

Short Range Voice Communication Using Bluetooth

¹Md.Asif, ²A.Saida

Assistant Professor, Assistant Professor,
Department of ECE, Department of ECE,
KGR CET, Hyderabad, India, KGR CET, Hyderabad, India

Abstract: Bluetooth is a widely used technology for communication between two devices. Defines feature of Bluetooth wireless communication technology and how it can be use for voice communication for small region. Bluetooth device can be use as intercom for any Organization Using Bluetooth can communicate other people in remote area Bike riders, cyclers etc...Through inter communication between two devices. While riding the motor cycle people cannot communicate through mobile phones because it's very difficult to call and receives the phones on that situation. They can use Bluetooth intercom with Bluecore technology and paired with Bluetooth headset to communicate with nearby person.

Keywords-Bluetooth ,Bluecore, Bluelab 2.7,Casira(SDK).

I. INTRODUCTION

Originally Bluetooth conceived as a low-power short-range radio technology designed to replace cables for interconnecting devices such as printers, keyboards, and mice, its perceived potential has evolved into far more sophisticated usage models. Bluetooth devices can form piconets of up to seven slaves and one master, enabling discovery of services and subsequent implementation of many varied usage models including wireless headsets, Bluetooth was standardized as IEEE 802.15.1 Bluetooth technology for communication on Ad-Hoc network. Bluetooth is a low cost, low power, short Range radio technology intended to transfer data between cell phones. Bluetooth is also used as a medium for voice communication between cell phones.

It describes ways of connectivity. A Bluetooth network for a campus. This allows mobile phones having Android OS with API 5 and above enabled with Bluetooth version 2.1 to be used for voice communication, without any service charges. The communication medium is Bluetooth. Based on HCI protocol specification, design that based on SCM control Bluetooth module hardware interface control program then provides Bluetooth-based wireless data transmission software interface programs by using Keil C programming developed the Bluetooth data transfer module. Bluetooth voice communication system under interference and simulates Bluetooth voice communication system using Matlab simulink toolbox .Bluetooth protocol to communicate digital voice data for small groups. The proposed protocol can relay data or voice to other nodes by multi-hop retransmission using TDMA method. Solution of integrating both voice and data communications into a single device based on Bluetooth technology. The design solution presented in this to integrate the primary functions of PC mouse, headset, laser pointer and data transfer unit into a single device targeted for all PC users. A new mouse design is introduced to reduce the data rate needed for the mouse through wireless link. Develop an application that allows a user to make use of mobile phones enabled with Bluetooth and PC's connected over Local Area Network (LAN) in order to communicate with other user who is out of Bluetooth's range. Proposes a design to develop a Bluetooth walkie-talkie for a campus. It allows mobile phones enabled with Bluetooth to be used as walkie-talkies for voice communication, without any service charges. The communication medium is Bluetooth, which is a short-range radio service radio service with a range of 10 meters. This is based on the recent standardization of the Enhanced Voice Services (EVS) codec in 3GPP, mobile operators can upgrade their voice services to offer super-wideband audio quality and however one important use case which is currently limited by existing standards hands free communication with wireless headsets, car kits, or connected audio devices often rely on Bluetooth, and the hands free-profile (HFP) in Bluetooth is currently limited to narrowband and wideband speech. Following the approach used to extend HFP to support wideband, in this the applicability of the SBC codec to further extend HFP to SWB. An evaluation of performance is provided taking into account Bluetooth system constraints. Is based on numerical analysis with the peak power of sound channel under its numerical range of the region as the signal of voice communication can automatically start Bluetooth on iOS smart phone systems. Besides, the voice communication link using Bluetooth protocol. At the same time, the entire system is implemented in the intelligent mobile devices. In this paper the intelligent mobile devices use microphone and mobile device operating system's built-in audio API to collect the data from the peak power channel of voice. The collected data is trended and noise reduction processing, so that it is easy to be used to identify trends in data. From the data peak power generated by the people blowing sound and spoken voice data. Then, it can use the peak power value as a voice call to control the start signal of Bluetooth. It is based on the concept of voice transferring from one device to another. Bluetooth is the connection which can be used as a link to share Wi-Fi can also be used to share the voice from one mobile to another by receiving the data from one mobile (user) and sending the data to the destination user. Concept behind this data transferring is VOIP (voice over protocol). Voice telephony over mobile is currently supported at a cost using service provider such as GSM, or using IP service provider at cheaper cost.

