框图。计算环境 200 包括与服务

计算设备 204 通信的计算设备 202。计算环境 200 的各组件可以使用有线、无线、有线和无线的组合、以及其它通信和连网技术来彼此通信地耦合。尽管示出了一个计算设备 202 和一个计算设备 204，但其它实施例可以包括多个这种计算和服务计算设备。在一实施例中，共享空间可以在使用诸如超移动计算设备等两个计算设备的至少两个用户之间创建和定义。

如图 2 所示，计算设备 202 包括共享空间应用程序 206。共享空间应用程序 206 被配置成可以由多个用户共享来交互的持久空间。根据该实施例，共享空间应用程序 206 包括用于维护空间的多个相关联的组件。共享空间应用程序 206 包括但不限于：启动组件 208；认证组件 210；联系人组件 212；画布分派组件 214；媒体记录程序组件 216；帧捕捉组件 218；历史/剪贴簿管理程序组件 220；空间管理程序组件 222；内容对象创建程序组件 224；数据同步程序组件 226；文件创建程序组件 228；响应/请求处理程序组件 230；以及空间画布组件 232。在各替换实施例中，各组件的功能和操作可被组合来提供更少的组件和/或所需实现。

启动组件 208 可被配置为用户界面并用于提供用户认证、空间选择和/或参与者选择，认证组件 210 可被配置并用作认证服务，如 PASSPORT 服务。联系人组件 212 可被配置并用于定位和/或维护用户联系人列表。例如，联系人组件 212 可被配置成连接到 MSN 服务来展示作为共享空间的参与者的、用户的 MSN 联系人列表。画布分派组件 214 可被配置并用于创建新空间画布并显示空间中的对象。媒体记录程序组件 216 可被配置并用于记录音频、图像、视频和其它对象/表达。例如，媒体记录程序组件 216 可以使用本地照相机、话筒、和/或其它组件来将图像、音频和视频作为空间中的表达来记录。

继续参考图 2，帧捕捉组件 218 可被配置并用于捕捉空间的用于历史和/或剪贴簿的“快照”图像。历史/剪贴簿管理程序组件 220 可被配置并用于管理空间的“快照”的按时间顺序的集合，并向用户提供审阅所选表达和/或将其存储在被称为剪贴簿的私有本地储存库中的机制。历史/剪贴簿管理程序组件 220 可以记录空间中发生的每一事件。因此，用户不必不断地使用保存操作，这允许与该空间的更非正式交互。空间管理程序组件 222

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可被配置并用于管理空间的各方面。例如，空间管理程序组件 222 可被配置并用于管理主文件的本地副本。内容对象创建程序组件 224 可被配置并用于管理空间中的对象和其它表达。例如，内容对象创建程序组件 224 可被配置并用于管理图像、墨水、文本、和/或其它用户表达。

数据同步程序组件 226 可被配置并用于在用户计算设备 202 和服务计算设备 204 之间同步数据文件。例如，数据同步程序组件 226 可被配置并用于在用户计算设备 202 和服务计算设备之间同步主数据文件。文件创建程序组件 228 可被配置并用于管理共享空间数据文件，包括但不限于：创建、打开、和保存共享空间数据文件。响应/请求处理程序组件 230 可被配置并用于管理计算设备之间的通信。例如，响应/请求处理程序组件 230 可被配置并用于管理计算设备 202 和服务计算设备 204 之间的通信。空间画布组件 232 可被配置并用作启用用户与空间的交互的用户界面。

根据该实施例，服务计算设备 204 包括多个共享空间组件。如图 2 所示，服务计算设备 204 包括但不限于：数据同步程序组件 234；响应/请求处理程序组件 236；以及空间管理程序组件 238。数据同步程序组件 234 可被配置并用于在服务计算设备 202 与一个或多个用户计算设备之间同步数据文件。例如，数据同步程序组件 234 可被配置并用于在服务计算设备 204 和用户计算设备 202 之间同步主数据文件。响应/请求处理程序组件 236 可被配置并用于管理服务计算设备与一个或多个其它计算设备之间的（包括与其它服务计算设备之间的）通信。空间管理程序组件 238 可被配置并用于管理空间的各方面。例如，空间管理程序组件 238 可被配置并用于管理主文件的读写主副本。其它实施例也是可以获得的。

共享空间应用程序 206 被配置成使用并提供共享空间中的各种对象。在一实施例中，共享空间应用程序 206 使用并提供：表示正共享一空间的其他用户的参与者指示符（例如，图标、数字图像等）；该空间中的表达（例如，墨水、文本、照片、视频、实况连接等）；以及多个交互式工具。例如，图标（例如，默认人或群体图标）或数字图像可被用于表示正共享一空间的个人或群体。数字图像或照片可以使用联系人组件 212 连同与个人相关联的名称或群体名称一起导入或丢弃。联系人组件 212 可被配置成

向共享空间应用程序 206 传播名称/照片更新/改变。个人参与者指示符可以包括参与者状况或状态（例如，在场、忙碌、不在场等）的指示。群体参与者指示符还可以包括处于每一状态的参与者的计数（12 人中 4 人在场等）。如下所述，在用户敲击一参与者指示符时，建立实况连接（例如，音频和/或视频——取决于可用设备硬件和服务特征）。

表达包括参与者在空间中创建的任何项目，包括墨水、图像、文本、视频、实况连接等。例如，参与者可以使用图形输入板笔来绘制图片或书写一些文本。例如，用户还可以使用手指和触摸屏来在空间中书写墨水。在一实施例中，表达可以包括 3 种状态：正常、聚焦、和放大，但不限于此。在正常表达状态中，新表达出现在旧表达的顶部（除总是出现在顶部的实况连接之外）。先前保持的实况连接可以由诸如实况连接图标等实况连接指示符来表示。文本表达可以通过在文本区域中触摸并上下拖曳来滚动。对共享空间中的表达（或表达组）进行聚焦用于在该项目周围显示选取框。

以下表 1 列出多个表达以及每一表达是如何接收聚焦的。

表 1

表达	在从……中敲击时获取聚焦
墨水	选择工具
图像	选择工具
视频	选择工具
音频（音乐）	选择工具
文本	选择工具 文本工具
实况连接图标	选择工具
表达组	选择工具

在聚焦状态中，单独的表达（单独选择）或表达组（组选择）可以具有聚焦。在表达（或表达组）具有聚焦时，其被临时地显示在其它表达的顶部，包括周围的选取框、放大按钮、和移动手柄。失去聚焦将该表达（或

组）以查看顺序返回其先前位置。用户可以拖曳选取框以移动表达（例如，从中心或移动手柄拖曳）、调整表达的大小（例如从边缘和角落拖曳）、以及旋转表达（例如拖曳移动手柄或旋转柄）。

在一实施例中，对表达的任何改变（例如，移动、调整大小、旋转）用于将经改变的表达移动到查看顺序的顶部。改变对表达的聚焦而不对该表达进行任何改变用于以查看顺序将该表达返回到其先前位置。用户可以通过敲击共享空间的空白区域或选择另一表达来清除聚焦。粘贴到共享空间的表达被自动地给予聚焦。

用户可以敲击用于将表达视图改变为放大状态的放大按钮。在放大状态中，表达被放大来包围显示器的实质部分（工具保持可见）。在放大状态中，表达不能被移动、调整大小或旋转。用户可以敲击用于将表达返回聚焦状态的关闭按钮。

以下表 2 列出与各表达相关联的多个上下文控件和信息。

表 2

表达	控件	信息（元数据）
墨水	关闭 将副本保存在剪贴簿中 删除	时间戳 作者（只限＞2 参与者）
图像	关闭 将副本保存在剪贴簿中 删除 裁剪（工具）	时间戳 作者（只限＞2 参与者） 大小 位置（如果记录了的话）
视频	关闭 将副本保存在剪贴簿中 删除 裁剪	时间戳 作者（只限＞2 参与者） 大小 位置（如果记录了的话）
音频（音乐）	关闭 将副本保存在剪贴簿中 删除	时间戳 作者（只限＞2 参与者） 大小

	裁剪	
文本	关闭 将副本保存在剪贴簿中 删除	时间戳（表达中的子陈述） 作者（表达中的子陈述）
实况连接	关闭 将副本保存在剪贴簿中 删除 播放 停止 暂停 倒带 快进	参与者 时间戳 大小 持续时间 记录中的当前位置
表达组	关闭 将副本保存在剪贴簿中 删除	聚集大小

共享空间应用程序的工具被配置成方便照片、视频、音频、墨水、文本和其它用户表达的共享。这些工具可被用来创建、选择、修改并保存表达。在一实施例中，这些工具是经由空间画布组件 232 来提供的，并被配置为多个按钮（例如，触摸屏按钮、图形输入板按钮、图标等）。按钮类型包括但不限于：工具箱托盘按钮：展开/折叠工具箱托盘；选择工具并随后折叠工具箱托盘的工具箱按钮；激活控件（对模态按钮）或展开/折叠选项板（对选项板）的工具按钮；以及从选项板中选择项目/模式/选择并关闭该选项板的选项板按钮。工具按钮的外观可被改变以反映当前选项板选择。

以下表 3 示出一实施例下的每一工具箱、工具和选项板。

表 3

工具箱	工具	选项板
墨水	笔（默认）	
	放大笔	

	墨水浓度	浓度选项板
	墨水颜色	颜色选项板
	笔划擦除器	
从……获取材料	我的图片（默认）	
	我的视频	
	我的音乐	
	剪贴簿	
	历史	
文本	文本（默认）	
	样式	样式选项板
	大小	大小选项板
	颜色	颜色选项板
	字体	字体选项板
选择	单独选择（默认）	
	组选择（有界的表达）	
	复制	
	粘贴	
	撤消	
剪贴簿		

共享空间应用程序 206 和相关联的工具允许参与者与空间交互，并在该空间中任何所需位置处定位表达。此外，空间参与者在其方便时自由地与空间交互。没有刚性的通信要求或协议（例如，用户 1 通信之后是用户 2 通信再之后是用户 3 通信等）。

如上所述，共享空间应用程序 206 被配置成在共享空间的各参与者之间提供实况连接。在一实施例中，实况连接被配置成相当于具有少许例外的表达。实况连接可被用来参与（并存储）实况音频/视频会话（例如像视频会议），或记录对于另一参与者的消息（例如像音频邮件或视频邮件）。在任一情况下，方法和控件都是相同的。在通过敲击参与者图标打开实况

连接时，用户被提示选择一种类型的实况连接。实况连接的类型取决于服务订阅的类型。

以下表 4 列出一实施例的实况连接的订阅类型。

表 4

订阅类型	与一参与者的实况连接	与群体或多个参与者的实况连接
基本	音频 视频	记录音频并在共享空间中留下消息。 记录视频并在共享空间中留下消息。
高级	音频 视频	组合的音频。 为每一参与者分离视频流。

实况连接被配置成提供本地（“我”）和远程（“你”）视图。在群体实况连接中，该群体的每一成员都有“你”视图。在打开实况连接的同时，提供了多个控件和信息。提供持续时间信息以显示实况连接的持续时间（例如分钟:秒）。（向音频和视频两者）提供用于将设备话筒和照相机静音以使得其他人不能听到或看到你的静音按钮。关闭按钮在被敲击时用于提示用户选择“取消”、“保持”或“擦除”。选择取消返回到实况连接，好像关闭按钮未被敲击过一样。选择保持将实况连接置于相关联的空间，并由一实况连接图标来表示。选择擦除丢弃所缓存的实况连接。

共享空间应用程序 206 还被配置成使用历史/剪贴簿管理程序组件 220 提供剪贴簿。剪贴簿提供对表达和空间快照的方便的私有存储。剪贴簿可以通过敲击剪贴簿工具来打开。剪贴簿被配置成提供多个视图（例如，列表、图标、缩略图等）和分组/分类（例如，按参与者，按日期、按表达类型、按位置等）。剪贴簿还包括用于定位该剪贴簿中的表达和其它项目的搜索/过滤工具。

任何表达或空间快照都可以存储在剪贴簿中。剪贴簿包括用于将当前

空间的快照副本以图像的形式保存在剪贴簿中的“保存空间”按钮。剪贴簿的内容存储在操作文件系统中的名为“我的剪贴簿”的文件夹中。“我的剪贴簿”是“我的图片”、“我的记事簿”和“我的音乐”的对等体。在安装共享空间应用程序时，可以创建“我的剪贴簿”文件夹。剪贴簿中的表达同样具有 3 种状态（正常、聚焦、放大）和同样所有的相应控件以及它们在空间中进行的行为，除以下控件被改变和添加之外：移动、调整大小、旋转不可用；“将副本保存到剪贴簿”被“复制到空间”所替换；“打印”按钮打印表达或空间快照。

“获取材料”工具箱被配置成提供浏览项目和从操作文件系统中将项目导入空间的方便的方式。“获取材料”工具箱可被用来从诸如我的图片、我的视频和我的音乐等各个文件夹中浏览和导入项目。从“获取材料”工具箱中敲击“我的<材料>”工具打开浏览操作文件系统中的相应<材料>文件夹的内容的查看程序。提供了多个视图（例如，列表、图标、缩略图等）和分组/分类（例如，按参与者，按日期、按表达类型、按位置等）。还提供了搜索/过滤工具。表达同样具有 3 种状态（正常、聚焦、放大），和同样所有的相应控件和它们在空间中进行的行为，除以下控件被改变和添加之外：移动、调整大小、旋转不可用；“将副本保存到剪贴簿”被“复制到空间”所替换。

共享空间应用程序 206 还被配置成使用历史/剪贴簿管理程序组件 220 提供历史。在一实施例中，历史是在服务计算设备 204 中维护并从中访问的。历史可被配置为空间的简单的只读临时视图。在一实施例中，空间历史可以全屏显示，具有以下控件：单独选择（默认）；组选择（有边界的表达）；以及复制。在另一实施例中，历史可以作为列表、缩略图等来显示。历史视图包括可被用来控制时间（例如占据工具托盘空间）的水平滚动条。历史中的表达同样具有 3 种状态（正常、聚焦、放大），和同样所有所显示的相应信息，但不具有任何修改控件。另外，“将副本保存到剪贴簿”被“复制到空间”所替换。

在一实施例中，共享空间应用程序 206 可被配置成提供 3 个用于访问自动存储的笔划、片段和其它表达的界面。第一个是无限撤消和重做。使

用撤消和重做，用户可以访问片段的任何过去的状态。第二个是时间滑动条。使用时间滑动条，用户可以直接指定时间点，或使用跳转按钮到达离散的“感兴趣的”时间点。第三个是基于上下文的搜索，这可以被实现为行为。搜索行为允许用户基于诸如时间、片段、位置、片段大小、墨水颜色等上下文信息来检索先前的笔划、片段和其它表达。搜索结果在屏幕上被示为一组缩略图，且用户可以通过点击缩略图来访问历史中的点。

图 3 是一实施例下的共享空间体系结构 300 的框图。共享空间体系结构 300 可被配置为包括核心层 302 的分层体系结构。核心层包括服务和配置组件 302a、事件处理组件 302b 和显示上下文组件 302c。

模型层 304 定义文档、用户界面、工具和交互样式的基本接口。模型层 304 包括空间模型组件 304a、用户界面模型 304b、工具模型 304c、交互组件 304d 和物理组件 304e。模型层 304 包括定义共享空间组件的抽象的接口和抽象类。模型层 304 可以与通用层 306 分开以确保模块和组件的可扩展性、灵活性、可重用性和互操作性。

空间模型组件 304a 定义可以作为空间的一部分的基类和对象功能。用户界面模型 304b 定义适于室件（roomware）组件的替换用户界面概念。工具模型 304c 向空间提供附加功能。突出的示例是工具条或浏览器。空间浏览器具有在用户界面和空间之间提供连接的角色。另外，工具模型 304c 控制可能的工作模式，例如耦合的程度。物理模型是与共享空间相关的“真实”世界的各部分的表示。例如，术语“站”指的是运行共享空间应用程序的计算机。交互组件 304d 支持不同样式的交互，包括定义不同的交互样式。

通用层 306 可以提供用于交互和通信的功能，如团队协作、会议和其它情况。通用层 306 包括链接和引用组件 306a、显示区域组件 306b、工具条组件 306c、点击组件 306d、拖放组件 306e、空间组件 306f、交互组件 306g、浏览器组件 306h、姿势组件 306i 和站组件 306h。通用层 306 包括像文本、图形和非正式的手写输入等标准数据类型，以及用于例如通用协作支持的私有和公共工作空间。

超媒体数据模型类的实例作为共享对象空间的一部分被包括。因此，

用户可以同时访问这些对象。通用文档元素包括工作空间（页面的等效物）、手写输入（涂鸦）、文本和图像。用户界面的主元素包括片段和覆盖物。交互可被分为“片段”，其定义了对诸如文档浏览器等工具可用的空间。另外，“覆盖物”可被自由放置。文档浏览器和工具条由通用层 306 提供。

对于与各组件的交互，存在除使用鼠标和键盘外的可用的交互技术。这些技术包括用笔或手指来书写的姿势、以及对拖放的支持。为生成上述姿势事件，绘制的每一笔划都可被发送到姿势识别程序。共享空间体系结构 300 还包括具有同步组件 308a、复制组件 308b、认证组件 308c 和安全组件 308d 的基础层 308。

图 4 是示出一实施例下的用于使用共享空间应用程序的过程的流程图。如上所述，共享空间可以在两个或更多用户之间共享。在用户在线且相应的计算设备彼此通信时，共享空间可以根据任何参与者改变来更新。如上所述，一旦用户成为共享空间的参与者，则该用户可以用各种方式与共享空间的另外的一个或多个参与者交互和通信。

在 400 处，在用户的计算设备上安装共享空间应用程序。在 402 处，提示用户在使用共享空间应用程序之前注册。收集与该用户相关联的简档信息并可将其存储在服务计算设备上或作为注册过程的一部分来本地地存储。在 404 处，在注册之后，已注册的用户可以创建或加入空间来与其他已注册的用户共享。每一空间都可以具有标识该空间的唯一名称。在创建空间之后，空间发起者可以邀请多个其他用户加入所创建的空间。该用户可以使用联系人储存库（例如，消息通信程序联系人（“伙伴”）、OUTLOOK 联系人、WINDOWS VISTA 联系人等、或联系人的聚集）来标识要共享所创建的空间的可能用户。一旦该用户邀请了另一用户加入空间，则共享空间应用程序被配置成向被邀请者发送邀请消息。被邀请者可以经由电子邮件、IN、SMS、超移动 PC 上的外壳应用程序来接收该邀请消息，和/或在被邀请者下一次打开共享空间应用程序并通信时，经由该共享空间应用程序来接收。每一被邀请的用户可以接受该邀请来在本地创建复制的空间文件。

在 406 处，打开共享空间并向用户呈现持久的白板画布。如果用户在

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线，则对该画布进行的任何参与者改变都被自动地更新并呈现给该用户。在 408 处，参与者可以使用多个共享空间工具来添加表达、修改表达、或以其它方式与该共享空间的画布交互。每一在线参与者都看到其它参与者的交互和经更新的空间画布。如果用户离线但在另一参与者进行了改变之后回到在线，则该参与者的画布随后被更新来显示改变。另外，每一参与者都可以将空间中的任何对象保存到本地剪贴簿中。在一实施例中，剪贴簿是空间独立的，但可以与任何空间一起使用。如上所述，共享空间应用程序还使用历史纪录或历史来跟踪和维护空间修改过程。参与者可以使用该历史纪录来记起任何时候的任何步骤。

如上所述，实时数据同步（例如，在参与者的交互之后、在上线并打开共享空间之后等）可由共享空间应用程序和相关联的组件来提供，以使得所有在线参与者都能够“看到”相同的、空间画布形式的、持久存储的空间。该同步过程部分地取决于参与者正用来通信的通信网络的类型。例如，对等通信网络使用与多个参与者计算设备和服务计算设备之间的同步过程相比所不同的同步过程。在 410 处，用户关闭空间，并且用户的计算设备和其它参与者计算设备之间的连接被自动地关闭。此后，释放与空间画布相关联的图形用户界面（GUI）和其它实用程序资源。

现在参考图 5A-5K，各框图示出一实施例下的用于访问共享空间并与其交互的用户界面。如图 5A 所示，用户界面 500 描绘与共享空间应用程序的当前用户相关联的多个共享空间。用户界面 500 是在用户成功地完成认证过程（例如，用户名、口令、以及其它登录凭证）之后示出的。用户界面 500 示出用户具有与一个或多个共享空间相关联的多个联系人。如图所示，用户拥有具有包括 Peter 502、Rose 504、Robin 506 和 Mary 508 等的联系人的共享空间。用户界面 500 还包括用于定义关于相关联的联系人 510 的新空间的框。如上所述，与共享空间相关联的每一联系人 502-508 都可以包括用户可以用来个性化空间的参与者图片或其它标识标记。

图 5B 是示出多个共享空间的用户界面 500 的框图。各联系人之间的连线定义多个共享空间。例如，Robin 506 和 Tom 512 定义与该用户的共享空间。Jacky 514 定义与该用户的共享空间。Peter 502、Rose 504、Maggie 516

和 Frank 518 定义与该用户的另一共享空间。如上所述，用户可以使用共享空间应用程序来定义多个共享空间以与选择的参与者保持联系或以其它方式交互。

如图 5B 所示，用户选择了 Tom 512（“x”加亮了用户选择）来在共享空间中交互。用户未选择 Robin 506，所以该交互将只是与 Tom 512 的，直到用户邀请 Robin 506 加入该空间或打开不同的空间为止。在选择 Tom 512 之后，用户可以使用按钮 520 来进入空间。在该点处，如果 Tom 在线，则向 Tom 512 发送加入相关联的空间的通知。如果 Tom 离线或未打开其共享空间应用程序，则将在 Tom 打开该共享空间应用程序并上线时传递该通知。

图 5C 示出用户选择了与 Tom 512 共享该空间之后的用户界面 500。状况指示符 522 示出 Tom 512“在线”。如图 5C 所示，空间画布 524 是空白的。即，Tom 512 和用户都没有向空间画布 524 添加任何东西。向用户呈现了用于与空间画布 524 交互的多个工具 526。

图 5D 示出处于一状态中的用户界面 500，其中用户可以从多个对象（例如，图片、视频、音频等）中选择要包括在与 Tom 512 的共享空间中的对象。对象 528-538 可以从本地存储、对等源或某一在线源中选择。如图 5D 所示，用户选择了对象 528 来插入到空间画布 524 上。即，所插入的对象 528 是用户所提供的表达。Tom 512 实时地看到其空间画布上的对象 528，因为其在线。在一实施例中，用户还可以使用幻灯片放映按钮 540 来将幻灯片放映插入到空间画布 524 上。一旦用户选择了再多一个对象，则用户可以使用插入按钮 542 来将一个或多个对象插入到空间画布 524 上。

图 5E 示出用户选择了对象 528 并在空间画布 524 上插入了对象之后的用户界面 500。一旦用户在空间画布 524 上定位了对象 528，则使该用户可以使用多个附加上下文相关的工具 544 来与所插入的对象 528 交互。另外，用户可以使用把手 546 和 548 来扩展/收缩和/或旋转对象 528。图 5F 示出 Tom 512 在空间画布 524 上绘制墨水图画 550 之后的用户界面 500。在 Tom 512 创建墨水图画 550 的每一阶段，该用户都能够看到该图画。图 5G 示出 Tom 512 在空间画布 524 上插入对象 552 之后的用户界面 500。Tom 还在他

插入的对象 552 下键入了一些文本 554。如上所述，用户和 Tom 512 在其各自的、诸如触摸屏交互式显示器等显示器上看到同一交互和信息。

如上所述，共享空间应用程序允许某一参与者自由地与共享空间交互。图 5H 示出用户将 Tom 插入的对象 552 移动到空间画布 524 上的新位置之后的用户界面 500。墨水 550 现在部分地被重新定位的对象 552 所覆盖。图 5I 示出 Tom 512 用墨水书写了询问该用户为何移动对象 552 的问题(why？)之后的用户界面 500。

图 5J 示出剪贴簿视图 558 中的用户界面 500。用户将多个项目 560-568 保存到了剪贴簿。在一实施例中，剪贴簿的内容本地地存储到用户的计算设备中。用户界面 500 还包括用户可以点击来前往历史视图的按钮 570。图 5K 示出历史视图 559 中的用户界面 500。历史包括共享空间应用程序所记录的、表示参与者对空间和空间画布 524 的改变和交互的多个历史细节 572-582。用户还可以使用用户界面 500 来标记历史中除自动保存之外的用于保存的时间。在一实施例中，历史被保存到服务计算设备并在用户连接并在线时对用户可用。

如上所述，在一实施例中，共享空间应用程序可以包括或安装在计算设备上，并与用于管理共享空间的各方面的服务计算机相关联。例如，共享空间应用程序可以安装在超移动个人计算机上。超移动 PC 的便携性使用户能够以即时、方便、和容易访问的方式来使用共享空间应用程序。共享空间应用程序可被配置成提供共享空间以允许多个用户彼此通信和交互。空间可以总是对该空间的所有参与者可用，而不管是否存在网络连接。即，一旦空间被创建，则即使参与者当前未连接或不在线时，该参与者也自由地与该空间交互。在参与者连接和/或上线时，任何改变都被更新到其他参与者空间。

此外，共享空间应用程序使任何空间参与者都能够在任何时候添加、修改、创建表达，而不要求其他参与者加入会话。因此，共享空间应用程序允许一定程度的自由度，从而允许所有参与者在他们选择的任何时候进行自我表达。同样，共享空间应用程序允许表达接收者在他们选择的任何时候进行响应的自由。没有立即响应的直接的或蕴含的义务。

013

共享空间应用程序可以提供持久画布，其中所有参与者表达都是在单个显示器上可见的。例如，超移动个人计算设备的显示器可被用来显示共享空间，其中用户表达可以持久存储在显示器中。用户不必来回滚动以寻找所需信息，因为表达（包括隐藏的表达）包含在空间画布和显示器的可视区域中。共享空间被配置成对所有在线的并且打开该空间的参与者而言基本上在视觉上是相同的。

另外，共享空间应用程序被配置成使所有参与者实时地或基本上实时地看到对共享空间的编辑和其它修改（例如，取决于连接、带宽和其它因素）。用户可以使用笔或手指通过在空间画布上拖曳笔或手指（称为“划”），来在空间的任何位置处绘制任何手写笔划。用户可以通过按下指示笔的修改器按钮或用手指来画出涂写笔划（称为“划后”（metastroking））来擦除。共享空间应用程序被配置成允许所有参与者在编辑过程发生时都看到它。例如，参与者在字符被键入时可以看到字符（例如，你看到改正）、在墨水被绘制（和擦除）时看到墨水等。因此，共享空间应用程序创建许多其它应用程序中缺少的在场的感觉。

如在此所述，共享空间应用程序向用户提供使用情感上有表现力和/或被动的通信来保持联系的机制，但不限于此。由于商务关系、家庭和朋友分散在更大的距离上，共享空间提供方便的而非打扰的和强制的通信方式。例如，考虑家庭，其中家庭成员居住在国家的不同部分。整个家庭可以通过使用共享空间来彼此通信和参与。兄弟姐妹们可以张贴重要的生活事件的照片或只是普通的日常事件。其他家庭成员也可以使用该共享空间来对照片进行评论、寻求建议和/或共享观点。自然地作为注释、图画、个人笔记、视频、和/或音频剪辑等的交互流由各参与者添加。多个参与者无论在何时查看共享空间，他们还可以偶然参与实况连接。

在另一示例中，考虑由彼此依赖以向消费者提供重要服务的多个企业单元所组成的企业。企业单元位于世界的不同部分。并非使用不可靠的电子邮件或电话通信，该企业的每一雇员在超移动个人计算设备上运行共享空间应用程序。雇员可以有策略地设置和监控该企业的各重要对应物之间的一个或多个共享空间。例如，产品组可以设置与策略业务计划者通信以

0913

将新设备投放市场的共享空间。自然地作为注释、墨迹、图画、图像、个人笔记、视频、和/或音频剪辑等的交互流由各参与者添加。如果各方碰巧同时有空，则用户还可以使用共享空间应用程序来参与实况音频和/或视频会话。

示例性操作环境

现在参看图 6，以下讨论旨在提供对在其中可以实现本发明实施例的合适计算环境的简要一般描述。尽管将在结合在个人计算机上的操作系统上运行的应用程序执行的程序模块的一般上下文中描述本发明，但本领域的技术人员可以认识到，本发明也可结合其它类型的计算系统和程序模块实现。

