BTpower: An Application for Remote Controlling PowerPoint Presentation Through Smartphone

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BTpower: An Application for Remote Controlling PowerPoint Presentation Through Smartphone

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Abstract This paper presents an interesting android-based application "BTpower" which turns our phone into a remote. The app lets us control PowerPoint presentation from across the room, so we can walk around freely during presentations. The ppt/pptx file will be stored on the mobile. Bluetooth is used for connectivity purpose. The application provides a user-friendly interactive interface by which we can interact with Microsoft Office PowerPoint on our PC. With BTpower, we can start our PowerPoint presentation, jump to the next or previous slides, resume, or exit the slide show with a touch of our finger—all from our phone.

Keywords Android app · PowerPoint tools · Bluetooth · Remote desktop · Mobile communication

1 Introduction

The term "BTpower" has been derived by combining two words Bluetooth and PowerPoint. The use of smartphones, tablets, and other touch screen devices is gaining popularity with an unbelievable pace over the years. The smartphone applications can transfer commands to PC using the device communication mechanisms such as Bluetooth and Wi-Fi [1]. Controlling electronic devices and computers wirelessly is an important aspect of the technology [2]. Bluetooth has a tremendous potential in moving and synchronizing information in a localized setting. One can interact with electronic devices using Bluetooth of a smartphone. Many applications have come up in the market in Google play store, IOS play store,

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and for windows phone for serving this purpose. These applications provide options like streaming audio, video files of your computer controlling mouse and keyboard. One of the most widely used mobile OS these days is Android. Android is a powerful operating system supporting a large number of applications in smartphones. BTpower is an android-based application used to control PPT presentations remotely inside a house, an office, or a conference room. Many times while giving presentations either one has to be dependent on other person to change slides or he has to change it manually [1]. With BTpower, we can start our presentation, jump to the next or previous slides, resume, or exit the slide show with a touch of our finger —all from our phone. The connectivity is made between mobile and computer using Bluetooth.

The rest of the paper is organized as follows. The next section, Sect. 2, briefly describes some related work. Section 3 explains the implementation process of BTpower. Section 4 provides a user manual with some snapshots. Section 5 mentions the required technologies to execute the application. Section 6 concludes the paper with some future remarks.

2 Related Work

Many mobile applications are available in the market of Google play store, IOS play store, or Microsoft Windows store for controlling a PC from a smartphone. Some of them are Office remote, MyPoint etc. Office Remote is an application of Windows phone for controlling Microsoft Office, providing convenient touch-based control of Word, Excel, and PowerPoint documents projected from our PC. MyPoint is a PowerPoint remote application compatible with iOS. BTpower is an android-based application. The functionality of MyPoint is similar to our work. Yenel et al. developed a useful mobile software, called PocketDrive to access PC applications in 2007 [2]. Additionally, PocketDrive supports zooming and presentation mode with user-friendly GUI for fast forward and backward jumping on a presentation. The last few years have seen a growing interest in developing different mobile applications for controlling PC and thus making smartphone smarter. Chintalapati and Rao [3], Yang and Li [4], Mishra et al. [5], and many more researchers also suggested similar type of applications, which enable a cell phone to act as a remote controller device for desktop PCs and their applications. Our application is slightly different in this context. The application's purpose is to display the PowerPoint presentation on a computer or a projector and also to provide a user-friendly interactive interface in the mobile. The ppt/pptx file will have to be stored on the mobile. There is no need to copy the file into the computer. So we can present the data on anyone's computer without sharing it. The application will be accessible to the MS Office of the target PC over a Bluetooth connection.

3 Implementation

The purpose of the proposed system is to use a mobile phone as a remote for PowerPoint presentation. The ppt/pptx file stored in the mobile will be projected on a PC monitor or projector. The connectivity is made using Bluetooth. For establishing connectivity a server code in java is required to be run on PC. One way to send and receive data in Java Bluetooth is to use the RFCOMM protocol [6, 9]. Using RFCOMM, the application establishes a serial communication between smartphone and PC. After making the connections through Bluetooth, commands are transferred from android application to the computer and the computer responds according to the commands send through the mobile. So the system consists of two parts: an android application for our mobile and a server code to run on computer. Android application is implemented by using Bluetooth adapters, socket, and threads. The server code in PC is implemented using java bluecove directory. This bluecove package is used for connecting the PC Bluetooth to other Bluetooth devices. A waitthread and a process connection thread are used in server code for interacting with mobile's Bluetooth device by accepting requests and data. Java robot class is used for PC control (Fig. 1).

We used Eclipse for development purpose since it includes a base workspace and an extensible plug-in system for customizing the environment. With the help of Android SDK emulator we prototyped, developed, and tested our application. Android applications are composed of one or more application components, i.e., activities, services, content providers, and broadcast receivers [7, 10]. Each component performs a different role in the overall application behavior. There are mainly four modules in our application as follows.

