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SYSTEM AND METHOD FOR IMPLEMENTING REAL-TIME CONFERENCING

FIELD

The present disclosure relates to a system and method for implementing real-time conferencing and, more particularly, to a system and method for automatically initiating real-time audio/video conferencing to more closely mimic an in-person meeting.

BACKGROUND

In typical real-time conferencing systems, a computing device, such as a server computing device, will act as the hosting device and “host” the conference. The participants, via their associated conferencing devices (a telephone, a video-conferencing device having a display, a video camera, and a microphone, etc.), will begin communicating with the hosting device and join the conference. Typically, a first participant will initiate the conference and wait for the other participants to join. As participants join the conference, the conferencing system may signal to the participants that a new participant has joined, e.g., by providing a chime or other audio output. As new participants join a conference, there is typically an awkward interaction between the participants as the new participant is unaware of whether they are interrupting an on-going discussion or who (if anyone) is currently participating in the conference.

It would be desirable to provide an improved conferencing system and method that enhanced the user experience and more closely matched the interaction between participants during an in-person meeting.
SUMMARY

The present disclosure is directed to a system and method for initiating a real-time audio/video-conference. A hosting computing device will communicate with the user computing devices at, or a short time before, a scheduled time of the conference. Each user computing device and/or the hosting computing device will determine if there are any users ready to participate in the conference. If there are no users ready for the conference (e.g., there are no users in the rooms associated with the user computing devices), the conference will be initiated by the user computing device(s) and/or the hosting computing device such that users, as they arrive, will be immediately participating in the conference.

Further areas of applicability of the present disclosure will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples are intended for purposes of illustration only and are not intended to limit the scope of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

The present disclosure will become more fully understood from the detailed description and the accompanying drawings, wherein:

FIG. 1 is a diagram of a computing system including an example server computing device and user computing devices according to some implementations of the present disclosure;

FIG. 2 is a functional block diagram of the example user computing device of FIG. 1;
FIG. 3 is a functional block diagram of the example server computing device of FIG. 1; and

FIG. 4 is a flow diagram of a technique for implementing a real-time conference according to some implementations of the present disclosure.

DETAILED DESCRIPTION

As mentioned above, there is a need for an improved conferencing system and method that enhances the user experience and more closely matches the interaction between participants during an in-person meeting. In order to address this need, the present disclosure is directed to an improved system and method for implementing real-time conferencing. While potentially being well-suited for video-conferences (where at least one participant will be providing a video stream to other participants), the present techniques are applicable to all types of real-time conferences, such as audio-only (telephone) conferences and the like.

In an example implementation, a computing system can implement a real-time conferencing application, such as a video-conferencing application. The computing system can include one or more server computing devices and a plurality of user computing devices. Each of the plurality of user computing devices can be associated with one or more users that can participate in the conference. In the event that the example video-conference is between participants located in geographically different meeting rooms having video conferencing devices, participants can be greeted with an on-going video-conference upon entering their associated meeting room. A first participant to the video-conference can immediately determine that no other participants are currently in the conference, e.g., by viewing the video stream that is presented on a
display of the video conferencing device. As other users enter his/her physical meeting room, the first participant can see the new participants join and the new participants can determine how to announce their presence and begin participating in the conference. Similarly, as users enter in the other, geographically different meeting rooms, a similar interaction can occur. That is, the first participant(s) can see the new participants arrive and can choose to immediately greet the newly arrived participants, or continue any current discussion, with or without acknowledging the newly arrived participants, e.g., with a wave or nod of the head or other visual greeting.

The present disclosure provides a number of benefits over traditional conferencing systems. For example only, when a first user enters a physical room that has a conferencing device that will be utilized to connect to the conference, the conferencing device may automatically be connected to the conference, which eliminates the process, hassle, and time associated with the first user manually connecting to the conference. In addition to eliminating the difficult and/or time consuming process associated with manually connecting the conferencing device to the conference, the first user will also be confident that he/she is the first person to join the conference and, e.g., will not need to check that the conferencing device is connected to the correct conference. Furthermore, as additional users join the conference, e.g., by entering different physical rooms having additional conferencing devices, the additional users may immediately be noticed and recognized by the user(s) already participating. This provides the benefit that the conference is not awkwardly interrupted, e.g., by the conferencing device joining the conference and being announced, and/or allows the additional user to quickly ascertain whether or not the conference has already begun.
In this manner, the user experience more closely matches that of an in-person conference/meeting in one physical room. Further details and benefits of the present disclosure are described below.