一般而言，程序模块包括执行特定任务角色或实现特定的抽象数据类型的例程、程序、对象、组件、数据结构和其它类型的结构。而且，本领域的技术人员可以理解，本发明方法可以使用其它计算机系统配置来实现，包括手持式设备、多处理器、基于微处理器或可编程消费电子产品、小型机、大型计算机等。本发明也可以在其中任务由通过通信网络链接的远程处理设备执行的分布式计算环境中实现。在分布式计算环境中，程序模块可以位于本地和远程存储器存储设备中。

现在参看图 6，将描述用于本发明各实施例的示例性操作环境。如图 6 所示，计算机 2 包括通用台式机、膝上型计算机、手持式计算机、或能执行一个或多个应用程序的其它类型的计算机。计算机 2 包括至少一个中央处理单元 8（“CPU”）、包括随机存取存储器 18（“RAM”）和只读存储器（“ROM”）20 的系统存储器 12、以及将存储器耦合至 CPU 8 的系统总线 10。基本输入/输出系统包含如在启动过程中帮助在计算机中的元件之间传输信息的基本例程，并储存在 ROM 20 中。计算机 2 还包括用于储存操作系统 32、应用程序、以及其它程序模块的大容量存储设备 14。

大容量存储设备 14 通过连接至总线 10 的大容量存储控制器（未示出）连接到 CPU 8。大容量存储设备 14 及其相关联的计算机可读介质为计算机 2 提供非易失性存储。尽管此处包含的计算机可读介质的描述指的是大容量存储设备，诸如硬盘或 CD-ROM 驱动器，但本领域的技术人员应理解，计

算机可读介质可以是可由计算系统 2 访问或利用的任何可用介质。

作为示例而非限制，计算机可读介质可以包括计算机存储介质和通信介质。计算机存储介质包括以存储如计算机可读指令、数据结构、程序模块或其它数据等信息的任何方法或技术实现的易失性和非易失性、可移动和不可移动介质。计算机存储介质包括，但不限于，RAM、ROM、EPROM、EEPROM、闪存或其它固态存储器技术、CD-ROM、数字多功能盘（DVD）或其它光学存储、磁带盒、磁带、磁盘存储或其它磁性存储设备、或能用于存储所需信息且可以由计算设备 2 访问的任何其它介质。

根据本发明的各个实施例，计算机 2 可使用通过诸如局域网、因特网等的网络 4 与远程计算机的逻辑连接在联网环境中操作。计算机 2 可以通过连接至总线 10 的网络接口单元 16 来连接到网络 4。应理解，网络接口单元 16 也可用于连接至其它类型的网络和远程计算机系统。计算机 2 也可包括用于接收和处理来自包括键盘、鼠标、笔、手指、和/或其它手段等多个输入类型的输入的输入/输出控制器 22。类似地，输入/输出控制器 22 可以向显示器、打印机或其它类型的输出设备提供输出。另外，触摸屏可以用作输入和输出机制。

如前简述的那样，多个程序模块和数据文件可以存储在计算机 2 的大容量存储设备 14 和 RAM 18 内，包括适于控制联网个人计算机操作的操作系统 32，诸如来自华盛顿州雷德蒙市的微软公司的 WINDOWS XP 操作系统。大容量存储设备 14 和 RAM 18 还可以存储一个或多个程序模块。具体地，大容量存储设备 14 和 RAM 18 可储存应用程序，诸如文字处理应用程序 28、成像应用程序 30、电子邮件应用程序 34、绘图应用程序等。

应当了解，各种实施例的逻辑操作可被实现为(1)运行于计算机系统上的一系列计算机实现的动作或程序模块，以及/或者(2)计算机系统内互连的机器逻辑电路或电路模块。该实现是取决于实现本发明的计算机系统的性能要求来选择的。因此，包括相关算法的逻辑操作可被不同地称为操作、结构设备、动作或模块。本领域技术人员将认识到，这些操作、结构设备、动作和模块可用软件、固件、专用数字逻辑、及其任意组合实现，而不背离如本文中阐述的权利要求内陈述的本发明精神和范围。

尽管已结合各个示例性实施例描述了本发明，但本领域普通技术人员将理解，可在所附权利要求的范围内对其作出许多修改。因此，并非旨在以任何方式将本发明的范围限于以上的说明，而是应该完全参照所附权利要求书来确定。

100
服务计算设备
空间管理
程序组件
114
107
计算设备1
共享空间
应用程序
102
108
计算设备2
共享空间
应用程序
104
110
计算设备N
共享空间
应用程序
106
112

图 1

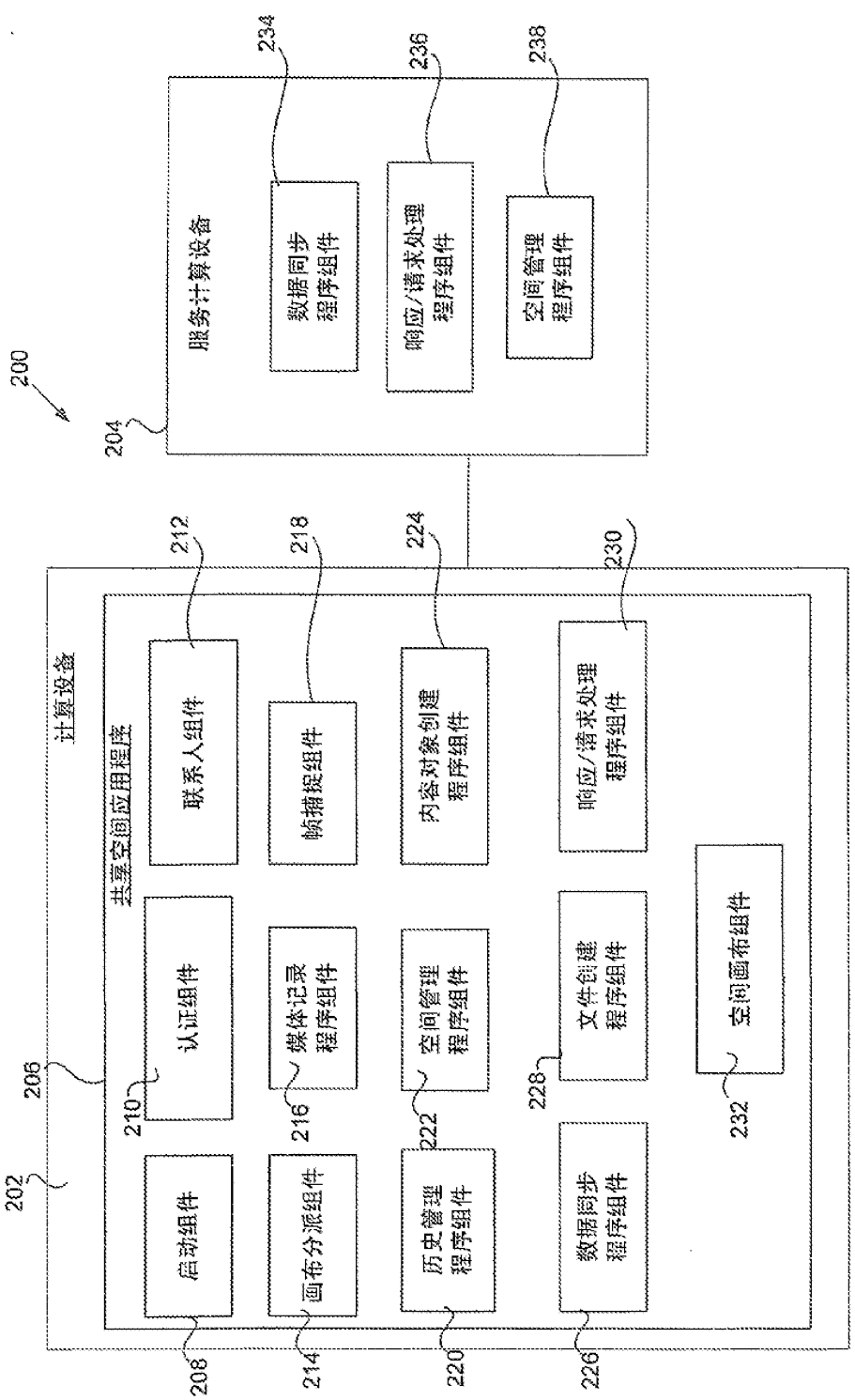

200
服务计算设备
204
数据同步程序组件
234
响应/请求处理程序组件
236
空间管理程序组件
238
计算设备
202
共享空间应用程序
206
联系人组件
212
帧捕捉组件
218
内容对象创建程序组件
224
响应/请求处理程序组件
230
认证组件
210
媒体记录程序组件
216
空间管理程序组件
222
文件创建程序组件
228
空闲画布组件
232
启动组件
208
画布分派组件
214
历史管理程序组件
220
数据同步程序组件
226

图 2

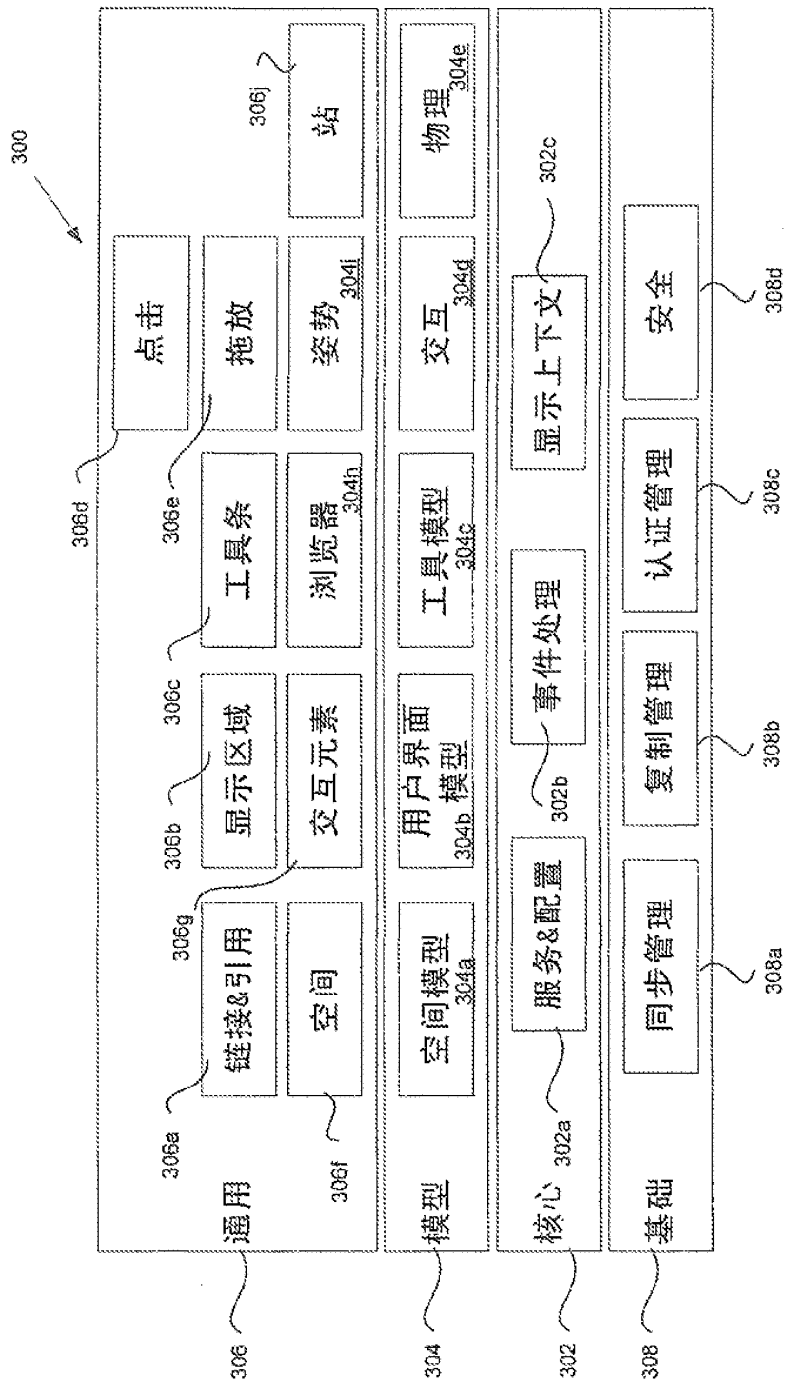

300
306
通用
306a
链接&引用
306g
空间
306f
306b
显示区域
306c
交互元素
306d
点击
306e
拖放
306j
站
工具条
浏览器
304n
姿势
304i
304
模型
空间模型
304a
用户界面
模型
304b
工具模型
304c
交互
304d
物理
304e
302
核心
302a
服务&配置
302b
事件处理
302c
显示上下文
308
基础
同步管理
308a
复制管理
308b
认证管理
308c
安全
308d

图 3



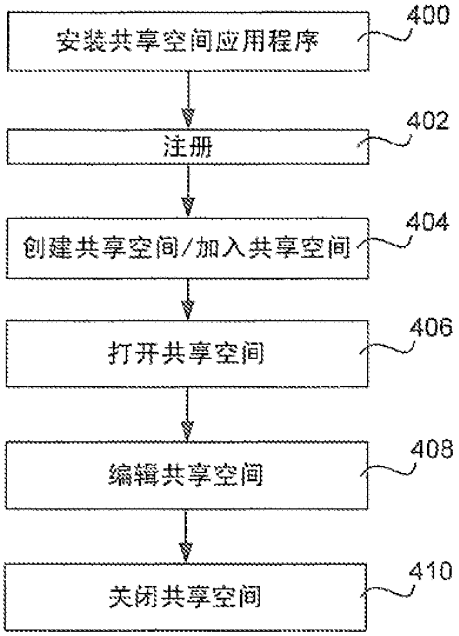

安装共享空间应用程序
400
注册
402
创建共享空间/加入共享空间
404
打开共享空间
406
编辑共享空间
408
关闭共享空间
410

图 4

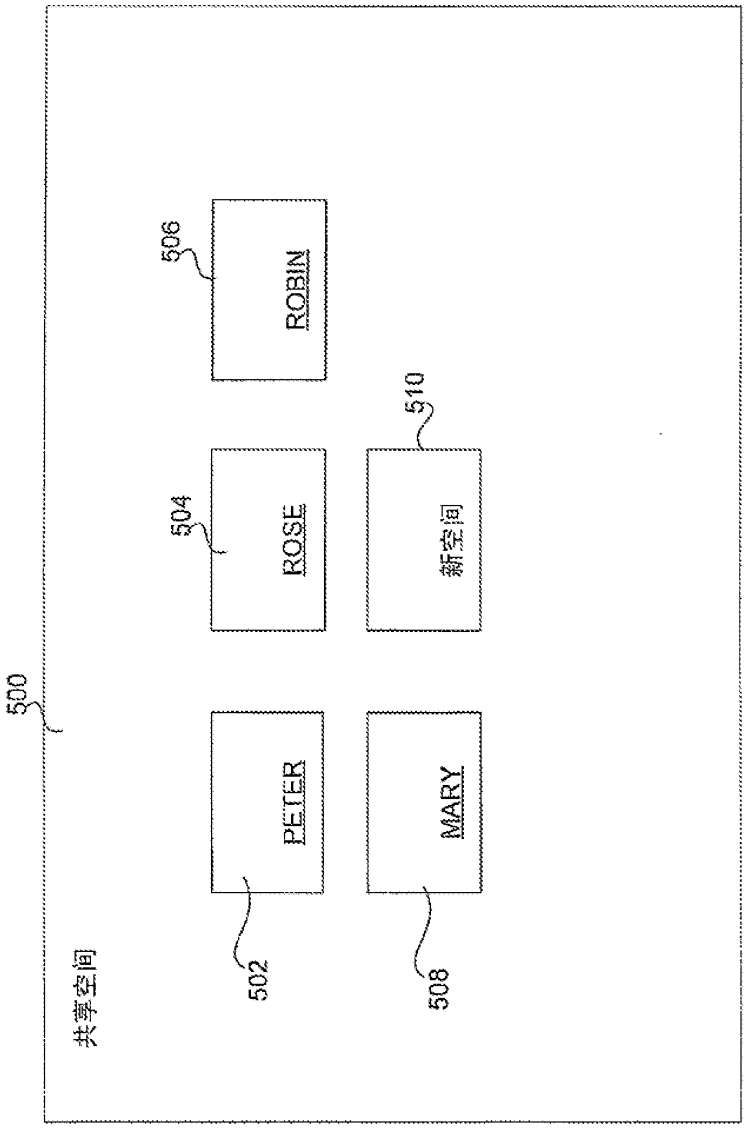


图 5A

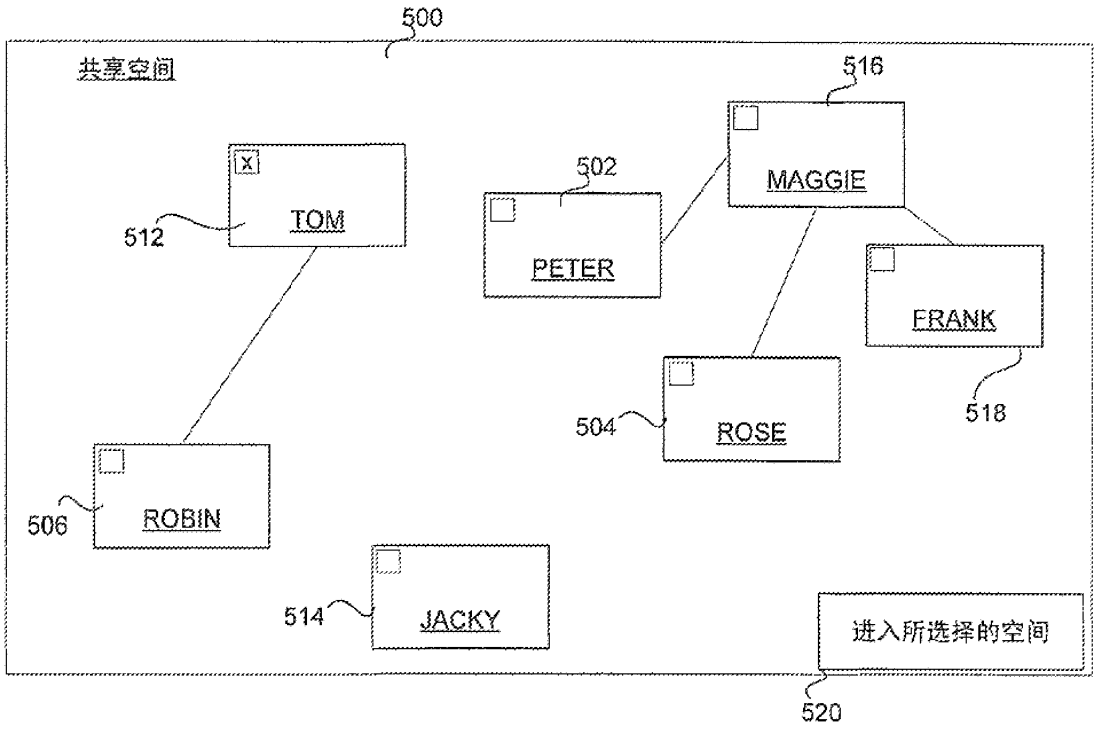

邀请参与者
500
共享空间
516
MAGGIE
502
PETER
512
TOM
FRANK
504
ROSE
518
506
ROBIN
514
JACKY
进入所选择的空间
520

