

## Bluetooth Chat Application: *Bluez*

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### **Abstract**

Bluetooth is still a relatively new technology to the wireless world. It is designed for wireless communication between a wide variety of different Bluetooth enabled devices; from computers and PDAs to GPS systems and heart monitoring devices. There are a growing number of companies continually adopting this technology. As Bluetooth becomes a standard feature in many products that we use every day, it seems that the use of the technology will grow even faster in the future. [2]

Unlike most devices, Bluetooth enabled devices communicate with each other automatically. There is no need to specify what type of action to take place or when it should to happen. When two devices are within range of each other, they will communicate back and forth to determine if there is any information to be passed.

Messenger applications are very much in vogue these days. Whatsapp, WeChat, Hangouts, etc are a rage in the app world. But all these messenger applications exploit either mobile data which is a paid service or Wi-Fi which is not always available and when available the connection strength fluctuates from place to place. Even when one wants to send a message to another person on the same floor or a few feet away they have to rely on the availability of these two. Hence we develop a Bluetooth based android chat application.

Apart from general messaging between to users, the application also has an additional feature which allows users to save their chat history to an Android based server for storage thus not crunching on the phone memory as well.

### **Keywords**

Android, Bluetooth, API, Paired Devices, Discovering Devices, Backup, Restore

### **Introduction**

The Android platform support for the Bluetooth network stack. It allows a device to wirelessly exchange data with other Bluetooth devices. The new vitality to the mobile space has injected because of the release of Android smart platform. Android is an operating system based on Linux

kernel. It is designed for the touch screen mobile devices. The user interface of Android is based on direct manipulation. The Android system provides many Bluetooth APIs for developers to call.

Bluetooth technology allows users to exchange voice and data transmission between two or more devices. It is basically a wireless communication technology. Bluetooth technology is reflected in the low price, easy to control and non-visual distance limitations. Bluetooth is integrated into the android platform as an android mobile network communication module. BlueZ is used to

connect the Android phones into a local area network. It helps to communicate with each other.

Bluetooth does not need a license around the globe for the working frequency band. In the connection initialization phase, firstly, it starts the application and search the Bluetooth devices. Second, it sends the signals to the server class. After this it can run, pause and stop the application. Third, it shows alert using setAlert function on every changing. Server goes active and sends the signals to other devices. Client class works to respond the other Bluetooth device server. This allows a two-way chat over Bluetooth. No GSM or Wi-Fi connection required. In addition to the person-to-person chat, chat rooms can be used to gather more than two persons at a time.

### ANDROID ARCHITECTURE

Android [1] is a software stack for mobile devices running on the Linux kernel which includes operating systems, iddleware, and key applications. Initially, Android was developed by Android Inc, later purchased by Google and recently by Open Handset Alliance. The Android SDK offers developers the ability to develop extremely rich and innovative applications using the Java language. Android runs on a Linux Kernel and utilizes the Dalvik virtual machine to run the applications. Most of the Android features are already available through other development platforms, which make Android a truly open source development platform, meaning handset makers allowed to use and run it on their devices for free.

Figure 1 illustrates how Android software stack layers are arranged.



Fig. 1 Android Architecture

### BLUETOOTH ARCHITECTURE

Bluetooth is a wireless technology standard for exchanging data over short distances. This low cost transmission technology for the handheld devices and various electronic products. Android Bluetooth system contains linux kernel, Bluetooth driver, Bluetooth protocol layers blueZ Bluetooth user library, blueZ.

Figure 2 shows Android Bluetooth Architecture.