II. BLUETOOTH COMMUNICATOR

Bluetooth communicator is to establish voice communication between two gadgets as Bluetooth offers the ability to provide seamless voice and data connections to virtually all sorts of personal devices the human imagination is the only limit to application options. Beyond un-tethering devices by replacing the cables, this technology computing and telecommunications devices easily and the following components are:

- Bluecore(CSRBC3)
- Bluetooth headsets
- Power supply(5v,2amp)

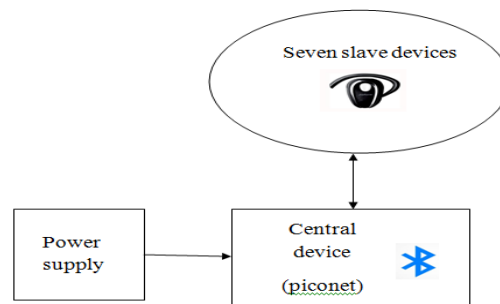


Fig.1: Bluetooth communicator

A. Principle of operation

Central device (Audio router) which is connected to slave device by giving power supply as 5V,2amp.if switch1 button is pressed pairing between two device and switch2 button is pressed call get connected similarly switch3 button is pressed call get disconnected, this is the flow of communicator device. Main infrastructure taken in the Bluetooth voice communication is as follows.

1. To establish communication between CSRBC3 with Bluetooth headset.
2. To establish voice communication between two devices using Blue-core technology.
3. Switch all the headsets off. Put the switch on the left to pairing mode. Power on the device using the adapter cable provided. And connect to 5V.
4. Press "Pair" and "Detach" button together for 6 seconds. A flicker will be seen on the LEDs above "pair" and "detach". Switches. Now switch the device off.
5. Power the device on still keeping the switch on the right in pairing mode. Click pair button. The LED on Channel 1 and on Pair button will light. Switch ON headset 1. Now put the headset in pair mode and press the pair button again. In a couple of seconds the headset will be paired to the interface unit on channel 1. Now Press the pair button again. The LED on Channel 1 and on Pair button will light.
6. Now press the left arrow button so that the LED on Channel 2 is lit. Switch ON headset 2. Now put the headset 2 in pairing mode and press the pair button. The headset will pair with the interface unit on channel 2
7. Repeat step 4 for channel 3 and another headset. Repeat till all 6 headsets are paired with channels 4, 5 and
6. Channel 7 LED is for the purpose of detaching ONLY.
8. Now press the "Pair" button and make sure all LEDs are off. Now without powering off, put the switch in the "ON" mode.
9. Push buttons on headset to connect to the interface unit and to conference with each other in full duplex mode.

This is the working principle of Bluetooth communicator device.

B Bluecore

The CSRBC3 Bluetooth Module is a Class 2 Bluetooth module using BlueCore3-External chipset from leading Bluetooth chipset supplier, Cambridge Silicon Radio. It provides a fully compliant Bluetooth system for data and voice communications. Interfaces with a host via USB or UART and support full data rate up to 3Mbps modulation modes. Voice interface supported PCM protocol. The module and device firmware is fully compliant with the Bluetooth specification v2.0. Its sufficient pin definitions, high receiving sensitivity, low power consumption, and low cost. Device Feature.

- Bluetooth spec V2.0+EDR compliant
- Enhanced data rate (EDR) compliant with V2.0.E.2 of specification for both 2Mbps and
- 3Mbps modulation modes
- Class 2 type output power
- Full Speed Bluetooth operation with full piconet support
- Scatternet support
- Low power 3.3V operation
- Minimum external components
- USB, UART, SPI, PCM interface
- Support for 8Mbit external flash onboard
- Support for 802.11co-existence
- RoHS compliant
- Applications
- Bluetooth car kit
- PCs
- Personal digital assistants(PDAs)

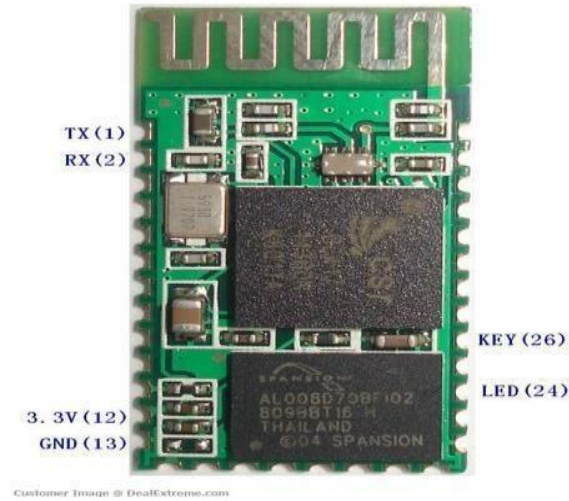


Figure 2: CSRBC3 module

C Bluetooth headset

A Bluetooth device works by using radio waves instead of wires or cables to connect with phone, Smartphone or computer. Bluetooth is a wireless short range communications technology standard found in millions of products we use every day including headsets, smart phones, laptops and portable speakers. A product with Bluetooth technology, such as a Bluetooth headset, has a tiny computer chip inside that contains the Bluetooth radio, and software that makes connectivity between devices possible. So when Bluetooth enabled products, such as a cell phone and headphones, are in close proximity to each other, they connect, or pair. A single Bluetooth headset can even connect to multiple devices at the same time. This enables you to talk on the phone or listen to music without the bother of wires or cords.