图 5B

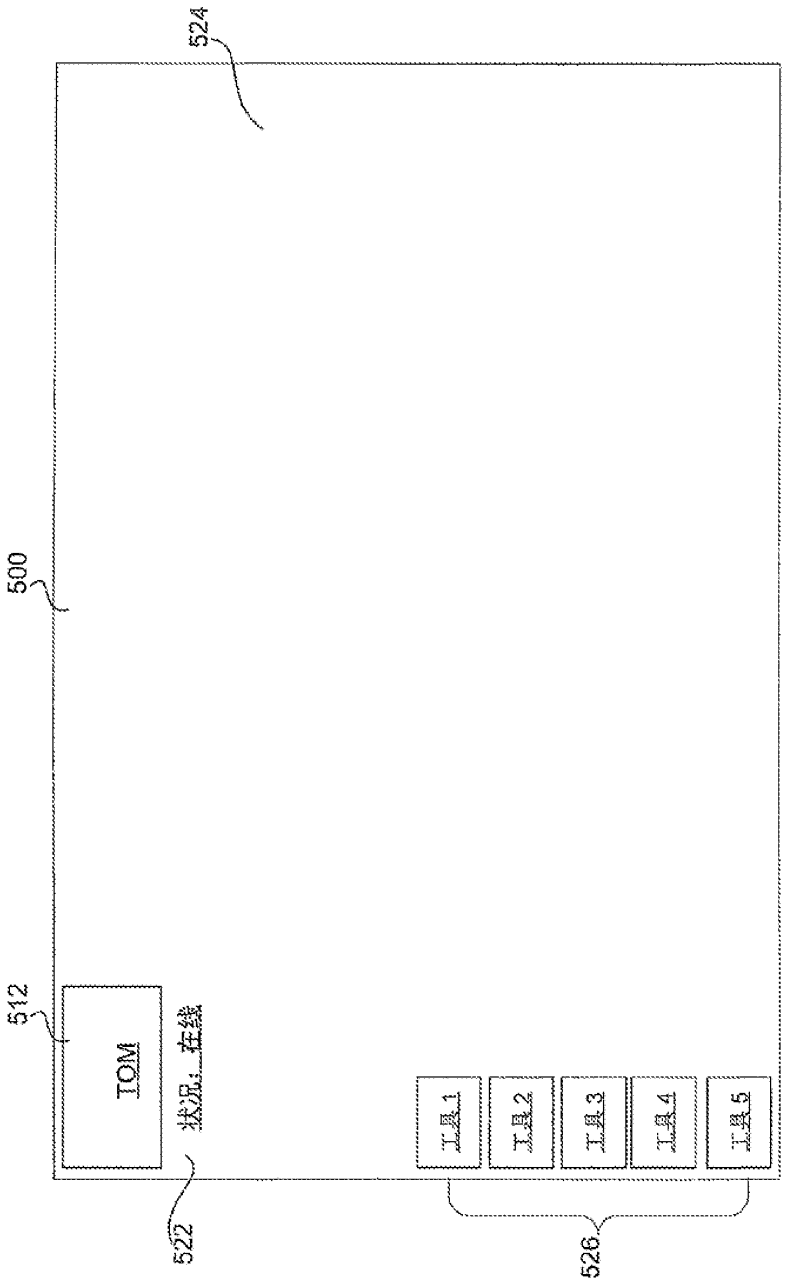


图 5C

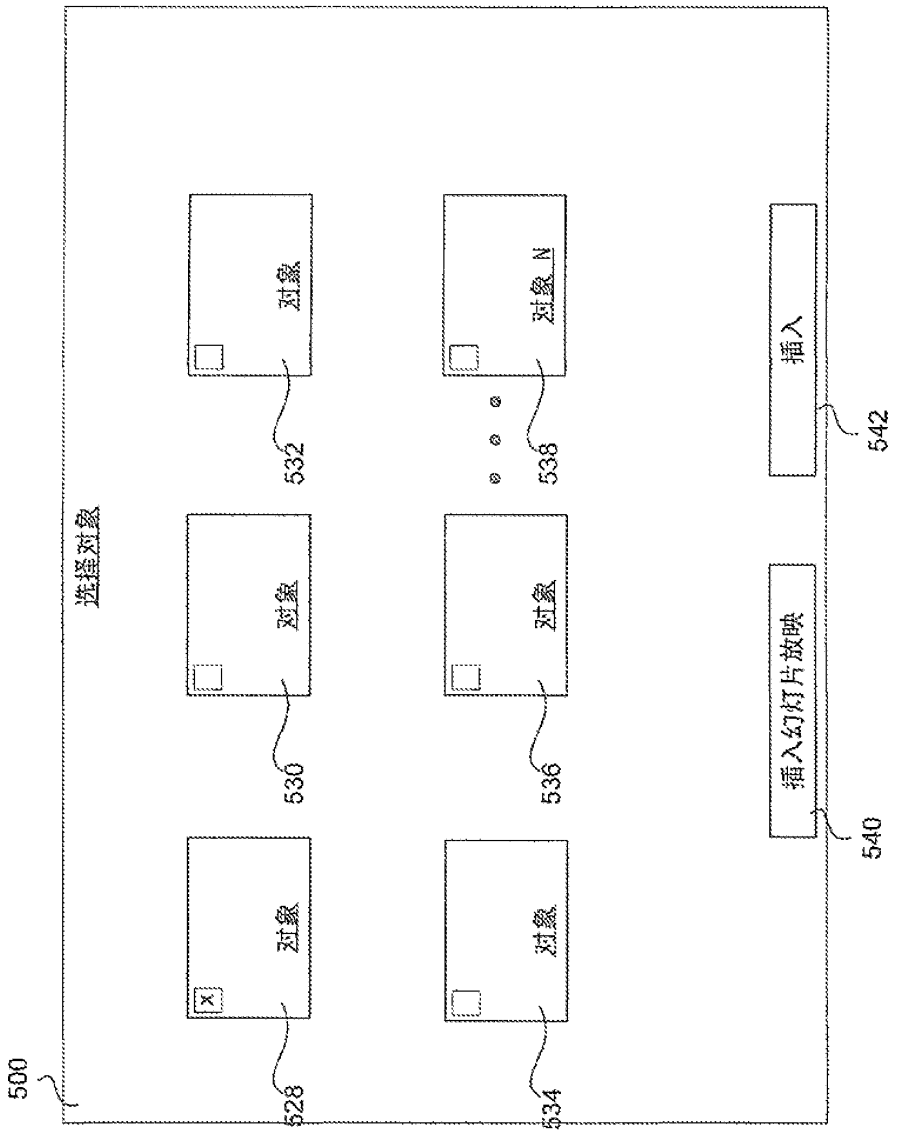

500
选择对象
对象
528
对象
530
对象
532
对象
534
对象
536
对象_N
538
插入幻灯片放映
540
插入
542

图 5D

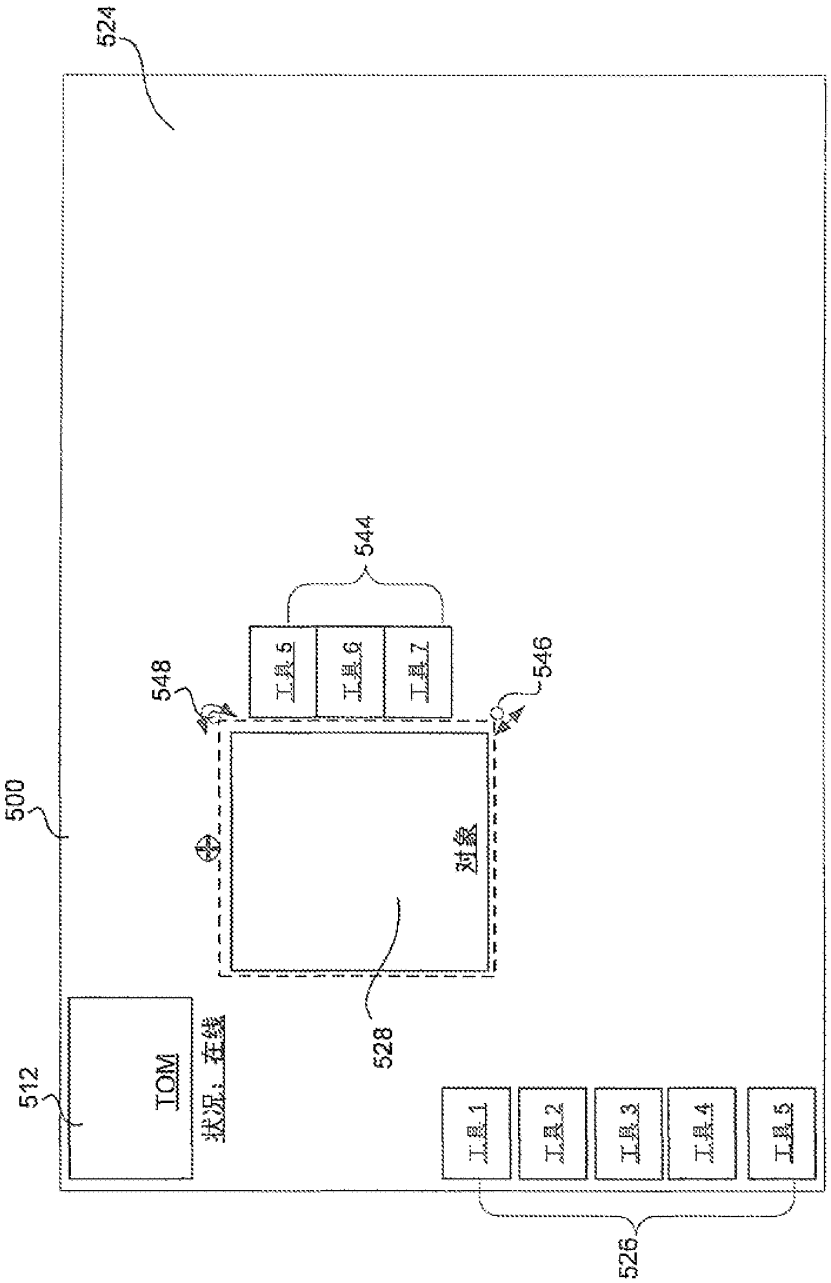

524
500
512
IOM
状况：在线
528
对象
548
546
544
工具5
工具6
工具7
工具1
工具2
工具3
工具4
工具5
526

图 5E

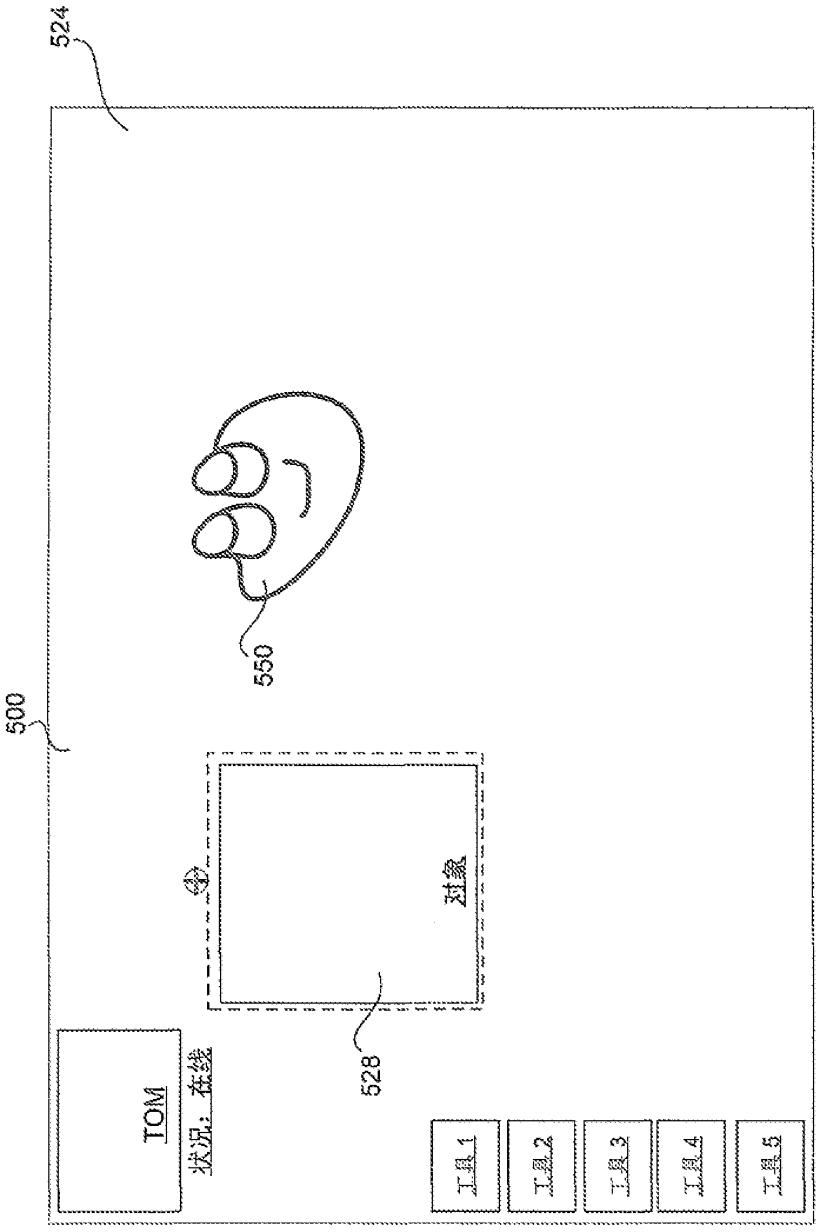


图 5F

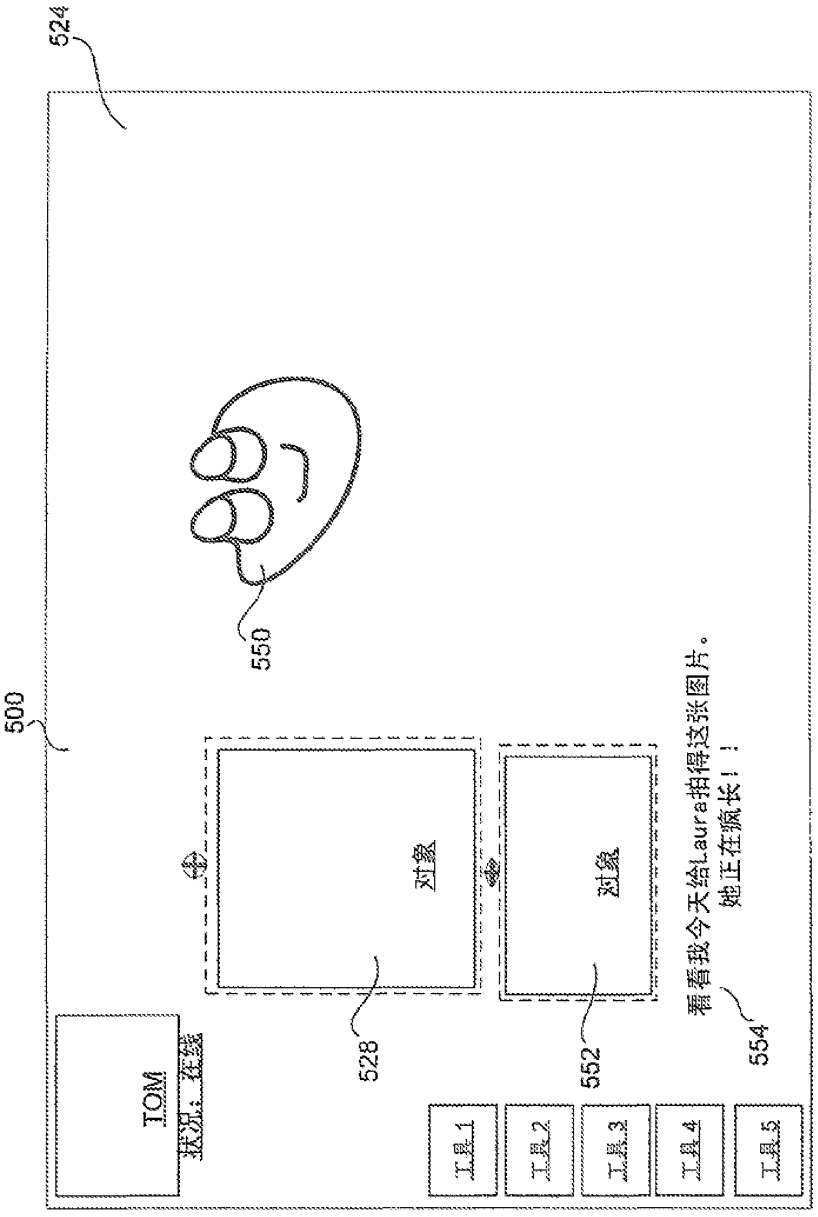

524
500
550
对象
对象
528
552
554
看看我今天给Laura拍得这张图片。
她正在疯长！！
TOM
状况：在线
工具1
工具2
工具3
工具4
工具5

图 5G

351/356

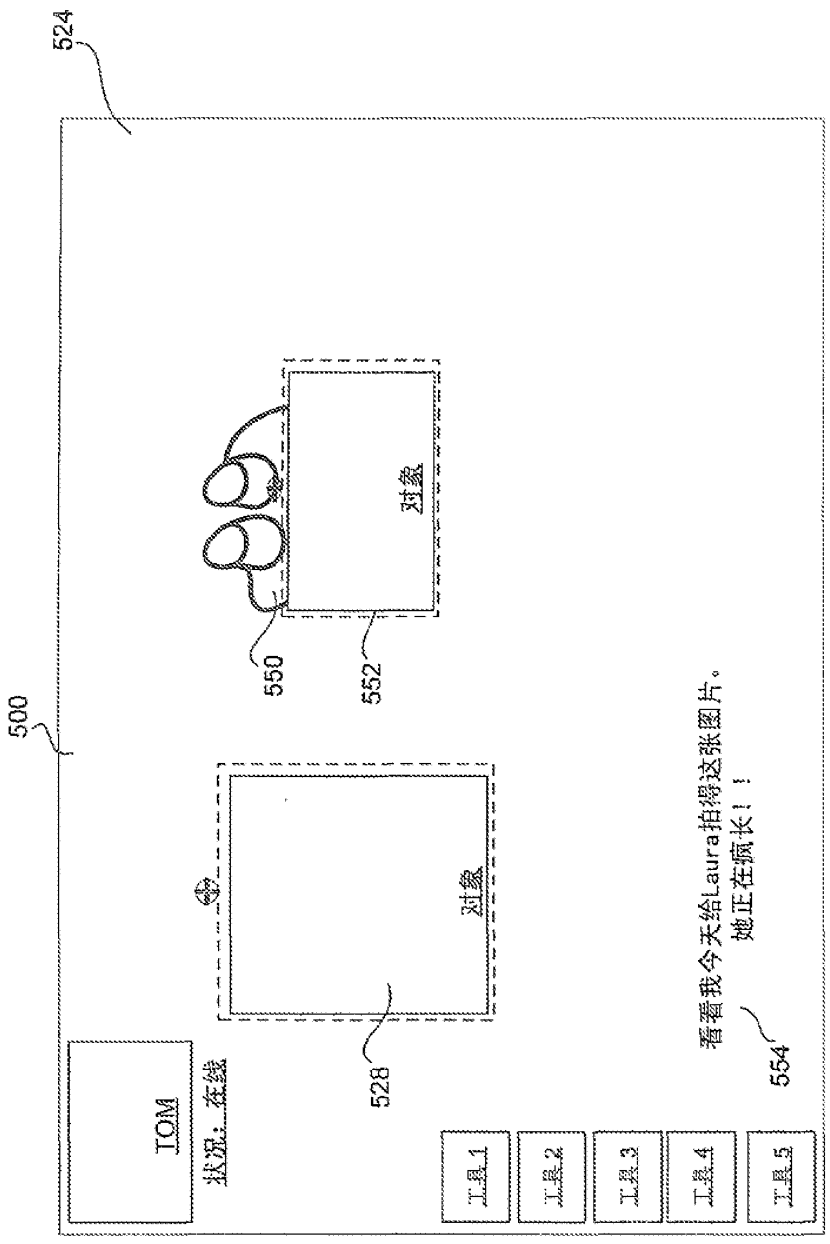

524
500
550
552
对象
528
对象
TOM
状况：在线
看看我今天给Laura拍得这张图片。
她正在疯长！！
554
工具1
工具2
工具3
工具4
工具5

图 5H

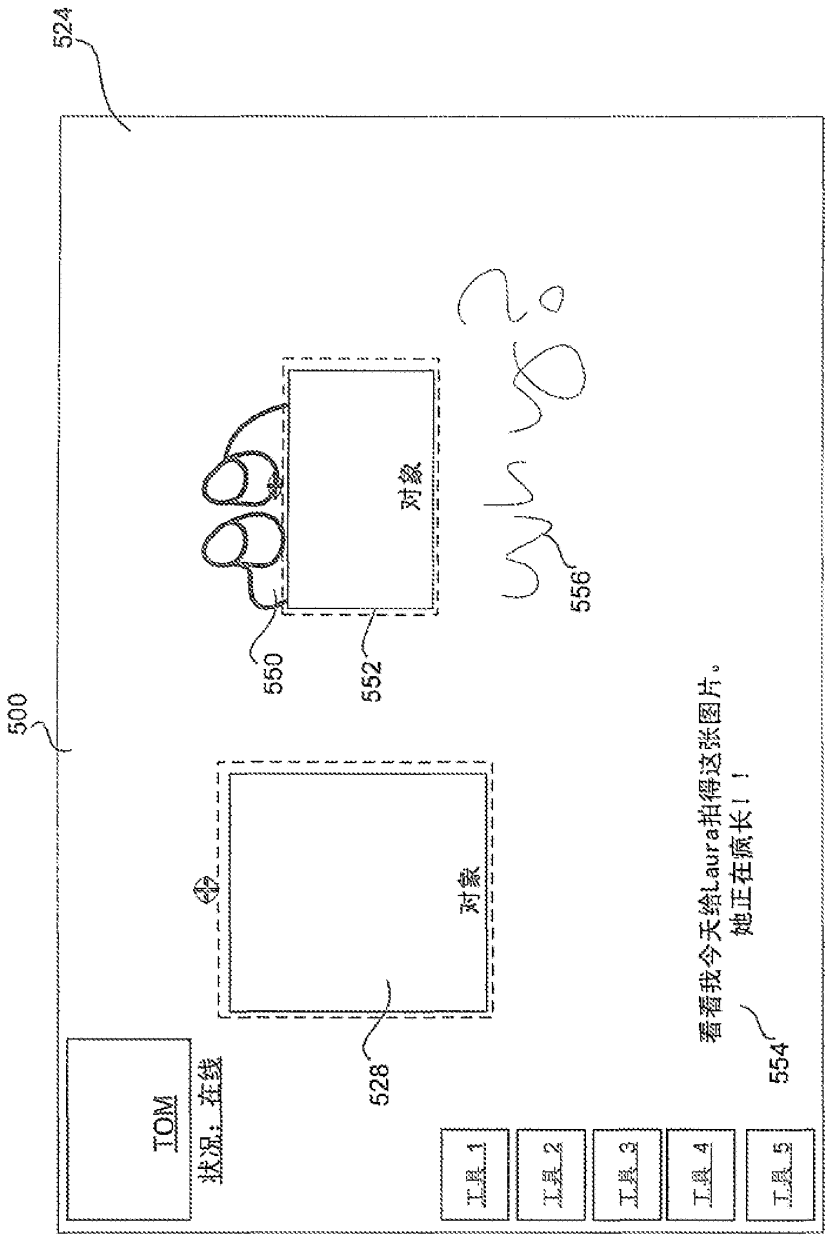

524
500
550
552
对象
556
528
对象
TOM
状况：在线
看看我今天给Laura拍得这张图片。
她正在疯长！！
554
工具_1
工具_2
工具_3
工具_4
工具_5

图 5I

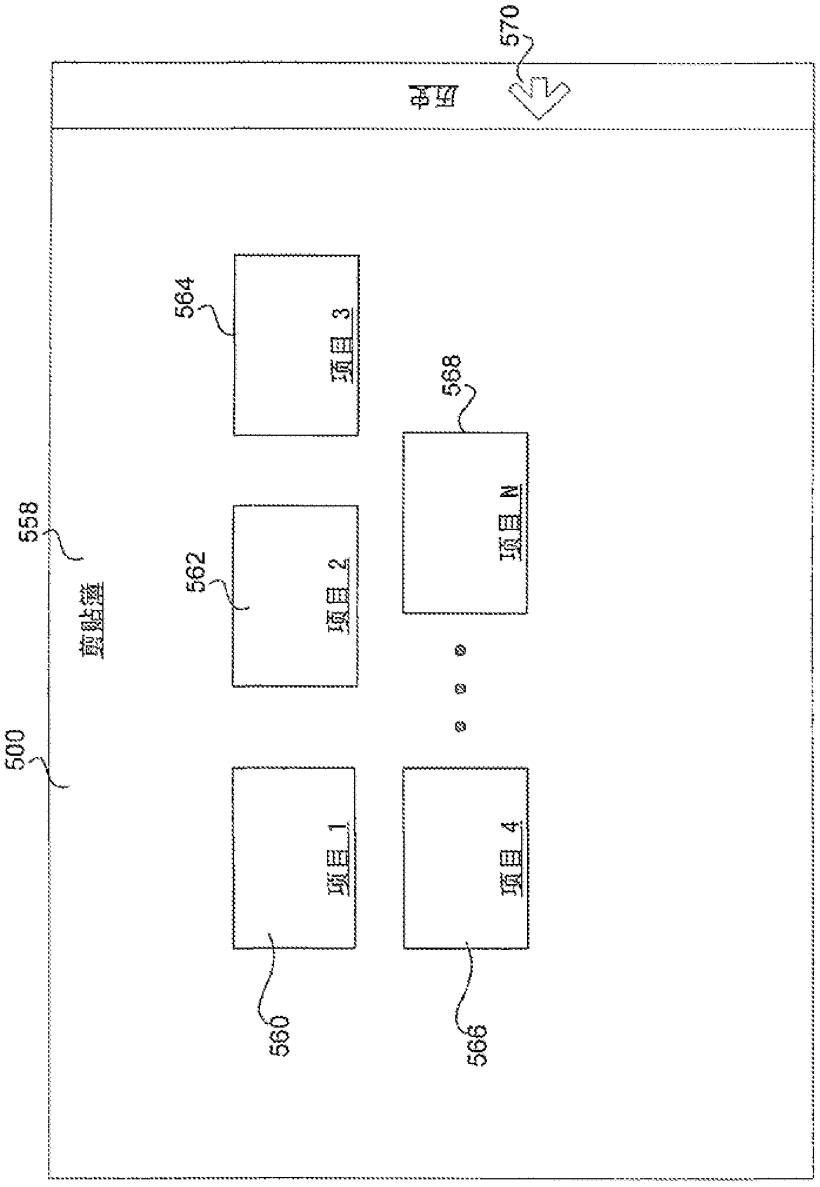


图 5J

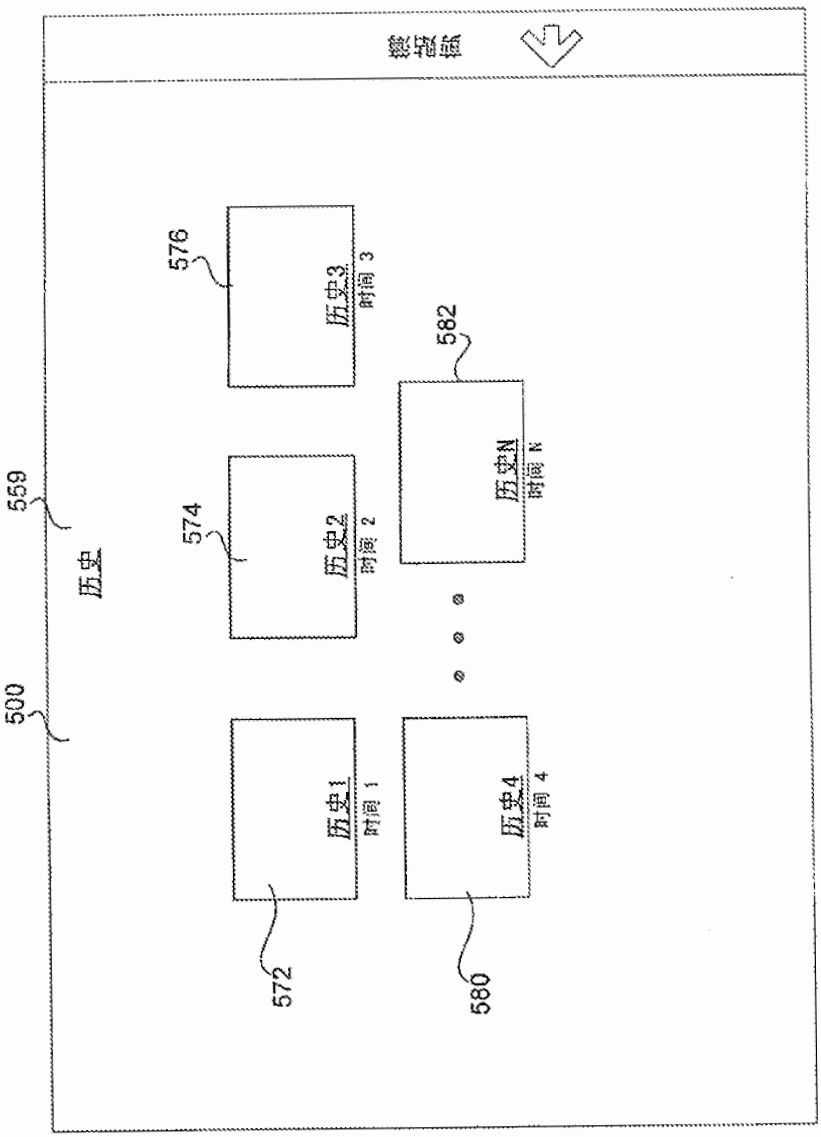

500
559
历史
576
历史3
时间 3
574
历史2
时间 2
582
历史N
时间 N
572
历史1
时间 1
580
历史4
时间 4

图 5K

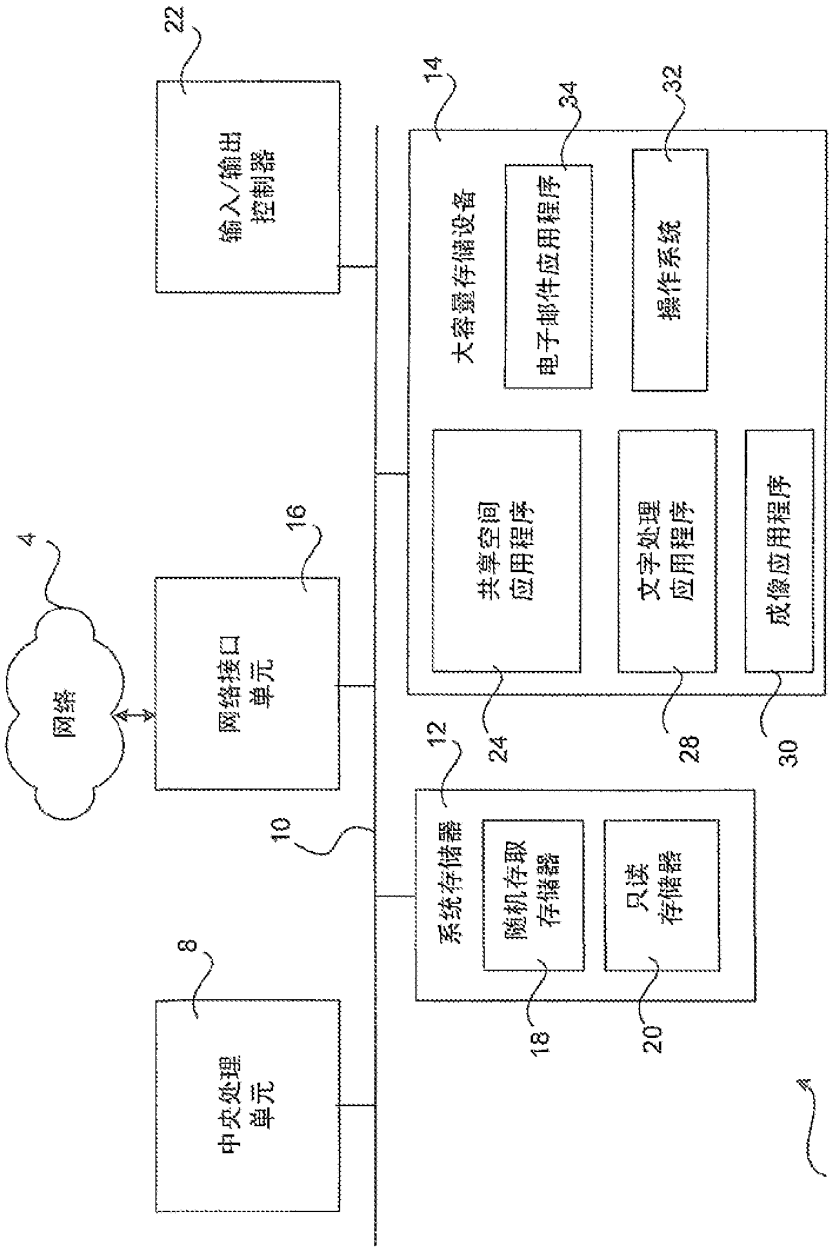

22
输入/输出
控制器
14
大容量存储设备
34
电子邮件应用程序
32
操作系统
共享空间
应用程序
文字处理
应用程序
成像应用程序
24
28
30
4
网络
16
网络接口
单元
12
系统存储器
随机存取
存储器
只读
存储器
18
20
10
8
中央处理
单元
2

图 6

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ABSTRACT CN101729850A

[1]

13 The invention discloses a video communication method based on handwriting characteristic data flow. In the process of video communication, all participants use the Soft Artboard as a collaboration platform. The handwriting feature parameters of their writing and drawing on the Soft Artboard are quickly collected, encoded into a handwriting feature data stream, and sent to remote clients in real time through the network. The remote terminal immediately decodes the received data, adjusts the decoded note feature parameters according to the difference in display resolution between the receiver and the sender, and draws corresponding graphics; remote participants can modify the graphics and Comment, his comments are also sent to the rest of the participants. The video communication based on the technical solution of the present invention only needs a very small network bandwidth to ensure clear, smooth and clear images during the conference, and greatly overcomes the problems of huge investment, high operating costs, complex algorithms and unclear images in the prior art. At the same time, it can achieve a deep level of communication and exchange between participants.

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DESCRIPTION CN101729850A

10 Video communication method and processing system based on handwriting feature data stream

[0001]

14 technical field

[0002]

18 The present invention relates to a video communication method and processing system based on handwriting feature data stream, in particular, the present invention relates to a video communication method in which handwriting feature parameters of a picture formed on a soft drawing board are used as video processing objects in a network environment A method and a processing system therefor.

[0003]

25 Background technique

[0004]

29 Various meetings occupy a lot of working time of the company's employees, and also cost the company a high cost.

31 How to effectively use the meeting time and save the expenses during the meeting has been paid more and more attention by enterprises as an effective means to increase productivity and save costs.

[0005]

36 Every business needs the free exchange of information and opinions to improve their products and services.

37 Effective communication and collaboration between people on and off the team can improve product quality,

improve product or project development lead times, and reduce costs. However, communicating quickly and effectively is often difficult to achieve, especially in multinational corporations. A key factor that hinders rapid and effective communication is often that people are geographically diverse. Often, people can spend large sums of money and days on the road for a one- or two-hour meeting, especially when there are cross-border or cross-continental conferences.

[0006]

46 To this end, there is an urgent need for a way to make it easy for stakeholders who are not in the same geographical location to participate in the meeting, express personal opinions and share the opinions of others in real time.

49 This is a video conferencing system. The current video conference system can be divided into two types: soft terminal and hard terminal. Although the video conference picture provided by the video conference system based on the hard terminal is clear and smooth, this kind of system is not only expensive in hardware equipment, but also requires a lot of bandwidth during the meeting, over LAN and ATM networks. This limits the wide application of this conference system. The Internet-based soft terminal video conferencing system uses a camera and a microphone as video and audio input devices. It usually takes up more than 400Kbps of bandwidth to transmit one channel of video and audio with a resolution of CIF. It is very difficult to meet such bandwidth everywhere in the Internet network, and many of these video conferencing products transmit several channels of video at the same time, or even a dozen channels of video, not to mention cross-border or cross-continental video conferences. Of course, some companies try to introduce some kind of technology to reduce the need for video conferencing bandwidth, such as: Patent No. CN1525300A, "System and Method for Real-time Whiteboard Streaming Technology"; Patent No. CN1555197A, "Internet-Based Video Conference Sharing Whiteboard Implementation Method"; Patent No. CN101005600A, "Conference System Using Whiteboard" and so on. However, none of these approaches inherently address the bandwidth requirements of video conferencing.

[0007]

67 The maturity of network technology provides the technical foundation for the development of network education.

69 At present, all regions and countries in the world pay attention to and intervene in virtual universities and online teaching models to varying degrees, but the development is extremely uneven. There are hundreds of universities around the world offering online teaching courses. 52.6% of these universities offering online courses are in North America, 23.9% in Europe, 10.6% in Oceania, 7.5% in Asia, 4.8% in Latin America and the Caribbean, and 0.6% in Africa. A key reason for this phenomenon is that the current network education relies on a large network bandwidth, and the global network resources are mainly distributed in North America.

[0008]

79 Also, in the current video conference or online class, it is very inconvenient (or not at all) for conference

participants or online class participants to modify the graphics displayed in the user window to feedback their different opinions, which is extremely limited. In-depth communication and communication with all meeting participants or class participants.