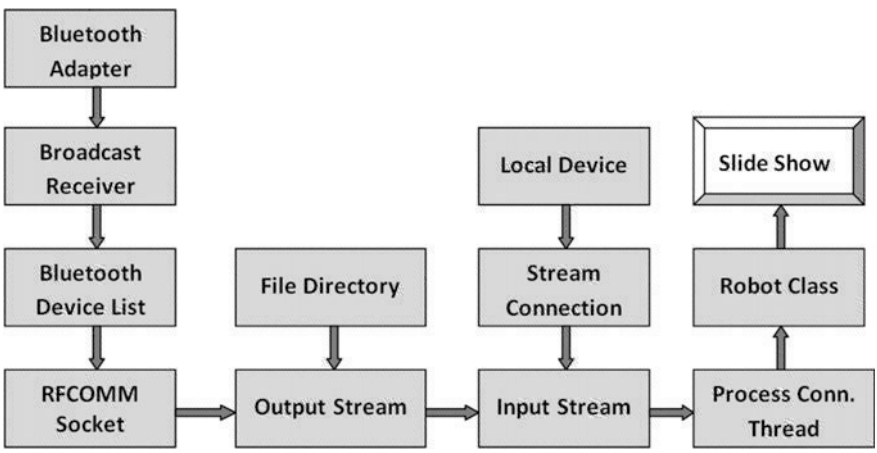

Fig. 1 Block diagram of the application

3.1 File Selector

It allows a user to select the required file among the .ppt/.pptx files stored in the android mobile. The files of .ppt/.pptx extension are added to the file list view. When user selects the file, its name is passed on along with its address in the directory to the next activity.

3.2 Bluetooth Device List Activity

It provides an interface to the user to select the target device among all Bluetooth devices present in his surroundings. First, the Bluetooth adapter is turned on. The list of paired devices is displayed. Through the scan button the user can search for nearby unpaired Bluetooth devices. To search new devices, a broadcast receiver is used. If a new device is found it is added to the available device list view. Now the user has to select a device from the list of available devices. Once a device is selected, the next button is pressed. Now two arguments, the address of the selected Bluetooth device and the filename along with its address are passed on to the next intent. The components used in the module are:

1. BluetoothAdapter: It represents the local Bluetooth adapter, i.e., Bluetooth radio which is the entry point for all Bluetooth interaction. Using this, we can discover other Bluetooth devices, query a list of paired devices, instantiate a BluetoothDevice using a known MAC address and create a BluetoothServerSocket to listen for communications from other devices.
2. BluetoothDevice: It represents a remote Bluetooth device. It is used either to request a connection with a remote device through a BluetoothSocket or to query information about the device such as its name, address, class, and bonding state.

3.3 Slide Show Activity

This activity acts as an interface between our mobile and computer. First, the connection is established between the PC and the mobile through a connection socket. Then data is sent from mobile to PC through an output stream and the data is received by the PC through an input stream. Six buttons are provided in the remote interface. One is share button (Up-arrow) used to send the ppt file to the PC. Once the bytes are completely received the slideshow is opened in the computer. Now four buttons—play, pause, previous, next are provided to control the slideshow on the pc. These buttons send signals to the computer in integer values and

the computer responds to it accordingly. Once the slideshow is completed the file can be deleted by using exit button. Components used are:

1. BluetoothSocket: It is similar to a TCP Socket. It allows an application to exchange data with another Bluetooth device via InputStream and OutputStream.
2. UUID: A Universally Unique Identifier (UUID) is a 128-bit number used to uniquely identify information. In this case, it is used to identify our application's Bluetooth service. To generate a UUID for our application, we can use one of many available random UUID generators on the web, then initialize it with from String (String).
3. FileInputStream: An input stream that reads bytes from a file.
4. ByteArrayOutputStream: It implements a specialized OutputStream for class in which the data is written into a byte array. The buffer automatically grows as data is written to it. When the writing is considered to be finished, a copy of the byte array can be requested from the class.

3.4 Server Code

Program listings or program commands in the text are normally set in typewriter font, e.g., CMTT10 or Courier. Once the connection is established, remote Bluetooth server class starts the Waitthread class which then initiates the process connection thread. The server code is run through the bluecove-2.1.0 java package. This package provides tools to manage the PC connection through other remote Bluetooth devices by assigning a UUID to the PC. Components used are:

1. Waitthread: This java file starts a thread that waits for a connection that has the same UUID as the computer. It sets the local Bluetooth device discoverable. If the device is found and paired, the process connection thread is started. If a new device tries to connect a pairing request is made before establishing connection. Once wait is over the object of the process connection thread is passed to a newly created processor thread.
2. Process Connection Thread: It contains commands and functions that respond to the data send by the mobile application. First, all the bytes of the ppt/pptx file are read and then the file is opened in slideshow mode. The commands are read as integers. This thread uses Robot class to press the computer right and left arrow keys to move to the previous and next slides. It uses Runtime class to open the PowerPoint file in slideshow mode.

