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(54) **INFORMATION PROCESSING SYSTEM,
WIRELESS TERMINAL, AND
INFORMATION PROCESSING METHOD**

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(57)

ABSTRACT

An information processing system including a video device for displaying a video and a wireless terminal for communicating with the video device and communicating with other apparatuses via a network, wherein the video device transmits video information captured by a camera and sound information collected by a microphone when reception from the wireless terminal of information pertaining to a video to be displayed is detected, and outputs the received sound information using a speaker. The wireless terminal transmits information pertaining to the video to be displayed to the video device, the other apparatuses receive the captured video information and collected sound information via the network, and transmit information pertaining to the video to be displayed and information pertaining to the sound to be outputted.

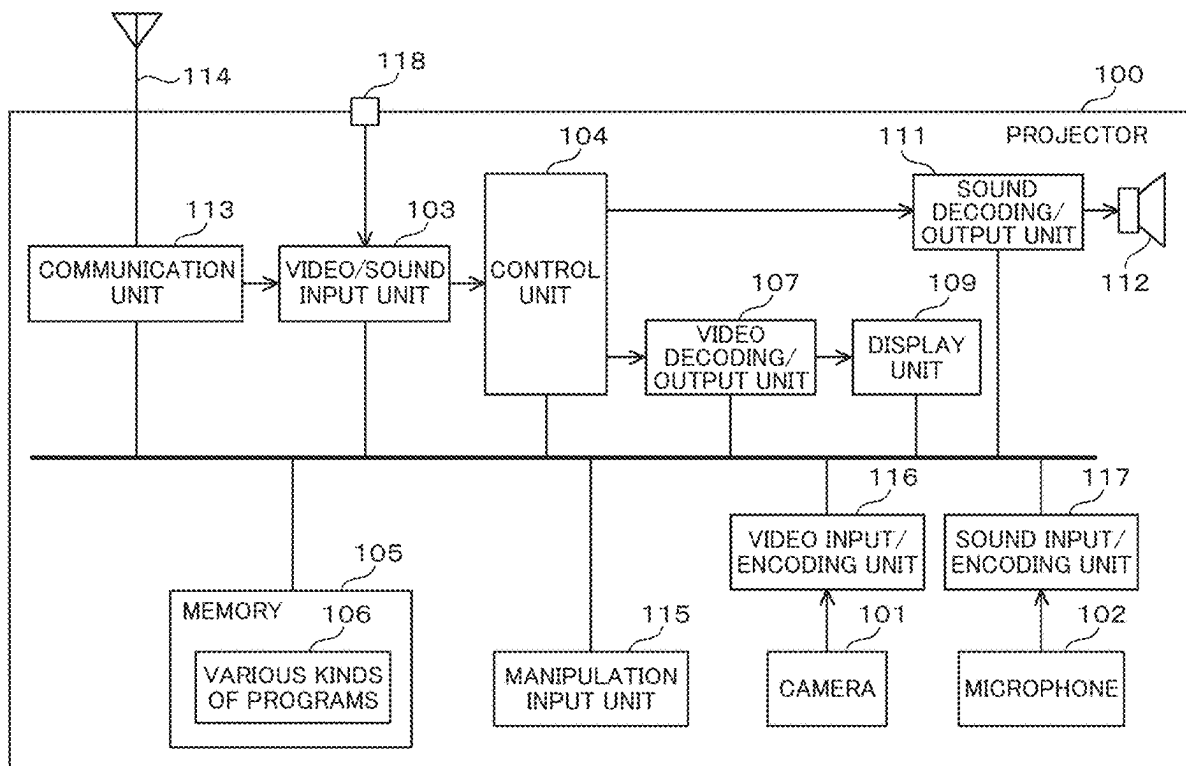


FIG. 1

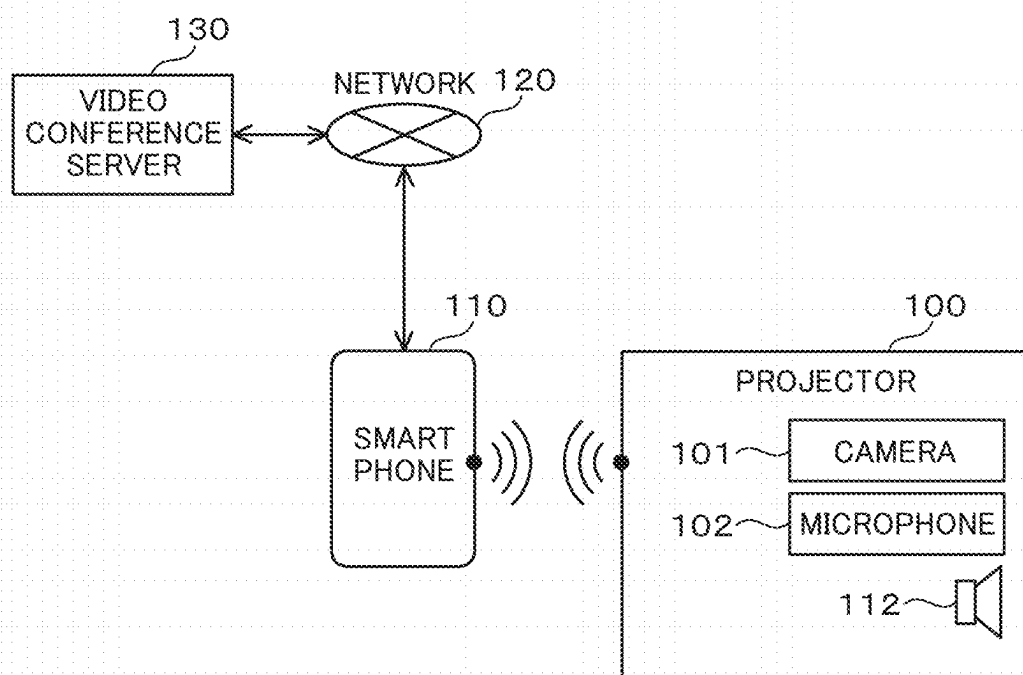


FIG. 2

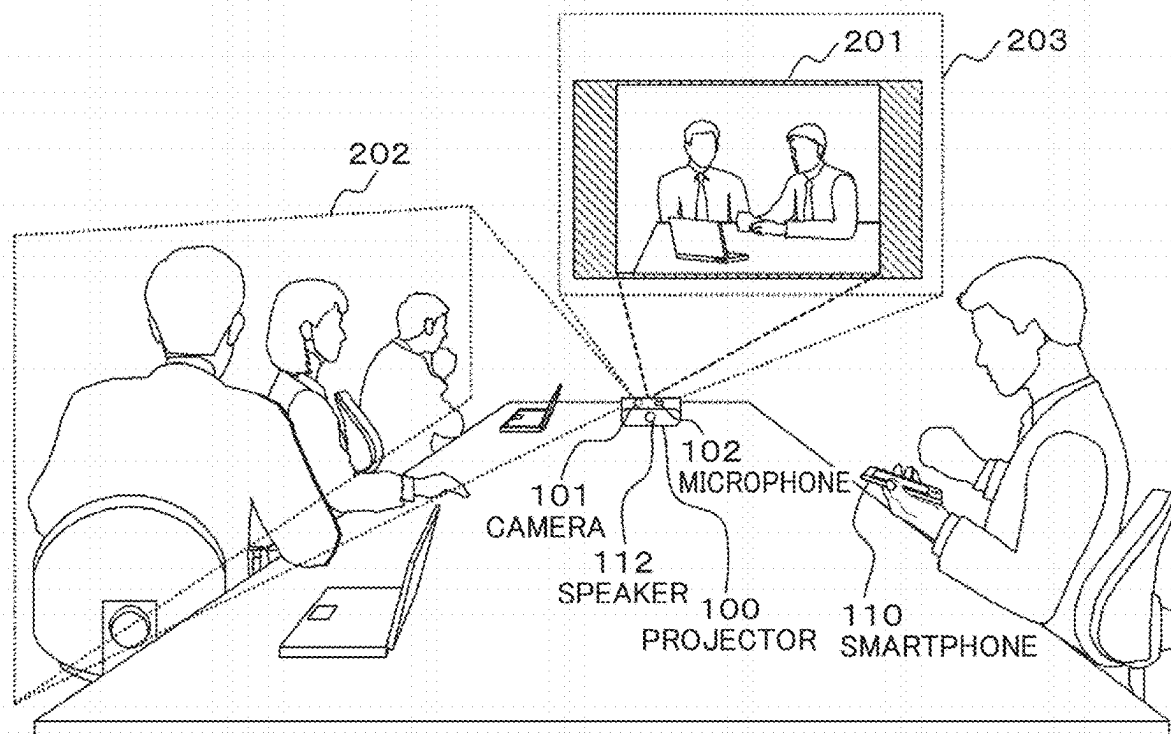


FIG. 3

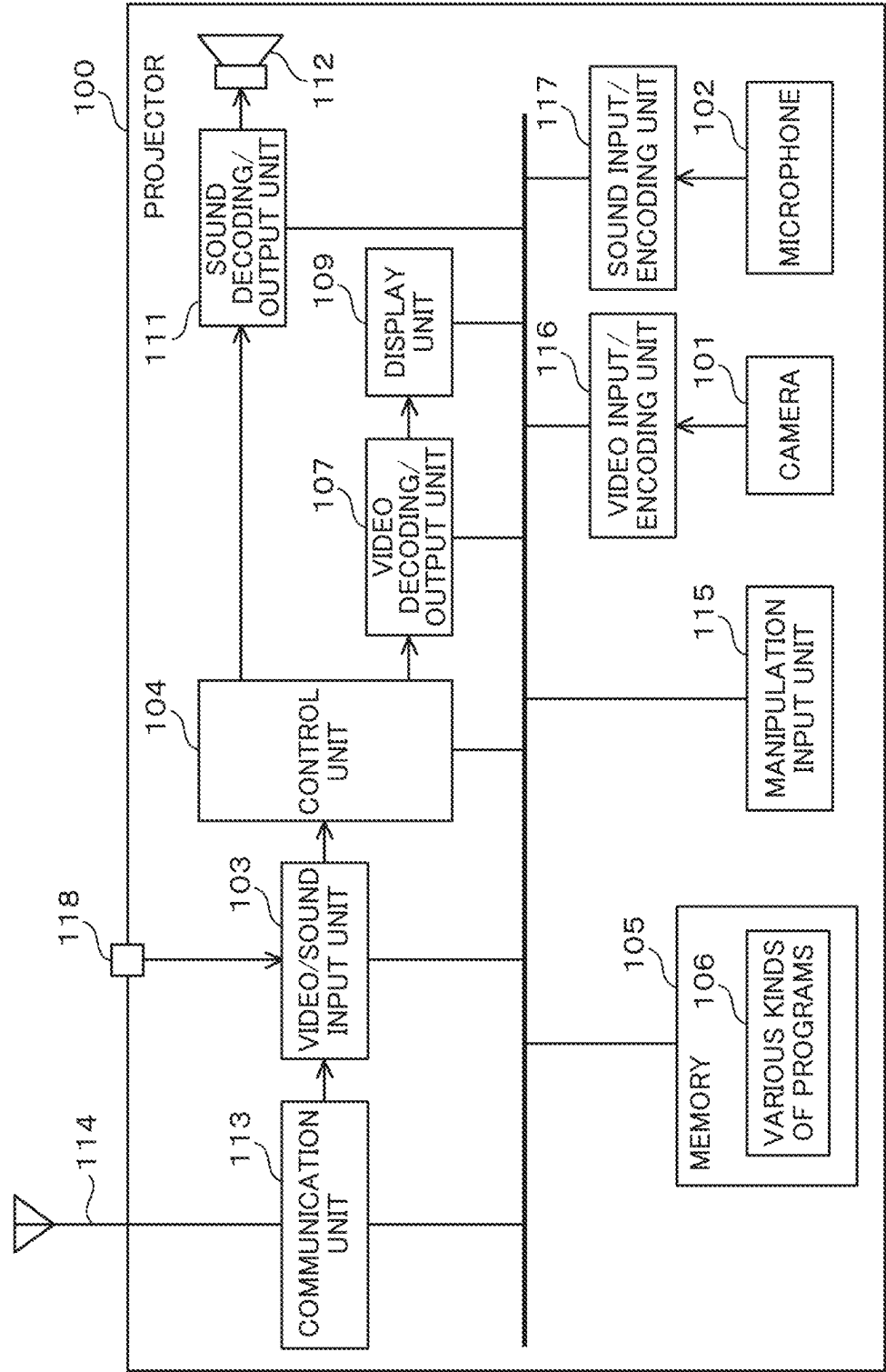


FIG. 4

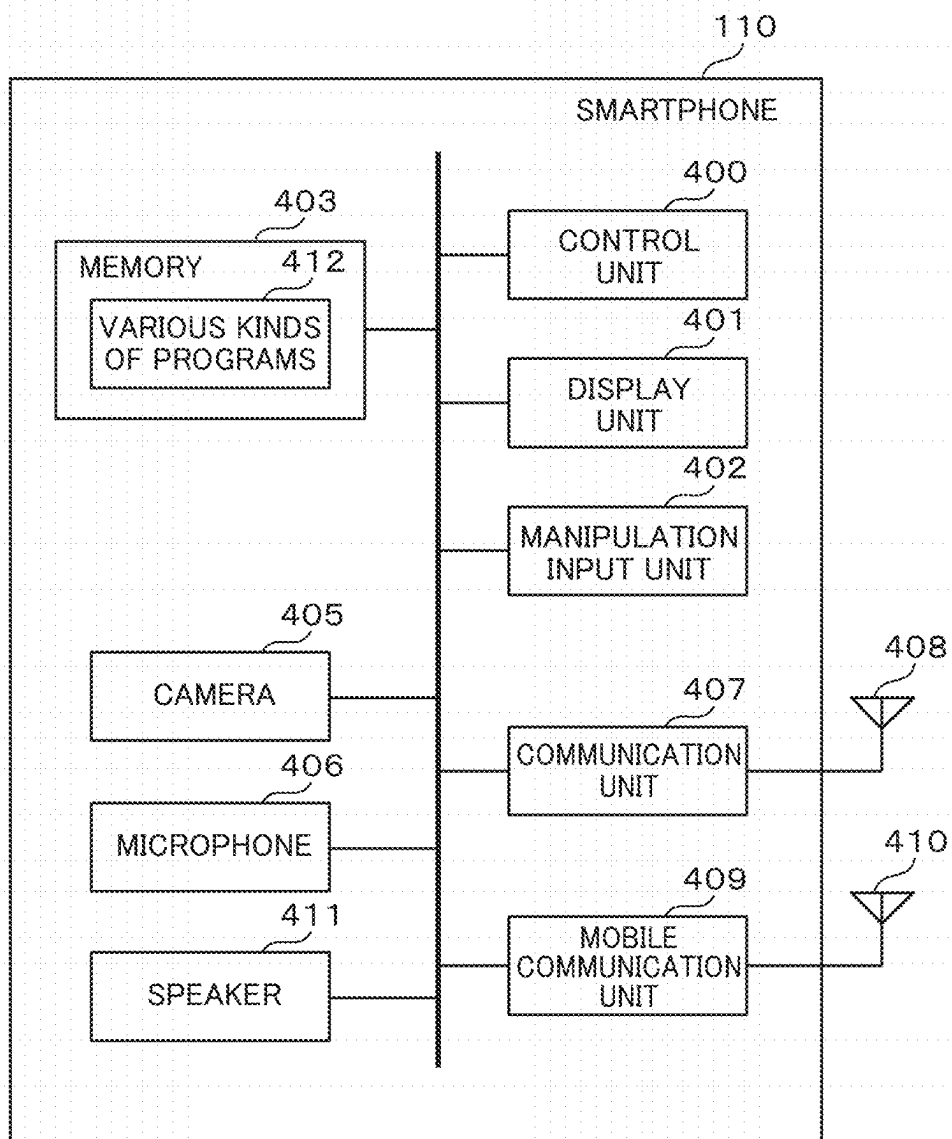


FIG. 5

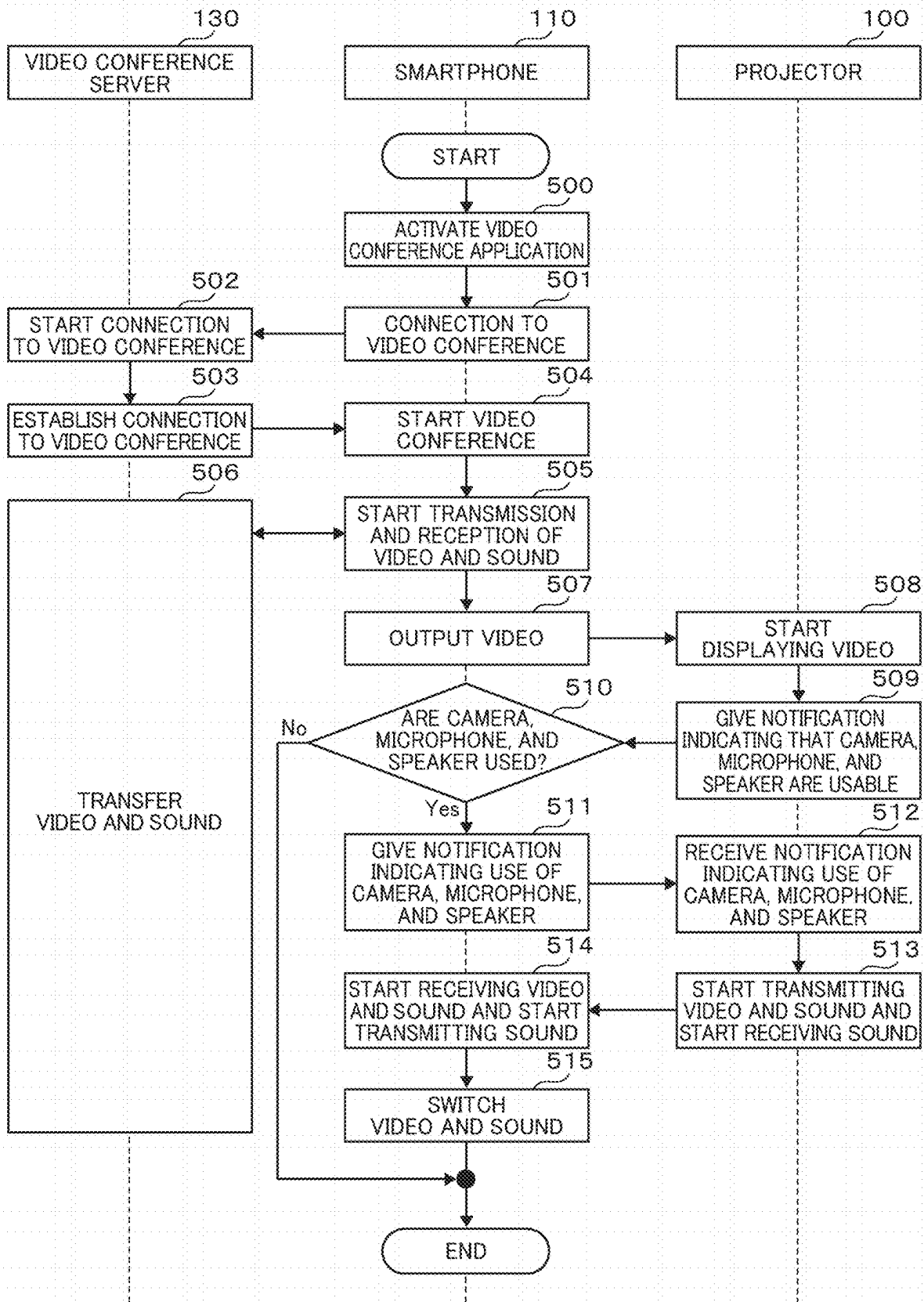


FIG. 6A

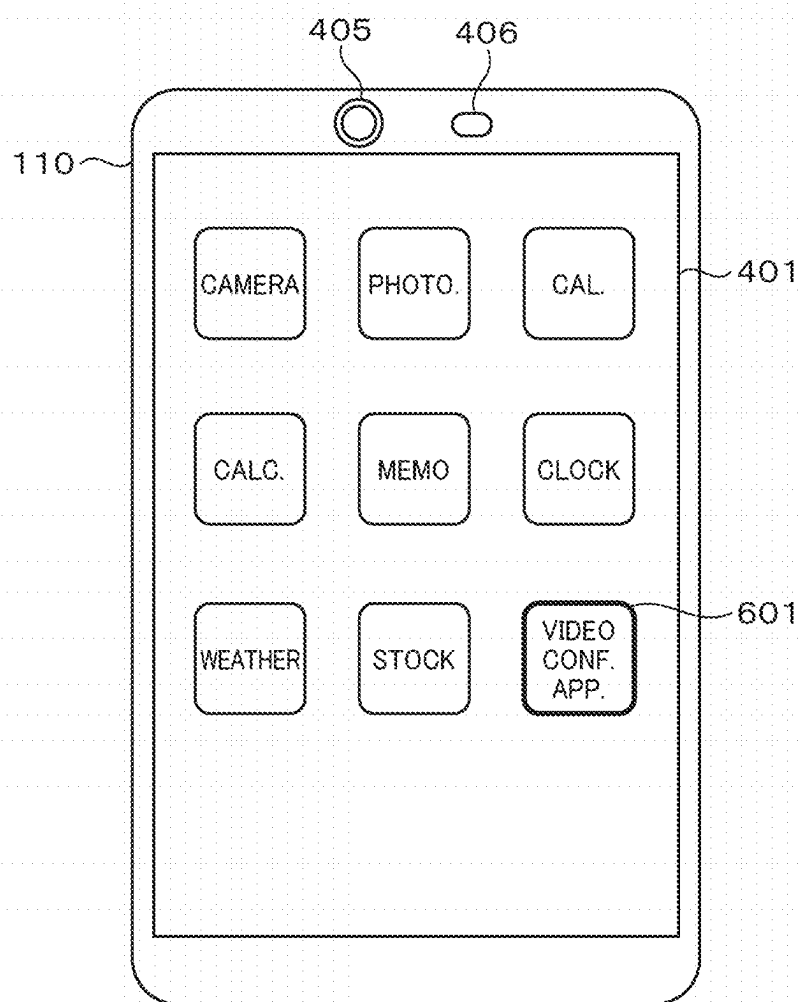


FIG. 6B

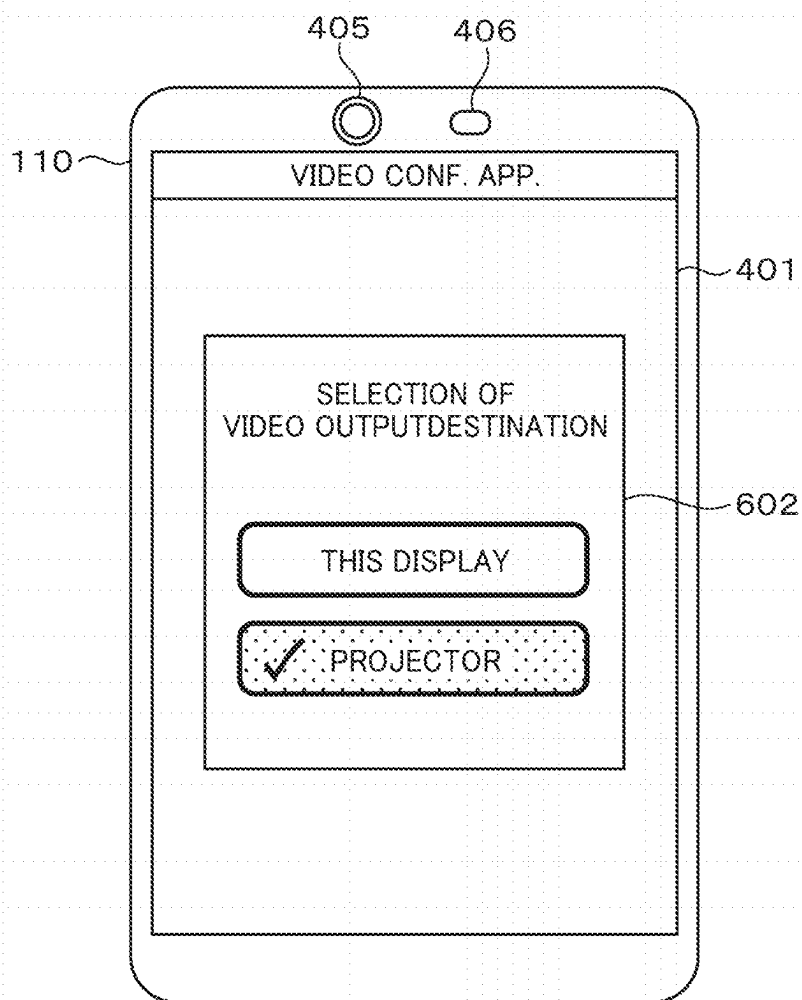


FIG. 6C

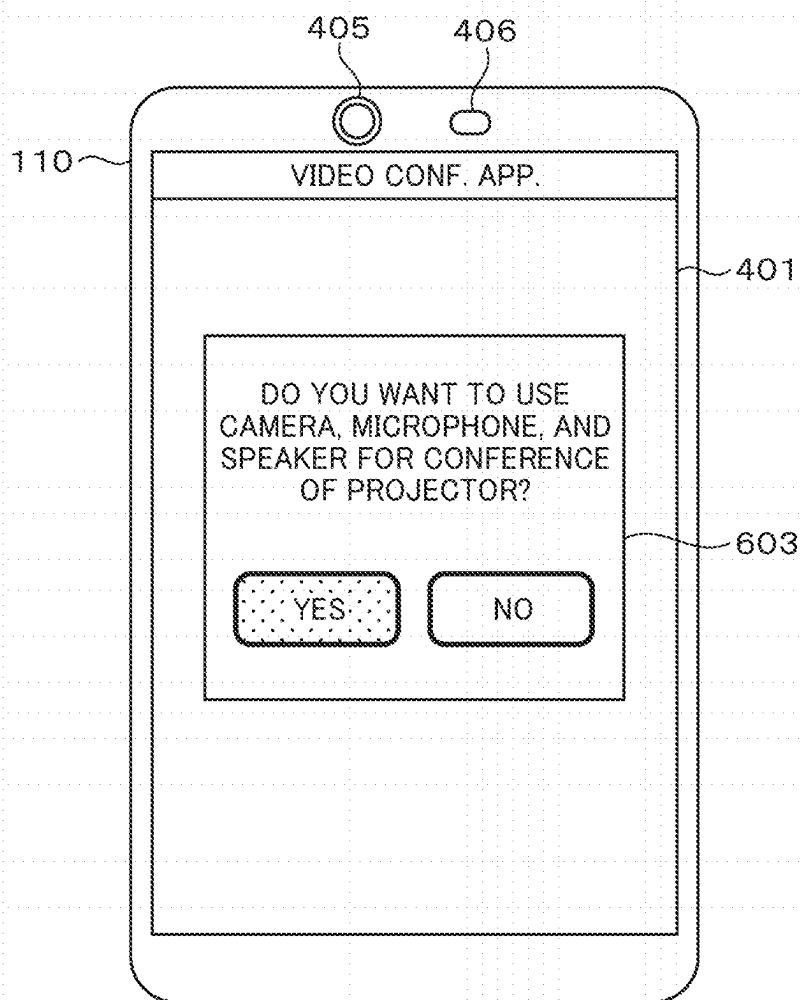


FIG. 7

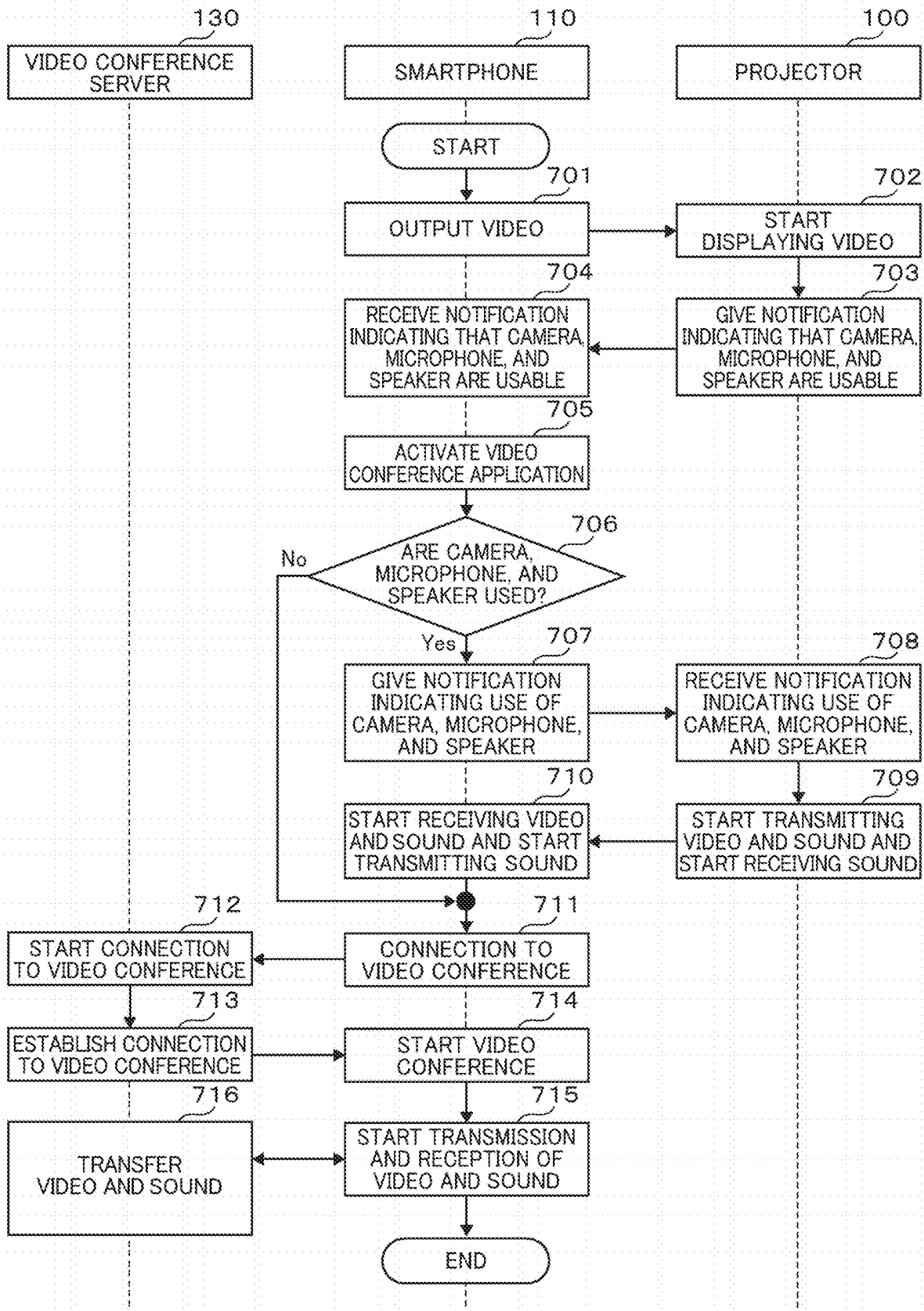


FIG. 8

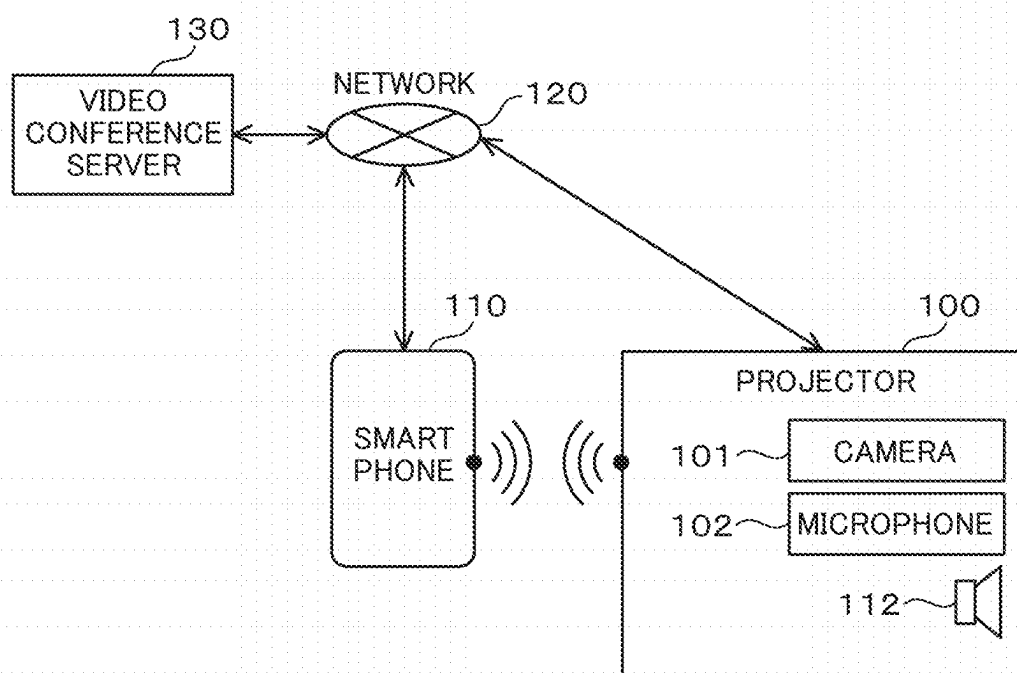


FIG. 9

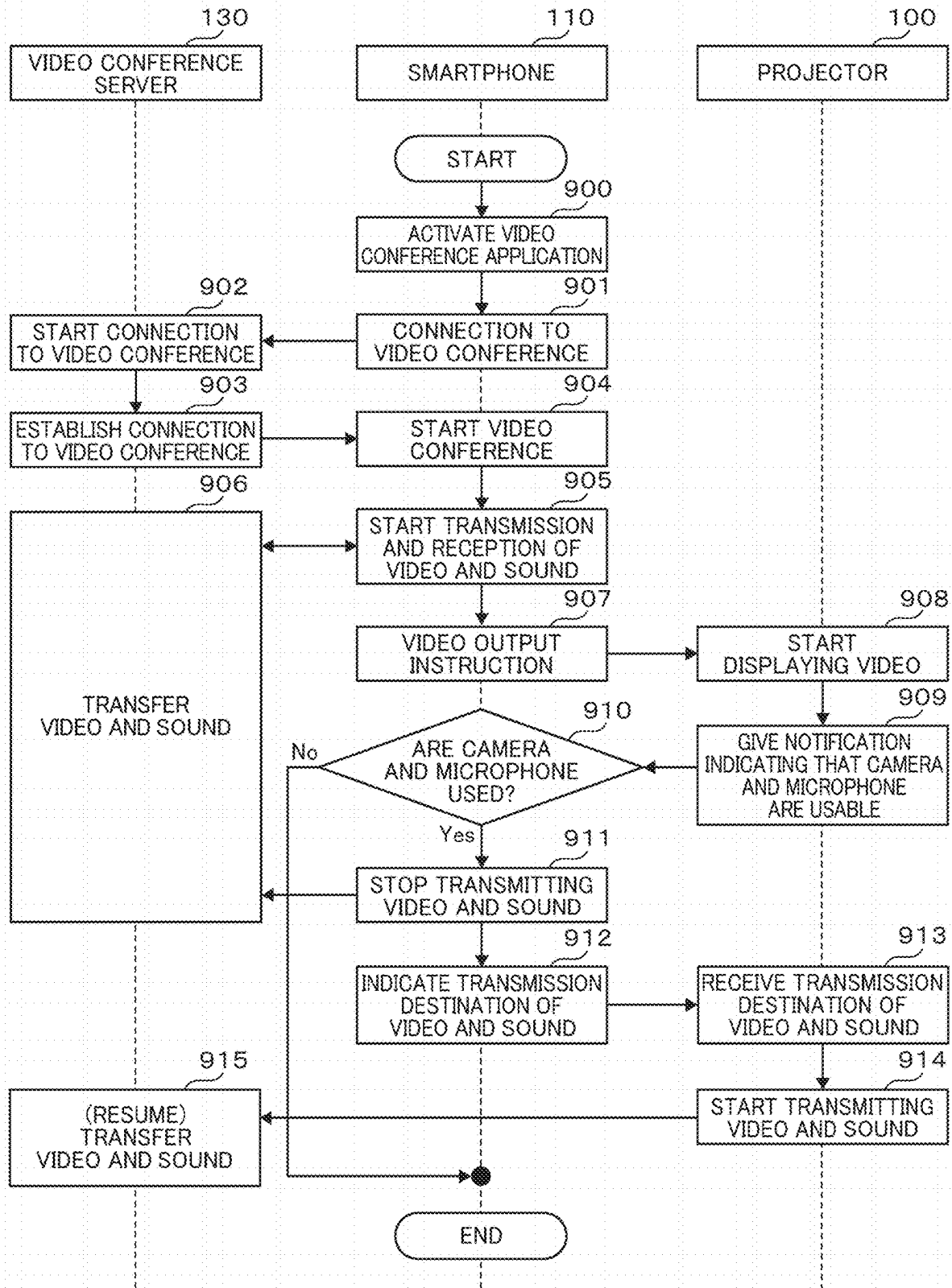
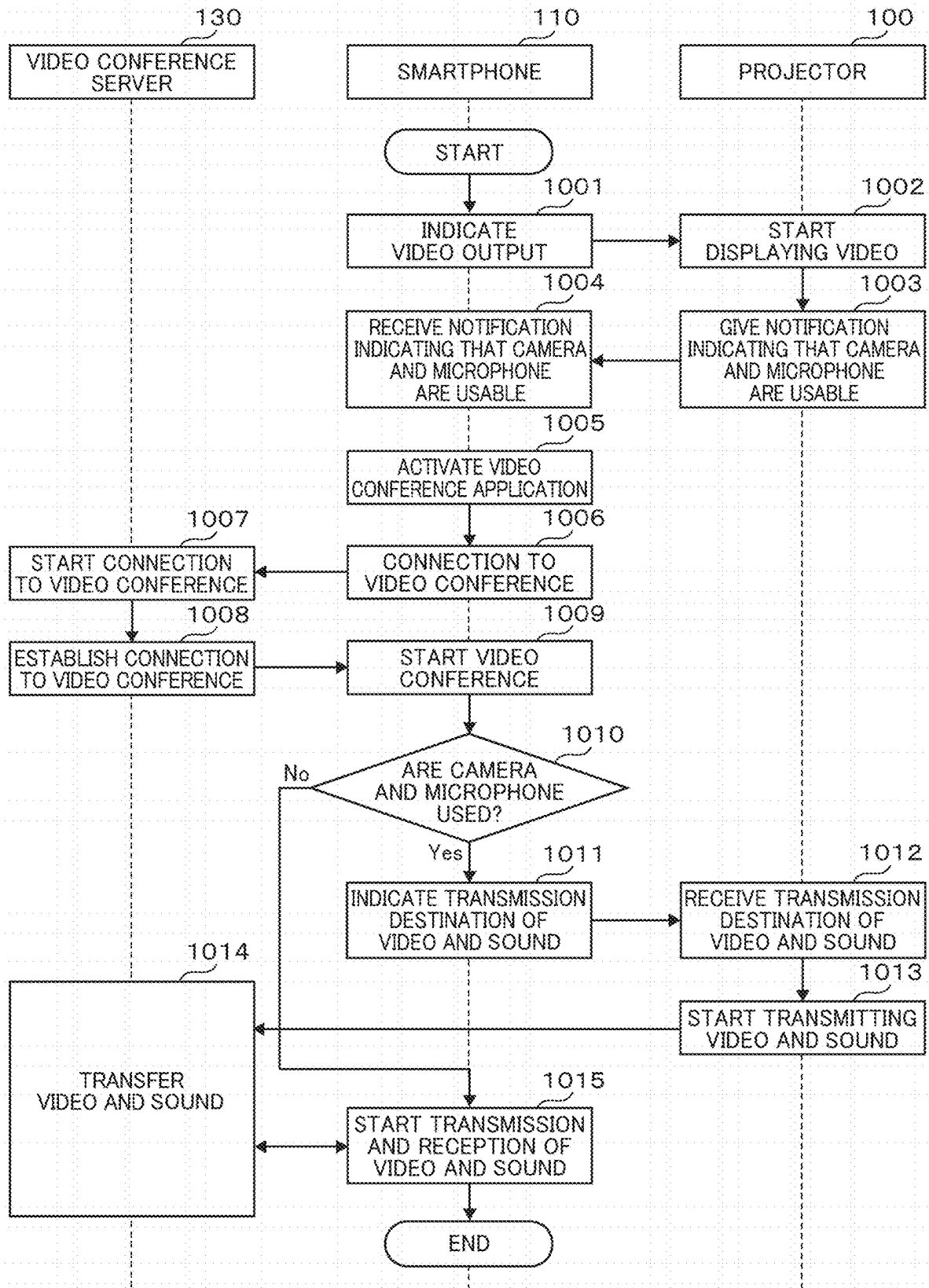


FIG. 10



INFORMATION PROCESSING SYSTEM, WIRELESS TERMINAL, AND INFORMATION PROCESSING METHOD

TECHNICAL FIELD