[0009]

86 SUMMARY OF THE INVENTION

[0010]

90 In order to overcome the deficiencies of the existing video communication technology, reduce the demand for network bandwidth for video communication as much as possible, and ensure that the picture is clear, smooth and clear during the video conference, the present invention abandons the traditional video communication technology. The processing method is adopted, and the processing method that takes the handwriting characteristic parameters when forming the picture as the processing object is adopted.

95 In the process of communication, all video communication participants use the Soft Artboard as a collaboration platform to express their own views and opinions by writing, drawing, or drawing on the Soft Artboard, so as to achieve in-depth discussions and exchanges; and , only a minimal network is required to ensure clear, smooth and clear sound during video conferences.

[0011]

102 In order to achieve the above-mentioned purpose, the technical scheme of the present invention is as follows: a video communication method based on handwriting characteristic data stream, the communication method involves two or more communication participants (for the convenience of discussion, in the present invention, send the The terminal that generates video communication data (that is, the terminal that generates the data) is called the local terminal, and the terminal that receives the video communication data is called the remote terminal). It is initialized on the soft artboard of these terminals, that is, only the background is displayed on the soft artboard of these terminals.

109 The soft drawing board mentioned in the present invention refers to a user window (also referred to as a user interface and a display window), which belongs to software.

111 When the local end detects that the user has penned, the local end immediately processes the data. The steps are as follows:

[0012]

118 A. Collect data: collect the handwriting feature parameters of local users when they write;

[0013]

120 B. Graphic drawing: that is, according to the collected handwriting characteristic parameters, the corresponding graphics are drawn on the soft drawing board;

[0014]

C. Data encoding: perform lossless encoding on the locally generated handwriting feature parameters, and process them into a handwriting feature data stream;

[0015]

D. Data sending: send the locally generated handwriting feature data stream to other remote terminals participating in this video communication through the network.

[0016]

When the remote end receives the handwriting feature data stream, it immediately performs corresponding processing. The processing steps are as follows:

[0017]

E. Data decoding: decode the received handwriting feature data stream to obtain handwriting feature parameters;

[0018]

F. Data pre-processing: If the resolution of the display screen of the receiving data terminal is different from that of the sending data terminal, the decoded note feature parameters need to be adjusted accordingly before drawing the graphics;

[0019]

G. Graphic drawing: draw corresponding graphics on its own soft drawing board according to the note feature parameters.

[0020]

If a remote participant has different opinions, he can modify the picture displayed on the soft artboard, then his communication device becomes the local end, and the terminals of other video communication participants become the remote end, and return to step A.

[0021]

Like drawing on an ordinary drawing board, the graphics on the soft drawing board are enriched with the increase of handwriting feature parameters during the communication period, that is, the present invention

adopts incremental drawing of graphics---when the handwriting feature parameters are received, the graphics increase accordingly. part, otherwise the graph will remain unchanged.

168 As can be seen from the above description, in the present invention, the local end and the remote end are opposite, and the local end generates data in the process of video communication. It not only needs to draw graphics according to the handwriting feature parameters generated locally, but also needs to encode the handwriting feature parameters into handwriting. The feature data stream is sent out in real time; the remote end immediately decodes the received handwriting feature data stream. If the resolution of its display screen is different from that of the sender (ie, the local end), it needs to be Adjust the decoded handwriting feature parameters accordingly, and draw the corresponding part of the graph; if the remote end modifies the graph displayed on the soft artboard, it becomes the local end, and the original local end becomes the remote end end.

[0022]

178 Another object of the present invention is to provide a video communication processing system based on handwriting feature data stream, video communication using the processing system requires only a very small network bandwidth to ensure clear picture, smoothness and clear sound during the video conference.

[0023]

184 In order to achieve this purpose, the technical solutions of the present invention are as follows: a video communication processing system based on handwriting feature data stream, the processing system involves two (or more than two) communication terminals, and is characterized in that all communication terminals include a collection The data module is used to collect the handwriting feature parameters of the local user when writing; the data encoding module is used to losslessly encode the locally generated handwriting feature parameters, and process them into a handwriting feature data stream; The feature data stream is sent to the other remote terminals participating in this video communication; the data receiving module receives the handwriting feature data stream transmitted from the far end of the network; the data decoding module decodes the received handwriting feature data stream to obtain the handwriting feature parameters; the data preprocessing module adjusts the decoded note feature parameters according to the difference between its own display screen resolution and the sender′ s screen resolution; the graphics drawing module draws the corresponding notes on the soft drawing board according to the note feature parameters graphics.

[0024]

199 The above-mentioned handwriting feature parameters are composed of three parameters, such as the coordinates of the point where the pen is touched, the pressure (level) of the pen at that time, and the color of the pen.

202 Without causing confusion, these three parameters will be referred to simply as coordinates, pressure levels, and colors, respectively.

204 The coordinates indicate a specific position of the pen tip in the picture when drawing; the pressure level indicates the pressure applied to the pen tip when drawing, and what is displayed on the picture is the

thickness of the handwriting or the concentration of the ink, or the width of the line; the color is the drawing color used in the process.

208 The present invention defines the combination of these three parameters (coordinates of the stroke point, the pressure (level) of the pen at that time, and the color of the pen) as the handwriting feature parameter, that is, the processing object in the present invention.

211 In the process of communication, the three components of the handwriting feature parameters are collected in real time, and the collected handwriting feature parameters are encoded in real time, that is, processed into a handwriting feature data stream, and the handwriting feature data stream is sent to the remote client through the network.

215 The remote client immediately decodes the received handwriting feature data stream to obtain the same handwriting feature parameters as the sender. After adjusting accordingly, a graph similar to that of the sender can be drawn.

218 Since the three components (coordinates, pressure level, and color) that make up the handwriting feature parameters are only slightly different, the drawn graphs will be very different, so the lossless encoding method is used when encoding the handwriting feature parameters, that is, The data before encoding is exactly the same as the data after decoding.

[0025]

225 The method according to the present invention has many advantages: 1) It discloses a very promising data processing method that takes the handwriting when forming the picture as the processing object, and this processing method greatly reduces the data volume of video communication. Small size, which greatly reduces the bandwidth requirements for video conferences or online classrooms, and saves the operating costs of enterprises or educational institutions; 2) At the same time, this processing method enables all participants to meet in the same conference room. 3) This processing method also overcomes the fact that participants in traditional video conferences or online classes can only listen and comment, but cannot modify the content in the window (such as traditional hardware conference systems) Or it is inconvenient and inaccurate to modify the content in the window (such as pure software conference system), which also makes the wide application of video conference system or network classroom system possible, and also saves labor costs and facilitates students; 4) Realization The complexity of the algorithm of the present invention is very low, which enables portable products (such as smart phones) with relatively low processor performance to become the video communication terminal equipment of the present invention.

[0026]

241 In addition to the above-mentioned advantages, other advantages of the present invention can be further manifested from the following detailed description in conjunction with the accompanying drawings.

[0027]

246 Description of drawings

[0028]

250 FIG. 1 is a typical communication system diagram of a video communication method and system based on handwriting feature data flow.

[0029]

255 FIG. 2 is a process diagram of processing handwriting feature parameters during video communication of the video communication method and system based on the handwriting feature data stream.

[0030]

260 3a and 3b are flowcharts of encoding and decoding handwriting feature parameters in a direct manner.

[0031]

264 Fig. 4a and Fig. 4b are flowcharts of encoding and decoding handwriting feature parameters using a difference method.

[0032]

269 Fig. 5a and Fig. 5b are the encoding and decoding processes of the combination of the coordinate increment and the pressure level increment as the encoding object of the lossless encoding.

[0033]

274 Fig. 6a and Fig. 6b are respectively the encoding and decoding flow of the encoding object of lossless encoding with coordinate increment and pressure level increment.

[0034]

279 FIG. 7a and FIG. 7b show the encoding and decoding flow of the encoding target of the lossless encoding as the acceleration amount.

[0035]

284 detailed description

[0036]

288 In the following description of the preferred embodiments of the invention, reference is made to the accompanying drawings, which are incorporated in and constitute a part of the specification, and which

illustrate specific embodiments in which the invention may be employed.

291 It will be understood by those skilled in the art that other embodiments may be used or modified without departing from the spirit of the present invention.

293 None of this goes beyond the scope of the present disclosure.

[0037]

297 1、Model work environment

[0038]

301 A video communication method and system based on handwriting feature data flow generally has a server in a network-based environment and a plurality of client terminals arranged in the network-based environment.

303 Client terminals may be (but are not limited to) personal computers, server computers, hand-held or laptop devices, multiprocessor systems, microprocessor-based systems, set-top boxes, smart phones, tablet PCs, network PCs, microcomputers, mainframes computers, distributed computing environments including any of the above systems and devices.

307 Some of these client terminals have only basic configuration, and they can only play audio, video and recording.

309 Others are equipped with advanced equipment, such as projectors, coordinate detectors, etc. The coordinate detectors include (but are not limited to) electronic drawing boards, electronic whiteboards, mouse pens, and the like.

312 When participating in a video conference or an online class, the handwriting feature parameters drawn by the user using the coordinate detector on the soft drawing board are collected and processed into a handwriting feature data stream.

315 These handwriting feature data streams are sent to the server in real time through the network, and the server forwards the received data to the client terminals (such as PCs, smart phones, etc.) of the participants in remote video conferences or online classes, and their The coordinate detector modifies the content on the soft artboard, and the parts they add are also processed into handwriting feature data streams and sent back in the same way to the client terminals of remote participants, while in the progress of the meeting or class. They can express their opinions orally, and these oral opinions are captured by the audio capture device, compressed and encoded into an audio stream, and sent to the terminals of other participants in the same or similar way.

[0039]

326 Typical solutions of such a system include company video conferences and online classrooms opened by educational institutions (for the convenience of discussion, video conferences will be used as an example to illustrate).

329 As shown in FIG. 1 , the video conference involves L people gathered in the meeting room 101 at place A, N people gathered in the meeting room 102 at place B, and M scattered remote users 104a-104m.

331 L people gathered in the conference room 101 are equipped with an electronic drawing board (which is an

input device) 111, a microphone device 112 for capturing conference audio, a projector 115, a personal computer 114, and a speaker 113 mounted on the microphone device, and the personal computer 114 is connected to the network connection 103 of the server 100 in the Internet network environment.

335 The equipment of the N people gathered in the meeting room 102 is similar to the equipment of the L people gathered in the meeting room 101, except that the coordinate detector equipped is an electronic whiteboard instead of an electronic drawing board.

338 M video conference participants distributed elsewhere can be in the office, at home, and possibly on a business trip.

340 They are equipped with personal terminals (such as personal PCs, laptops, smart phones, etc.), headphones with microphones, coordinate detectors (such as drawing pads, mouse pen, etc.), and a network connection capable of connecting to the server 100 .

343 All the people attending the meeting use the soft artboard as a collaborative space, and share their opinions by using the coordinate detector to write and draw on the soft artboard.

[0040]

348 2、Video communication method based on handwriting feature data stream.

[0041]

352 As shown in Figure 2, when the video conference participant X uses the coordinate detector to write and draw a picture on the soft drawing board (that is, the pen), the local end immediately processes the data, and the steps are as follows:

[0042]

358 Step 211, collecting data: collecting the handwriting feature parameters of the local user when writing;

[0043]

362 Step 212, graphic drawing: that is, draw a corresponding graphic on the soft drawing board according to the collected handwriting feature parameters;

[0044]

367 Step 213, data encoding: carry out lossless encoding to the handwriting feature parameters generated locally, and process them into handwriting feature data streams;

[0045]

372 Step 214, data sending: send the locally generated handwriting feature data stream to other remote terminals participating in this video communication through the network.

[0046]

377 Another video conference participant Y is located at the network remote terminal, when the remote terminal receives the handwriting feature data stream (221), it immediately makes corresponding processing, and the processing steps are as follows:

[0047]

383 Step 222, data decoding, decoding the received handwriting feature data stream to obtain handwriting feature parameters;

[0048]

388 Step 223, data preprocessing, if the resolution of the display screen of the receiving data terminal is different from the resolution of the display screen of the sending data terminal, then it is necessary to make corresponding adjustments to the decoded note feature parameters before drawing the graphics;

[0049]

394 Step 224, drawing a graph, drawing a corresponding graph on its own soft drawing board according to the note feature parameters.

[0050]

399 If a remote communication participant has different opinions, he can modify the picture displayed on the soft artboard, then his communication device becomes the local end, and the terminals of other video communication participants become the remote end, and returns to step 211 .

[0051]

405 Of course, it is better to use different colors when different people modify the graphics on the soft drawing board, so as to remind all video conference or online class participants that new content is being or has been input on the drawing board.

[0052]

411 During the video communication, what they say is captured by a recording device, encoded into an audio stream and sent to the endpoints of the remote meeting participants.

413 After receiving the audio stream, the remote client terminal invokes the corresponding audio decoder to decode it into audio data, and plays it out through headphones and speakers.

[0053]

418 3.How handwriting data is handled

[0054]

422 When the customer writes and draws on the soft drawing board, the method of obtaining the handwriting feature parameters is as follows: the coordinates may include (but not limited to) the coordinates of the electronic pen on the drawing board or the handwriting board, the coordinates of the pen on the electronic whiteboard, the coordinates of the mouse pen on the The coordinates displayed on the computer screen, or the coordinates displayed by the mouse on the computer screen; the pressure level includes (but is not limited to) the pressure (level) collected by the sensor when drawing with the drawing board, or obtained in the program and related to the thickness of the line. Commands; colors include (but are not limited to) colors collected by sensors during drawing or commands representing colors, or commands obtained in a program that are related to colors.

431 In order to correctly process the handwriting feature data received by the terminal of the video conference participant to draw a graph similar to that of the sender on the soft drawing board and reduce the amount of transmitted data, the handwriting feature parameters need to be encoded.

[0055]

437 3.1、Handwriting Feature Parameter Coding and Decoding Method 1

[0056]

441 The simplest way to encode the handwriting feature parameters is to directly encapsulate the coordinates, pressure levels and colors that make up the handwriting feature parameters into a handwriting feature data stream. The processing flow is shown in Figure 3.

444 For the convenience of processing, the data read into the input buffer each time is all the handwriting feature parameters of a stroke, that is, all the handwriting feature parameters from the moment when the pen is started to the moment when the pen is started, and the pressure level at any time during this period is not equal to 0.

448 The encoding process is shown as 300 in FIG. 3 .

449 At the beginning, the value of the count variable i is 1. Assuming that the number of read handwriting feature parameters is FrameLen, the detailed processing steps are as follows:

[0057]

454 Step 301, read data: read all the handwriting feature parameters of a stroke and put them into the input buffer;

[0058]

458 Step 302, output start code: in order to be able to judge that the data received at the beginning of the decoding is the handwriting feature parameter when the pen was just started, put the start code Start_Code into the output at the beginning of the handwriting feature data stream of a stroke, in the cache;

[0059]

464 Step 303, output color: during one stroke, the color of the handwriting is unchanged, so only one color value needs to be put into the output buffer in the handwriting feature data stream of one stroke;

[0060]

469 Step 304, output coordinates and pressure level: read out the coordinates Z(i) and pressure level F(i) of the i-th handwriting feature parameter and put them into the output buffer;

[0061]

474 Step 305, add 1 to the counting variable: i=1+i;

[0062]

478 Step 306, end judgment: if i<FrameLen+1, go to step 304 to continue processing, otherwise, execute the following steps;

[0063]

483 Step 307, output end code: in order to be able to judge the end of the handwriting feature data stream during decoding, put the end code End_Code behind all the data in the output buffer;

[0064]

488 Step 308: Output all the handwriting feature data streams from the start code Start_Code and the end code End_Code in the output buffer, and the encoding ends.

[0065]

493 After the remote client receives the handwriting feature data, the processing flow is 320 in FIG. 3 .

494 At the beginning of decoding, the value of the count variable i is 0, and the detailed steps of decoding are as follows:

[0066]

499 Step 321, read data: read all the handwriting feature data streams of one stroke and put them into the input

buffer;

[0067]

504 Step 322, remove the start code: remove the start code Start_Code at the beginning of the handwriting feature data stream;

[0068]

509 Step 323, read the color: after removing the start code Start_Code, the color C of the handwriting can be directly obtained;

[0069]

514 Step 324, read the coordinates and pressure level: read the coordinate Z(i) and pressure level F(i) of the i-th handwriting feature parameter;

[0070]

519 Step 325, end judgment: if End_Code is equal to the combination Z(i)F(i) of the coordinate and pressure level just read out, it means that the code stream has been decoded, and then step 329 is executed, otherwise step 326 is executed;

[0071]

525 Step 326, construct handwriting feature parameters S(i): S(i)={Z(i), F(i), C}

[0072]

529 Step 327, output data: put the handwriting feature parameter S(i) into the output buffer;

[0073]

533 Step 328, add 1 to the count variable: i=1+i; and go to step 324 to continue execution.

[0074]

537 Step 329, output data: output all the handwriting feature parameters in the output buffer, and the decoding ends.

[0075]

542 3.2、Handwriting feature parameter encoding and decoding method 2

[0076]

546 During a stroke, the sampling values of the two consecutive handwriting feature parameters not only do not change the color, but also usually have a small difference between the coordinates and the pressure level, so it only needs less bits to complete the handwriting feature parameters. coding.

549 At the beginning of encoding, the initialization parameters are i=0, Z(0)=F(0)=0.

550 Each time the data read into the input buffer is all the handwriting feature parameters of a single stroke. Assuming that the number of read handwriting feature parameters is FrameLen, the encoding process is shown as 400 in Figure 4:

[0077]

556 Step 401, read data: read all the handwriting feature parameters of a stroke and put them into the input buffer;

[0078]

560 Step 402, output start code: put the start code Start_Code into the output buffer at the beginning of the handwriting characteristic data stream of a stroke;

[0079]

565 Step 403, output color: send the color value of the pen to the output buffer;

[0080]

569 Step 404, add 1 to the counting variable: i=1+i;

[0081]

573 Step 405, increment calculation: read the coordinate Z(i) and pressure level F(i) of the i-th handwriting characteristic parameter, and calculate the coordinate increment and pressure level increment respectively, that is,

[0082]

579 $\Delta Z(i)=Z(i)-Z(i-1)$

[0083]

583 $\Delta F(i)=F(i)-F(i-1)$

[0084]

Step 406, incremental output: put $\Delta Z(i)$ and $\Delta F(i)$ into the output buffer.

[0085]

Step 407, end judgment: if i<FrameLen+1, go to step 404 to continue processing, otherwise, execute the following steps;

[0086]

Step 408, output end code: put the end code End_Code behind all the data in the output buffer;

[0087]

Step 409, output data: output all the handwriting feature data streams from the start code Start_Code and the end code End_Code in the output buffer, and the encoding ends.

[0088]

At the beginning of decoding, the initialization parameters are i=0, Z(0)=F(0)=0, the decoding process is 420 in the figure, and the detailed steps are as follows:

[0089]

Step 421, read data: read all the handwriting feature data streams of a stroke and put them into the input buffer;

[0090]

Step 422, remove the start code: remove the start code Start_Code at the beginning of the handwriting feature data stream;

[0091]

Step 423, read the color: directly obtain the color C of this handwriting after removing the start code Start_Code;

[0092]

Step 424, add 1 to the count variable: i=1+i;

[0093]

Step 425, read increment: read the coordinate increment $\Delta Z(i)$ and pressure level increment $\Delta F(i)$ of the i-th handwriting characteristic parameter;

[0094]

Step 426, end judgment: if End_Code is equal to the combination $\Delta Z(i)\ \Delta F(i)$ of $\Delta Z(i)$ and $\Delta F(i)$ just read out, it means that the code stream has been decoded, and then step 430 is executed, otherwise, step 430 is executed. 427;

[0095]

Step 427: Calculate the coordinates and pressure level: Calculate the coordinates and pressure level according to the read coordinate increment and pressure level increment:

[0096]

$Z(i)=Z(i-1)+\Delta Z(i)$

[0097]

$F(i)=F(i-1)+\Delta F(i)$

[0098]

Step 428: Construct handwriting feature parameters S(i): $S(i)=\{Z(i), F(i), C\}$

[0099]

Step 429, output data: put the handwriting feature parameter S(i) into the output buffer, and go to step 424 to continue execution;

[0100]

Step 430, output data: output all the handwriting feature parameters in the output buffer, and the decoding ends.

[0101]

3.3、Handwriting feature parameter encoding and decoding method 3

[0102]

671 In order to further reduce the bit rate of the handwriting feature data stream, the lossless encoding algorithm is used to encode the combination $\{\Delta Z(i)\ \Delta F(i)\}$ of the coordinate increment and the pressure level increment based on the incremental encoding in Section 2.2, can achieve this purpose.

674 The encoding process is shown as 500 in Figure 5. The object of lossless encoding is the combination of coordinate increment and pressure level increment $\{\Delta Z(i)\ \Delta F(i)\}$. The detailed encoding process is as follows:

[0103]

680 Step 501, read data: read all the handwriting feature parameters of a stroke and put them into the input buffer;

[0104]

684 Step 502, output start code: put the start code Start_Code into the output buffer;

[0105]

688 Step 503, output color: send the color value of the pen to the output buffer;

[0106]

692 Step 504, output the DC component: put the coordinates and pressure level of the first handwriting feature parameter into the output buffer;

[0107]

697 Step 505, increment calculation and combination: read the coordinate Z(i) and pressure level F(i) of the i-th handwriting characteristic parameter, and calculate the coordinate increment and pressure level increment respectively, that is,

[0108]

703 $\Delta Z(i)=Z(i)-Z(i-1)$

[0109]

707 , $(2\leqslant i\leqslant FrameLen)$

[0110]

ΔF(i)=F(i)-F(i-1)

[0111]

The incremental combination X(i) is X(i)={ΔZ(i), ΔF(i)};

[0112]

Step 506, lossless encoding: use a lossless encoding algorithm to encode the incremental combination X(i);

[0113]

Step 507, output code stream: put the code stream obtained through lossless encoding into the output buffer;

[0114]

Step 508, output end code: put the end code End_Code behind all the data in the output buffer;

[0115]

Step 509, output data: output all the handwriting feature data streams from the start code Start_Code and the end code End_Code in the output buffer, and the encoding ends

[0116]

The decoding process is shown as 520 in Figure 5, and the detailed steps are as follows:

[0117]

Step 521, read data: read all the handwriting feature data streams of one stroke and put them into the input buffer;

[0118]

Step 522, remove the start code: remove the start code Start_Code at the beginning of the handwriting feature data stream;

[0119]

Step 523, read the color: directly obtain the color C of this handwriting after removing the start code Start_Code;

[0120]

Step 524, read the DC component: read the coordinate Z(1) and the pressure level F(1) of the first sample of the handwriting characteristic parameter;

[0121]

Step 525, read code stream: read all lossless encoded code streams;

[0122]

Step 526, lossless decoding: decode the lossless encoded code stream;

[0123]

Step 527, data restoration: Calculate the coordinates and pressure levels according to the decoded coordinate increments, pressure level increments and mass components, and combine the handwriting feature parameters S(i):

[0124]

S(i)={Z(i), F(i), C}

[0125]

in

[0126]

$Z(i)=Z(i-1)+\Delta Z(i)$

[0127]

, $(2\leqslant i\leqslant FrameLen)$

[0128]

$F(i)=F(i-1)+\Delta F(i)$

[0129]

794 Step 528, output data: output all the handwriting feature parameters in the output buffer, and the decoding ends.

[0130]

799 The lossless compression algorithm adopted in the present invention includes (but is not limited to) LZ77 encoding, LZMA encoding, LZW encoding, Huffman encoding, arithmetic encoding, ADPCM, exponential Golomb encoding, run-length encoding, DEFLATE encoding, and ABO encoding.

802 These algorithms are all classical algorithms and will not be discussed here.

[0131]

806 3.4、Handwriting feature parameter encoding and decoding method 4

[0132]

810 In general, encoding the individual objects in a composite object sequentially reduces the bitrate of the bitstream even further.

812 To this end, the encoding algorithm in Section 2.3 can be improved.

813 The encoding process of the improved algorithm is shown as 600 in Figure 6, and the detailed encoding process is as follows:

[0133]

818 Step 601, read data: read all the handwriting feature parameters of a stroke and put them into the input buffer;

[0134]

822 Step 602, output start code: put the start code Start_Code into the output buffer;

[0135]

826 Step 603, output color: send the color value of the pen to the output buffer;

[0136]

830 Step 604, output the DC component: put the coordinates and pressure level of the first handwriting feature parameter into the output buffer;

[0137]

835 Step 605, component separation and increment calculation: read the coordinates Z(i) and pressure level F(i)

of the remaining trace feature parameters, and calculate the coordinate increment series {ΔZ(i): 2≤i≤FrameLen} and pressure level increment series {ΔF(i): 2≤i≤FrameLen};

[0138]

Step 606, lossless encoding of coordinate increments: use a lossless encoding algorithm to encode coordinate increments {ΔZ(i): 2≤i≤FrameLen};

[0139]

Step 607, coordinate code stream output: put the coordinate code stream obtained through lossless encoding into the output buffer;

[0140]

Step 608, output end code: put the end code End_Code into the output buffer;

[0141]

Step 609, lossless encoding of pressure level increments: perform lossless encoding on pressure level increments {ΔF(i): 2≤i≤FrameLen};

[0142]

Step 610, output the pressure level code stream: put the pressure level code stream into the output buffer;

[0143]

Step 611, output end code: put the end code End_Code into the output buffer;

[0144]

Step 612, output data: output all the handwriting feature data streams in the output buffer, and end the encoding.

[0145]

The decoding process is shown as 620 in Figure 6, and the detailed steps are as follows:

[0146]

Step 621, read data: read all the handwriting feature data streams of a stroke and put them into the input

buffer;

[0147]

Step 622, remove the start code: remove the start code Start_Code at the beginning of the handwriting feature data stream;

[0148]

Step 623, read the color: directly obtain the color C of this handwriting after removing the start code Start_Code;

[0149]

Step 624, read the DC component: read the coordinate Z(1) and the pressure level F(1) of the first sample of the handwriting feature parameter;

[0150]

Step 625, read coordinate code stream: read all coordinate code streams;

[0151]

Step 626, lossless decoding: decode the coordinate code stream;

[0152]

Step 627, coordinate data restoration: calculate the coordinate series {Z(i): 1≤i≤FrameLen} according to the decoded coordinate increment and the DC component of the coordinate;

[0153]

Step 628, read the pressure level code stream: read all pressure level code streams;

[0154]

Step 629, lossless decoding: decode the pressure-level code stream;

[0155]

Step 630, restore pressure level data: calculate the pressure level series {F(i): 1≤i≤FrameLen} according to the pressure level increment obtained by decoding and the DC component of the pressure level;

[0156]

923 Step 631: Restoration and output of handwriting parameters: according to color C, coordinate series {Z(i): 1≤i≤FrameLen}, pressure level series {F(i): 1≤i≤FrameLen}, synthesize the handwriting feature parameter series {S (i): 1≤i≤FrameLen} and output, and end decoding.

[0157]

929 3.5、Handwriting Feature Parameter Coding and Decoding Method 5

[0158]

933 In general, the acceleration amount is smaller than the incremental change. Therefore, taking the acceleration amount as the encoding object will further reduce the bit rate of the handwriting feature parameter code stream.

