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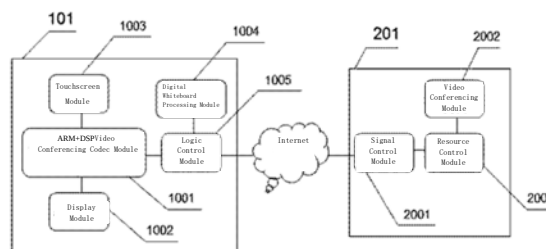
Claims, 2 pages; Specification, 4 pages; Drawings, 2 pages

(54) Name of Utility Model

An Integrated Digital Whiteboard and Video Conferencing System for Implementation of a Combined Multi-View Display

(57) Abstract

The present utility model provides an integrated digital whiteboard and video conferencing system for implementation of a combined multi-view display. By combining multiple views of video and images from a video conference and images from a digital whiteboard, the present utility model achieves the simultaneous display of both the video view and the digital whiteboard view on a single display screen, thereby allowing users to efficiently engage in distance education and achieving the effects of conserving resources and reducing complexity.



1. An integrated digital whiteboard and video conferencing system for implementation of a multi-view display, comprising an integrated terminal connected to the Internet and an integrated server, characterized in that:

The integrated terminal includes:

An ARM+DSP video conferencing codec module, which is for use in processing the transmission and reception of audio and video data streams, controlling encoding and decoding, and sending the audio to be played and the video to be displayed to the display module;

A display module, which is connected to the ARM+DSP video conferencing codec module, and is for use in receiving video and audio, displaying video and playing audio;

A touchscreen module, which is connected to the ARM+DSP video conferencing codec module, and is responsible for displaying the user interface and responding to user operations;

A digital whiteboard processing module, which is connected to the logic control module, and is for use in processing digital whiteboard operations and facilitating whiteboard data exchanges;

A logic control module, which is connected to the ARM+DSP video conferencing codec module and the digital whiteboard processing module, and is for use in controlling the other modules;

The integrated server includes:

A signal control module, which is connected to the resource control module, and is for use in sending and receiving conference control signals between the integrated terminal and the integrated server;

A video conferencing module, which is connected to the resource control module, and is for use in responding to requests from integrated terminals, and for use in decoding bitstreams sent by multiple integrated terminals, combining them with whiteboard data streams to form multiple views, and then encoding, packaging and transmitting them to all integrated terminals participating in the video conference;

A resource control module, which is connected to the signal control module and the video conferencing module, and is for use in processing and refining whiteboard data and sending the processed whiteboard data stream to the video conferencing module.

2. A system according to Claim 1, characterized in that the ARM+DSP video conferencing codec module further comprises:

A request generation module, which is connected to the control module, and is for use in sending video conference requests;

A media processing module, which is connected to the control module, and is for use in forwarding audio and video to the display module;

A friend management module, which is connected to the control module, and is for use in maintaining the friend list, selecting friends for video conferences, and sending and receiving conference control signals between an integrated terminal and the integrated server;

A control module, which is for use in forwarding control signals from the friend management module and sending interaction messages to other modules.

3. The system according to claim 1, characterized in that the digital whiteboard processing module further comprises:

A user interface generation module, which is connected to the scheduling module, and is for use in providing a view of user operations;

A document processing module, which is connected to the scheduling module, and is for use in displaying, browsing, zooming in and out, and turning pages in various types of documents; a remote desktop module, which is connected to the scheduling module, and is for use in capturing and sending desktop images or receiving remote desktop displays; an input processing module, which is connected to the scheduling module, and is for use in performing preliminary filtering of input to prevent interference with the data; and a scheduling module, which is for use in scheduling and controlling the other modules.

4. The system according to Claim 1, characterized in that the integrated terminal may further include a debugging module for use in outputting debug logs.

5. The system according to Claim 1, characterized in that the touchscreen module may be either a capacitive screen or a resistive screen.

6. The system according to Claim 1, characterized in that the ARM+DSP video conferencing codec module is implemented using a TI6467 chip, the digital whiteboard processing module is implemented using an Intel chip, and the logic control module is implemented using a 15F2K60 microcontroller.

An Integrated Digital Whiteboard and Video Conferencing System for Implementation of a Combined Multi-View Display

Technical Field

[0001] The present utility model relates to the field of video conferencing, and in particular concerns an integrated digital whiteboard and video conferencing system for implementation of a multi-view display.