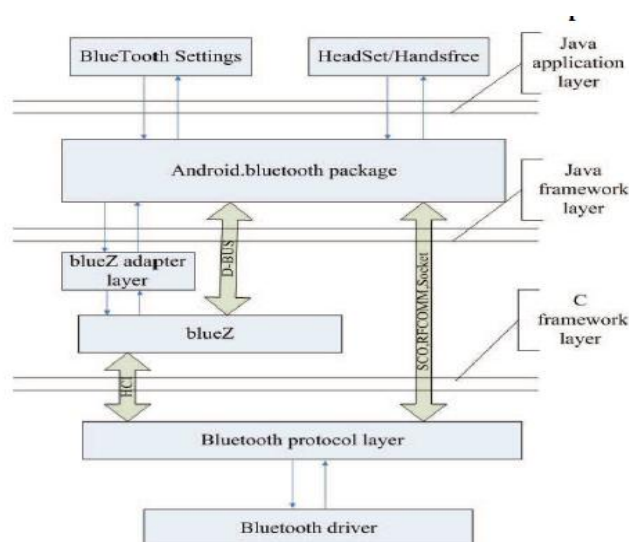


Fig. 2 Android Bluetooth Architecture

## PROCESS OF BLUETOOTH CHAT APPLICATION

- i. It first checks whether the Bluetooth of the devices is in ON/OFF mode.
- ii. If the Bluetooth of the devices is in OFF mode then it makes the request to enable the Bluetooth.
- iii. Perform scanning of the devices which are in their range.
- iv. Display the list of all the devices in the range.
- v. Select the device with which one wants to do the chat.
- vi. If the device connects then set up the chat.

### A. Design Of Bluetooth Communication

User interface is divided into 4 parts:

- a) Requesting Connection: This user interface is on the client side that sends a request to the other device (server) for setting up a chat session.
- b) Communication: This is common to both the client and the server. This is where both the devices chat and exchange information.
- c) Disabling Session: Any of the two devices can ask terminate the session.
- d) Sync: The messages sent between the two devices can be stored as well as the previous history of messages can be synced from the device itself.

### B. Bluetooth API : android.bluetooth

It provides classes that manage Bluetooth functionality, such as scanning for devices, connecting with devices, and managing data transfer between devices.

The Bluetooth APIs let applications:

- i. Scan for other Bluetooth devices (including BLE [BT Low Energy] devices).

- ii. Query the local Bluetooth adapter for paired Bluetooth devices.
- iii. Establish RFCOMM[Radio Frequency Communication] channels/sockets.
- iv. Connect to specified sockets on other devices.
- v. Transfer data to and from other devices.
- vi. Communicate with BLE devices, such as proximity sensors, heart rate monitors, fitness devices, and so on.

## ANDROID STORAGE AND BACKUP

Android's Backup service allows you to copy your application's data to a remote 'cloud' server so as to provide a restore point for your application in case of an up gradation of android version or re-installation of any application.

During a backup operation (which your application can request), Android's Backup Manager (BackupManager) queries your application for backup data, then hands it to a backup transport, which then delivers the data to the cloud storage. During a restore operation, the Backup Manager retrieves the backup data from the backup transport and returns it to your application so your application can restore the data to the device. It's possible for your application to request a restore, but that shouldn't be necessary—Android automatically performs a restore operation when your application is installed and there exists backup data associated with the user. The primary scenario in which backup data is restored is when a user resets their device or upgrades to a new device and their previously installed applications are re-installed.

### C. Phases in Bluetooth Communication

5 Phases have been identified for BlueZ. These are:

- a. Setting up Bluetooth
- b. Finding devices
- c. Setting up connection
- d. Communication

## e. Android Storage

### a. Setting up Bluetooth and finding Devices

#### *BluetoothAdapter*

- Represents the local Bluetooth adapter (Bluetooth radio).
- Using this, you can discover other Bluetooth devices, query a list of bonded (paired) devices, instantiate a 'BluetoothDevice' using a known MAC address, and create a 'BluetoothServerSocket' to listen for communications from other devices.
- The 'BluetoothAdapter' is the entry-point for all Bluetooth interaction.