[0001] The present invention relates to an information processing system, a wireless terminal, and an information processing method.

BACKGROUND ART

[0002] As a background technology in the present technical field, in order to provide “a projector capable of enabling a user to appropriately participate in or appropriately view a video conference or a remote presentation performed on a network”, “a projector which is connected with one or more projectors via a network and includes an input means for receiving an input of a video signal, a determining means for determining the presence or absence of the input of the video signal in the input means, a projecting means for projecting an image on the basis of the video signal, and a mode selecting means for selecting a server mode or a client mode on the basis of a determination result of the determining means, wherein, when the client mode is selected, video data to be projected by the projector is received from the projector in the server mode on the network, and the received video data is output to the projecting means, and when the server mode is selected, the video data to be projected by the projecting means is transmitted to the projector in the client mode on the network” is disclosed in Patent Document 1.

CITATION LIST

Patent Document

[0003] Patent Document 1: JP 2004-239968 A

SUMMARY OF THE INVENTION

Technical Problem

[0004] By using the technique disclosed in Patent Document 1, it is possible to participate in the video conference appropriate. However, in order to participate in the video conference, it is necessary for a device such as a projector to establish a connection with the video conference server and transmit authentication information, and thus usability is bad. There is a video call or a video conference by a smartphone, and there is already authentication for this, but cooperation between the smartphone and the projector is not taken into consideration.

