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Call Manager for an Incoming Phone Call

Abstract:

This publication describes methods and techniques directed at enabling a user of a mobile device to receive an incoming phone call on the device, trigger functionality implemented on the mobile device to temporarily place the call in a hold state, and utilize the functionality to bring the call out of the hold state to speak with the caller, for example, once the user moves to an appropriate location to take the call. The functionality may be implemented in a software application installed on the device or as a feature of the operating system of the device.

Keywords:

mobile device, smartphone, cellular phone, phone call, phone application, caller, user interface (UI), answer, hold, message, audio, location, telephony, application programming interface (API), mobile operating system

Background:

Mobile-device users may often be in meetings, offices, stores, or other restrictive places when they receive phone calls on their devices. The circumstances of their surroundings may not be appropriate or conducive (*e.g.*, presence of distractions, ambient noise, lack of privacy) to hold a conversation on the mobile device at the time the call is received. Many times, these calls are important to the user, and simply missing the call is not a satisfactory solution.

If a user does receive a call under these circumstances, the user will commonly have three options: answer the phone call and ask the caller to wait, let the call proceed to voicemail, or move as quickly as possible to an appropriate location before answering the call.

Each of these options comes with certain risks. If the user answers the call, the user might risk the caller hearing sensitive information, or the user might interrupt others in the immediate area (*e.g.*, meeting room, doctor's office). If the user allows the call to proceed to voicemail or if the user tries to relocate before answering, the user risks missing the call and not receiving a voicemail message from the caller. Rather than disrupting the current environment and people surrounding the user, it could be more beneficial to have an option to immediately place an incoming call on hold and send the caller a message explaining the circumstances of the hold until the user can answer.

For example, assume that Jane is in a meeting when her phone, in a silent mode, vibrates, indicating that she has received a call. She has been expecting this very important call, and she decides to answer the call. Jane whispers quietly to the caller to hold on for a little while until she can move to a private location. Unfortunately, the speaker at the meeting was presenting some company-sensitive information, and Jane's caller hears some of the presentation. Further, everyone in the meeting hears background construction noise coming from the caller's end through Jane's phone. Jane rushes to the hallway and finishes her conversation.

Description:

This publication describes methods and techniques directed at enabling a user of a mobile device to receive an incoming phone call on the device, trigger functionality implemented on the mobile device to temporarily place the call in a hold state, and utilize the functionality to bring the call out of the hold state to speak to with the caller, for example, once the user moves to an appropriate location to take the call. The functionality may be implemented in a software

application installed on the device or as a feature of the operating system of the device. The functionality is referred to as a “Call Manager” throughout this publication.

An example implementation involves a phone application (*e.g.*, dialer app) with Call Manager functionality that uses the application programming interface (API) of an operating system designed for mobile devices (*e.g.*, mobile operating system) to provide the user with call management options for an incoming call. System calls provided by the API allow the phone application access to the ability of the operating system to place calls on hold, send predetermined messages, control the audio inputs and outputs of the mobile device, and answer calls. This implementation could be applied to a default phone application or to third-party phone applications.

The term “mobile device,” as used in this disclosure, refers to a portable device that has both computational and communication capabilities (*e.g.*, portable telecommunication device, wireless-communication device, mobile phone, smartphone, computing device, tablet computer, and so forth). While this publication focuses on an aspect where the mobile device is a smartphone, other types of mobile devices can also support the methods and techniques described in this publication.

The mobile device includes a processor, transceiver(s) for transmitting data to and receiving data from an access point of a wireless network, and an input/output device (*e.g.*, a display, a speaker, a microphone, a haptic mechanism).

The mobile device also includes a computer-readable medium (CRM). The CRM may include any suitable memory or storage device (*e.g.*, random-access memory (RAM), static RAM (SRAM), dynamic RAM (DRAM), non-volatile RAM (NVRAM), read-only memory (ROM), flash memory). The CRM includes a Call Manager (*e.g.*, Call Manager application, Call Manager

functionality implemented in an operating system). The mobile device performs operations under the direction of the Call Manager to recognize an incoming call and receive an input from the user triggering the Call Manager. The Call Manager can play a message for the caller, place the call in a hold state, mute the audio on the user's mobile device, and bring the call out of a hold state at a later time.

In one aspect, illustrated in Figure 1, when a mobile device receives an incoming call, the user interface (UI) of a phone application appears on the device's screen and provides various options (*e.g.*, "answer," "ignore," "silent answer"). The "silent answer" option uses the Call Manager to direct the phone application to receive the call. A message, either pre-recorded or possibly computer-generated, plays for the caller and informs the caller that the user will answer the call shortly. The phone application, through the use of the system calls provided by the API of the operating system, then places the call on hold (in a hold state). The phone application also mutes all audio on the device and temporarily deactivates both the speaker and microphone utilizing more system calls.