#### *BluetoothSocket*

- Represents the interface for a Bluetooth socket (similar to a TCP socket). This is the connection point that allows an application to exchange data with another Bluetooth device via InputStream and OutputStream.

### b. Scanning connection and transferring data

#### *BluetoothDevice*

- Represents a remote Bluetooth device.
- Use this to request a connection with a remote device through 'BluetoothSocket' or query information about the device such as its name, address, class, and bonding state.

### c. Android Storage/Backup

- The android platform now provides a generalized backup service that applications can use to backup and restore user data, to ensure that users can maintain their data when switching devices or reinstalling the application.
- The Backup Manager handles the work of transporting the application data to and from the backup storage area in the cloud. The Backup Manager can store any type of

data, from arbitrary data to files, and manages backup and restore operations in an atomic manner.

- The android API used for this purpose is 'android.app.backup' which has various classes like 'BackupAgent', 'BackupDataInput', 'BackupDataOutput', 'RestoreObserver' which can be used to efficiently backup and restore data in an application.

## Algorithm

### Requesting Device (Client)

1. Launches Bluetooth Messenger.
2. Inputs its name.
3. Chooses to be connected to a Device.
4. Chooses not to be in Listen Mode.
5. selects the device it wants to chat with from 'List of nearby Bluetooth Devices'.
6. Sends its own identity from udetails.txt on server phone's request.
7. Receives server's identity.
8. Inputs and exchanges Messages.
9. All messages exchanged gets stored in 'chat.txt'.

### Requested Device (Server)

1. Launches Bluetooth Messenger.
2. Inputs its name.
3. Chooses to be connected to a Device.
4. Chooses to be in Listen Mode and waits.
5. When a client tries to connect it asks for identity.
6. Receives client identity and saves it.
7. Sends its identity to client.
8. Inputs and exchanges Messages.
9. All messages exchanged get stored in 'chat.txt'.

### Roster (Android Storage/Backup)

1. Server remains in Bluetooth Accept mode.
2. User sends a message saying 'sync' followed by contents of its chat.txt with its name from udetails.txt.
3. Server receives the sync message and stores all the contents that follow.

4. Server picks out the name of the user which is differentiated from the contents of chat.txt.
5. It searches its ChatHistory.txt for the particular username.
  - 5.1 If it finds that name in its records it updates it.
  - 5.2 If it does not find the username in its record it creates a new key with that username and adds the messages.
6. 'Sync Completed' message is announced.

6. Bluetooth is only used for small amounts of data to be transferred at one time

## Future Scope

1. Enhancing security by encryption.
2. Improving the range of Bluetooth.
3. Improving the speed of communication.
4. Extending the Frequency Band.

## Result and Conclusion

Hence, after going through the design and architecture of android as well as Bluetooth we can conclude that the implementation of Bluetooth chat application can be done easily which can be prove to be very useful to the android users.

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## Advantages

1. Low-power & low-cost wireless connection.
2. Open standard short-range wireless communication.
3. Bluetooth offers higher level service profiles, such as FTP-like file servers, voice transport, and more.
4. Innovative approach to the mobile world.
5. No GSM or Wi-Fi connection required.
6. Bluetooth does not need a license around the globe for the working frequency band.
7. Low cost transmission technology for the handheld device.
8. One of the most notable is its ease of use. With Bluetooth, all these wires disappear, saving the user the time that would be spent trying to figure out how to get all the devices connected.
9. When two Bluetooth devices come within range of each other, they automatically make a connection and decide if there is any information that needs to be passed, or if one needs to control the other.
10. This reduces user interaction time, and tasks can be accomplished more efficiently..

## Disadvantages

1. Strangers can communicate with others using Bluetooth devices.
2. Blue jacking, refers to people who send irrelevant, surprising, or shocking messages to strangers in their vicinity.
3. Limited range to chat.
4. Low speed as compared to wired technologies.
5. Bluetooth is only capable of transferring at speeds of 1 Mbit/s

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