Prior Art

[0002] With the development of Internet technology, the application of distance education is becoming increasingly widespread. Currently, digital whiteboards are commonly used on the market for distance education. A digital whiteboard serves as a teacher's input window, incorporating the functions of a blackboard and chalk while also offering many features that a blackboard lacks, such as the ability to freely select from a variety of fonts, line styles, and colors; use teaching resources such as courseware PowerPoint presentations; and record or take screenshots of the teaching process, etc. All of these make teaching more efficient, more environmentally friendly, and healthier.

[0003] In existing video conferencing equipment or multimedia teaching and distance education equipment, the video conferencing and digital whiteboard images are displayed on separate display screens; or, a single screen is used, and switching of the display on the display screen is then performed between two views—the video view and the digital whiteboard view.

[0004] If two display screens are used, when our operations are all performed on the video (or digital whiteboard), our attention is always focused on the video display screen (or the digital whiteboard display screen), while the other screen is essentially in an idle state, resulting in a waste of resources; if only one display screen is used, by switching between the displays, there is no waste of resources, but the complexity of the operations increases. Furthermore, when the display screen shows the digital whiteboard, if there is no video at all, it lacks a sense of face-to-face communication, which completely negates the advantages of video conferencing.

[0005] Therefore, it is necessary to research an integrated digital whiteboard and video conferencing system for implementation of a multi-view display, to thereby engage in more efficient distance education.

Utility Model Content

[0006] To address the aforementioned issues, the present utility model proposes an integrated digital whiteboard and video conferencing system for implementation of a multi-view display.

[0007] By combining multiple views of video and images from a video conference and images from a digital whiteboard, the present utility model achieves the simultaneous display of both the video view and the digital whiteboard view on a single display screen, thereby allowing users to efficiently engage in distance education and achieving the effects of conserving resources and reducing complexity.

[0008] This utility model claims protection for an integrated digital whiteboard and video conferencing system for implementation of a multi-view display, comprising an integrated terminal connected to the Internet and an integrated server;

[0009] The integrated terminal includes:

[0010] An ARM+DSP video conferencing codec module, which is for use in processing the transmission and reception of audio and video data streams, controlling encoding and decoding, and sending the audio to be played and the video to be displayed to the display module;

[0011] A display module, which is connected to the ARM+DSP video conferencing codec module, and is for use in receiving video and audio, displaying video and playing audio;

[0012] A touchscreen module, which is connected to the ARM+DSP video conferencing codec module, and is responsible for displaying the user interface and responding to user operations;

[0013] A digital whiteboard processing module, which is connected to the logic control module, and is for use in processing digital whiteboard operations and facilitating whiteboard data exchanges;

[0014] A logic control module, which is connected to the ARM+DSP video conferencing codec module and the digital whiteboard processing module, and is for use in controlling the other modules;

[0015] The integrated server includes:

[0016] A signal control module, which is connected to the resource control module, and is for use in sending and receiving conference control signals between the integrated terminal and the integrated server;

[0017] A video conferencing module, which is connected to the resource control module, and is for use in responding to requests from integrated terminals, and for use in decoding bitstreams sent by multiple integrated terminals, combining them with whiteboard data streams to form multiple views, and then encoding, packaging and transmitting them to all integrated terminals participating in the video conference;

[0018] A resource control module, which is connected to the signal control module and the video conferencing module, and is for use in processing and refining whiteboard data

and sending the processed whiteboard data stream to the video conferencing module.

[0019] Furthermore, the ARM+DSP video conferencing codec module includes:

[0020] A request generation module, which is connected to the control module, and is for use in sending video conference requests;

[0021] A media processing module, which is connected to the control module, and is for use in forwarding audio and video to the display module;

[0022] A friend management module, which is connected to the control module, and is for use in maintaining the friend list, selecting friends for video conferences, and sending and receiving conference control signals between an integrated terminal and the integrated server;

[0023] A control module, which is for use in forwarding control signals from the friend management module and sending interaction messages to other modules.

[0024] Furthermore, the digital whiteboard processing module further comprises:

[0025] A user interface generation module, which is connected to the scheduling module, and is for use in providing a view of user operations;

[0026] A document processing module, which is connected to the scheduling module, and is for use in displaying, browsing, zooming in and out, and turning pages in various types of documents;

[0027] A remote desktop module, which is connected to the scheduling module, and is for use in capturing and sending the desktop, or receiving remote desktop displays

;

[0028] An input processing module, which is connected to the scheduling module, and is for use in performing preliminary filtering of input to prevent interference with the data;

[0029] A scheduling module, which is for use in scheduling and controlling the other modules.