936 The encoding process is shown in Figure 7, which is an improvement of Embodiment 4. The detailed process is as follows:

[0159]

941 Step 701, read data: read all the handwriting feature parameters of a stroke and put them into the input buffer;

[0160]

945 Step 702, output start code: put the start code Start_Code into the output buffer;

[0161]

949 Step 703, output color: send the color value of the pen to the output buffer;

[0162]

953 Step 704, calculation of increment and acceleration: respectively calculate the x-direction increment { Δ X(i)} and acceleration { δ X(i)} of the coordinates; the y-direction increment { Δ Y(i)} and acceleration { δ Y(i)}; and the pressure level increment { Δ F(i)} and acceleration { δ F(i)}, calculated as follows:

[0163]

959 Δ X(i)=X(i)-X(i-1)

[0164]

$\Delta Y(i)=Y(i)-Y(i-1)$, $(2\leqslant i\leqslant FrameLen)$

[0165]

$\Delta F(i)=F(i)-F(i-1)$

[0166]

in

[0167]

$\delta X(i)=\Delta X(i)-\Delta X(i-1)$

[0168]

$\delta Y(i)=\Delta Y(i)-\Delta Y(i-1)$, $(3\leqslant i\leqslant FrameLen)$

[0169]

$\delta F(i)=\Delta F(i)-\Delta F(i-1)$

[0170]

Step 705, output the DC component: put the coordinates and pressure level of the first handwriting feature parameter into the second coordinate increment ($\Delta X(2)$, $\Delta Y(2)$), the second pressure level increment $\Delta F(2)$ in the output cache;

[0171]

Step 706, acceleration lossless encoding: use a lossless encoding algorithm to encode the acceleration volume series $\{\delta X(i)\}$, $\{\delta Y(i)\}$ and $\{\delta F(i)\}$ respectively, to obtain the acceleration flow;

[0172]

Step 707, code stream output: according to the X, Y directions of the coordinates, and the pressure level sequence, put the code stream obtained through the lossless encoding into the output buffer, and separate them with the end code End_Code;

[0173]

1004 Step 708, output data: output all the handwriting feature data streams in the output buffer, and end the encoding.

[0174]

1009 The decoding process is shown as 720 in Figure 7, and the detailed steps are as follows:

[0175]

1013 Step 721, read data: read all the handwriting feature data streams of a stroke and put them into the input buffer;

[0176]

1018 Step 722, remove the start code: remove the start code Start_Code at the beginning of the handwriting feature data stream;

[0177]

1023 Step 723, read the color: directly obtain the color C of the handwriting after removing the start code Start_Code;

[0178]

1028 Step 724, read the DC component: read the coordinate Z(1) and the pressure level F(1) of the first sample of the handwriting characteristic parameter;

[0179]

1033 Step 725, read the code stream: read out all the acceleration streams;

[0180]

1037 Step 726, lossless decoding: decode the read acceleration flow;

[0181]

1041 Step 727: Formation of handwriting feature parameters: Calculate the X-direction series {X(i)}, Y-direction series {Y(i)}, pressure and series {F (i)}; and combine the handwriting feature parameters S(i):

[0182]

1046 S(i)={Z(i), F(i), C}, (1≤i≤FrameLen)

[0183]

1050 where Z(i)={X(i), Y(i)}.

1051 and

[0184]

1055 X(i)=X(i-1)+ΔX(i)

[0185]

1059 Y(i)=Y(i-1)+ΔY(i), (2≤i≤FrameLen)

[0186]

1063 F(i)=F(i-1)+ΔF(i)

[0187]

1067 in

[0188]

1071 ΔX(i)=ΔX(i-1)+δX(i)

[0189]

1075 ΔY(i)=ΔY(i-1)+δY(i), (3≤i≤FrameLen)

[0190]

1079 ΔF(i)=ΔF(i-1)+δF(i)

[0191]

1083 Step 728, output data: output all the handwriting feature parameters in the output buffer, and the decoding ends.

[0192]

1088 4、Content preservation

[0193]

1092 All content of the entire conference (including graphics on the softboard, oral comments, images and videos) are saved for future reference.

1094 In this way, the participants of the video communication can review the meeting in their free time.

1095 In addition, those who are unable to participate can view the video communication at a later time.

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CLAIMS CN101729850A

1.

13 A video communication method based on handwriting feature data flow, the communication method involves two or more communication participants (wherein the terminal that sends video communication data, that is, the terminal that collects data is called the local end, and the video The terminal that communicates data is called the remote terminal), which is characterized in that the processing method of taking the handwriting characteristic parameters when forming the picture as the processing object is adopted. During the video communication, when it is detected that the user is writing, the local terminal immediately processes the data. , the steps are as follows:

20 A. Collect data: collect the handwriting feature parameters of local users when they write;

21 B. Graphic drawing: that is, according to the collected handwriting characteristic parameters, the corresponding graphics are drawn on the soft drawing board;

23 C. Data encoding: perform lossless encoding on the locally generated handwriting feature parameters, and process them into a handwriting feature data stream;

25 D. Data sending: send the locally generated handwriting feature data stream to the other remote terminals participating in this video communication through the network;

27 When the remote end receives the handwriting feature data stream, it immediately performs corresponding processing. The processing steps are as follows:

29 E. Data decoding: decode the received handwriting feature data stream to obtain handwriting feature parameters;

31 F. Data preprocessing: If the resolution of the display screen of the receiving data terminal is different from the resolution of the display screen of the sending data terminal, it is necessary to make corresponding adjustments to the decoded note feature parameters before drawing the graphics;

34 G. Graphic drawing: draw corresponding graphics on its own soft drawing board according to the note feature parameters.

2.

39 The video communication method based on handwriting feature data stream as claimed in claim 1, characterized in that when the video communication starts, the soft artboards of all video communication participants are initialized first, that is, only backgrounds are presented on these soft artboards.

3.

45 The video communication method based on handwriting feature data stream as claimed in claim 1, characterized in that the graph is incrementally drawn during the communication, that is, when the handwriting feature parameter is received, the graph of the added part is drawn, otherwise the graph will remain constant.

4.

52 The video communication method based on handwriting feature data stream as claimed in claim 1, wherein the handwriting feature parameter is composed of three parameters: the coordinates of the point where the pen is touched, the pressure (level) of the pen at that time, and the color of the pen.

5.

58 A video communication processing system based on handwriting feature data stream, the processing system involves two (or more than two) communication terminals (wherein the terminal that sends video communication data, that is, the terminal that collects data is called the local terminal, and the receiving terminal is called the local terminal. The terminal to the video communication data is called the remote terminal), and it is characterized in that all communication terminals include a data acquisition module, which is used to collect the handwriting characteristic parameters of the local user when writing; the data encoding module, which performs lossless on the handwriting characteristic parameters produced locally, encoding and processing them into handwriting feature data streams; data sending module, sending the locally generated handwriting feature data streams to the other remote ends participating in this video communication through the network; data receiving module, receiving the handwriting features from the remote end of the network Data stream; the data decoding module decodes the received handwriting feature data stream to obtain handwriting feature parameters; the data preprocessing module interprets the decoded notes according to the difference between its own display screen resolution and that of the sender ' s screen. The feature parameters are adjusted accordingly; the graphics drawing module draws the corresponding graphics on the soft drawing board according to the note feature parameters.

6.

76 The video communication processing system based on the handwriting feature data stream as claimed in claim 5, wherein the graphic drawing module adopts incremental drawing, that is, when the handwriting feature parameters are received, the graphic of the added part is drawn, otherwise the graphic will be constant.

7.

The video communication processing system based on the handwriting feature data stream as claimed in claim 5, wherein the handwriting feature parameter is composed of three parameters: the coordinates of the point where the pen is touched, the pressure (level) of the pen at that time, and the color of the pen.

(19)中华人民共和国国家知识产权局

(12)发明专利申请

(10)申请公布号 CN 101729850 A
(43)申请公布日 2010.06.09

(21)申请号 200810201108.1

(22)申请日 2008.10.13

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(51)Int.Cl.
H04N 7/15(2006.01)
G06F 3/033(2006.01)

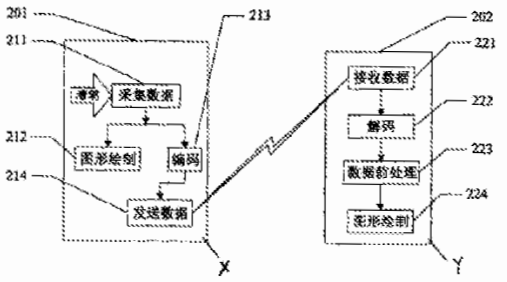
权利要求书 1 页 说明书 11 页 附图 10 页

(54)发明名称

基于笔迹特征数据流的视频通信方法及其处理系统

(57)摘要

本发明公开了一种基于笔迹特征数据流的视频通信方法。在视频通信的过程中，所有参与者以软画板为协作平台，他们在软画板上写字、绘画时的笔迹特征参数被迅速采集，编码成笔迹特征数据流并通过网络实时发送给远程客户端，远程终端立即对收到数据进行解码，根据接收端与发送端的显示屏分辨率的差异对解码出来的笔记特征参数作相应的调整，并绘制出相应的图形；远程参与者可以对图形进行修改和评述，他的意见也被发送给其余参与者。基于本发明技术方案的视频通信只需要极小的网络带宽就能保证会议期间画面清晰、流畅和声音清晰，极大地克服了现有技术的投资巨大、运营成本高、算法复杂、画面不清晰的缺点，同时能让参与者间达到深层次的沟通和交流。



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1. 一种基于笔迹特征数据流的视频通信方法，该通信方法涉及两方或者两方以上通信参与者（其中发送视频通信数据的终端，也即收集数据的终端被称为本地端，而收到视频通信数据的终端被称为远程端），其特征在于，采用了把形成画面时的笔迹特征参数作为处理对象的处理方式，在视频通信期间，当检测到用户着笔时，本地端立即进行处理数据，其步骤如下：

A、采集数据：收集本地用户着笔时的笔迹特征参数；

B、图形绘制：即根据采集到的笔迹特征参数在软画板上绘制出相应的图形；

C、数据编码：对本地产生的笔迹特征参数进行无损编码，把它们处理成笔迹特征数据流；

D、数据发送：通过网络把本地产生的笔迹特征数据流发送给其余参加本次视频通信的远程终端；

远程端接收到笔迹特征数据流时立即做出相应处理，处理步骤如下：

E、数据解码：对收到的笔迹特征数据流进行解码，以得到笔迹特征参数；

F、数据前处理：如果收到数据终端的显示屏的分辨率与发送数据终端的显示屏分辨率的不同，则在绘制图形前需要对解码出来的笔记特征参数作相应的调整；

G、图形绘制：根据笔记特征参数在自身的软画板上绘制出相应图形。

2. 如权利要求 1 所述的基于笔迹特征数据流的视频通信方法，其特征在于在视频通信开始时，首先要对所有视频通信参与者的软画板进行初始化，即这些软画板上只呈现背景。

3. 如权利要求 1 所述的基于笔迹特征数据流的视频通信方法，其特征在于在通信期间采用增量式绘制图形，即当收到笔迹特征参数时，才绘制增加部分的图形，否则图形将保持不变。

4. 如权利要求 1 所述的基于笔迹特征数据流的视频通信方法，其特征在于笔迹特征参数由着笔时着笔点的坐标、笔当时的压力（级）、笔的颜色三个参数组成。

5. 一种基于笔迹特征数据流的视频通信处理系统，该处理系统涉及两个（或者两个以上）通信终端（其中发送视频通信数据的终端，也即收集数据的终端被称为本地端，而收到视频通信数据的终端被称为远程端），其特征在于所有通信终端均包含采集数据模块，用于收集本地用户着笔时的笔迹特征参数；数据编码模块，对本地产生的笔迹特征参数进行无损编码，把它们处理成笔迹特征数据流；数据发送模块，通过网络把本地产生的笔迹特征数据流发送给其余参加本次视频通信的远程端；数据接收模块，接收网络远程端传来的笔迹特征数据流；数据解码模块，对收到的笔迹特征数据流进行解码，以得到笔迹特征参数；数据前处理模块，根据本身的显示屏分辨率与发送端的显示屏分辨率的差异对解码出来的笔记特征参数作相应的调整；图形绘制模块，根据笔记特征参数在软画板上绘制出相应图形。

6. 如权利要求 5 所述的基于笔迹特征数据流的视频通信处理系统，其特征在于图形绘制模块采用增量式绘制图形，即当收到笔迹特征参数时，才绘制增加部分的图形，否则图形将保持不变。

7. 如权利要求 5 所述的基于笔迹特征数据流的视频通信处理系统，其特征在于笔迹特征参数由着笔时着笔点的坐标、笔当时的压力（级）、笔的颜色三个参数组成。

基于笔迹特征数据流的视频通信方法及其处理系统

技术领域

[0001] 本发明涉及一种基于笔迹特征数据流的视频通信方法及其处理系统，具体地说，本发明涉及一种在网络环境中把在软画板上形成画面的笔迹特征参数作为视频处理对象的视频通信方法及其处理系统。

背景技术

[0002] 各种会议占据企业员工很多工作时间，同时也花费企业很高的成本。如何有效地利用会议时间和节约会议期间来往的费用被企业作为增加生产力和节约成本方面的有效手段而越来越重视。

[0003] 每个企业都需要信息和意见的自由交流以改善他们的产品和服务。团队里和团队外的人员之间的有效沟通和协作可以提高产品的质量、提升产品或项目开发的研发周期并减少成本。然而，快速有效地沟通通常是很难实现的，特别是在跨国企业。而阻碍快速有效沟通的一个关键因素通常是人们在不同的地域上。通常，人们为了参加一两个小时的会议可能会花费大笔费用和几天的时间在旅途上，特别是当召开跨国界或跨大陆会议时，该问题就更加突出。

[0004] 为此，人们迫切地需要一种方式来使得在召开会议时不在同一地域上的相关人都能够轻松容易地实时参加会议、发表个人意见并分享他人的意见。这就是视频会议系统。现在的视频会议系统可以分为软终端和硬终端两种。虽然基于硬终端的视频会议系统的提供的视频会议的画面清晰、流畅，但是这种系统不光硬件设备昂贵，而且在开会时需要占用很大的带宽，要为此付出高昂的通讯费，并且基本上基于 LAN 和 ATM 网络。这就限制了这种会议系统的广泛应用。而基于 Internet 的软终端视频会议系统是以摄像头和麦克风为视频和音频输入的设备，传送一路分辨率为 CIF 的视频和音频通常需要占用 400Kbps 以上的带宽。在 Internet 网中处处满足这样的带宽是很困难的，而很多这类视频会议产品同时传送几路视频，甚至十几路视频，更不用说跨国界或跨大陆的视频会议了。当然，一些公司试图引入某种技术，以降低视频会议带宽的需求，如：专利号为 CN1525300A，“用于实时白板流技术的系统和方法”；专利号为 CN1555197A，“基于 Internet 的视频会议共享白板的实现方法”；专利号为 CN101005600A，“使用白板的会议系统”等等。但是，这些方法都没有从本质上解决视频会议对带宽的需求。

[0005] 网络技术的成熟为网络教育发展提供了技术基础。目前，世界各地区和国家均不同程度地关注和介入虚拟大学和网上教学模式，但发展极不均衡。世界上有几百所所大学提供网络教学课程。这些提供网络教学课程的大学中有 52.6% 在北美，23.9% 在欧洲，大洋洲为 10.6%，亚洲 7.5%，拉丁美洲和加勒比海为 4.8%，非洲为 0.6%。造成这种现象的一个关键原因是现在的网络教育依托在很大的网络带宽之上，而全球的网络资源主要分布在北美洲。

[0006] 还有，在现在视频会议或者网络课堂中，会议参与者或者网络课堂参与者很不方便（或者根本不能）对显示在用户窗口中的图形进行修改以反馈他们的不同意见，这极度

地限制了所有会议参与者或者课堂参与者的深入交流和沟通。

发明内容

[0007] 为了克服现有视频通信技术的不足，尽可能降低视频通信对网络带宽的需求，并保证视频会议期间画面清晰、流畅和声音清晰，本发明抛弃了在传统的视频通信技术中把画面作为处理对象的处理方式，而采用了把形成画面时的笔迹特征参数作为处理对象的处理方式。在通信的过程中，所有视频通信参与者以软画板为协作平台，通过在软画板上写字、画图，或者是画画来表达他们各自的观点和意见，以达到深层次的讨论和交流；并且，只需要极小的网络就能保证视频会议期间画面清晰、流畅和声音清晰。

[0008] 为了实现上述这一目的，本发明的技术方案如下：一种基于笔迹特征数据流的视频通信方法，该通信方法涉及两方或者两方以上通信参与者（为了讨论方便，在本发明中把发送视频通信数据的终端（即产生数据端）称为本地端，而把收到视频通信数据的终端称为远程端），在视频通信开始时，首先要对所有视频通信参与者的终端上软画板上进行初始化，即这些终端的软画板上只呈现背景。本发明中所述的软画板是指用户窗口（也称为用户界面、显示窗口），属于软件。当本地端检测到用户着笔时，本地端立即进行处理数据，其步骤如下：

[0009] A、采集数据：收集本地用户着笔时的笔迹特征参数；

[0010] B、图形绘制：即根据采集到的笔迹特征参数在软画板上绘制出相应的图形；

[0011] C、数据编码：对本地产生的笔迹特征参数进行无损编码，把它们处理成笔迹特征数据流；

[0012] D、数据发送：通过网络把本地产生的笔迹特征数据流发送给其余参加本次视频通信的远程终端。

[0013] 远程端接收到笔迹特征数据流时，立即做出相应处理，处理步骤如下：

[0014] E、数据解码：对收到的笔迹特征数据流进行解码，以得到笔迹特征参数；

[0015] F、数据前处理：如果收到数据终端的显示屏的分辨率与发送数据终端的显示屏分辨率有所不同，则在绘制图形前需要对解码出来的笔记特征参数作相应的调整；

[0016] G、图形绘制：根据笔记特征参数在自身的软画板上绘制出相应图形。

[0017] 如果某一远程参与者有不同的意见，他可以对软画板上显示的画面进行修改，那么他的通信设备就成了本地端，其余视频通信参与者的终端就成远程端，返回步骤A。

[0018] 同在普通的画板上绘画一样，在通信期间软画板上的图形随着笔迹特征参数的增多而丰富，即本发明采用增量式绘制图形——当收到笔迹特征参数时，图形才增加相应的部分，否则图形将保持不变。从上面叙述可知，在本发明中本地端与远程端是相对的，本地端在视频通信过程中产生数据，它不但需要根据本地产生的笔迹特征参数绘制图形，而且需要把笔迹特征参数编码成笔迹特征数据流，实时发送出去；远程端则对收到的笔迹特征数据流立即进行解码，如果它的显示屏的分辨率与发送端（即本地端）的显示屏分辨率有所不同，则需要对解码出来的笔迹特征参数做相应的调整，并绘制出相应部分的图形；如果远程端对显示在软画板上的图形进行修改，那么它就变成本地端，原来的本地端就成为了远程端。

[0019] 本发明的另一目的在于提供一种基于笔迹特征数据流的视频通信处理系统，采用

该处理系统的视频通信只需要极小的网络带宽就能保证视频会议期间画面清晰、流畅和声音清晰。

[0020] 为了实现这一目的，本发明的技术方案如下：一种基于笔迹特征数据流的视频通信处理系统，该处理系统涉及两个（或者两个以上）通信终端，其特征在于所有通信终端均包含采集数据模块，用于收集本地用户着笔时的笔迹特征参数；数据编码模块，对本地产生的笔迹特征参数进行无损编码，把它们处理成笔迹特征数据流；数据发送模块，通过网络把本地产生的笔迹特征数据流发送给其余参加本次视频通信的远程终端；数据接收模块，接收网络远端传来的笔迹特征数据流；数据解码模块，对收到的笔迹特征数据流进行解码，以得到笔迹特征参数；数据前处理模块，根据本身的显示屏分辨率与发送端的显示屏分辨率的差异对解码出来的笔记特征参数作相应的调整；图形绘制模块，根据笔记特征参数在软画板上绘制出相应图形。

[0021] 上述的笔迹特征参数由着笔时着笔点的坐标、笔当时的压力（级）、笔的颜色等三个参数组成。在不引起混淆的情况下，这三个参数将分别简称为坐标、压力级、颜色。坐标表示在画图时笔尖在画面中的一具体位置；压力级表示在画图时施加给笔尖的压力，在画面上呈现出来的是笔迹的粗细程度或墨迹的浓度，或线条的宽度；颜色就是画图过程中所采用的颜色。本发明把这三个参数（着笔点的坐标、笔当时的压力（级）、笔的颜色）的组合定义为笔迹特征参数，即本发明所说的处理对象。在通信的过程中，实时采集笔迹特征参数的三个组成成分，并对采集到的笔迹特征参数进行实时编码、即处理成笔迹特征数据流，通过网络把笔迹特征数据流传送给远程客户端。远程客户端立即对收到笔迹特征数据流进行解码以得到与发送端相同的笔迹特征参数，远程客户端根据自身的显示屏分辨率与发送端的不同对笔迹特征参数（坐标、压力级、颜色）相应调整后就能绘制出与发送端相似的图形。由于组成笔迹特征参数的三个成分（坐标、压力级、颜色）只要有一点差别，绘制出来的图形就有很大的不同，所以在对笔迹特征参数进行编码时采用的是无损编码方式，即编码前的数据与解码后的数据是完全相同的。

[0022] 如本发明所述的方法具有许多优点：1）它公开了一种把形成画面时的笔迹作为处理对象的，非常具有前景的数据处理方式，这种处理方式使视频通信的数据量极大地减小，从而大大降低了视频会议或者网络课堂对带宽的要求，节约了企业或教育机构的运营成本；2）同时，这种处理方式使所有与会者都能够像在同一个会议室开会一样，方便了参与者的深入沟通和交流；3）这种处理方式也克服了传统视频会议或者网络课堂的参与者只能听和发表评论、却不能对窗口中的内容进行修改（比如传统硬件会议系统）或者对窗口中内容修改不方便、不准确（比如纯软件会议系统）的不足，也使视频会议系统或网络课堂系统的广泛应用成为可能，同时也节约了人力成本、方便了学员；4）实现本发明的算法的复杂度非常低，这使得处理器性能比较低便携产品（如智能手机）就可以成为本发明的视频通信终端设备。

[0023] 除了上述的优点之外，本发明的其它优点可以从下面结合附图的具体描述中进一步体现出来。

附图说明

[0024] 图 1 是基于笔迹特征数据流的视频通信方法及系统的典型通信系统图。

[0025] 图 2 是基于笔迹特征数据流的视频通信方法及系统的视频通信时处理笔迹特征参数的过程图。

[0026] 图 3a 和图 3b 是采用直接方式对笔迹特征参数编码、解码的流程图。

[0027] 图 4a 和图 4b 是采用差值方式对笔迹特征参数编码、解码的流程图。

[0028] 图 5a 和图 5b 是以坐标增量和压力级增量的组合为无损编码的编码对象的编码、解码流程。

[0029] 图 6a 和图 6b 是分别以坐标增量和压力级增量为无损编码的编码对象的编码、解码流程。

[0030] 图 7a 和图 7b 是以加速度量为无损编码的编码对象的编码、解码流程。

具体实施方式

[0031] 在本发明的较佳实施例的下述描述中，参考了作为说明书一部分的附图进行描述，所述附图说明了本发明可以采用的特定实施例。本领域技术人员应该理解在不背离本发明精神的情况下，还可以使用其它实施例或对这些实施例进行修改。这都没有超出本发明的公开范围。

[0032] 1、示范工作环境

[0033] 一种基于笔迹特征数据流的视频通信方法及系统通常具有基于网络环境中服务器和多个安排在基于网络的环境中的客户终端。客户终端可以是（但不局限于）个人计算机、服务器计算机、手提或膝上型设备、多处理器系统、基于微处理器的系统、机顶盒、智能手机、平板 PC、网络 PC、微型计算机、大型机、包含上述任意系统和设备的分布式计算环境。这些客户终端中，有些终端只有基本的配置，它们只能播放音频、视频和录音。另一些则配备高级的设备，如投影仪、坐标检测仪等，坐标检测仪包括（但不局限于）电子画板、电子白板、鼠标笔等。在参加视频会议或者网络课堂时，用户利用坐标检测仪在软画板上画图的笔迹特征参数被收集并处理成笔迹特征数据流。这些笔迹特征数据流通过网络实时地发送给了服务器，服务器把接收到的数据转发给远程的视频会议或者网络课堂的参与者的客户终端（如 PC，智能手机等），而他们的也可以利用坐标检测仪对软画板上的内容进行修改，他们所添加的部分也被处理成笔迹特征数据流也以同样的方式发送回来以及其于远程参与者的客户终端，同时在会议或者课堂的进程中他们可以进行口头表达意见，这些口头意见被音频采集设备采集并压缩编码成音频流，以相同或者相似的方式发送给其他参与者的终端。

[0034] 这种系统的典型方案包括公司的视频会议和教育机构所开设的网络课堂（为了讨论方便，将以视频会议为例进行阐述）。如图 1 所示，该视频会议涉及到在聚集在 A 地会议室 101 的 L 个人，和聚集在 B 地会议室 102 的 N 个人，以及 M 个分散的远程用户 104a ～ 104m。聚集在会议室 101 中的 L 个人配备有电子画板（属于输入设备）111、捕获会议音频的麦克风设备 112、投影仪 115、个人电脑 114，以及安装在麦克风设备上的扬声器 113，以及将个人计算机 114 连接到在 Internet 网络环境中的服务器 100 的网络连接 103。聚集在会议室 102 里的 N 个人的配备与聚集在会议室 101 中的 L 个人的配备相似，只是配备的坐标检测仪是电子白板而不是电子画板。分布在其他地方的 M 个视频会议参与者可以在办公室里，家里，还可能在商务旅途中。他们配备了个人终端（如个人 PC、笔记本电脑、智能手机等

等）、带麦克风的耳机，坐标检测仪（如画板、鼠标笔等等），以及能够连接服务器 100 的网络连接。所有参加会议的人利用软画板作为协作空间，通过利用坐标检测仪在软画板上写字、画图来共享他们的意见。

[0035] 2、基于笔迹特征数据流的视频通信方法。

[0036] 如图 2 所示，当视频会议参与者 X 利用坐标检测仪在软画板上写字画图时（即着笔），本地端立即进行处理数据，其步骤如下：

[0037] 步骤 211，采集数据：收集本地用户着笔时的笔迹特征参数；

[0038] 步骤 212，图形绘制：即根据采集到的笔迹特征参数在软画板上绘制出相应的图形；

[0039] 步骤 213，数据编码：对本地产生的笔迹特征参数进行无损编码，把它们处理成笔迹特征数据流；

[0040] 步骤 214，数据发送：通过网络把本地产生的笔迹特征数据流发送给其余参加本次视频通信的远程终端。

[0041] 另一视频会议参与者 Y 位于网络远程终端，远程端接收到笔迹特征数据流时(221)，立即做出相应处理，处理步骤如下：

[0042] 步骤 222，数据解码，对收到的笔迹特征数据流进行解码，以得到笔迹特征参数；

[0043] 步骤 223，数据前处理，如果收到数据终端的显示屏的分辨率与发送数据终端的显示屏分辨率的不同，则在绘制图形前需要对解码出来的笔记特征参数作相应的调整；

[0044] 步骤 224，图形绘制，根据笔记特征参数在自身的软画板上绘制出相应图形。

[0045] 如果某一远程通信参与者有不同的意见，他可以对软画板上显示的画面进行修改，那么他的通信设备就成了本地端，其余视频通信参与者的终端就成远程端，返回步骤 211。

[0046] 当然，不同的人对软画板上的图形进行修改时最好采用不同的颜色，以便于提醒所有视频会议或者网络课堂参与者有新的内容正在或者已经输入到画板上。

[0047] 在视频通信期间，他们说的话被录音设备采集，编码成音频流也被发送给远程的会议参与者的终端。远程客户终端接收到音频流后调用相应的音频解码器进行解码成音频数据，通过耳机、扬声器播放出来。

[0048] 3. 笔迹数据的处理方式

[0049] 当客户在软画板上写字画图时，笔迹特征参数的取得方式是：坐标可以包括（但不局限于）电子笔在画图板或手写板上的坐标、笔在电子白板上的坐标、鼠标笔在计算机屏幕显示的坐标、或者鼠标在计算机屏幕显示的坐标；压力级包括（但不局限于）利用画图板画图时传感器采集到的压力（级），或者在程序中取得的、与线条粗细相关的命令；颜色包括（但不局限于）画图时传感器采集到的颜色或代表颜色的命令，或者在程序中取得的、与颜色相关的命令。为了使视频会议参与者的终端接收到笔迹特征数据能够正确处理以在软画板上绘制出与发送端相似的图形，同时减小传送的数据量，需要对笔迹特征参数进行编码处理。

[0050] 3.1、笔迹特征参数编码、解码方法 1

[0051] 对笔迹特征参数编码的最简单一种方式就是把组成笔迹特征参数的坐标、压力级和颜色直接封装成笔迹特征数据流，处理流程如图 3 所示。为了处理方便，每次读入输入缓

存的数据是一笔的所有笔迹特征参数，即刚着笔瞬间到起笔瞬间的所有笔迹特征参数，在这期间任何时刻的压力级都不等于 0。编码过程如图 3 中 300 所示。在开始时，计数变量 i 值为 1，假设读入笔迹特征参数的个数是 FrameLen，详细地处理步骤如下：

[0052] 步骤 301，读取数据：读取一笔的所有笔迹特征参数放入输入缓存；

[0053] 步骤 302，输出起始码：为了在解码开始时能够判断收到的数据是开头的数据就是刚着笔时的笔迹特征参数，在一笔的笔迹特征数据流的开头把起始码 Start_Code 放入输出缓存中；