[0005] In this regard, it is an object of the present invention to improve the usability of the user.

Solution to Problem

[0006] In order to solve the above problem, for example, configurations described in claims set forth below are employed.

[0007] The present application provides a plurality of configurations for solving the above-mentioned problems, and as an example, provided is an information processing system, including a video device that displays a video and a wireless terminal that performs communication with the video device and performs communication with another

apparatus via a network, wherein the video device transmits, if reception of information of the video to be displayed from the wireless terminal is detected, the video information captured by a camera and sound information collected by a microphone, and output received sound information through a speaker, the wireless terminal transmits information of the video to be displayed to the video device, and the other apparatus receives the captured video information and the collected sound information via a network and transmit video information to be displayed and sound information to be output via the network.

Advantageous Effects of the Invention

[0008] According to the present invention, it is possible to improve the usability of the user.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 is a diagram illustrating an example of a system configuration according to a first embodiment.

[0010] FIG. 2 is a diagram illustrating an example of a video conference.

[0011] FIG. 3 is a diagram illustrating an example of a configuration of a projector.

[0012] FIG. 4 is a diagram illustrating an example of a configuration of a smartphone.

[0013] FIG. 5 is a sequence diagram illustrating an example of a first video conference start operation according to the first embodiment.

[0014] FIG. 6A is a diagram illustrating an example of a first screen display of a smartphone.

[0015] FIG. 6B is a diagram illustrating an example of a second screen display of a smartphone.

[0016] FIG. 6C is a diagram illustrating an example of a third screen display of a smartphone.

[0017] FIG. 7 is a sequence diagram illustrating an example of a second video conference start operation according to the first embodiment.

[0018] FIG. 8 is a diagram illustrating an example of a system configuration according to a second embodiment.

[0019] FIG. 9 is a sequence diagram illustrating an example of a first video conference start operation according to the second embodiment.

[0020] FIG. 10 is a sequence diagram illustrating an example of a second video conference start operation according to the second embodiment.

DESCRIPTION OF EMBODIMENTS

[0021] Hereinafter, exemplary embodiments of the present invention will be described with reference to the appended drawings. Each of the following embodiments is applied to a system in which transmission and reception of a video captured by a camera and a sound collected by a microphone are performed between terminals at remote sites via a network (hereinafter referred to as a “video conference system”) as an example, but the video conference system is not limited to the following embodiments. Further, a system is not limited to the video conference system.

First Embodiment

[0022] A first embodiment will be described in connection with a configuration in which, when a video conference with a remote site is performed using a video conference application of a smartphone (a wireless terminal), the smartphone