Referring now to FIG. 1, a diagram of an example computing system 100 for performing the disclosed techniques is illustrated. The computing system 100 can include a plurality user computing devices 104-1, ..., 104-n (hereinafter referred to individually and collectively as a “user computing device 104”) that are operated by/associated with a plurality of users 108-1, ..., 108-n (hereinafter referred to individually and collectively as a “user 104” or “participant 104”). Examples of the user computing device 104 include a desktop computer, laptop computer, tablet computer, mobile phone, and a dedicated conferencing device (such as, a video-conferencing device having a display, a microphone, and a video camera). The computing system 100 can further include a server computing device 150 that is configured to communicate with the user computing devices 104 via a network 112. As used herein, the term “server computing device” can refer to any suitable hardware computer server, as well as both a single server and multiple servers operating in a parallel or distributed architecture. The network 112 can include a local area network (LAN), a wide area network (WAN), e.g., the Internet, or a combination thereof. In some implementations, the user computing device 104 includes peripheral components, such as a display 116, a camera 124 to capture photographs and/or video, and one or more other input devices, such as a mouse 132 and/or keyboard 128.

Referring now to FIG. 2, a functional block diagram of an example user computing device 104 is illustrated. The user computing device 104 can include a
communication device 200, a processor 204, and a memory 208. The user computing
device 104 can also include the display 116, the mouse 132, the keyboard 128, and the
camera 124 (referred to herein individually and collectively as "user interface device(s)
212"). The user interface devices 212 are configured for interaction with the user 108.
In some implementations, the user interface devices 212 can further include a
microphone 220, and a speaker 224.

The communication device 200 is configured for communication between the
processor 204 and other devices, e.g., the server computing device 150, via the
network 112. The communication device 200 can include any suitable communication
components, such as a transceiver. The memory 208 can be configured to store
information at the user computing device 104, such as one or more photographs of
individuals. The memory 208 can be any suitable storage medium (flash, hard disk,
etc.).

The processor 204 can be configured to control operation of the user computing
device 104. It should be appreciated that the term “processor” as used herein can refer
to both a single processor and two or more processors operating in a parallel or
distributed architecture. The processor 204 can be configured to perform general
functions including, but not limited to, loading/executing an operating system of the user
computing device 104, controlling communication via the communication device 200,
and controlling read/write operations at the memory 208. The processor 204 can also
be configured to perform specific functions relating to at least a portion of the present
disclosure, which are described in greater detail below.
Referring now to FIG. 3, a functional block diagram of the server computing device 150 is illustrated. It should be appreciated that the server computing device 150 can have the same or similar structure to the user computing devices 104 described above. The server computing device 150 can include a communication device 152, a processor 154, and a memory 158. As described above, the term “processor” as used herein can refer to both a single processor and multiple processors operating in a parallel or distributed architecture. The communication device 152 can include any suitable communication components (e.g., a transceiver) for communication via the network 112. The memory 158 can be any suitable storage medium (flash, hard disk, etc.) for storing information at the server computing device 150. The processor 154 can control operation of the server computing device 150 and can implement at least a portion of the techniques of the present disclosure, which are described in greater detail below.

Various implementations of the techniques of the present disclosure will be described in the context of the disclosed computing system 100 that includes the plurality of user computing devices 104 and the server computing device 150. It should be appreciated that, while various aspects of the techniques will be described as being performed by one of the user computing devices 104 or the server computing device 150, any aspect of the techniques may be performed by one or more user computing devices 104, the server computing device 150, or a combination thereof.

With reference to FIG. 4, a flow diagram of an example method 400 for implementing a real-time conference is illustrated. For ease of description, the method 400 will be described in the context of a computing system 100 that is executing a video
conferencing application that is hosted by a server computing device 150 and that permits real-time communication between users 108 associated with two user computing devices 104. Specifically, in the examples below each of the user computing devices 104 comprises a video conferencing device that includes a display 116, a video camera 124, and a microphone 220. Each of the video conferencing devices is located in a different, physical room, such as a conference room, an office, or an auditorium, and connects to the server computing device 150 to couple to the video-conference.