[0030] Furthermore, the integrated terminal may also include a debugging module, which is for use in outputting debug logs.

[0031] Furthermore, the touchscreen module may be either a capacitive screen or a resistive screen.

[0032] Furthermore, the ARM+DSP video conferencing codec module is implemented using a TI6467 chip, the digital whiteboard processing module is implemented using an Intel chip, and the logic control module is implemented using a 15F2K60 microcontroller.

Specification Drawings

[0033] Drawing 1 is a schematic diagram of an embedded system according to an embodiment of the present utility model;

[0034] Drawing 2 is a block diagram of an integrated digital whiteboard and video conferencing system for implementation of a combined multi-view display according to an embodiment of the present utility model;

[0035] Drawing 3 is a block diagram of the ARM+DSP video conferencing codec module of the present utility model;

[0036] Drawing 4 is a block diagram of the digital whiteboard processing module of the present utility model;

Specific Embodiments

[0037] Specific embodiments of the present utility model are described below in further detail, with reference to the drawings and embodiments. The following embodiments are provided to illustrate the present utility model but are not intended to limit the scope of the present utility model.

[0038] As shown in Drawing 1, the present utility model proposes an integrated digital whiteboard and video conferencing system for implementation of a combined multi-view display, comprising: A first integrated terminal 101 and a second integrated terminal 102, which are connected to an integrated server 201 via the Internet.

[0039] Said terminals integrate an interactive whiteboard, which allows for direct convening of video conferences, without the need to set up any auxiliary equipment or connect cables. With the assistance of the interactive whiteboard, remote viewers are provided with an immersive experience.

[0040] Drawing 2 provides further introduction to the embedded system of the present utility model. The present utility model, an integrated digital whiteboard and video conferencing system for implementation of a combined multi-view display, comprises an integrated terminal 101 connected to the Internet and an integrated

server 201.

[0041] The integrated terminal 101 includes:

[0042] An ARM+DSP video conferencing codec module 1001, which is for use in processing the transmission and reception of audio and video data streams, controlling encoding and decoding, and sending the audio to be played and the video to be displayed to the display module 1002;

[0043] In the process of building an actual system, the ARM+DSP video conferencing codec module is implemented using a TI6467 chip.

[0044] A display module 1002, which is connected to the ARM+DSP video conferencing codec module 1001, and is for use in receiving video and audio, displaying video and playing audio;

[0045] A touchscreen module 1003, which is connected to the ARM+DSP video conferencing codec module 1001, and is responsible for displaying the user interface and responding to user operations;

[0046] The touchscreen module 1003 may be either a capacitive screen or a resistive screen.

[0047] A digital whiteboard processing module 1004, which is connected to the logic control module 1005, and is for use in processing digital whiteboard operations and facilitating whiteboard data exchanges;

[0048] In the process of building an actual system, the digital whiteboard processing module is implemented using an Intel chip. In addition, the digital whiteboard processing module 1004 may also be integrated with an office OA system.

[0049] A logic control module 1005, which is connected to the ARM+DSP video conferencing codec module 1001 and the digital whiteboard processing module 1004, and is for use in controlling the other modules. The logic control module is generally implemented using a 15F2K60 microcontroller.

[0050] The integrated server 201 comprises:

[0051] A signal control module 2001, which is connected to the resource control module 2003, and is for use in sending and receiving conference control signals between the integrated terminal 101 and the integrated server 201;

[0052] A video conferencing module 2002, which is connected to the resource control module 2003, is for use in responding to requests from integrated terminals 101, and for use in decoding bitstreams sent by multiple integrated terminals, combining them with whiteboard data streams to form multiple views, and then encoding, packaging and transmitting them to all integrated terminals participating in the video conference;

[0053] The multi-view primarily includes three modes: The three modes of picture-in-picture, AVTN six-view, and AVTN seven-view. By setting the multi-view mode, the effects of conserving resources and reducing complexity are achieved.

[0054] A resource control module 2003, which is connected to the signal control module 2001 and the video conferencing module 2002, and is for use in processing and refining whiteboard data and sending the processed whiteboard data stream to the video conferencing module 2002.