performs the video conference using a video and a sound obtained by a video conference camera, a microphone, and a speaker which are installed in a projector and suitable for the use by a plurality of persons.

[0023] FIG. 1 is a diagram illustrating an example of a configuration of a video conference system according to the present embodiment. The video conference system of the present embodiment includes, for example, a projector 100, a smartphone 110, a network 120, and a video conference server 130. The projector 100 is a device for projecting a video so that the video can be seen by a plurality of persons, and a video conference camera 101, a microphone 102, and a speaker 112 are installed in the projector 100.

[0024] In the example of FIG. 1, the camera 101, the microphone 102, and the speaker 112 are installed in the projector 100, but the camera 101, the microphone 102, and the speaker 112 may be externally attached to the projector 100 if necessary, and a plurality of cameras 101, a plurality of microphones 102, or a plurality of speakers 112 may be installed.

[0025] The projector 100 and the smartphone 110 communicate with each other through a predetermined inter-apparatus communication unit built in each of the projector 100 and the smartphone 110. The inter-apparatus communication unit may perform communication via a wireless local area network (LAN) such as Wi-Fi (a registered trademark) or may perform communication via a wired LAN. Further, other wired or wireless communication such as USB, Bluetooth (a registered trademark), IrDA (a registered trademark), near field communication (NFC) or the like may be used.

[0026] Here, Wi-Fi is a wireless LAN standard established by an Institute of Electrical and Electronic Engineers (IEEE) standard. USB is a standard established by USB Implementers Forum (USB-IF). Bluetooth is a standard established by a Bluetooth Special Interest Group (Bluetooth SIG).