[0054] 步骤 303，输出颜色：在一次着笔期间，笔迹颜色是不变的，所以一笔的笔迹特征数据流里只需要放入一次颜色值到输出缓存；

[0055] 步骤 304，输出坐标和压力级：把这笔第 i 笔迹特征参数的坐标 Z(i) 和压力级 F(i) 读出来放入输出缓存中；

[0056] 步骤 305，计数变量加 1：i = 1+i；

[0057] 步骤 306，结束判断：如果 i < FrameLen+1，则转到步骤 304 继续处理，否则执行下面的步骤；

[0058] 步骤 307，输出结束码：为了在解码时能够判断这次笔迹特征数据流结束，把结束码 End_Code 放到输出缓存中所有数据的后面；

[0059] 步骤 308，把输出缓存中从起始码 Start_Code 和结束码 End_Code 的所有笔迹特征数据流输出，编码结束。

[0060] 当远程客户端接收到笔迹特征数据后，处理流程如图 3 中 320。在解码开始时，计数变量 i 值为 0，解码的详细步骤如下：

[0061] 步骤 321，读取数据：读取一笔的所有笔迹特征数据流放入输入缓存；

[0062] 步骤 322，去掉起始码：去掉笔迹特征数据流开头的起始码 Start_Code；

[0063] 步骤 323，读取颜色：去掉起始码 Start_Code 后可以直接取得这笔笔迹的颜色 C；

[0064] 步骤 324，读取坐标和压力级：读取这笔第 i 笔迹特征参数的坐标 Z(i) 和压力级 F(i)；

[0065] 步骤 325，结束判断：如果 End_Code 等于刚读出来坐标与压力级的组合 Z(i)F(i)，则表明码流已经被解码完，接下来执行步骤 329，否则执行步骤 326；

[0066] 步骤 326，构造笔迹特征参数 S(i)：S(i) = {Z(i), F(i), C}

[0067] 步骤 327，输出数据：把笔迹特征参数 S(i) 放入输出缓存中；

[0068] 步骤 328，计数变量加 1：i = 1+i；并转到步骤 324 继续执行。

[0069] 步骤 329，输出数据：把输出缓存中的所有笔迹特征参数输出，解码结束。

[0070] 3.2、笔迹特征参数编码、解码方法 2

[0071] 在一次着笔期间，连续的前后两个笔迹特征参数的采样值不但颜色不改变，而且坐标和压力级之间通常也相差很小，所以只需要更少的比特数就可以完成对笔迹特征参数的编码。在编码之初，初始化参数为 i = 0，Z(0) = F(0) = 0。每次也是读入输入缓存的数据是一笔的所有笔迹特征参数，假设读入笔迹特征参数的个数是 FrameLen，其编码流程如图 4 中的 400 所示：

[0072] 步骤 401，读取数据：读取一笔的所有笔迹特征参数放入输入缓存；

[0073] 步骤 402，输出起始码：在一笔的笔迹特征数据流的开头把起始码 Start_Code 放

入输出缓存中；

[0074] 步骤 403，输出颜色：把这着笔的颜色值到输出缓存；

[0075] 步骤 404，计数变量加 1：i = 1+i；

[0076] 步骤 405，增量计算：读取第 i 笔迹特征参数的坐标 Z(i) 和压力级 F(i)，分别计算出坐标增量和压力级增量，即

[0077] $\Delta Z(i) = Z(i)-Z(i-1)$

[0078] $\Delta F(i) = F(i)-F(i-1)$

[0079] 步骤 406，增量输出：把 $\Delta Z(i)$ 和 $\Delta F(i)$ 放入输出缓存中。

[0080] 步骤 407，结束判断：如果 $i < FrameLen+1$，则转到步骤 404 继续处理，否则执行下面的步骤；

[0081] 步骤 408，输出结束码：把结束码 End_Code 放到输出缓存中所有数据的后面；

[0082] 步骤 409，输出数据：把输出缓存中从起始码 Start_Code 和结束码 End_Code 的所有笔迹特征数据流输出，编码结束。

[0083] 在解码之初，初始化参数为 $i = 0, Z(0) = F(0) = 0$，解码流程如图中 420，详细步骤如下：

[0084] 步骤 421，读取数据：读取一笔的所有笔迹特征数据流放入输入缓存；

[0085] 步骤 422，去掉起始码：去掉笔迹特征数据流开头的起始码 Start_Code；

[0086] 步骤 423，读取颜色：去掉起始码 Start_Code 后直接取得这笔笔迹的颜色 C；

[0087] 步骤 424，计数变量加 1：i = 1+i；

[0088] 步骤 425，读取增量：读取第 i 笔迹特征参数的坐标增量 $\Delta Z(i)$ 和压力级增量 $\Delta F(i)$；

[0089] 步骤 426，结束判断：如果 End_Code 等于刚读出来 $\Delta Z(i)$ 与 $\Delta F(i)$ 的组合 $\Delta Z(i)\ \Delta F(i)$，则表明码流已经被解码完，接下来执行步骤 430，否则执行步骤 427；

[0090] 步骤 427，计算坐标和压力级：根据读出来的坐标增量和压力级增量计算出坐标和压力级：

[0091] $Z(i) = Z(i-1)+\Delta Z(i)$

[0092] $F(i) = F(i-1)+\Delta F(i)$

[0093] 步骤 428，构造笔迹特征参数 S(i)：$S(i) = \{Z(i), F(i), C\}$

[0094] 步骤 429，输出数据：把笔迹特征参数 S(i) 放入输出缓存中，并转到步骤 424 继续执行；

[0095] 步骤 430，输出数据：把输出缓存中的所有笔迹特征参数输出，解码结束。

[0096] 3.3、笔迹特征参数编码、解码方法 3

[0097] 为了进一步减小笔迹特征数据流的比特率，在 2.2 节的增量编码的基础上采用无损编码算法对坐标增量与压力级增量的组合 $\{\Delta Z(i)\ \Delta F(i)\}$ 进行编码就可以达到这个目的。编码流程如图 5 中 500 所示，无损编码的对象是坐标增量与压力级增量的组合 $\{\Delta Z(i)\ \Delta F(i)\}$，详细编码流程如下：

[0098] 步骤 501，读取数据：读取一笔的所有笔迹特征参数放入输入缓存；

[0099] 步骤 502，输出起始码：把起始码 Start_Code 放入输出缓存中；

[0100] 步骤 503，输出颜色：把这着笔的颜色值到输出缓存；

[0101] 步骤 504，输出直流分量：把第 1 个笔迹特征参数的坐标和压力级放入输出缓存中；

[0102] 步骤 505，增量计算及组合：读取第 i 笔迹特征参数的坐标 Z(i) 和压力级 F(i)，分别计算出坐标增量和压力级增量，即

[0103] $\Delta Z(i) = Z(i)-Z(i-1)$

[0104] ， $(2 \leqslant i \leqslant FrameLen)$

[0105] $\Delta F(i) = F(i)-F(i-1)$

[0106] 增量组合 X(i) 是 $X(i) = \{\Delta Z(i), \Delta F(i)\}$；

[0107] 步骤 506，无损编码：采用无损编码算法对增量组合 X(i) 进行编码；

[0108] 步骤 507，输出码流：把经过无损编码得到的码流放到输出缓存中；

[0109] 步骤 508，输出结束码：把结束码 End_Code 放到输出缓存中所有数据的后面；

[0110] 步骤 509，输出数据：把输出缓存中从起始码 Start_Code 和结束码 End_Code 的所有笔迹特征数据流输出，编码结束

[0111] 解码流程如图 5 中 520 所示，详细步骤如下：

[0112] 步骤 521，读取数据：读取一笔的所有笔迹特征数据流放入输入缓存；

[0113] 步骤 522，去掉起始码：去掉笔迹特征数据流开头的起始码 Start_Code；

[0114] 步骤 523，读取颜色：去掉起始码 Start_Code 后直接取得这笔笔迹的颜色 C；

[0115] 步骤 524，读取直流分量：读取笔迹特征参数的第 1 个采样的坐标 Z(1) 和压力级 F(1)；

[0116] 步骤 525，读取码流：读取所有无损编码码流；

[0117] 步骤 526，无损解码：对无损编码的码流进行解码；

[0118] 步骤 527，数据复原：根据解码得到的坐标增量和压力级增量和质量分量计算出坐标和压力级，并组合出笔迹特征参数 S(i)；

[0119] $S(i) = \{Z(i), F(i), C\}$

[0120] 其中

[0121] $Z(i) = Z(i-1)+\Delta Z(i)$

[0122] ， $(2 \leqslant i \leqslant FrameLen)$

[0123] $F(i) = F(i-1)+\Delta F(i)$

[0124] 步骤 528，输出数据：把输出缓存中的所有笔迹特征参数输出，解码结束。

[0125] 本发明中采用的无损压缩算法包括（但不局限于）LZ77 编码、LZMA 编码、LZW 编码、哈夫曼编码、算术编码、ADPCM、指数哥伦布编码，游程编码、DEFLATE 编码、ABO 编码。这些算法都是经典算法，这里不再讨论。

[0126] 3.4、笔迹特征参数编码、解码方法 4

[0127] 通常情况下，按顺序对复合对象中单个对象进行编码会更进一步降低码流的比特率。为此，可以对在 2.3 节的编码算法进行改进。改进的算法的编码流程如图 6 中 600 所示，详细编码流程如下：

[0128] 步骤 601，读取数据：读取一笔的所有笔迹特征参数放入输入缓存；

[0129] 步骤 602，输出起始码：把起始码 Start_Code 放入输出缓存中；

[0130] 步骤 603，输出颜色：把这着笔的颜色值到输出缓存；

[0131] 步骤 604，输出直流分量：把第 1 个笔迹特征参数的坐标和压力级放入输出缓存中；

[0132] 步骤 605，成份分离及增量计算：读取剩余的迹特征参数的坐标 Z(i) 和压力级 F(i)，分别计算出坐标增量系列 {ΔZ(i)：2 ≤ i ≤ FrameLen} 和压力级增量系列 {ΔF(i)：2 ≤ i ≤ FrameLen}；

[0133] 步骤 606，坐标增量无损编码：采用无损编码算法对坐标增量 {ΔZ(i)：2 ≤ i ≤ FrameLen} 进行编码；

[0134] 步骤 607，坐标码流输出：把经过无损编码得到的坐标码流放到输出缓存中；

[0135] 步骤 608，输出结束码：把结束码 End_Code 放到输出缓存中；

[0136] 步骤 609，压力级增量无损编码：对压力级增量 {ΔF(i)：2 ≤ i ≤ FrameLen} 进行无损编码；

[0137] 步骤 610，压力级码流输出：把压力级码流放到输出缓存中；

[0138] 步骤 611，输出结束码：把结束码 End_Code 放到输出缓存中；

[0139] 步骤 612，输出数据：把输出缓存中的所有笔迹特征数据流输出，结束编码。

[0140] 解码流程如图 6 中 620 所示，详细步骤如下：

[0141] 步骤 621，读取数据：读取一笔的所有笔迹特征数据流放入输入缓存；

[0142] 步骤 622，去掉起始码：去掉笔迹特征数据流开头的起始码 Start_Code；

[0143] 步骤 623，读取颜色：去掉起始码 Start_Code 后直接取得这笔笔迹的颜色 C；

[0144] 步骤 624，读取直流分量：读取笔迹特征参数的第 1 个采样的坐标 Z(1) 和压力级 F(1)；

[0145] 步骤 625，读取坐标码流：读取所有坐标码流；

[0146] 步骤 626，无损解码：对坐标码流进行解码；

[0147] 步骤 627，坐标数据复原：根据解码得到的坐标增量和坐标的直流分量计算出坐标系列 {Z(i)：1 ≤ i ≤ FrameLen}；

[0148] 步骤 628，读取压力级码流：读取所有压力级码流；

[0149] 步骤 629，无损解码：对压力级码流进行解码；

[0150] 步骤 630，压力级数据复原：根据解码得到的压力级增量和压力级的直流分量计算出压力级系列 {F(i)：1 ≤ i ≤ FrameLen}；

[0151] 步骤 631，笔迹参数复原及输出：根据颜色 C、坐标系列 {Z(i)：1 ≤ i ≤ FrameLen}、压力级系列 {F(i)：1 ≤ i ≤ FrameLen} 合成笔迹特征参数系列 {S(i)：1 ≤ i ≤ FrameLen} 并输出，结束解码。

[0152] 3.5、笔迹特征参数编码、解码方法 5

[0153] 通常情况下加速度量比增量变化更小，为此，以加速度量为编码对象将更加降低笔迹特征参数码流的比特率。其编码流程如图 7 所示，是实施例 4 的改进，详细过程如下：

[0154] 步骤 701，读取数据：读取一笔的所有笔迹特征参数放入输入缓存；

[0155] 步骤 702，输出起始码：把起始码 Start_Code 放入输出缓存中；

[0156] 步骤 703，输出颜色：把这着笔的颜色值到输出缓存；

[0157] 步骤 704，增量和加速度量的计算：分别计算出坐标的 x 方向增量 {ΔX(i)} 和加速度量 {δX(i)}；y 方向的增量 {ΔY(i)} 和加速度量 {δY(i)}；以及压力级的增量

{ΔF(i)} 和加速度量 {δF(i)}，计算方法如下：

[0158] $\Delta X(i) = X(i)-X(i-1)$

[0159] $\Delta Y(i) = Y(i)-Y(i-1), (2 \leqslant i \leqslant FrameLen)$

[0160] $\Delta F(i) = F(i)-F(i-1)$

[0161] 其中

[0162] $\delta X(i) = \Delta X(i)-\Delta X(i-1)$

[0163] $\delta Y(i) = \Delta Y(i)-\Delta Y(i-1), (3 \leqslant i \leqslant FrameLen)$

[0164] $\delta F(i) = \Delta F(i)-\Delta F(i-1)$

[0165] 步骤 705，输出直流分量：把第 1 个笔迹特征参数的坐标和压力级放入以及第 2 个坐标增量 (ΔX(2)，ΔY(2))，第 2 个压力级增量 ΔF(2) 输出缓存中；

[0166] 步骤 706，加速度无损编码：采用无损编码算法分别对加速度量系列 {δX(i)}、{δY(i)} 和 {δF(i)} 进行编码，得到加速度量流；

[0167] 步骤 707，码流输出：按照坐标的 X，Y 方向，压力级顺序把经过无损编码得到的码流放到输出缓存中，它们之间用结束码 End_Code 分开；

[0168] 步骤 708，输出数据：把输出缓存中的所有笔迹特征数据流输出，结束编码。

[0169] 解码流程如图 7 中 720 所示，详细步骤如下：

[0170] 步骤 721，读取数据：读取一笔的所有笔迹特征数据流放入输入缓存；

[0171] 步骤 722，去掉起始码：去掉笔迹特征数据流开头的起始码 Start_Code；

[0172] 步骤 723，读取颜色：去掉起始码 Start_Code 后直接取得这笔笔迹的颜色 C；

[0173] 步骤 724，读取直流分量：读取笔迹特征参数的第 1 个采样的坐标 Z(1) 和压力级 F(i)；

[0174] 步骤 725，读取码流：把所有加速度量流读取出来；

[0175] 步骤 726，无损解码：对读取到的加速度量流进行解码；

[0176] 步骤 727，笔迹特征参数形成：根据解码得到的加速度量和读取得到的直流分量计算出坐标的 X 方向系列 {X(i)}，Y 方向系列 {Y(i)}，压力及系列 {F(i)}；并组合出笔迹特征参数 S(i)：

[0177] $S(i) = \{Z(i), F(i), C\}, (1 \leqslant i \leqslant FrameLen)$

[0178] 其中 $Z(i) = \{X(i), Y(i)\}$。而

[0179] $X(i) = X(i-1)+\Delta X(i)$

[0180] $Y(i) = Y(i-1)+\Delta Y(i), (2 \leqslant i \leqslant FrameLen)$

[0181] $F(i) = F(i-1)+\Delta F(i)$

[0182] 其中

[0183] $\Delta X(i) = \Delta X(i-1)+\delta X(i)$

[0184] $\Delta Y(i) = \Delta Y(i-1)+\delta Y(i), (3 \leqslant i \leqslant FrameLen)$

[0185] $\Delta F(i) = \Delta F(i-1)+\delta F(i)$

[0186] 步骤 728，输出数据：把输出缓存中的所有笔迹特征参数输出，解码结束。

[0187] 4、内容保存

[0188] 整个会议所有内容（包括软画板上的图形、口头评述、图像视频）都保存，以便将来进行查阅。这样，视频通信的参与者可以在空闲的时间里回顾该会议。另外，不能参加的

人员也可以在随后的时间查阅此次视频通信。

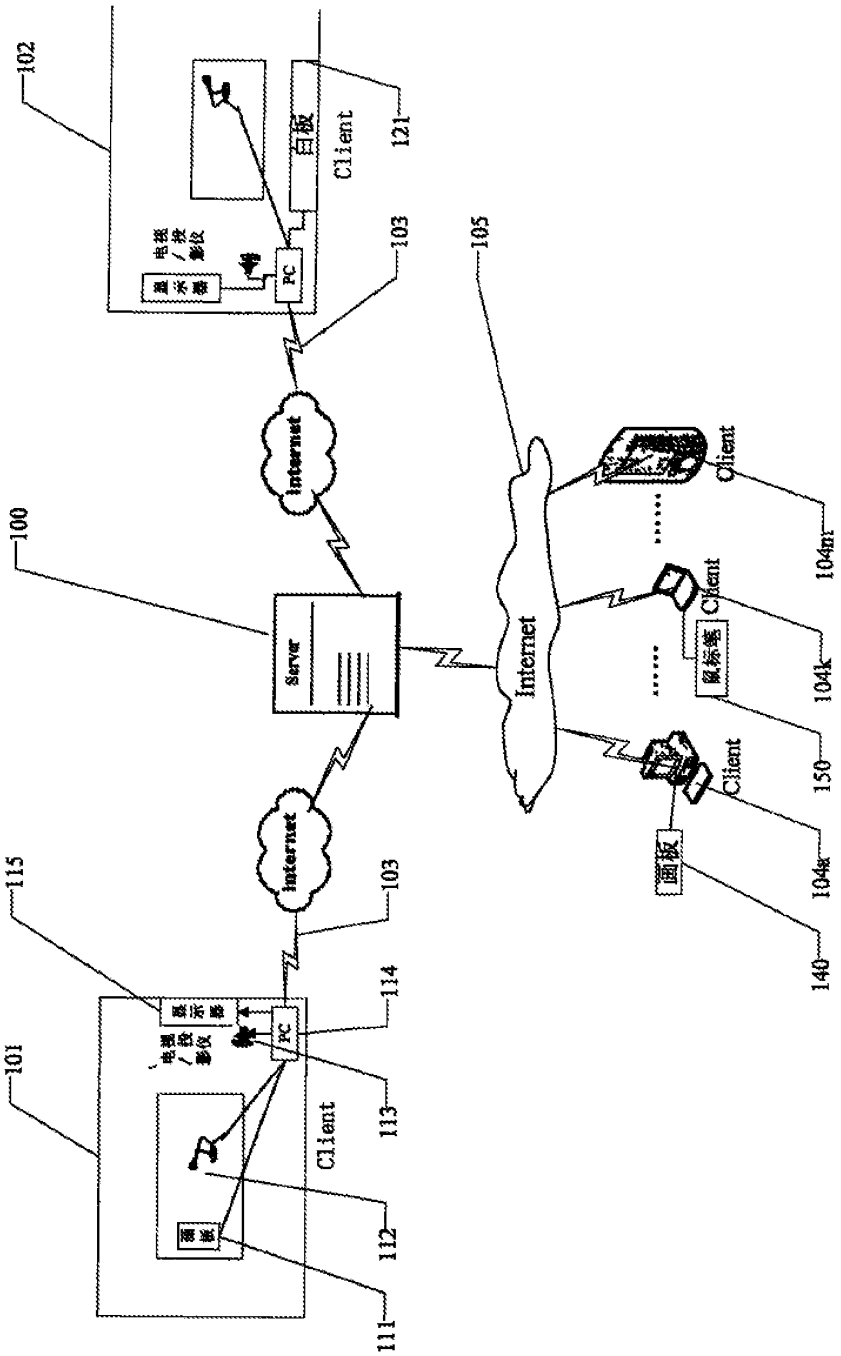

102
白板
Client
121
PC
103
105
Internet
Client
104m
100
Server
Internet
Client
104k
150
Internet
Client
104a
103
115
140
114
101
PC
113
Client
112
111

图 1

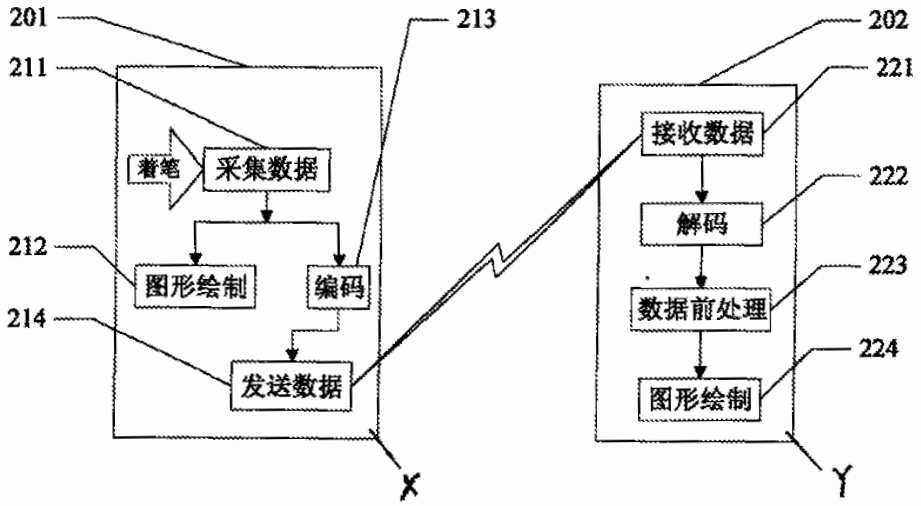

201
211
213
202
221
着笔
采集数据
接收数据
222
解码
212
图形绘制
编码
223
数据前处理
214
发送数据
224
图形绘制
X
Y

图 2

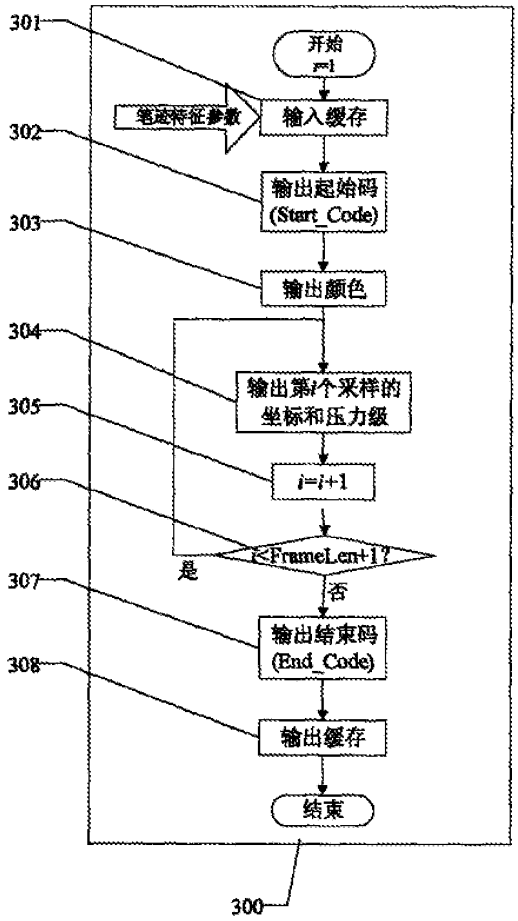

301
开始
i=1
笔迹特征参数
输入缓存
302
输出起始码
(Start_Code)
303
输出颜色
304
输出第i个采样的
坐标和压力级
305
i=i+1
306
i<FrameLen+1?
是
否
307
输出结束码
(End_Code)
308
输出缓存
结束
300

图 3a

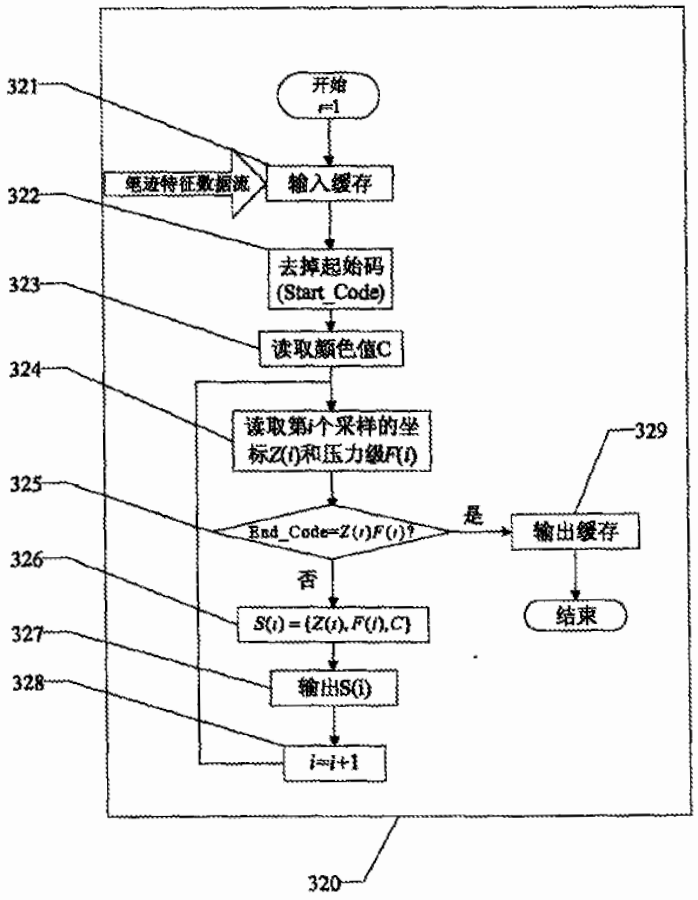

321
开始
i=1
笔迹特征数据流
输入缓存
322
去掉起始码
(Start_Code)
323
读取颜色值C
324
读取第i个采样的坐
标Z(i)和压力级F(i)
325
End_Code=Z(i)F(i)?
是
329
输出缓存
结束
326
否
S(i)={Z(i),F(i),C}
327
输出S(i)
328
i=i+1
320

图 3b

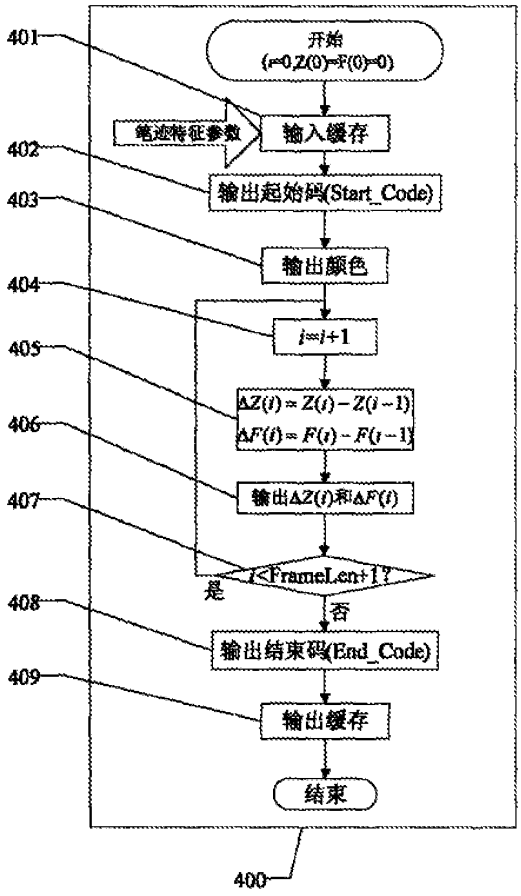

401
开始
(i=0,Z(0)=F(0)=0)
笔迹特征参数
输入缓存
402
输出起始码(Start_Code)
403
输出颜色
404
i=i+1
405
ΔZ(i)=Z(i)-Z(i-1)
ΔF(i)=F(i)-F(i-1)
406
输出ΔZ(i)和ΔF(i)
407
i<FrameLen+1?
是
否
408
输出结束码(End_Code)
409
输出缓存
结束
400