[0055] As shown in Drawing 3, the ARM+DSP video conferencing codec module 1001 further comprises:

[0056] A request generation module 1011, which is connected to the control module 1014, and is for use in sending video conference requests;

[0057] A media processing module 1012, which is connected to the control module 1014, and is for use in forwarding audio and video to the display module 1002;

[0058] A friend management module 1013, which is connected to the control module 1014, and is for use in maintaining the friend list, selecting friends for video conferences, and sending and receiving conference control signals between an integrated terminal and the integrated server 201;

[0059] A control module 1014, which is for use in forwarding control signals from the friend management module 1013 and sending interaction messages to other modules.

[0060] To facilitate debugging of the integrated terminal 101, the terminal may also include a debugging module for use in outputting debug logs for software engineers.

[0061] As shown in Drawing 4, the digital whiteboard processing module 1004 further comprises:

[0062] A user interface generation module 1021, which is connected to the scheduling module 1025, and is for use in providing a view of user operations;

[0063] A document processing module 1022, which is connected to the scheduling module 1025, and is for use in displaying, browsing, zooming in and out, and turning pages in various types of documents;

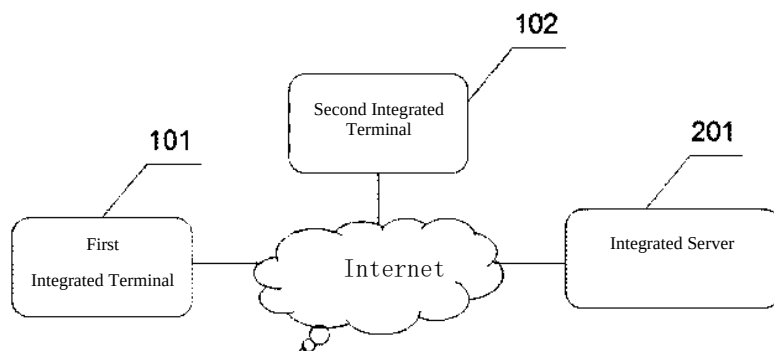
[0064] A remote desktop module 1023, which is connected to the scheduling module 1025, and is for use in capturing and sending desktop images or receiving remote desktop displays;

[0065] An input processing module 1024, which is connected to the scheduling module 1025, and is for use in performing preliminary filtering of input to prevent interference with the data;

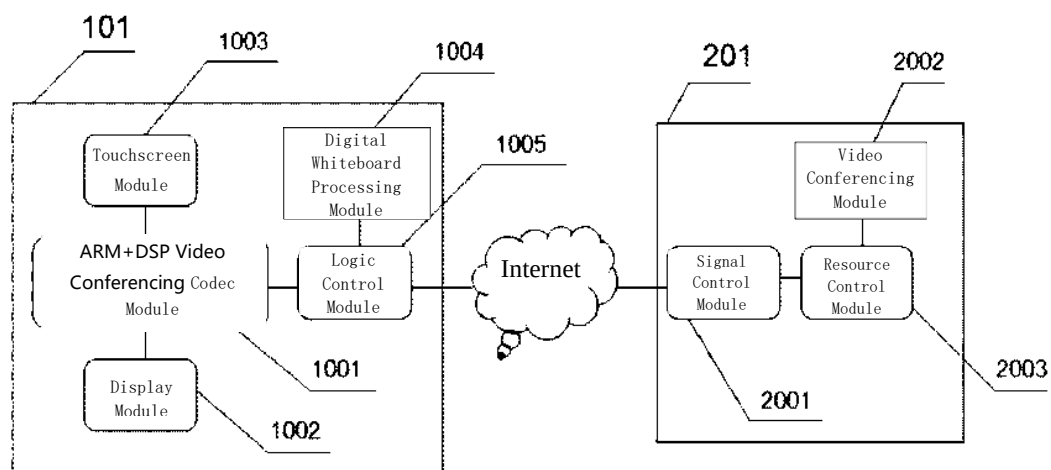
[0066] A scheduling module 1025, which is for use in scheduling and controlling the other modules.

[0067] By simultaneously displaying the video view and the digital whiteboard view on a single display screen, this utility model enables users to efficiently engage in distance education and achieves the effects of conserving resources and reducing complexity.