[0027] The network 120 is a network in which communication can be performed between apparatuses at remote sites or in a company such as the Internet, an in-house network, or the like. A wireless LAN such as Wi-Fi, or a wired LAN may be included as all or part of the network 120. Further, the network 120 may include a mobile communication network used for mobile phones or the like.

[0028] The video conference server 130 performs management of a connection between terminals and transfer of data such as a video and a sound transmitted from each terminal in order to make it possible to perform transmission and reception of a video and a sound among a plurality of terminals participating in the same video conference upon receiving a video conference start request from a terminal connected to the network 120 such as the smartphone 110. Further, the video conference server 130 may accumulate video information of a material distributed at the video conference and distribute the video information to a plurality of terminals participating in the same video conference. A sound may be included in the information of the materials to be distributed.

[0029] FIG. 2 is a diagram illustrating an example of a form in which the user uses the video conference system. In the example of FIG. 2, a form in which the projector 100 is placed on a conference table surrounded by a plurality of persons, and the video conference is performed using the video conference application of the smartphone 110 is illustrated. The smartphone 110 transmits a video and a

sound to the projector 100, and a camera video of the other party of the video conference is shown in a projection video 201 of the projector 100 as the video transmitted to the projector 100. Further, a sound collected by a microphone of the other party of the video conference is output from the speaker 112 of the projector 100 as the sound transmitted to the projector 100.

[0030] In the example of FIG. 2, the camera video of the other party is projected on the projection video 201, but the present invention is not limited thereto, and the video of the material accumulated in the video conference server 130 may be projected or may be switchable by a switch (not illustrated). Further, the projection video 201 may be divided into two, and the camera video of the other party and the video of the material may be simultaneously projected.

[0031] The video captured by the camera 101 installed in the projector 100 and the sound collected by the microphone 102 are transmitted to the smartphone 110 and input to the video conference application of the smartphone 110. The camera 101 may image an imaging range 202 for participants in the video conference, or a plurality of imaging ranges 202 may be set so that some of a plurality of participants are imaged.

[0032] Further, the camera 101 may image an imaging range 203 including the projection video 201. The video of the material is projected on the projection video 201, and for example, the participant points to a specific part of the material and explains it or overwrites a part of the material, and thus content to be explained to the other party of the video conference is easily conveyed. The imaging range 202 and the imaging range 203 of the camera 101 may be switchable by a switch (not illustrated), the camera 101 may be physically movable, or both the imaging range 202 and the imaging range 203 may be imaged at the same time.

[0033] Further, the camera 101 may image a paper material, a sample item, or the like placed on the conference table as the imaging range.

[0034] FIG. 3 is a diagram illustrating an example of a configuration of a projector 100. The projector 100 includes, for example, a camera 101, a microphone 102, a video/sound input unit 103, a control unit 104, a memory 105, a video decoding/output unit 107, a display unit 109, a sound decoding/output unit 111, a speaker 112, a communication unit 113, an antenna unit 114, a manipulation input unit 115, a video input/encoding unit 116, an sound input/encoding unit 117, an input terminal 118, and the like, and the respective units are connected via a bus as illustrated in FIG. 3.

[0035] The control unit 104 includes, for example, a processor, and receives information of an input manipulation of the user via the manipulation input unit 115 and controls the respective units connected to the bus of the projector 100 by executing various kinds of programs 106 stored in the memory 105. For example, the control unit 104 reads a programs among various kinds of programs 106 from the memory 105, and controls the video input/encoding unit 116 and the communication unit 113 in accordance with the read program such that the video input/encoding unit 116 receives and encodes the video captured by the camera 101, and the encoded video is transmitted from the communication unit 113.

[0036] The control unit 104 is a system-on-a-chip (SoC) and may include a circuit that separates video/sound information input from the video/sound input unit 103 into sound

information and video information and outputs the sound information and the video information to the sound decoding/output unit **111** and the video decoding/output unit **107** in addition to the processor. Detailed description of the control of each part of the projector **100** by the control unit **104** executing various kinds of programs **106** is omitted, and an operation of the projector **100** will be described with reference to FIGS. **5** and **7**.

[0037] The memory **105** stores various kinds of programs **106** executed by the control unit **104**, data which is written and read out by the control unit **104**, and the like. Setting information of the projector **100**, video data, and sound data may be stored in the memory **105**. Various kinds of programs **106** stored in the memory **105** may be stored in the memory **105** in advance at a time point at which the projector **100** is shipped, may be stored in a recording medium such as a semiconductor memory, or may be stored in the memory **105** via a medium connecting unit (not illustrated) and installed.

[0038] Further, various kinds of programs **106** may be downloaded from an external network via the communication unit **113**, stored in the memory **105**, and installed. The operation performed by the control unit **104** executing various kinds of programs **106** may be implemented by hardware as a circuit for performing the same operation.

[0039] The communication unit **113** performs communication with the smartphone **110** via the antenna unit **114** in accordance with a predetermined standard or protocol. The standard used by the communication unit **113** may be a wireless LAN such as Wi-Fi or a wired LAN. Further, other wired or wireless communication such as USB, Bluetooth, IrDA, NFC, or the like may be used, and direct communication may be performed without going through the network **120**. Further, the communication unit **113** may include a plurality of chips supporting communications of different standards mounted therein or a single chip supporting communications of a plurality of standards mounted therein.

[0040] The communication unit **113** outputs the video/sound information received by the antenna unit **114** to the video/sound input unit **103**, and transmits the video/sound information input from the video input/encoding unit **116** and the sound input/encoding unit **117** through the antenna unit **114**. The video/sound information received by the antenna unit **114** may be output to the bus.

[0041] The video/sound input unit **103** receives the video/sound information to be projected by the projector **100** from the input terminal **118**. This may be for an original use of projecting the input video of the projector **100** other than the use for the video conference or may be used for receiving a material referred to in the video conference from a personal computer or the like. To this end, the video/sound input unit **103** may output the video/sound information to the bus as well as the control unit **104**.

[0042] The input terminal **118** is, for example, a composite terminal, an S terminal, a D terminal, a component terminal, a VGA terminal, a DVI terminal, an HDMI terminal, or the like. In a case in which an input from the input terminal **118** is an analog signal, the video/sound input unit **103** may convert an analog signal into a digital signal. Further, the video/sound input unit **103** may select the input from the input terminal **118** and an input from the communication unit **113** or may synthesize both inputs.

[0043] In a case in which the video/sound input unit **103** outputs the video/sound information to the bus, the communication unit **113** may receive the video/sound information

via the bus and transmit the video/sound information through the antenna unit **114**. At this time, the video information or the sound information may be selected, and for example, the video information of the material may be transferred from the video/sound input unit **103** to the communication unit **113**, and the sound information of the person participating in the conference may be transferred from the microphone **102** to the communication unit **113** via the sound input/encoding unit **117**.

[0044] The video decoding/output unit **107** decodes the video information input from the control unit **104** if necessary and outputs the decoded video information to the display unit **109**. For example, since the video information received by the communication unit **113** is compressed/encoded, the video information received by the communication unit **113** is decoded and output, and the video information input from the input terminal **118** may be output without change since the video information input from the input terminal **118** is not compressed/encoded. The control unit **104** may control whether or not the decoding is performed. Part of the video information output from the video decoding/output unit **107** may be video information generated by the control unit **104** executing various kinds of programs **106**.

[0045] The display unit **109** is constituted by, for example, a liquid crystal panel, an optical lens, or the like and projects a video onto a screen or the like. A video projection structure may be a digital light processing (DLP: a registered trademark), a laser light source, or the like or may be another video projection structure. Further, the display unit **109** may include a liquid crystal panel or the like that does not project a video.

[0046] The sound decoding/output unit **111** decodes the sound information input from the control unit **104** if necessary and outputs the decoded sound information to the speaker **112**. For example, since the sound information received by the communication unit **113** is compressed/encoded, the sound information received by the communication unit **113** may be decoded and output, and since the sound information input from the input terminal **118** is not compressed/encoded, the sound information input from the input terminal **118** may be output without change. The control unit **104** may control whether or not the decoding is performed. The sound information output by the sound decoding/output unit **111** may be output to an external apparatus (not illustrated) in place of the speaker **112**.

[0047] The speaker **112** is preferably a speaker which is omnidirectional and generates a sound with a sufficient volume for the conference. The microphone **102** is preferably a microphone which is omnidirectional and has sensitivity capable of collecting the sound of the participant on the conference table. The speaker **112** and the microphone **102** may be ones in which emphasis is placed on a sound frequency band. Further, a plurality of speaker **112** and a plurality of microphones **102** may be installed for an omnidirectional property or the like. The sound input/encoding unit **117** receives the sound information converted into an electric signal by the microphone **102**, encodes the sound information to compress an information amount, and outputs the encoded sound information to the communication unit **113** via the bus.

[0048] The camera **101** images the imaging ranges **202** and **203**, converts the captured video into an electric signal, and inputs the electric signal to the video input/encoding

unit 116. A plurality of cameras 101 may be installed in accordance with the imaging ranges 202 and 203, or the like, and a plurality of cameras 101 may be connected to the video input/encoding unit 116. Further, the camera 101 may be mounted on the projector 100 with a physically movable structure.