图 4a

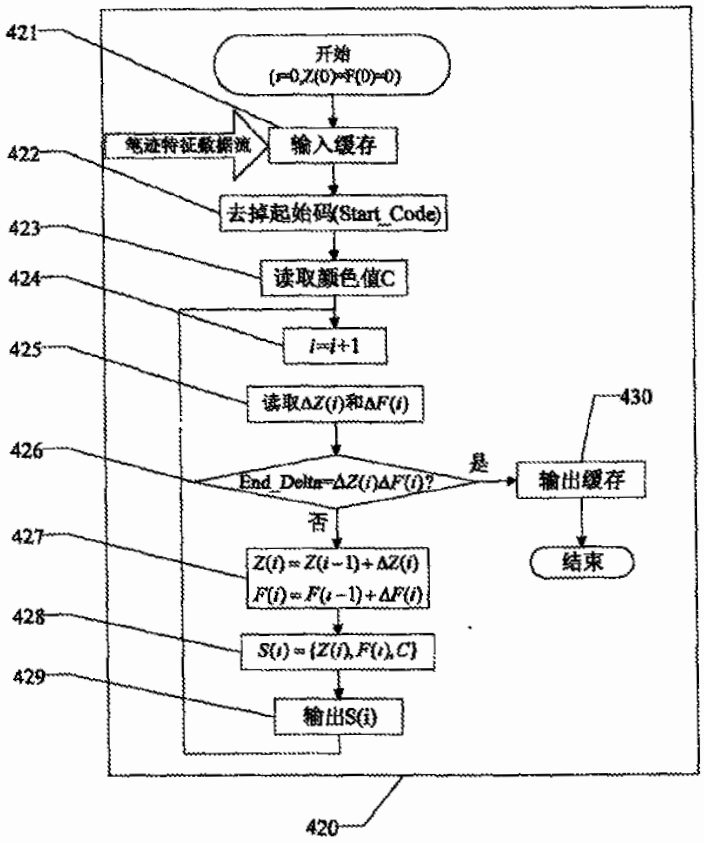

421
开始
(i=0,Z(0)=F(0)=0)
笔迹特征数据流
输入缓存
422
去掉起始码(Start_Code)
423
读取颜色值C
424
i=i+1
425
读取ΔZ(i)和ΔF(i)
426
End_Delta=ΔZ(i)ΔF(i)?
是
否
430
输出缓存
结束
427
Z(i)=Z(i-1)+ΔZ(i)
F(i)=F(i-1)+ΔF(i)
428
S(i)={Z(i),F(i),C}
429
输出S(i)
420

图 4b

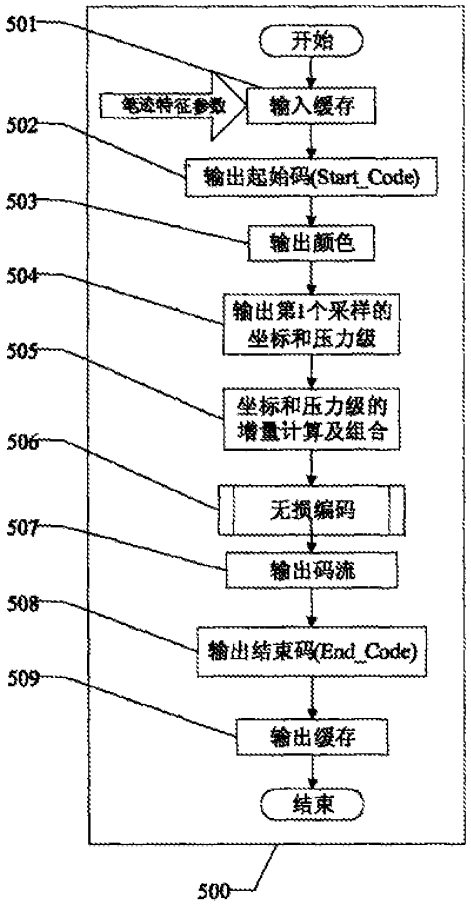

501
开始
笔迹特征参数
输入缓存
502
输出起始码(Start_Code)
503
输出颜色
504
输出第1个采样的坐标和压力级
505
坐标和压力级的增量计算及组合
506
无损编码
507
输出码流
508
输出结束码(End_Code)
509
输出缓存
结束
500

图 5a

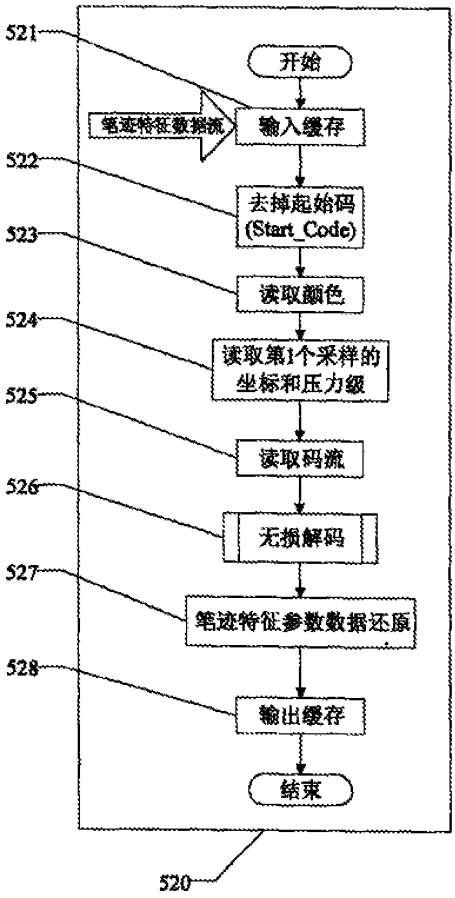

521
开始
笔迹特征数据流
输入缓存
522
去掉起始码(Start_Code)
523
读取颜色
524
读取第1个采样的坐标和压力级
525
读取码流
526
无损解码
527
笔迹特征参数数据还原
528
输出缓存
结束
520

图 5b

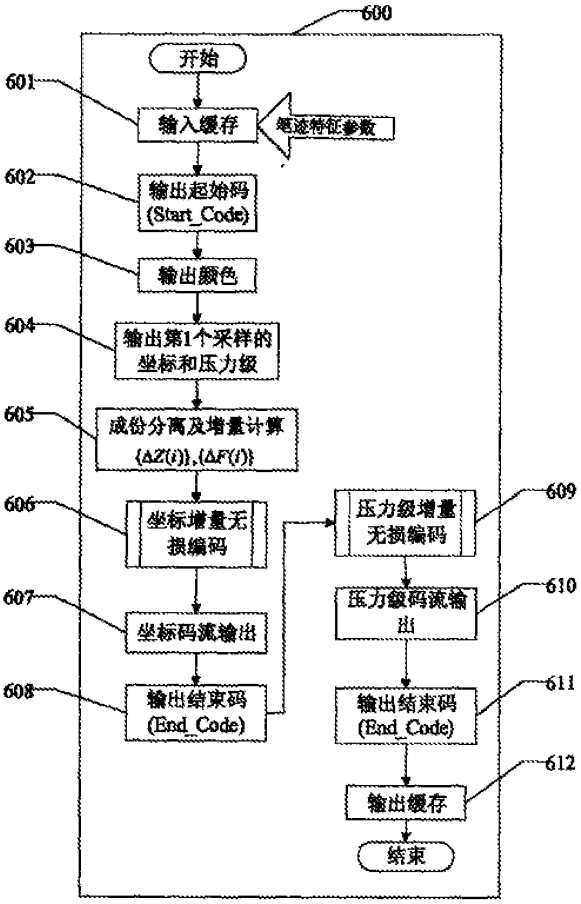

600
开始
601
输入缓存
笔迹特征参数
602
输出起始码
(Start_Code)
603
输出颜色
604
输出第1个采样的
坐标和压力级
605
成份分离及增量计算
{ΔZ(i)},{ΔF(i)}
606
坐标增量无
损编码
607
坐标码流输出
608
输出结束码
(End_Code)
609
压力级增量
无损编码
610
压力级码流输
出
611
输出结束码
(End_Code)
612
输出缓存
结束

图 6a

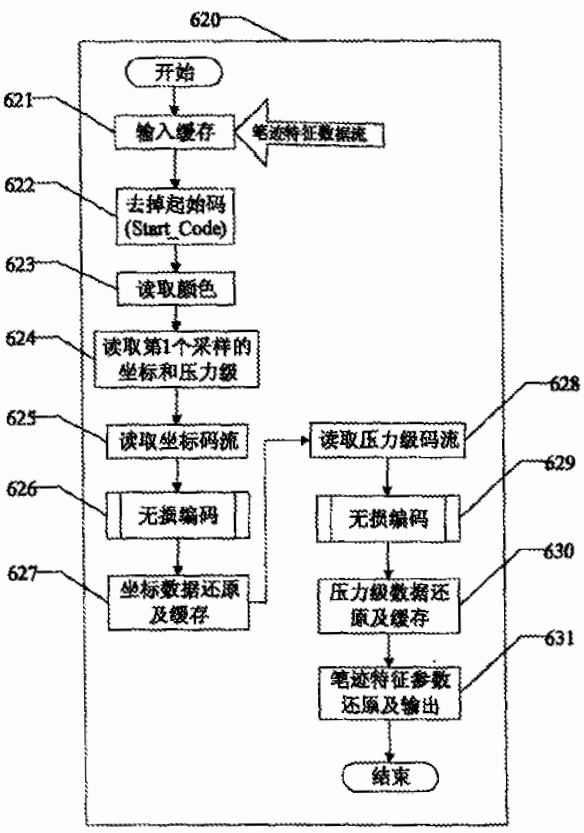

620
开始
621
输入缓存
笔迹特征数据流
622
去掉起始码
(Start_Code)
623
读取颜色
624
读取第1个采样的
坐标和压力级
625
读取坐标码流
626
无损编码
627
坐标数据还原
及缓存
628
读取压力级码流
629
无损编码
630
压力级数据还
原及缓存
631
笔迹特征参数
还原及输出
结束

图 6b

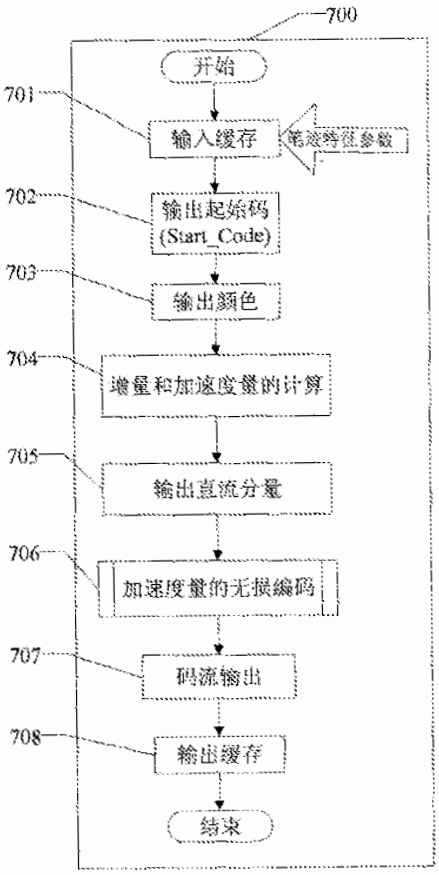

700
开始
701
输入缓存
笔迹特征参数
702
输出起始码
(Start_Code)
703
输出颜色
704
增量和加速度量的计算
705
输出直流分量
706
加速度量的无损编码
707
码流输出
708
输出缓存
结束

图 7a

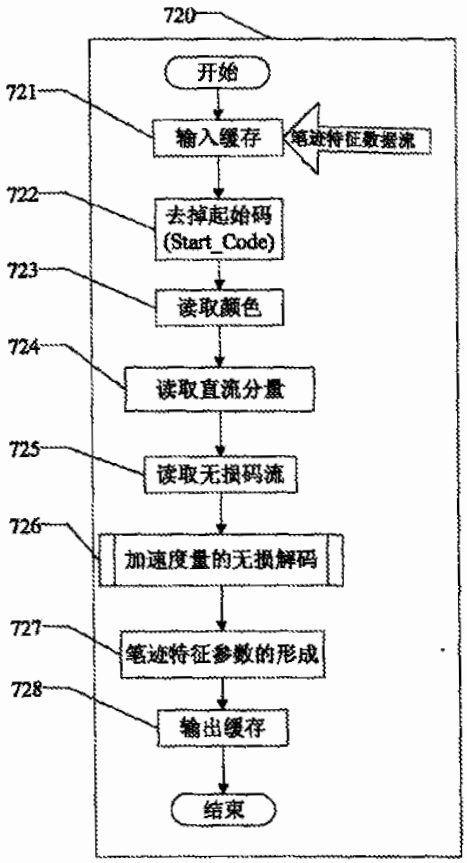

720
开始
721
输入缓存
笔迹特征数据流
722
去掉起始码
(Start_Code)
723
读取颜色
724
读取直流分量
725
读取无损码流
726
加速度量的无损解码
727
笔迹特征参数的形成
728
输出缓存
结束

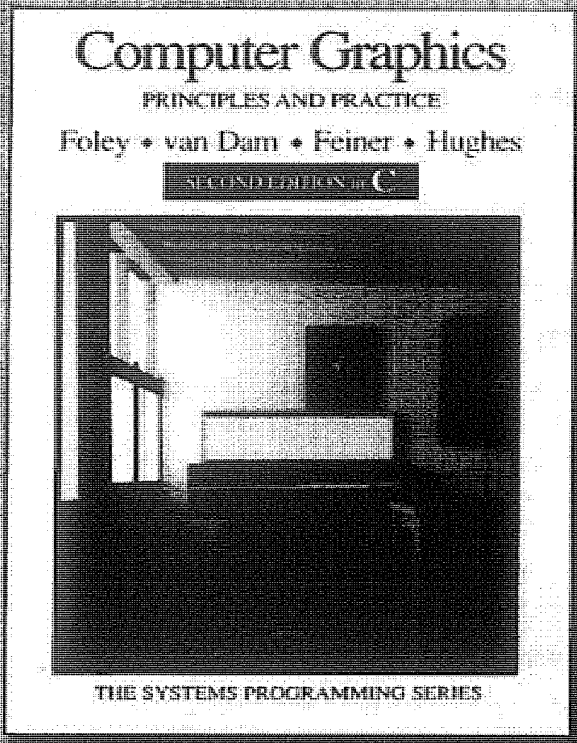
图 7b

计 算 机 科 学 丛 书

原书第2版

计算机图形学原理及实践
C语言描述

(美) James D. Foley Andries van Dam Steven K. Feiner John F. Hughes 著
唐泽圣 荣上海 李华 吴恩华 江国平 等译



Computer Graphics
Principles and Practice
Second Edition in C

机械工业出版社
China Machine Press

8/356

本书是计算机图形学领域的经典著作。本书由基础知识、用户界面、模型定义和图像合成四个部分组成，包括SRGP的编程、画二维图元的基本光栅图形学算法、图形硬件、几何变换、三维空间的观察、对象的层次结构和SPHIGS系统、输入设备、交互技术与交互任务、对话设计、用户界面软件、实体造型、消色光与彩色光、可视图像的真实性、可见面判定、光照模型与光照计算、图像处理与存储、高级光栅图形体系结构、高级几何与光栅算法、高级建模技术和动画等内容。

本书内容全面，涉及图形学的各个领域，可以作为计算机专业本科生和研究生的教材，同时也可供相关技术人员阅读。

Authorized translation from the English language edition entitled *Computer Graphics: Principles and Practice, Second Edition in C* (ISBN: 0-201-84840-6) by James D. Foley et al., published by Pearson Education, Inc, publishing as Addison-Wesley, Copyright © 1996 by Bell Telephone Laboratories, Incorporated.

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Chinese simplified language edition published by China Machine Press.

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图书在版编目（CIP）数据

计算机图形学原理及实践——C语言描述（原书第2版）/（美）福利（Foley, J. D.）等著；唐泽圣等译. -北京：机械工业出版社，2004.3

（计算机科学丛书）

书名原文：Computer Graphics: Principles and Practice, Second Edition in C

ISBN 7-111-13026-X

Ⅰ.计… Ⅱ.①福… ②唐… Ⅲ.①计算机图形学 ②C语言-程序设计 Ⅳ.①TP391.41 ②TP312

中国版本图书馆CIP数据核字（2003）第080765号

机械工业出版社（北京市西城区百万庄大街22号 邮政编码 100037）

责任编辑：杨海玲

北京中加印刷有限公司印刷 · 新华书店北京发行所发行

2004年3月第1版第1次印刷

787mm×1092mm 1/16 · 59.25印张（彩插4.25印张）

印数：0 001-5 000册

定价：95.00元

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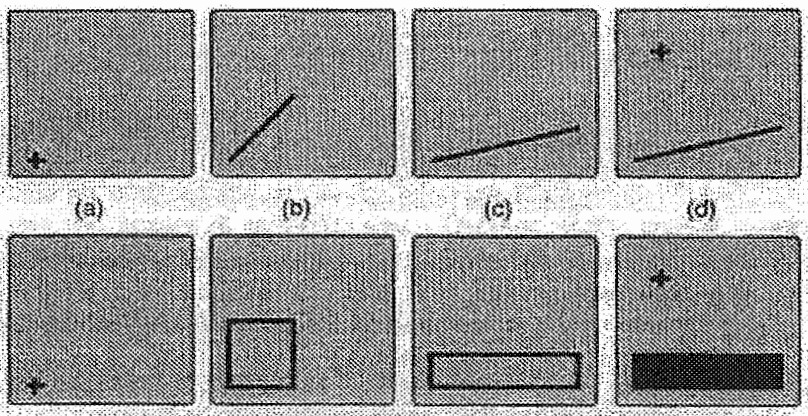


Fig. 2.23 Rubber-echo scenarios.

reset to the center of the screen whenever the locator is deactivated. Unless the programmer explicitly resets it, the measure (and feedback position, if the echo is active) is initialized to that same position when the device is reactivated. At any time, whether the device is active or inactive, the programmer can reset the locator's measure (the *position* portion, not the fields concerning the buttons) using

```
void SRGP_setLocatorMeasure (point position);
```

Resetting the measure while the locator is inactive has no immediate effect on the screen, but resetting it while the locator is active changes the echo (if any) accordingly. Thus, if the program wants the cursor to appear initially at a position other than the center when the locator is activated, a call to SRGP_setLocatorMeasure with that initial position must precede the call to SRGP_setInputMode. This technique is commonly used to achieve continuity of cursor position: The last measure before the locator was deactivated is stored, and the cursor is returned to that position when it is reactivated.

Keyboard attributes and measure control. Unlike the locator, whose echo is positioned to reflect movements of a physical device, there is no obvious screen position for a keyboard device's echo. The position is thus an attribute (with an implementation-specific default value) of the keyboard device that can be set via

```
void SRGP_setKeyboardEchoOrigin (point origin);
```

The default measure for the keyboard is automatically reset to the null string when the keyboard is deactivated. Setting the measure explicitly to a nonnull initial value just before activating the keyboard is a convenient way to present a default input string (displayed by SRGP as soon as echoing begins) that the user can accept as is or modify before pressing the Return key, thereby minimizing typing. The keyboard's measure is set via

```
void SRGP_setKeyboardMeasure (char *measure);
```

2.3 RASTER GRAPHICS FEATURES

By now, we have introduced most of the features of SRGP. This section discusses the remaining facilities that take particular advantage of raster hardware, especially the ability

to save and restore pieces of the screen as they are overlaid by other images, such as windows or temporary menus. Such image manipulations are done under control of window- and menu-manager application programs. We also introduce offscreen bitmaps (called *canvases*) for storing windows and menus, and we discuss the use of clipping rectangles.

2.3.1 Canvases

The best way to make complex icons or menus appear and disappear quickly is to create them once in memory and then to copy them onto the screen as needed. Raster graphics packages do this by generating the primitives in invisible, offscreen bitmaps or pixmaps of the requisite size, called *canvases* in SRGP, and then copying the canvases to and from display memory. This technique is, in effect, a type of buffering. Moving blocks of pixels back and forth is faster, in general, than is regenerating the information, given the existence of the fast SRGP_copyPixel operation that we shall discuss soon.

An SRGP *canvas* is a data structure that stores an image as a 2D array of pixels. It also stores some control information concerning the size and attributes of the image. Each canvas represents its image in its own Cartesian coordinate system, which is identical to that of the screen shown in Fig. 2.1; in fact, the screen is itself a canvas, special solely in that it is the only canvas that is displayed. To make an image stored in an off-screen canvas visible, the application must copy it onto the screen canvas. Beforehand, the portion of the screen image where the new image—for example, a menu—will appear can be saved by copying the pixels in that region to an offscreen canvas. When the menu selection has taken place, the screen image is restored by copying back these pixels.

At any given time, there is one *currently active* canvas: the canvas into which new primitives are drawn and to which new attribute settings apply. This canvas may be the screen canvas (the default we have been using) or an offscreen canvas. The coordinates passed to the primitive procedures are expressed in terms of the local coordinate space of the currently active canvas. Each canvas also has its own complete set of SRGP attributes, which affect all drawing on that canvas and are set to the standard default values when the canvas is created. Calls to attribute-setting procedures modify only the attributes in the currently active canvas. It is convenient to think of a canvas as a virtual screen of program-specified dimensions, having its own associated pixmap, coordinate system, and attribute group. These properties of the canvas are sometimes called the *state* or *context* of the canvas.

When SRGP is initialized, the *screen canvas* is automatically created and made active. All our programs thus far have generated primitives into only that canvas. It is the only canvas visible on the screen, and its ID is SCREEN_CANVAS, an SRGP constant. A new offscreen canvas is created by calling the following procedure, which returns the ID allocated for the new canvas:

```
canvasID SRGP_createCanvas (int width, int height);
```

Like the screen, the new canvas's local coordinate system origin (0, 0) is at the bottom-left corner and the top-right corner is at (*width*–1, *height*–1). A 1 by 1 canvas is therefore defined by width and height of 1, and its bottom-left and top-right corners are both (0, 0)! This is consistent with our treatment of pixels as being at grid intersections: The single pixel in a 1 by 1 canvas is at (0, 0).

A newly created canvas is automatically made active and its pixels are initialized to color 0 (as is also done for the screen canvas before any primitives are displayed). Once a canvas is created, its size cannot be changed. Also, the programmer cannot control the number of bits per pixel in a canvas, since SRGP uses as many bits per pixel as the hardware allows. The attributes of a canvas are kept as part of its "local" state information; thus, the program does not need to save the currently active canvas's attributes explicitly before creating a new active canvas.

The application selects a previously created canvas to be the currently active canvas via

```
void SRGP_useCanvas (canvasID id);
```

A canvas being activated in no way implies that that canvas is made visible; an image in an offscreen canvas must be copied onto the screen canvas (using the SGRP_copyPixel procedure described shortly) in order to be seen.

Canvases are deleted by the following procedure, which may not be used to delete the screen canvas or the currently active canvas.

```
void SRGP_deleteCanvas (canvasID id);
```

The following procedures allow inquiry of the size of a canvas; one returns the rectangle which defines the canvas coordinate system (the bottom-left point always being (0, 0)), and the other returns the width and height as separate quantities.

```
rectangle SRGP_inquireCanvasExtent (canvasID id);
void SRGP_inquireCanvasSize (canvasID id, int *width, int *height);
```

Let us examine the way canvases can be used for the implementation of PerformPulldownMenuInteraction, the procedure called by the high-level interaction handler presented in Fig. 2.22 and Section 2.2.6. The procedure is implemented by the pseudocode of Fig. 2.24, and its sequence of actions is illustrated in Fig. 2.25. Each menu has a unique

```
int PerformPulldownMenuInteraction (int menuID);
/* The saving/copying of rectangular regions of canvases is described in Section 2.3.3. */
{
    highlight the menu header in the menu bar;
    menuBodyScreenExtent = screen-area rectangle at which menu body should appear;
    save the current pixels of the menuBodyScreenExtent in a temporary canvas;
        /* See Fig. 2.25a. */
    copy menu body image from body canvas to menuBodyScreenExtent;
        /* See Fig. 2.25b and C code in Fig. 2.28. */
    wait for button-up signaling the user made a selection, then get locator measure;
    copy saved image from temporary canvas back to menuBodyScreenExtent;
        /* See Fig. 2.25c */
    if (GEOM_ptInRect (measureOfLocator.position, menuBodyScreenExtent))
        calculate and return index of chosen item, using y coord of measure position;
    else
        return 0;
} /* PerformPulldownMenuInteraction */
```

Fig. 2.24 Pseudocode for PerformPulldownMenuInteraction.

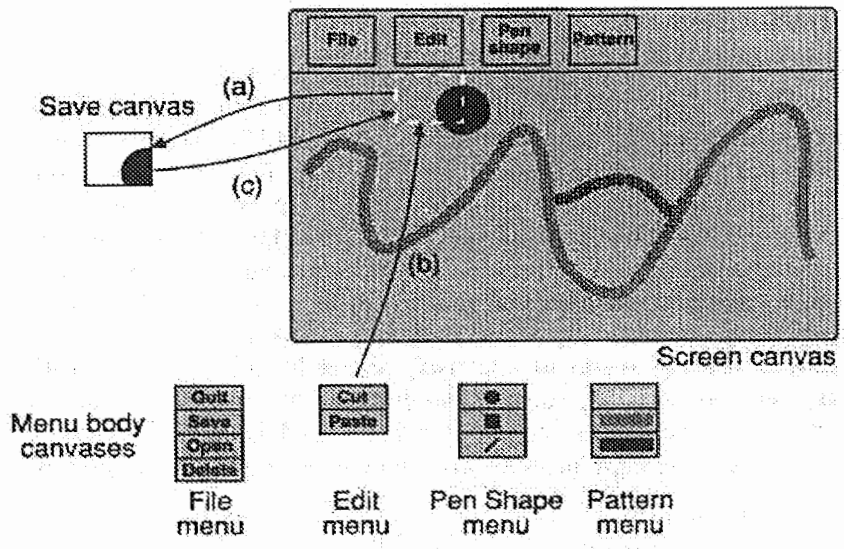


Fig. 2.25 Saving and restoring area covered by menu body.

ID (returned by the CorrelateMenuBar function) that can be used to locate a database record containing the following information about the appearance of the menu body:

- The ID of the canvas storing the menu's body
- The rectangular area (called *menuBodyScreenExtent* in the pseudocode), specified in screen-canvas coordinates, in which the menu's body should appear when the user pulls down the menu by clicking in its header

2.3.2 Clipping Rectangles

Often, it is desirable to restrict the effect of graphics primitives to a subregion of the active canvas, to protect other portions of the canvas. To facilitate this, SRGP maintains a *clip rectangle* attribute. All primitives are clipped to the boundaries of this rectangle; that is, primitives (or portions of primitives) lying outside the clip rectangle are not drawn. Like any attribute, the clip rectangle can be changed at any time, and its most recent setting is stored with the canvas's attribute group. The default clipping rectangle (what we have used so far) is the full canvas; it can be changed to be smaller than the canvas, but it cannot extend beyond the canvas boundaries. The relevant set and inquiry calls for the clip rectangle are

```
void SRGP_setClipRectangle (rectangle clipRect);
rectangle SRGP_inquireClipRectangle (void);
```

A painting application like that presented in Section 2.2.4 would use the clip rectangle to restrict the placement of paint to the drawing region of the screen, ensuring that the surrounding menu areas are not damaged. Although SRGP offers only a single upright rectangle clipping boundary, some more sophisticated software such as POSTSCRIPT offers multiple, arbitrarily shaped clipping regions.

3
Basic Raster Graphics Algorithms for Drawing 2D Primitives

A raster graphics package approximates mathematical ("ideal") primitives, described in terms of vertices on a Cartesian grid, by sets of pixels of the appropriate intensity of gray or color. These pixels are stored as a bitmap or pixmap in CPU memory or in a frame buffer. In the previous chapter, we studied the features of SRGP, a typical raster graphics package, from an *application programmer's* point of view. The purpose of this chapter is to look at SRGP from a *package implementor's* point of view—that is, in terms of the fundamental algorithms for scan converting primitives to pixels, subject to their attributes, and for clipping them against an upright clip rectangle. Examples of scan-converted and clipped primitives are shown in Fig. 3.1.

More advanced algorithms that handle features not supported in SRGP are used in more sophisticated and complex packages; such algorithms are treated in Chapter 19. The algorithms in this chapter are discussed in terms of the 2D integer Cartesian grid, but most of the scan-conversion algorithms can be extended to floating point, and the clipping algorithms can be extended both to floating point and to 3D. The final section introduces the concept of antialiasing—that is, minimizing jaggies by making use of a system's ability to vary a pixel's intensity.

