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MICROPHONE INPUT FOR ACCESSIBILITY SERVICE

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ABSTRACT

System and method are disclosed to connect a switch or set of switches to a device through its microphone input stream for use with an accessibility service. Each switch is provided with a different resistance and this allows mobile devices to recognize the different switches connected to the microphone input stream. To make the switches used in the inline microphone customizable, an adapter is provided that allows multiple switches to the maximum number of media buttons supported by the mobile device. On certain devices, an application can differentiate between different switch inputs by registering a BroadcastReceiver in the manifest with the intent filter for ACTION_MEDIA_BUTTON. The BroadcastReceiver then checks which key was pressed by checking the KeyEvent extra EXTRA_KEY_EVENT and responds accordingly. The disclosed system and method allows users to have their device plugged into the power source for charging, while simultaneously having a reliable alternative wired connection for accessibility.

BACKGROUND

Switch interfaces allow users with severe physical or motor impairment to access mobile devices and personal computers. It is very important to be able to customize one's setup as much as possible because the users of switch interfaces vary highly in degree of physical impairment and preferences. Users are often unable to interact with their devices directly. They may not be able to press the power button or even adjust cables connected to their devices due to their motor difficulties, developmental delays, or physical limitations and this makes a reliable switch setup necessary. In the case of mobile devices, switches are usually connected to the device using either Bluetooth pairing or USB port. Both of these methods have their downsides when it comes

to reliability. In the case of Bluetooth pairing, the connection is frequently unreliable. If the connection is lost, the user is usually unable to fix the problem without external assistance due to their physical impairment. Using the USB port overcomes this problem, but the device cannot be simultaneously connected to power for charging as well as to the switch. Users usually are not able to swap the switch and power cables by themselves due to their physical impairment. This means that when the phone dies, the user will be stuck until outside help is provided. The microphone or audio input port is presently used by mobile phone users to control things like stopping/starting a song or media volume. The disclosed system and method utilizes this input port to interface with the accessibility services.

DESCRIPTION

The disclosed system and method connect a switch or set of switches to a device through its microphone input stream to interface with an accessibility service on the respective device. The method uses the microphone input stream for accessibility related controls. Each switch is connected with a different resistance and this allows mobile devices to differentiate between the different switches connected to the microphone input stream. On certain devices, up to 4 switches may be provided. Resistances may be as follows: 1) 70 ohm or less, 2) 110 - 180 ohm, 3) 210 - 290 ohm, 4) 360 - 680 ohm.

On certain devices, an accessibility service is notified via method call when a user presses a key on a connected device, with the method receiving a key code corresponding to the key that the user pressed as a parameter. The key code for a media button might be 'KEYCODE_HEADSETHOOK,' indicating (to an accessibility service) a key sent via the microphone input. This suffices for a basic version with one switch. For a more full-fledged version that differentiates between different key inputs, one might assign different key codes to

each of the media buttons supported by the device. Certain devices, instead, require that a BroadcastReceiver is registered in the accessibility service's manifest with the intent filter for ACTION_MEDIA_BUTTON. When the BroadcastReceiver is notified of a key press, it then checks which key was pressed (allowing the device to differentiate between various media buttons) by reading the extra EXTRA_KEY_EVENT (provided as a Bundle parameter), after which the accessibility service responds accordingly.

To make the keys used in the inline microphone customizable, an adapter is provided. This adapter allows the user to hook up a single switch or a set of switches to a microphone input. Each switch has 0 ohm resistance. The adapter allows multiple switches to be plugged in, up to the maximum number of media buttons supported by the device and assigns resistances to them based on the media button resistances recognized by the device. For example, on an adapter for an mobile phone device we could have the adapter allow for up to four switches, one with a resistance of 0 ohm, one with a resistance of 150 ohm, one with a resistance of 200 ohm, and one with a resistance of 400 ohm. This allows the device to recognize each switch as distinct. These inputs can then be used by the accessibility service that takes switch input, with each switch being recognized as distinct. Should the user have fewer switches than the adapter's maximum, all connected switches would still be recognized as distinct and work correctly.

FIG .1: Generic switch interface (to be connected to the adapter)

Thus the disclosed system and method allow users to have their device plugged into the power source for charging, while simultaneously having a reliable alternative wired connection to their switch or set of switches. This allows users with severe motor impairments to be more independent.