[0049] The video input/encoding unit 116 receives the video information converted into an electric signal by the camera 101, encodes the video information to compress an information amount, and outputs the encoded video information to the communication unit 113 via the bus. The video input/encoding unit 116 may be connected to a plurality of cameras 101, and in a case in which the video information is input from each of a plurality of cameras 101, video input/encoding unit 116 may select one of the inputs from a plurality of cameras 101 or may synthesize the inputs from a plurality of cameras 101.

[0050] The manipulation input unit 115 is an input device that receives an input manipulation to the projector 100 from the user, and is, for example, a remote controller, a keyboard, a pointing device such as a mouse or a touch panel, or the like.

[0051] In the example of FIG. 3, the structure of the projector 100 has been described, but a display that displays a video instead of projecting the video may be used as the display unit 109, and each structure described above with reference to FIG. 3 may be installed in a television receiver or a display device. In other words, the projection video 201 illustrated in FIG. 2 may be a television receiver, and the projector 100 may be included in the television receiver. In the configuration of this television receiver, the camera 101 for imaging the imaging range 202 may be installed, and the camera 101 for imaging the imaging range 203 may not be installed, or a touch panel or the like may be installed in the television receiver instead of the camera 101 for imaging the imaging range 203.

[0052] Further, a configuration in which the display unit 109 and the speaker 112 are removed from the configuration illustrated in FIG. 3, and output terminals are installed instead of the display unit 109 and the speaker 112, and it is configured with a set-top box (STB) or a recorder which does not directly display the video or output the sound may be provided. Further, instead of the projector 100, a personal computer, a monitor device, a tablet terminal, or the like including the respective components illustrated in FIG. 3 may be used.

[0053] FIG. 4 is a diagram illustrating an example of the configuration of the smartphone 110. The smartphone 110 includes, for example, a camera 405, a microphone 406, a control unit 400, a memory 403, a display unit 401, a manipulation input unit 402, a communication unit 407, a communication antenna unit 408, a mobile communication unit 409, a mobile communication antenna unit 410, and the like.

[0054] The control unit 400 includes a processor, reads out and executes various kinds of programs 412 stored in the memory 403, and controls the respective units of the smartphone 110 via a bus. The control unit 400 is an SoC and may include a circuit related to processing of videos and sounds. The display unit 401 may be a liquid crystal panel, an organic EL (Electroluminescence) display, or the like or may be integrated with a touch panel of the manipulation input unit 402. The camera 405 images a specific direction

of the smartphone 110, the microphone 406 collects the sound around the smartphone 110, and a speaker 411 outputs the sound.

[0055] The communication unit 407 performs communication with the projector 100 via the communication antenna unit 408 in accordance with a predetermined standard or protocol. The communication standard is a standard in which communication with the projector 100 can be performed. In order to perform communication with the network 120 via the mobile communication antenna unit 410, a mobile communication base station (not illustrated), or the like, the mobile communication unit 409 may perform communication conforming to a mobile communication standard such as 3G, 4G, or LTE.

[0056] Further, in order to perform communication with the network 120 via the mobile communication antenna unit 410, an access point (not illustrated), or the like, the mobile communication unit 409 may perform communication conforming to a wireless LAN standard such as Wi-Fi. Further, the mobile communication unit 409 may perform communication with the network 120 via a wired LAN through a terminal (not illustrated) in place of the mobile communication antenna unit 410 and may include a plurality of chips supporting communications of different standards mounted therein or a single chip supporting communications of a plurality of standards mounted therein.

[0057] As various kinds of programs 412 stored in the memory 403, a video conference application is included. The video conference application may be a program such as a video call or the like, and may be an application program of a telephone call using the display unit 401, the camera 405, the microphone 406, and the like. Further, as various kinds of programs 412, an operating system (OS) or a presentation application may be included.

[0058] Hereinafter, an operation example in which the video conference is started using the smartphone 110, and the camera 101, the microphone 102, and the speaker 112 of the projector 100 are used in the video conference will be described with reference to FIGS. 5 and 6.

[0059] FIG. 5 is a sequence diagram illustrating an example of a video conference start operation according to the first embodiment. The video conference start operation is a sequence in which the video conference via the video conference server 130 is started using the video conference application of the smartphone 110, the display unit 109 and the speaker 112 of the projector 100 are used for the video and the sound received from the video conference server 130, and the camera 101 and the microphone 102 of the projector 100 are used for the video and the sound to be transmitted to the video conference server 130.

[0060] FIGS. 6A, 6B, and 6C are diagrams illustrating an example of a screen display of the smartphone 110. In the sequence described with reference to FIG. 5, the smartphone 110 displays the screen to be described with reference to FIGS. 6A, 6B, and 6C. The camera 405, the microphone 406, and the display unit 401 in FIGS. 6A, 6B, and 6C are similar to those described above with reference to FIG. 4, the manipulation input unit 402 is integrated with the display unit 401, and a manipulation is input when the display of the display unit 401 is touched.

[0061] Step 500: The smartphone 110 displays a plurality of icons on the display unit 401 as illustrated in FIG. 6A,

detects that an icon **601** of the video conference application is selected (touched) by the user, and activates the video conference application.

[0062] Step **501**: The smartphone **110** displays a screen for prompting an input of a conference ID, an account/password (authentication information), and the like for a video conference to participate in on the display unit **401**, receives the conference ID, the account/password, and the like input by user, transmits the input conference ID, the account/password, and the like to the video conference server **130**, and requests a connection to the video conference.

[0063] Step **502**: The video conference server **130** receives the request from the smartphone **110**, and starts a connection process with a terminal participating in the same video conference on the basis of the received conference ID, the account/password, and the like.

[0064] Step **503**: The video conference server **130** establishes a connection with the terminal participating in the same video conference as the video conference requested by the smartphone **110**, and gives a notification indicating that the connection has been established to the smartphone **110**.

[0065] Step **504**: The smartphone **110** starts a video conference process using the camera **405**, the microphone **406**, and the speaker **411** of the smartphone **110**.

[0066] Step **505**: The smartphone **110** transmits the video captured by the camera **405** and the sound collected by the microphone **406** to the video conference server **130**. Further, the smartphone **110** receives the video and the sound of another terminal transmitted from the video conference server **130**, displays the video on the display unit **401**, and outputs the sound through the speaker **411**.

[0067] Step **506**: The video conference server **130** transfers the video and the sound received from the smartphone **110** to the terminal participating in the same conference. Further, the video conference server **130** transfers the video and the sound received from the terminal participating in the same meeting to the smartphone **110**.

[0068] Step **507**: The smartphone **110** displays a video output destination setting menu **602** on the display unit **401** as illustrated in FIG. 6B, detects that the “projector” is selected (touched) by the user, and transmits the display screen to the projector **100** through the communication unit **407**. The video output destination setting menu **602** may be displayed if the video conference application is activated or may be displayed if a specific menu of the video conference application is selected.

[0069] Step **508**: Upon detecting the reception of the display screen from the smartphone **110** through the communication unit **113**, the projector **100** starts displaying the received display screen and proceeds to step **509**.

[0070] Step **509**: The projector **100** gives a notification indicating that the camera **101**, the microphone **102**, and the speaker **112** of the projector **100** are usable to the smartphone **110** through the communication unit **113**.

[0071] Step **510**: Upon receiving the notification from the projector **100**, the smartphone **110** displays a camera/microphone/speaker use confirmation menu **603** on the display unit **401** as illustrated in FIG. 6C, the process proceeds to step **511** if “Yes” is selected (touched) by the user, and the video conference start operation ends if it is detected that “No” is selected (touched).

[0072] Step **511**: Since “Yes” is selected in the camera/microphone/speaker use confirmation menu **603**, the smartphone **110** gives a notification indicating the use of the

camera **101**, the microphone **102**, and the speaker **112** to the projector **100** through the communication unit **407**.

[0073] Step **512**: Upon receiving the notification of step **511** from the smartphone **110** through the communication unit **113**, the projector **100** starts imaging and sound collection using the camera **101** and the microphone **102** of the projector **100**.

[0074] Step **513**: The projector **100** starts transmitting the video captured by the camera **101** of the projector **100** and the sound collected by the microphone **102** to the smartphone **110** through the communication unit **113**, and starts receiving the sound from the smartphone **110** so that the sound can be output through the speaker **112**.

[0075] Step **514**: The smartphone **110** starts receiving the video and the sound from the projector **100** through the communication unit **407**, and starts transmitting the sound to the projector **100**.

[0076] Step **515**: The smartphone **110** switches the video and the sound to be transmitted to the video conference server **130** from the video and the sound obtained by the camera **405** and the microphone **406** of the smartphone **110** to the video and the sound received from the projector **100**, and switches the sound received from the video conference server **130** from the output of the speaker **411** to the transmission of the sound to the projector **100**.

[0077] As described above, when the video conference is started using the application used in the smartphone **110**, and the smartphone **110** outputs the video to the projector **100**, the projector **100** gives a notification indicating that the camera **101**, the microphone **102**, and the speaker **112** of the projector are usable to the smartphone **110**, and thus a cooperation can be easily achieved.

[0078] Further, since the smartphone **110** uses the video and the sound obtained by the camera **101** and the microphone **102** of the projector **100** in the video conference and uses the speaker **112** for the sound of the video conference, it is possible to use the camera, the microphone, and the speaker suitable for the conference using the smartphone **110** which is daily used by the user and the application thereof, and thus it is possible to improve the convenience of the user.

[0079] Further, since the information of the smartphone **110** can be used as the information for participating in the video conference (the authentication information, the password, or the like), it is easy to input information, special dedicated information is unnecessary, and it is easy to use a popular participation procedure.