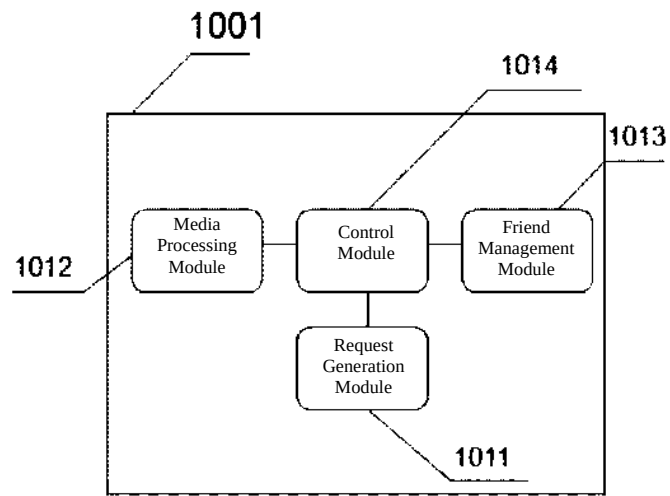
[0068] The description of the present utility model is provided for illustrative and descriptive purposes and is not exhaustive, nor does it limit the present utility model to the forms disclosed herein. Many modifications and changes are obvious to a person having ordinary skill in the art. The embodiments have been selected and described to better illustrate the principles and practical applications of the present utility model, and to enable a person having ordinary skill in the art to understand the present utility model and thereby design various embodiments with various modifications suitable for specific purposes.



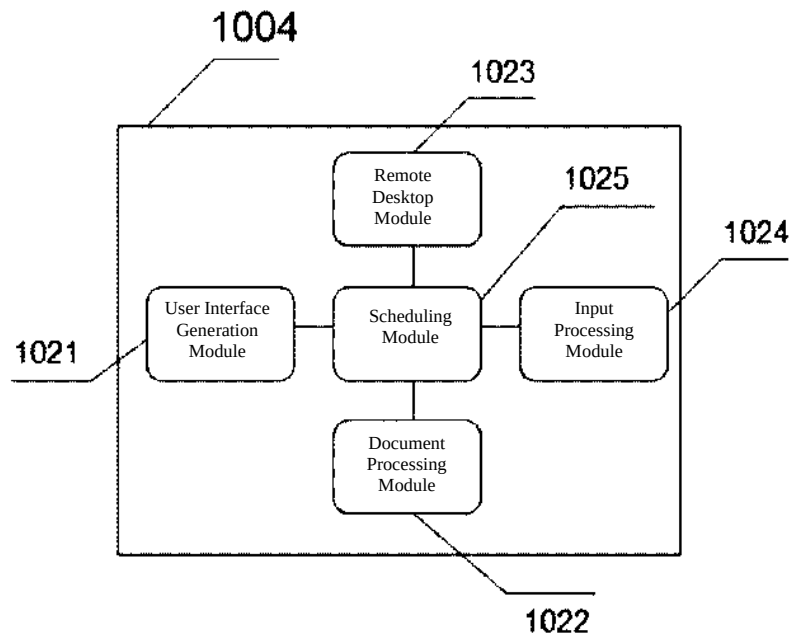
Drawing 1



Drawing 2



Drawing 3



Drawing 4

THE STATE OF Colorado }

COUNTY OF Arapahoe }

AFFIDAVIT OF ACCURACY

BEFORE ME, the undersigned authority, on this day personally appeared Carissa Fletcher who, by oath and by presentation of identification, is personally known to me to be the person subscribing her name below and, after being by me duly sworn according to law, upon her oath deposes and says in due form of law that to the best of her knowledge, information and belief:

1. My name is Carissa Fletcher and I am over the age of twenty-one years and competent to make this affidavit.
2. I have been warned that willful false statements and the like are punishable by fine or imprisonment.
3. All statements made of my own knowledge are true and that all statements made on information and belief are believed to be true.
4. I speak, read, and write fluently in the English and Chinese languages.
5. I am a professional legal translator with 17 years of experience and hereby declare that I am qualified to translate from Chinese into English. Furthermore, I am a member of the American Translators Association and hold a Master's degree in Interpreting and Translation, Mandarin and English.

I hereby certify that the translations of the documents titled "CN104135484" and "CN203984563U" from Chinese into English are, to the best of my knowledge and belief, a true, accurate, and complete translations of the original documents.



Carissa Fletcher
Professional Legal Translator

Sworn to before me this 18th day of June 2026



Notary Public in and for the State of Colorado
My commission expires: 06/14/2027



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