3.1 OVERVIEW

3.1.1 Implications of Display-System Architecture

The fundamental conceptual model of Section 1.7 presents a graphics package as the system that mediates between the application program (and its application data structure/model) and the display hardware. The package gives the application program a device-

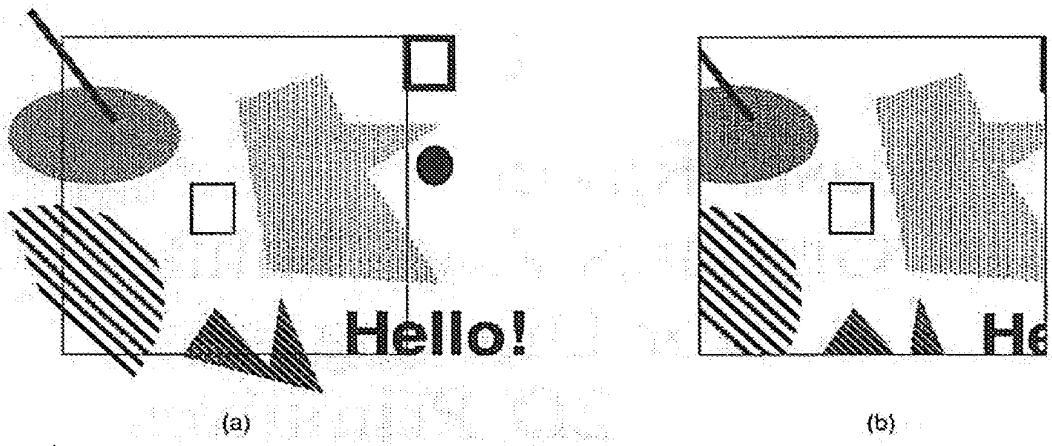


Fig. 3.1 Clipping SRGP primitives to a rectangular clip region. (a) Primitives and clipping rectangle. (b) Clipped results.

independent interface to the hardware, as shown in Fig. 3.2, where SRGP's procedures are partitioned into those forming an output pipeline and those forming an input pipeline.

In the *output pipeline*, the application program takes descriptions of objects in terms of primitives and attributes stored in or derived from an application model or data structure, and specifies them to the graphics package, which in turn clips and scan converts them to the pixels seen on the screen. The package's primitive-generation procedures specify *what* is to be generated, the attribute procedures specify *how* primitives are to be generated, the SRGP_copyPixel procedure specifies *how* images are to be modified, and the canvas-control procedures specify *where* the images are to be generated. In the *input pipeline*, a user interaction at the display end is converted to measure values returned by the package's sampling or event-driven input procedures to the application program; it typically uses those

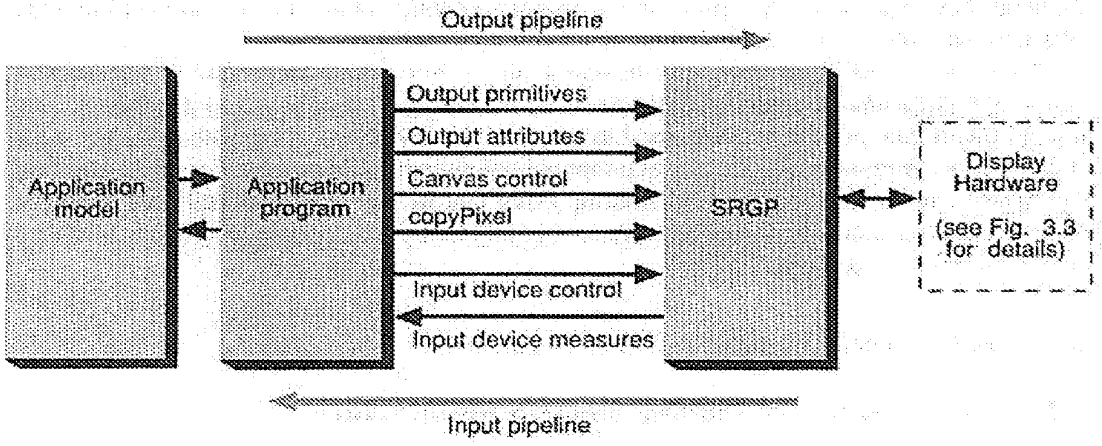


Fig. 3.2 SRGP as intermediary between the application program and the graphics system, providing output and input pipelines.

values to modify the model or the image on the screen. Procedures relating to input include those to initialize and control input devices and those to obtain the latter's measures during interaction. We do not cover either SRGP's canvas management or its input handling in this book, since these topics have little to do with raster graphics and are primarily data-structure and low-level systems-software issues, respectively.

An SRGP implementation must communicate with a potentially wide variety of display devices. Some display systems are attached as peripherals with their own internal frame buffers and display controllers. These display controllers are processors specialized to interpret and execute drawing commands that generate pixels into the frame buffer. Other, simpler systems are refreshed directly from the memory used by the CPU. Output-only subsets of the package may drive raster hardcopy devices. These various types of hardware architectures are discussed in more detail in Chapters 4 and 18. In any display-system architecture, the CPU must be able to read and write individual pixels in the frame buffer. It is also convenient to be able to move rectangular blocks of pixels to and from the frame buffer to implement the copyPixel (bitBlt) type of operation. This facility is used not for generating primitives directly but to make portions of offscreen bitmaps or pixmaps visible and to save and restore pieces of the screen for window management, menu handling, scrolling, and so on.

Whereas all implementations for systems that refresh from CPU memory are essentially identical because all the work is done in software, implementations for display controller and hardcopy systems vary considerably, depending on what the respective hardware devices can do by themselves and what remains for the software to do. Naturally, in any architecture, software scan conversion must be used to generate both primitives and attributes not directly supported in hardware. Let's look briefly at the range of architectures and implementations.

Displays with frame buffers and display controllers. SRGP has the least amount of work to do if it drives a display controller that does its own scan conversion and handles all of SRGP's primitives and attributes directly. In this case, SRGP needs only to convert its internal representation of primitives, attributes, and write modes to the formats accepted by the display peripheral that actually draws the primitives (Fig. 3.3 a).

The display-controller architecture is most powerful when memory mapping allows the CPU to access the frame buffer directly and the display controller to access the CPU's memory. The CPU can then read and write individual pixels and copyPixel blocks of pixels with normal CPU instructions, and the display controller can scan convert into offscreen canvases and also use its copyPixel instruction to move pixels between the two memories or within its own frame buffer. When the CPU and the display controller can run asynchronously, there must be synchronization to avoid memory conflicts. Often, the display controller is controlled by the CPU as a coprocessor. If the display peripheral's display controller can only scan convert into its own frame buffer and cannot write pixels into CPU memory, we need a way to generate primitives in an offscreen canvas. The package then uses the display controller for scan conversion into the screen canvas but must do its own software scan conversion for offscreen canvases. The package can, of course, copyPixel images scan converted by the hardware from the frame buffer to offscreen canvases.

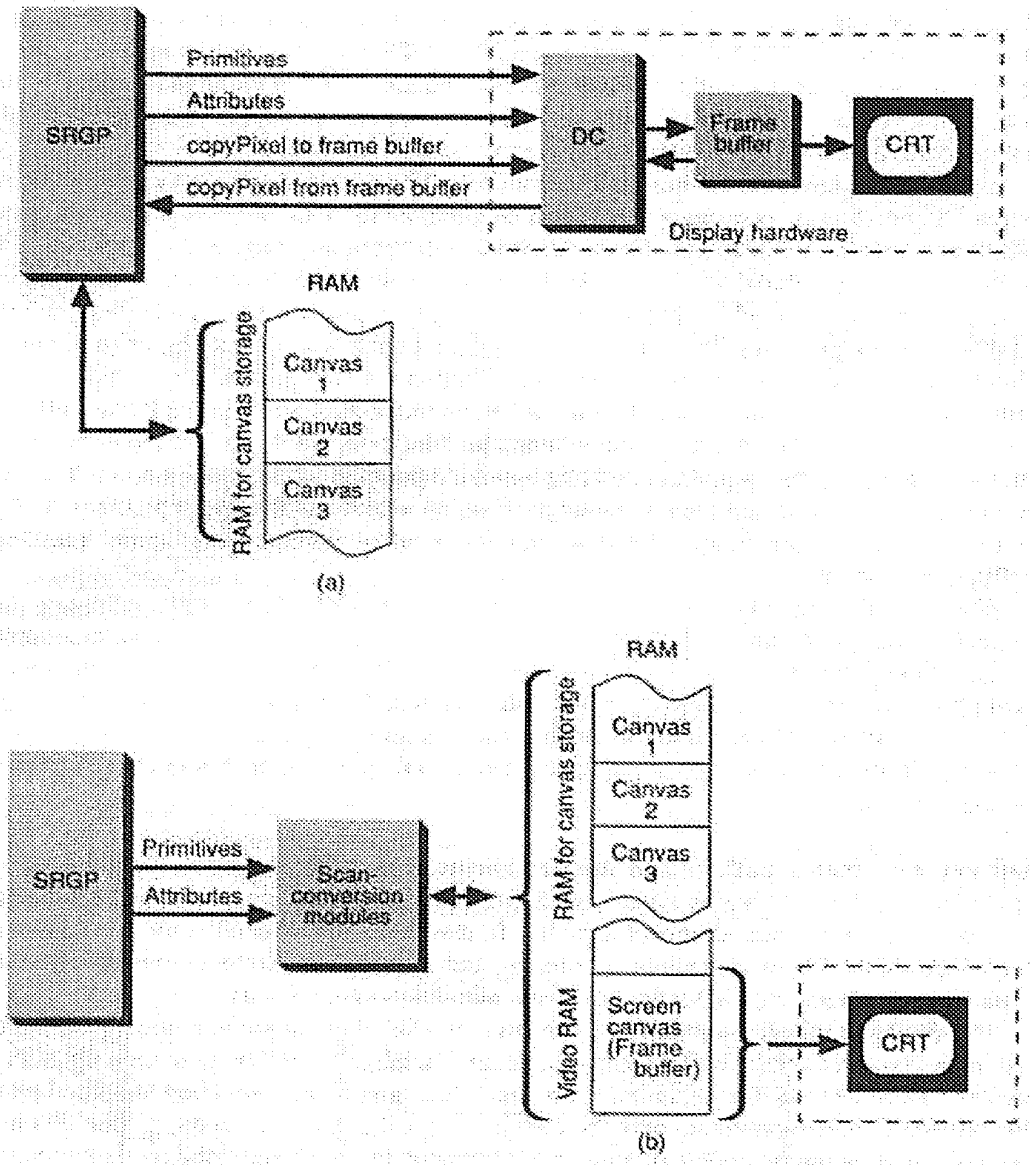


Fig. 3.3 SRGP driving two types of display systems. (a) Display peripheral with display controller and frame buffer. (b) No display controller, memory-shared frame buffer.

Displays with frame buffers only. For displays without a display controller, SRGP does its own scan conversion into both offscreen canvases and the frame buffer. A typical organization for such an SRGP implementation that drives a shared-memory frame buffer is shown in Fig. 3.3 (b). Note that we show only the parts of memory that constitute the frame

buffer and store the canvases managed by SRGP; the rest of the memory is occupied by all the usual software and data, including, of course, SRGP itself.

Hardcopy devices. As explained in Chapter 4, hardcopy devices range in their capabilities along the same spectrum as display systems. The simplest devices accept only one scan line at a time and rely on the software to provide that scan line exactly when it is to be imaged on film or on paper. For such simple hardware, SRGP must generate a complete bitmap or pixmap and scan it out one line at a time to the output device. Slightly smarter devices can accept an entire frame (page) at a time. Yet more powerful equipment has built-in scan-conversion hardware, often called raster image processors (RIPs). At the high end of the scale, PostScript printers have internal "engines" that read PostScript programs describing pages in a device-independent fashion; they interpret such programs to produce the primitives and attributes that are then scan converted. The fundamental clipping and scan-conversion algorithms are essentially independent of the raster device's output technology; therefore, we need not address hardcopy devices further in this chapter.

3.1.2 The Output Pipeline in Software

Here we examine the output pipeline driving simple frame-buffer displays only in order to address the problems of software clipping and scan conversion. The various algorithms introduced are discussed at a general, machine-independent level, so they apply to both software and hardware (or microcode) implementations.

As each output primitive is encountered by SRGP, the package *scan converts* the primitive: Pixels are written in the current canvas according to their applicable attributes and current write mode. The primitive is also *clipped* to the clip rectangle; that is, pixels belonging to the primitive that are outside the clip region are not displayed. There are several ways of doing clipping. The obvious technique is to clip a primitive prior to scan conversion by computing its analytical intersections with the clip-rectangle boundaries; these intersection points are then used to define new vertices for the clipped version of the primitive. The advantage of clipping before scan converting is, of course, that the scan converter must deal with only the clipped version of the primitive, not with the original (possibly much larger) one. This technique is used most often for clipping lines, rectangles, and polygons, for which clipping algorithms are fairly simple and efficient.

The simplest, brute-force clipping technique, called *scissoring*, is to scan convert the entire primitive but to write only the visible pixels in the clip-rectangle region of the canvas. In principle, this is done by checking each pixel's coordinates against the (x, y) bounds of the rectangle before writing that pixel. In practice, there are shortcuts that obviate having to check adjacent pixels on a scan line, as we shall see later. This type of clipping is thus accomplished on the fly; if the bounds check can be done quickly (e.g., by a tight inner loop running completely in microcode or in an instruction cache), this approach may actually be faster than first clipping the primitive and then scan converting the resulting, clipped portions. It also generalizes to arbitrary clip regions.

A third technique is to generate the entire collection of primitives into a temporary canvas and then to copyPixel only the contents of the clip rectangle to the destination canvas. This approach is wasteful of both space and time, but is easy to implement and is often used for text. Data structures for minimizing this overhead are discussed in Chapter 19.

Raster displays invoke clipping and scan-conversion algorithms each time an image is created or modified. Hence, these algorithms not only must create visually satisfactory images, but also must execute as rapidly as possible. As discussed in detail in later sections, scan-conversion algorithms use *incremental methods* to minimize the number of calculations (especially multiplies and divides) performed during each iteration; further, these calculations employ integer rather than floating-point arithmetic. As shown in Chapter 18, speed can be increased even further by using multiple parallel processors to scan convert simultaneously entire output primitives or pieces of them.

3.2 SCAN CONVERTING LINES

A scan-conversion algorithm for lines computes the coordinates of the pixels that lie on or near an ideal, infinitely thin straight line imposed on a 2D raster grid. In principle, we would like the sequence of pixels to lie as close to the ideal line as possible and to be as straight as possible. Consider a 1-pixel-thick approximation to an ideal line; what properties should it have? For lines with slopes between -1 and 1 inclusive, exactly 1 pixel should be illuminated in each column; for lines with slopes outside this range, exactly 1 pixel should be illuminated in each row. All lines should be drawn with constant brightness, independent of length and orientation, and as rapidly as possible. There should also be provisions for drawing lines that are more than 1 pixel wide, centered on the ideal line, that are affected by line-style and pen-style attributes, and that create other effects needed for high-quality illustrations. For example, the shape of the endpoint regions should be under programmer control to allow beveled, rounded, and mitered corners. We would even like to be able to minimize the jaggies due to the discrete approximation of the ideal line by using antialiasing techniques exploiting the ability to set the intensity of individual pixels on n-bits-per-pixel displays.

For now, we consider only "optimal," 1-pixel-thick lines that have exactly 1 bilevel pixel in each column (or row for steep lines). Later in the chapter, we consider thick primitives and deal with styles.

To visualize the geometry, we recall that SRGP represents a pixel as a circular dot centered at that pixel's (x, y) location on the integer grid. This representation is a convenient approximation to the more or less circular cross-section of the CRT's electron beam, but the exact spacing between the beam spots on an actual display can vary greatly among systems. In some systems, adjacent spots overlap; in others, there may be space between adjacent vertical pixels; in most systems, the spacing is tighter in the horizontal than in the vertical direction. Another variation in coordinate-system representation arises in systems, such as the Macintosh, that treat pixels as being centered in the rectangular box between adjacent grid lines instead of on the grid lines themselves. In this scheme, rectangles are defined to be all pixels interior to the mathematical rectangle defined by two corner points. This definition allows zero-width (null) canvases: The rectangle from (x, y) to (x, y) contains no pixels, unlike the SRGP canvas, which has a single pixel at that point. For now, we continue to represent pixels as disjoint circles centered on a uniform grid, although we shall make some minor changes when we discuss antialiasing.

Figure 3.4 shows a highly magnified view of a 1-pixel-thick line and of the ideal line that it approximates. The intensified pixels are shown as filled circles and the nonintensified

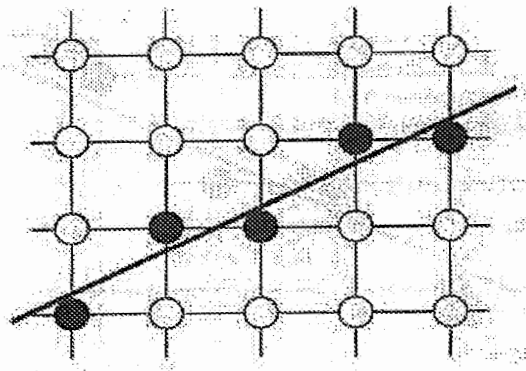


Fig. 3.4 A scan-converted line showing intensified pixels as black circles.

pixels are shown as unfilled circles. On an actual screen, the diameter of the roughly circular pixel is larger than the interpixel spacing, so our symbolic representation exaggerates the discreteness of the pixels.

Since SRGP primitives are defined on an integer grid, the endpoints of a line have integer coordinates. In fact, if we first clip the line to the clip rectangle, a line intersecting a clip edge may actually have an endpoint with a noninteger coordinate value. The same is true when we use a floating-point raster graphics package. (We discuss these noninteger intersections in Section 3.2.3.) Assume that our line has slope $|m| \leq 1$; lines at other slopes can be handled by suitable changes in the development that follows. Also, the most common lines—those that are horizontal, are vertical, or have a slope of ± 1—can be handled as trivial special cases because these lines pass through only pixel centers (see Exercise 3.1).

3.2.1 The Basic Incremental Algorithm

The simplest strategy for scan conversion of lines is to compute the slope m as $\Delta y/\Delta x$, to increment x by 1 starting with the leftmost point, to calculate $y_i = mx_i + B$ for each x_i, and to intensify the pixel at $(x_i, \text{Round}(y_i))$, where $\text{Round}(y_i) = \text{Floor}(0.5 + y_i)$. This computation selects the closest pixel—that is, the pixel whose distance to the true line is smallest.[1] This brute-force strategy is inefficient, however, because each iteration requires a floating-point (or binary fraction) multiply, addition, and invocation of Floor. We can eliminate the multiplication by noting that

$$y_{i+1} = mx_{i+1} + B = m(x_i + \Delta x) + B = y_i + m\Delta x,$$

and, if $\Delta x = 1$, then $y_{i+1} = y_i + m$.

Thus, a unit change in x changes y by m, which is the slope of the line. For all points (x_i, y_i) on the line, we know that, if $x_{i+1} = x_i + 1$, then $y_{i+1} = y_i + m$; that is, the values of x and y are defined in terms of their previous values (see Fig. 3.5). This is what defines an

[1] In Chapter 19, we discuss various measures of closeness for lines and general curves (also called *error measures*).

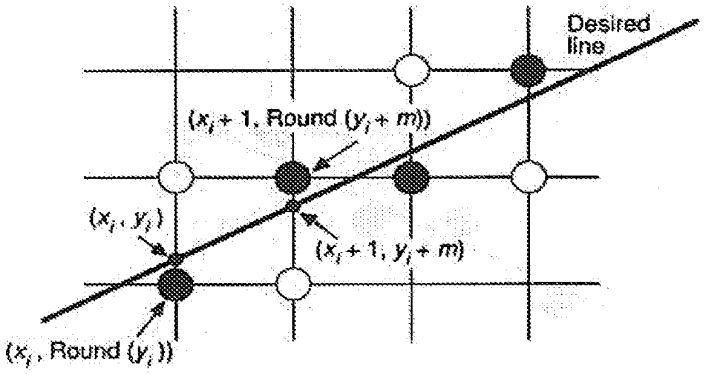


Fig. 3.5 Incremental calculation of (x_i, y_i).

incremental algorithm: At each step, we make incremental calculations based on the preceding step.

We initialize the incremental calculation with (x_0, y_0), the integer coordinates of an endpoint. Note that this incremental technique avoids the need to deal with the y intercept, B, explicitly. If $|m| > 1$, a step in x creates a step in y that is greater than 1. Thus, we must reverse the roles of x and y by assigning a unit step to y and incrementing x by $\Delta x = \Delta y/m = 1/m$. Line, the procedure in Fig. 3.6, implements this technique. The start point must be the left endpoint. Also, it is limited to the case $-1 \leq m \leq 1$, but other slopes may be accommodated by symmetry. The checking for the special cases of horizontal, vertical, or diagonal lines is omitted.

WritePixel, used by Line, is a low-level procedure provided by the device-level software; it places a value into a canvas for a pixel whose coordinates are given as the first two arguments.[2] We assume here that we scan convert only in replace mode; for SRGP's other write modes, we must use a low-level ReadPixel procedure to read the pixel at the destination location, logically combine that pixel with the source pixel, and then write the result into the destination pixel with WritePixel.

This algorithm is often referred to as a *digital differential analyzer (DDA)* algorithm. The DDA is a mechanical device that solves differential equations by numerical methods: It traces out successive (x, y) values by simultaneously incrementing x and y by small steps proportional to the first derivative of x and y. In our case, the x increment is 1, and the y increment is $dy/dx = m$. Since real variables have limited precision, summing an inexact m repetitively introduces cumulative error buildup and eventually a drift away from a true Round(y_i); for most (short) lines, this will not present a problem.

3.2.2 Midpoint Line Algorithm

The drawbacks of procedure Line are that rounding y to an integer takes time, and that the variables y and m must be real or fractional binary because the slope is a fraction. Bresenham developed a classic algorithm [BRES65] that is attractive because it uses only

[2] If such a low-level procedure is not available, the SRGP_pointCoord procedure may be used, as described in the SRGP reference manual.

M_1	M_2
Translate	Translate
Scale	Scale
Rotate	Rotate
Scale (with $s_x = s_y$)	Rotate

In these cases, we need not be concerned about the *order* of matrix manipulation.

5.4 THE WINDOW-TO-VIEWPORT TRANSFORMATION

Some graphics packages allow the programmer to specify output primitive coordinates in a floating-point *world-coordinate* system, using whatever units are meaningful to the application program: angstroms, microns, meters, miles, light-years, and so on. The term *world* is used because the application program is representing a world that is being interactively created or displayed to the user.

Given that output primitives are specified in world coordinates, the graphics subroutine package must be told how to map world coordinates onto screen coordinates (we use the specific term *screen coordinates* to relate this discussion specifically to SRGP, but that hardcopy output devices might be used, in which case the term *device coordinates* would be more appropriate). We could do this mapping by having the application programmer provide the graphics package with a transformation matrix to effect the mapping. Another way is to have the application programmer specify a rectangular region in world coordinates, called the *world-coordinate window*, and a corresponding rectangular region in screen coordinates, called the *viewport*, into which the world-coordinate window is to be mapped. The transformation that maps the window into the viewport is applied to all of the output primitives in world coordinates, thus mapping them into screen coordinates. Figure 5.10 shows this concept. As seen in this figure, if the window and viewport do not have the same height-to-width ratio, a *non*uniform scaling occurs. If the application program changes the window or viewport, then new output primitives drawn onto the screen will be affected by the change. Existing output primitives are not affected by such a change.

The modifier *world-coordinate* is used with *window* to emphasize that we are not discussing a *window-manager window*, which is a different and more recent concept, and

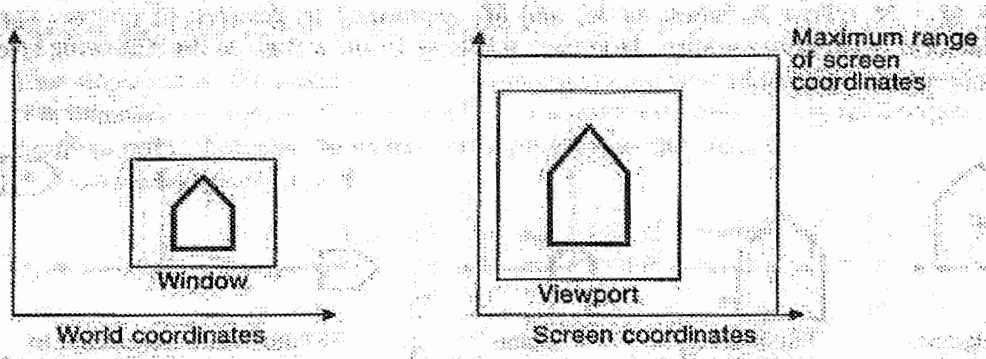


Fig. 5.10 The window in world coordinates and the viewport in screen coordinates determine the mapping that is applied to all the output primitives in world coordinates.

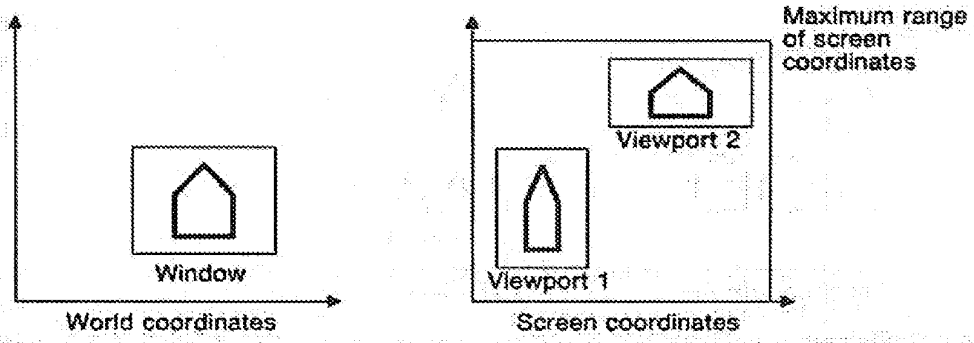


Fig. 5.11 The effect of drawing output primitives with two viewports. Output primitives specifying the house were first drawn with viewport 1, the viewport was changed to viewport 2, and then the application program again called the graphics package to draw the output primitives.

which unfortunately has the same name. Whenever there is no ambiguity as to which type of window is meant, we will drop the modifier.

If SRGP were to provide world-coordinate output primitives, the viewport would be on the current canvas, which defaults to canvas 0, the screen. The application program would be able to change the window or the viewport at any time, in which case subsequently specified output primitives would be subjected to a new transformation. If the change included a different viewport, then the new output primitves would be located on the canvas in positions different from those of the old ones, as shown in Fig. 5.11.

A window manager might map SRGP's canvas 0 into less than a full-screen window, in which case not all of the canvas or even of the viewport would necessarily be visible. In Chapter 10, we further discuss the relationships among world-coordinate windows, viewports, and window-manager windows.

Given a window and viewport, what is the transformation matrix that maps the window from world coordinates into the viewport in screen coordinates? This matrix can be developed as a three-step transformation composition, as suggested in Fig. 5.12. The

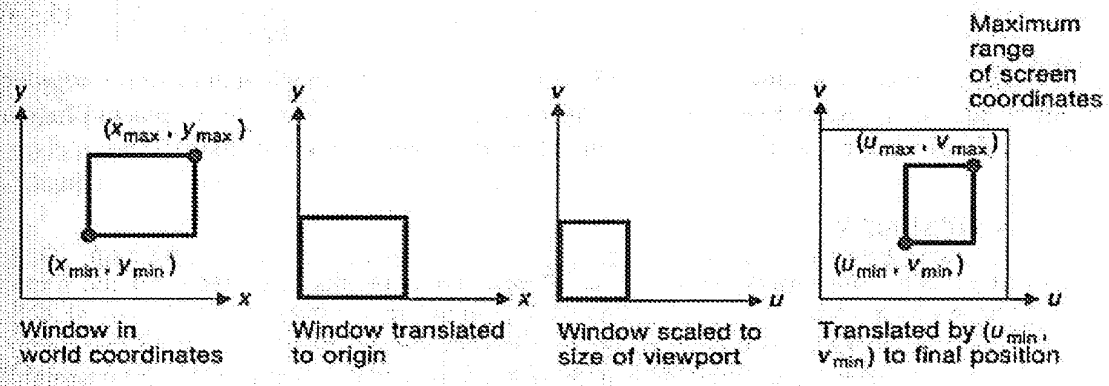


Fig. 5.12 The steps in transforming a world-coordinate window into a viewport.