[0080] In the example of the sequence illustrated in FIG. 5, after the video conference is started in the smartphone **110** (step **504**), the video output to the projector **100** and the use of the camera **101**, the microphone **102**, and the speaker **112** of the projector **100** are started, but this sequence is not limited.

[0081] For example, as illustrated in FIG. 7, before the video conference is started by the smartphone **110** (step **714**), the video may be output from the smartphone **110** to the projector **100** (step **701**), and at a time point at which the video conference application is activated (step **705**), the camera **101**, the microphone **102**, and the speaker **112** of the projector **100** may become usable.

[0082] Step **701** to step **703** of FIG. 7 correspond to step **507** to step **509** of FIG. 5, and the smartphone **110** receives the notification in step **704**. Thereafter, if the video conference application of the smartphone **110** is activated in step

705, the smartphone 110 executes step 706 on the basis of the notification received in step 704 in advance. Step 707 to step 710 correspond to step 511 to step 514, and step 711 to step 714 correspond to step 501 to step 504.

[0083] Step 715 to step 716 correspond to step 505 to step 506, but in step 505, the camera 405 or the like of the smartphone 110 is used, whereas in step 710, if step 710 is already executed, the camera 101 or the like of the projector 100 is used.

[0084] Further, when the smartphone 110 is outputting a screen of an application in which it is unnecessary to use the camera, the microphone, and the speaker such as a presentation application to the projector 100, the camera/microphone/speaker use confirmation menu 603 illustrated in FIG. 6C is not displayed, and the camera/microphone/speaker use confirmation menu 603 is displayed only when an application in which it is necessary to use the camera, the microphone, and the speaker such as the video conference application is activated, the menu display is not complicated, and the convenience of the user can be improved.

[0085] The communication unit 113 of the projector 100 and the communication unit 407 of the smartphone 110 may enter a communicable state in advance, for example, by pairing of Bluetooth or an operation equivalent thereto. Further, the video output from the smartphone 110 to the projector 100 may be a video output by execution of the OS of the smartphone 110.

[0086] In step 701, if the video can be output by the execution of the OS, a type of video is not limited, and it may be the output of the same video as the video displayed on the display unit 401 of the smartphone 110. Therefore, a mirror image of the display unit 401 of the smartphone 110 may be projected by the projector 100.

[0087] As the video conference system, the configuration in which participation in the video conference is performed through communication with the video conference server 130 has been described, but the present invention is not limited to this configuration. For example, the video conference server 130 may not be provided, and the smartphone 110 may perform point-to-point (P2P) communication of directly communicating with the terminal participating in the video conference via the network 120.

Second Embodiment

[0088] A second embodiment of the present invention will be described below with reference to FIGS. 8 to 10. In the first embodiment, the projector 100 transmits the video and the sound via the smartphone 110, but in the second embodiment, the smartphone 110 is used to participate in the video conference, and the projector 100 transmits the video and the sound without going through smartphone 110. Detailed description of the same configuration as in the first embodiment will be omitted, and different configurations will be described in particular.

[0089] FIG. 8 is a diagram illustrating an example of a video conference system according to the second embodiment. A difference from the first embodiment lies in that the projector 100 can communicate directly with the network 120. Accordingly, the projector 100 transmits the video collected by the camera 101 and the sound collected by the microphone 102 to the video conference server 130 via the network 120.

[0090] The configuration of the projector 100 is similar to that described above with reference to FIG. 3, but the

communication unit 113 of the projector 100 may perform communication with the network 120 via an access point or the like in addition to communication with the communication unit 407 of the smartphone 110. Further, the projector 100 may include a mobile communication unit or a wired communication unit (not illustrated) and performs communication with the network 120. The configuration of the smartphone 110 is similar to that described above with reference to FIG. 4.

[0091] FIG. 9 is a sequence diagram illustrating an example of the video conference start operation according to the second embodiment. Step 900 to step 910 of FIG. 9 correspond to step 500 to step 510 of FIG. 5. A difference from the sequence diagram of FIG. 5, that is, step 911 and subsequent steps will be described below.

[0092] Step 911: Since “Yes” is selected in the camera/microphone use confirmation menu, the smartphone 110 stops transmitting the video and the sound using the camera 405 and the microphone 406 of the smartphone 110 which are being transmitted to the video conference server 130. Further, with the stop, transferring the video and the sound which received from the smartphone 110 to other terminals in the video conference server 130 is stopped.

[0093] Step 912: The smartphone 110 transmits the connection destination of the video conference server 130 and information necessary to a connection to the video conference such as the conference ID and the account/password (the authentication information) to the projector 100, and instructs the video conference server 130 to transmit the video and the sound. Further, the connection destination of the video conference server 130 may be information indicated by an IP address, a URL, or the like.

[0094] Step 913: The projector 100 receives the connection destination of the video conference server 130 and the information necessary for a connection to the video conference such as the conference ID and the account/password, and starts imaging and sound collection using the camera 101 and the microphone 102 of the projector 100.

[0095] Step 914: The projector 100 establishes a connection with the video conference server 130 using the connection destination of the video conference server 130 and the information necessary for a connection to the video conference such as the conference ID and the account/password received from the smartphone 110, and starts transmitting the video captured by the camera 101 of the projector 100 and the sound collected by the microphone 102.

[0096] Step 915: The video conference server 130 resumes the transfer of the video and the sound to other terminals participating in the same meeting using the video and the sound received from the projector 100.

[0097] As described above, when the video conference is started using the application used in the smartphone 110, and the smartphone 110 outputs the video to the projector 100, the projector 100 gives a notification indicating that the camera 101, the microphone 102, and the speaker 112 of the projector 100 are usable to the smartphone 110, and thus a cooperation can be easily achieved.

[0098] The smartphone 110 instructs the projector 100 to transmit the video and the sound obtained by the camera 101 and the microphone 102 of the projector 100 to the video conference server 130, and thus it is possible to use the camera 101 and the microphone 102 suitable for the conference using the smartphone 110 which is daily used by

the user and the application thereof, and thus it is possible to improve the convenience of the user.

[0099] Further, since the video and the sound in the video conference are transmitted directly from the projector **100** to the video conference server **130**, for example, it is possible to reduce the amount of communication data of the smartphone **110** via the mobile communication network and improve the convenience of the user.

[0100] In the example of the sequence illustrated in FIG. 9, after the video conference is started in the smartphone **110** (step **904**), the video output to the projector **100** and the use of the camera **101**, the microphone **102**, and the speaker **112** of the projector **100** are started, but this sequence is not limited.

[0101] For example, as illustrated in FIG. 7, before the video conference is started by the smartphone **110** (step **1009**), the video may be output from the smartphone **110** to the projector **100** (step **1001**), and at a time point at which the video conference application is activated (step **1005**), the camera **101**, the microphone **102**, and the speaker **112** of the projector **100** may become usable.

[0102] Step **1001** to step **1003** of FIG. **10** correspond to step **909** to step **909** of FIG. 9, and the smartphone **110** receives the notification in step **1004**. Thereafter, in step **1005**, the video conference application of the smartphone **110** is activated. Step **1006** to step **1009** correspond to step **901** to step **904**, and the smartphone **110** executes step **1010** on the basis of the notification received in step **1004** in advance.

[0103] Step **1011** to step **1014** correspond to step **912** to step **915**. Step **1015** corresponds to step **905**, and the smartphone **110** uses the camera **405** and the microphone **406** of the smartphone **110**.

[0104] Further, when the smartphone **110** is outputting a screen of an application in which it is unnecessary to use the camera and the microphone such as a presentation application to the projector **100**, the camera/microphone use confirmation menu illustrated in FIG. **6C** is not displayed, and the camera/microphone use confirmation menu is displayed only when an application in which it is necessary to use the camera and the microphone such as the video conference application is activated, the menu display is not complicated, and the convenience of the user can be improved.

[0105] A part of the configuration of each embodiment described above may be deleted or replaced with a part of the configuration of another embodiment, and a part of the configuration of another embodiment is added to the configuration of each embodiment.

REFERENCE SIGNS LIST

[0106]	100 projector
[0107]	101 camera
[0108]	102 microphone
[0109]	110 smartphone
[0110]	112 speaker
[0111]	120 network
[0112]	130 video conference server
[0113]	405 camera
[0114]	406 microphone
[0115]	411 speaker

1. An information processing system, comprising:
a video apparatus configured to display a video; and
a wireless terminal configured to perform communication with the video apparatus and performs communication with another apparatus via a network,
wherein the wireless terminal is further configured to: i) receive information of a video to be displayed by the video apparatus from the other apparatus via the network; and ii) transmit the information of the video to be displayed by the video apparatus to the video apparatus,
wherein, after reception of information of the video to be displayed from the wireless terminal is detected, the video apparatus is further configured to: i) transmit information of a video captured by a camera of the video apparatus to the wireless terminal; ii) receive information of a sound from the wireless terminal; and iii) output the received information of the sound by a speaker of the video apparatus,
wherein the wireless terminal is further configured to: i) receive information of a video to be displayed by the video apparatus from the other apparatus; and ii) transmit the information of the video to be displayed by the video apparatus to the video apparatus,
wherein the wireless terminal is further configured to: i) receive the information of the video captured by the camera of the video apparatus from the video apparatus; and ii) transmit the received information of the video to the other apparatus via the network, and
wherein the other apparatus transmits the information of the video to be displayed by the video apparatus and the information of the sound to be output by the speaker of the video apparatus via the network to the video apparatus.

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