4 User Manual

The application is very easy to use. Following are few simple steps to make the application operational:

Step 1: Execute the jar file on PC.
Step 2: Open the app on the smartphone. First choose the file stored in the mobile phone for presentation. User has to select .ppt/.pptx file only.
Step 3: Now turn on Bluetooth. It will show the available nearby Bluetooth devices which are turned on. User has to select the target PC from the list (Fig. 2).
Step 4: Now application will provide a remote interface to the user. It has total six buttons for controlling presentation. Share button is used to temporarily transfer the data to the remote device. Play button is used to start the presentation. Next and Previous buttons are for slide movements. Pause button is used to stop the slide show and back to the editable window. One power button is also there to exit from the application and delete the ppt/pptx file from the remote device.
Step 5: Smartly present your information through a projector/monitor (Fig. 3).

5 Requirement Specification

The proposed application was successfully tested on a personal computer with the use of a smartphone. During the testing stage, first devices were connected via Bluetooth after executing the server code on PC. Application successfully enables user to remotely access their presentation in a convenient way. We identified the following as the requirements of a system that turns a smartphone into a remote.

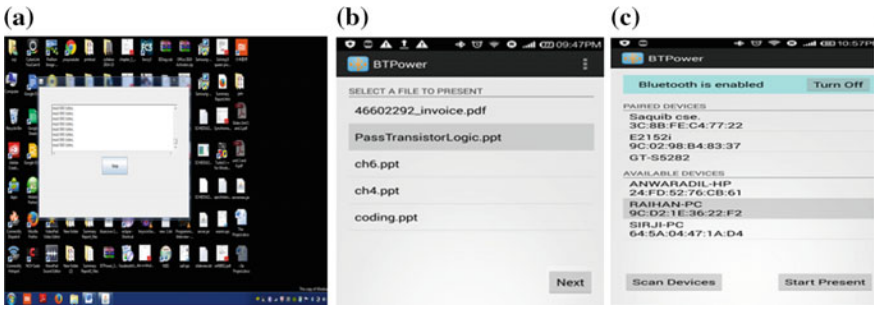

Fig. 2 **a** Step 1: jar file execution, **b** Step 2: file selection, **c** Step 3: device selection

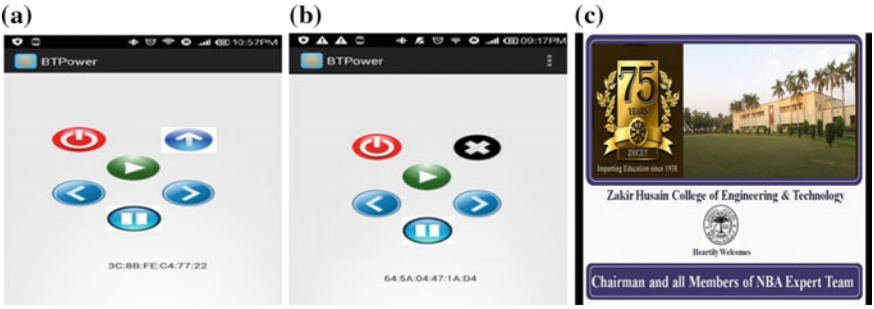

Fig. 3 **a** Step 4: remote interface for data sharing, **b** Step 4: remote interface for presentation, **c** Step 5: slideshow

Mobile:

1. Bluetooth version 3.0 or above.
2. Android version 4.0 or above.
3. 2 MB space for installation.

Computer:

1. Windows 7 or above operating system.
2. Bluetooth version 3.0 or above.
3. Microsoft office 2007 or above to open ppt file.
4. Java jdk 7u45 or above for running the server code jar file.

6 Conclusion

With this application user can display the presentation stored on his/her mobile through a projector/monitor by connecting his/her mobile to a computer wirelessly via Bluetooth. The interface with next, previous, pause, and play buttons provide user's full control on the slide show. We can roam around the room carrying our mobile and giving our presentation (Obviously room size should not exceed the Bluetooth range, i.e., 10 m). This application can be used in colleges, offices, business meetings, and community interaction programs. There is no need of any additional hardware devices. But it needs to be mentioned that the application is in its initial version of development. So there is a huge scope for further enhancement. Functionalities of BTpower can be extended by including other application interfaces such as whole MS Office package, audio–video players, or virtual keyboard. One major limitation of BTpower is that the application establishes a serial communication using RFCOMM sublayer of Bluetooth for message exchange between smartphone and PC. The ppt/pptx file is actually temporarily transferred at the time of presentation. The RFCOMM sublayer of Bluetooth and the layers below it do not

guarantee the full proof reliability for the delivery of the bytes and packets [8]. Another limitation is the running of server code which does not ensure security of the PC to which the mobile connects. Any future modification should deal with these issues.

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