In some implementations, each user computing device 104 can have a unique identifier that the server computing device 150 can utilize to associate with the video-conference. For example only, each user computing device 104 (such as a video conferencing device) can act as an addressable resource that can be added to meeting invitations/notifications/etc. as an “invitee” to enable a simple coupling of the user computing device 104 to the conference. Thus, the user 108 that schedules the conference can invite the various participating users 108, as well as one or more addressable resources (user computing devices 104), to the conference in a meeting invitation or the like. In an alternative or additional implementation, a user computing device 104 can be associated with the conference by having its associated user 108 be invited to the conference and the user 108 signing into the user computing device 104.

At 410, the time of the conference is determined. The time of the conference can refer to a scheduled start time of the conference or, alternatively, a short period of time (2-3 minutes) before the scheduled start time of the conference. At the time of the conference, the computing system 100 can determine (420) whether any users are present at the user computing devices 104. Any technique for determining the
presence of a user 104 at a user computing device 104 can be utilized. For example only, in the case of a video conferencing device, a video signal, audio signal, and/or other user input signal (input via the keyboard 128 or mouse 132, a detection of a short-range wireless signal, such as a Bluetooth or Near Field Communication signal, etc.) can be analyzed to determine whether a user 108 is present at the user computing device 104. In the case of a video conferencing device located in a conference room, the audio and/or video signal can be analyzed to detect the presence of user(s) 108 in the conference room.

If it is determined that a user 108 is present at the user computing device 104 (at 430), the method 400 can proceed to 440 and the user computing device 104 will not be automatically connected to the conference. Accordingly, uninvited persons in a conference room (such as, people who stayed in the conference room after a previous meeting, or people just looking for a quiet place to work) will not be automatically granted access to a conference to which they may not be invited. Additionally, in the event that an invited user 108 is present, and assuming that the determined time of the conference is before the scheduled start time of the conference, the invited user 108 may have enough time to manually initiate the conference via the user computing device 104. Alternatively, rather than automatically connect to the conference or permit the user 108 to manually connect to the conference, the user 108 may be prompted at the time of the conference to provide an authentication, sign-in, or other authorization via the user computing device 104 that is indicative of the user 108 being an invited user in the conference. In this manner, the conferencing system 100 can provide a semi-automated method for coupling the user computer device 104 to the conference.
If, however, at 430 it is determined that there are no persons present at the user computing device 104, the method 400 can proceed to 450 and the user computing device 104 will be automatically connected to the conference. Thus, when a user 108 arrives after the user computing device 104 is connected to the conference (e.g., at the scheduled start time of the conference), the user computing device 104 can be already connected to the server computing device 150 and be providing the outputs (audio, video, etc.) from the conference. The conferencing system 100 thereby mimics an in-person meeting, where people that arrive to a meeting already in progress are immediately presented with the current attendees. Thus, new arrivals to a conference can be unobtrusively observed arriving and do not need to announce their arrival, which may interrupt the conference in an unnatural way. Additionally, the first user 108 to arrive can immediately discern that she/he is the first to arrive, e.g., by viewing a video from the other user computing device(s) 104 of an empty room.

The above techniques provide for a simple and intuitive system and method for initiating a conference in a manner that more closely matches the tone and interactions of an in-person meeting. In this manner, users in such conferences can interact in a more natural manner and have a superior user experience.

One or more systems and methods discussed herein do not require collection or usage of user personal information. In situations in which certain implementations discussed herein may collect or use personal information about users (e.g., user data, information about a user’s social network, user’s location and time, user’s biometric information, user’s activities and demographic information), users are provided with one or more opportunities to control whether the personal information is collected, whether
the personal information is stored, whether the personal information is used, and how the information is collected about the user, stored and used. That is, the systems and methods discussed herein collect, store and/or use user personal information only upon receiving explicit authorization from the relevant users to do so. In addition, certain data may be treated in one or more ways before it is stored or used so that personally identifiable information is removed. As one example, a user's identity may be treated so that no personally identifiable information can be determined. As another example, a user's geographic location may be generalized to a larger region so that the user's particular location cannot be determined.

Example embodiments are provided so that this disclosure will be thorough, and will fully convey the scope to those who are skilled in the art. Numerous specific details are set forth such as examples of specific components, devices, and methods, to provide a thorough understanding of embodiments of the present disclosure. It will be apparent to those skilled in the art that specific details need not be employed, that example embodiments may be embodied in many different forms and that neither should be construed to limit the scope of the disclosure. In some example embodiments, well-known procedures, well-known device structures, and well-known technologies are not described in detail.