At this point, the user decides to move to a location that is more conducive to a phone conversation. The user then chooses an option on the UI of the phone application, allowing the user to answer the call. The appropriate system calls are made to the operating system, and the user and caller can have their phone conversation.

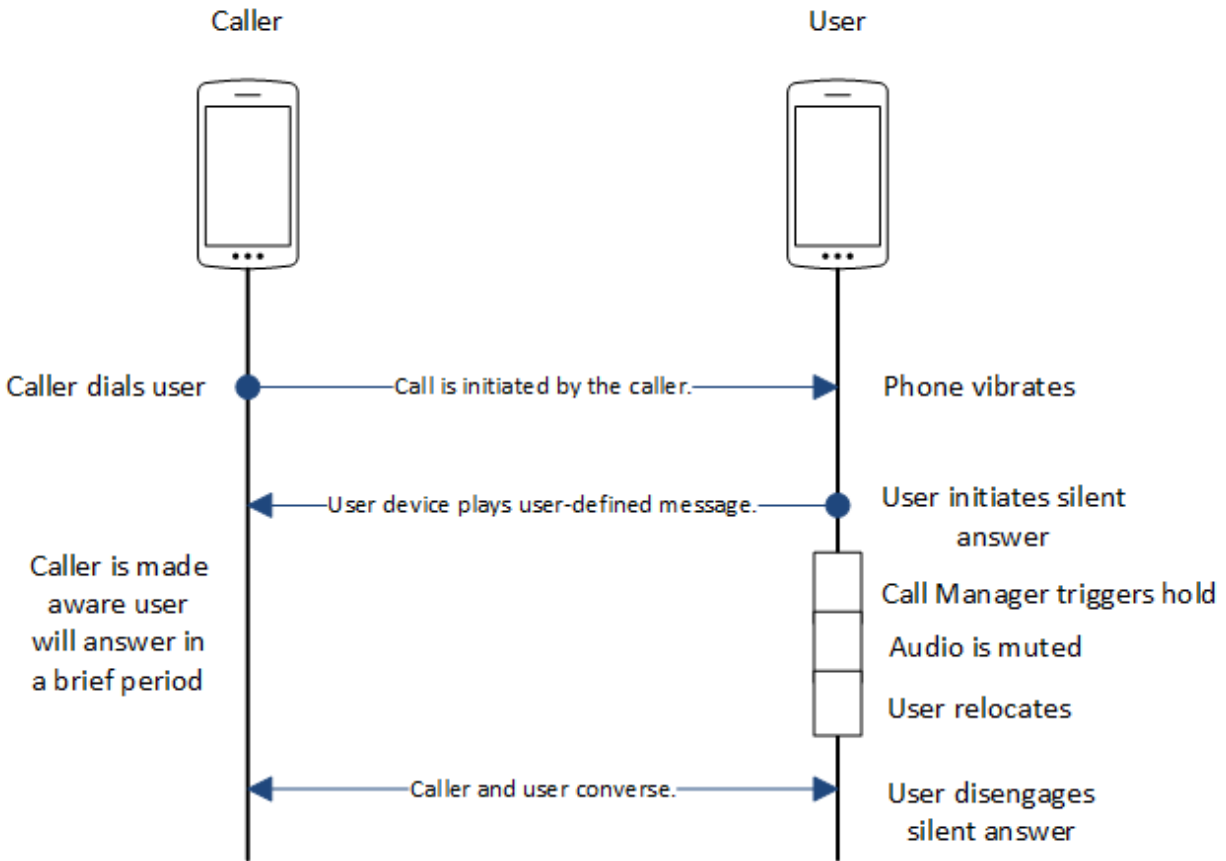


Figure 1: Call Manager Implementation

In an alternate scenario, Jane is in another meeting, but now her phone has the new Call Manager feature. She has pre-recorded a message asking the caller to hold for a couple of minutes until she can answer. During this meeting, she receives another important call. She discreetly pushes a button on the UI that initiates the Call Manager. The Call Manager alerts the caller that Jane will answer shortly and to please hold. The microphone and speaker on Jane's phone are automatically muted. While Jane relocates, the caller hears nothing but Jane's message, and the meeting is not disrupted from noise on the caller's end coming across Jane's phone. Jane quietly heads to the hallway and answers her call.

The described methods and techniques provide any phone application or mobile operating system, the ability to use the features of an operating system of a mobile device to implement a

Call Manager functionality, including answering calls, playing messages for the caller, placing calls on hold, and muting audio. The user of the device gets more capability and more options when the user is in a restricted environment while receiving an incoming phone call.

Through such techniques, phone applications can be utilized by mobile device users, enabling them to discreetly relocate when they receive incoming calls in a restricted environment.

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