The terminology used herein is for the purpose of describing particular example embodiments only and is not intended to be limiting. As used herein, the singular forms "a," "an," and "the" may be intended to include the plural forms as well, unless the context clearly indicates otherwise. The term "and/or" includes any and all combinations of one or more of the associated listed items. The terms "comprises,"
"comprising," "including," and "having," are inclusive and therefore specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof. The method steps, processes, and operations described herein are not to be construed as necessarily requiring their performance in the particular order discussed or illustrated, unless specifically identified as an order of performance. It is also to be understood that additional or alternative steps may be employed.

Although the terms first, second, third, etc. may be used herein to describe various elements, components, regions, layers and/or sections, these elements, components, regions, layers and/or sections should not be limited by these terms. These terms may be only used to distinguish one element, component, region, layer or section from another region, layer or section. Terms such as "first," "second," and other numerical terms when used herein do not imply a sequence or order unless clearly indicated by the context. Thus, a first element, component, region, layer or section discussed below could be termed a second element, component, region, layer or section without departing from the teachings of the example embodiments.

The techniques described herein may be implemented by one or more computer programs executed by one or more processors. The computer programs include processor-executable instructions that are stored on a non-transitory tangible computer readable medium. The computer programs may also include stored data. Non-limiting examples of the non-transitory tangible computer readable medium are nonvolatile memory, magnetic storage, and optical storage.
Some portions of the above description present the techniques described herein in terms of algorithms and symbolic representations of operations on information. These algorithmic descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art. These operations, while described functionally or logically, are understood to be implemented by computer programs. Furthermore, it has also proven convenient at times to refer to these arrangements of operations as modules or by functional names, without loss of generality.

Unless specifically stated otherwise as apparent from the above discussion, it is appreciated that throughout the description, discussions utilizing terms such as "processing" or "computing" or "calculating" or "determining" or "displaying" or the like, refer to the action and processes of a computer system, or similar electronic computing device, that manipulates and transforms data represented as physical (electronic) quantities within the computer system memories or registers or other such information storage, transmission or display devices.

Certain aspects of the described techniques include process steps and instructions described herein in the form of an algorithm. It should be noted that the described process steps and instructions could be embodied in software, firmware or hardware, and when embodied in software, could be downloaded to reside on and be operated from different platforms used by real-time network operating systems.

The present disclosure also relates to an apparatus for performing the operations herein. This apparatus may be specially constructed for the required purposes, or it may comprise a general-purpose computer selectively activated or reconfigured by a
computer program stored on a computer readable medium that can be accessed by the computer. Such a computer program may be stored in a tangible computer readable storage medium, such as, but is not limited to, any type of disk including floppy disks, optical disks, CD-ROMs, magnetic-optical disks, read-only memories (ROMs), random access memories (RAMs), EPROMs, EEPROMs, magnetic or optical cards, application specific integrated circuits (ASICs), or any type of media suitable for storing electronic instructions, and each coupled to a computer system bus. Furthermore, the computers referred to in the specification may include a single processor or may be architectures employing multiple processor designs for increased computing capability.

The algorithms and operations presented herein are not inherently related to any particular computer or other apparatus. Various general-purpose systems may also be used with programs in accordance with the teachings herein, or it may prove convenient to construct more specialized apparatuses to perform the required method steps. The required structure for a variety of these systems will be apparent to those of skill in the art, along with equivalent variations. In addition, the present disclosure is not described with reference to any particular programming language. It is appreciated that a variety of programming languages may be used to implement the teachings of the present disclosure as described herein, and any references to specific languages are provided for disclosure of enablement and best mode of the present invention.

The present disclosure is well suited to a wide variety of computer network systems over numerous topologies. Within this field, the configuration and management of large networks comprise storage devices and computers that are communicatively
coupled to dissimilar computers and storage devices over a network, such as the Internet.

The foregoing description of the embodiments has been provided for purposes of illustration and description. It is not intended to be exhaustive or to limit the disclosure. Individual elements or features of a particular embodiment are generally not limited to that particular embodiment, but, where applicable, are interchangeable and can be used in a selected embodiment, even if not specifically shown or described. The same may also be varied in many ways. Such variations are not to be regarded as a departure from the disclosure, and all such modifications are intended to be included within the scope of the disclosure.
Determine Time Of Conference

Determine Presence Of Participants At User Computing Devices 104

Any User Present At User Computing Device 104?

Do Not Automatically Connect To Conference

Automatically Connect To Conference

FIG. 4