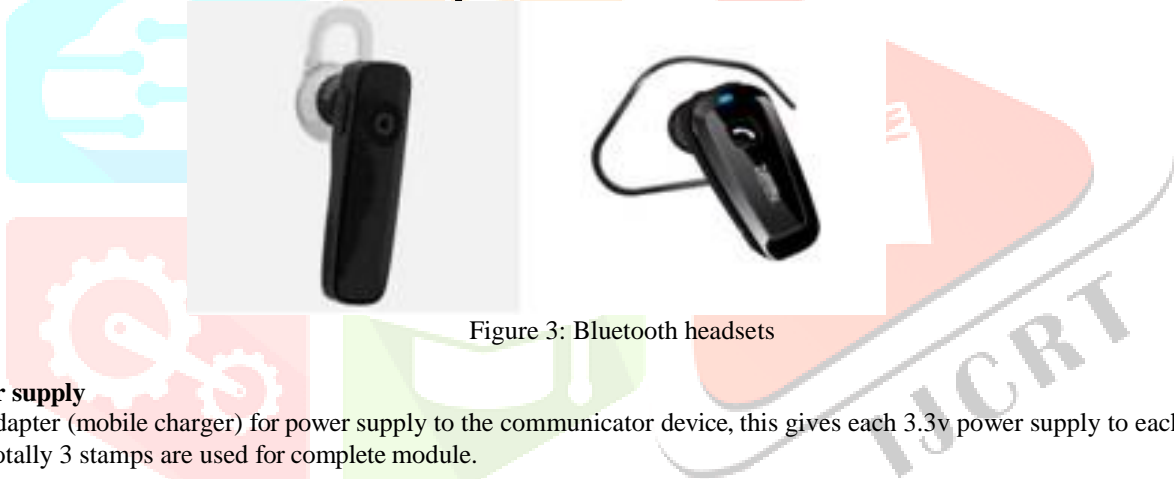


Figure 3: Bluetooth headsets

C Power supply

5v 2ams adapter (mobile charger) for power supply to the communicator device, this gives each 3.3v power supply to each stamp (BC3) module. Totally 3 stamps are used for complete module.

III. IMPLEMENTATION

Implementation of the project started with installation of the system software for windows, firstly install the bluecore 2.71 version in that cygwin window for programming and debugging. Open up Cygwin and change into the directory where the audio_gateway application resides. Make sure that you have the Casira(SDK) powered up and have the SPI LPT port hooked up on the PC and the other end connected to CN16. Then have to remove the cover of the Casira to get access to CN16. Once everything is connected then build the application. In Cygwin and in the right directory, type "makes bc03". This will compile the app and then download it to the BlueCore module. Now, the default way the audio_gateway works is that it uses control messages from the EAGdriver.exe. This program runs on the PC and controls the audio_gateway through the Serial RS232 cable. Though the module will have to be in BCSP mode to communicate over its serial interface, Now will have to use PS TOOL to configure this.



Figure 4: Casira(SDK)

- Connect the SPI cable to the Casira with the LPT port and power up the Casira. Then open up PSTOOLS.
- When opening PSTOOLS choose the SPI_BCCMD transport. This will let PSTOOLS know to use the SPI cable to talk to the module.
- The GUI is the PSKEY names and listings. Find the PKSEY named "Host Interface" and click on it. This will have PSTOOL select and read the PSKEY value that will then be displayed on the right hand side. On the value, and that it reads "UART link running BCSP". After selecting it, on the "SET" button on the bottom of the GUI. Then write the new value into that PSKEY.
- Next, find the PSKEY "UART configuration bit field" and this value should be set to decimal 6. If it is not please set it as with the same steps in step c.
- Then find the PSKEY "UART baud rate" and set this to 115.2K. Again follow the same steps in setting PSKEYS.
- Now powers cycle the module for the new PSKEY settings to take place. Now the module will be able to be communicated over the Serial port using BCSP @ 115.2k

Now connect the serial cable to the Casira and then launch the EAGdriver.exe. Then it will ask for the transport. Choose BCSP and the correct COM port that the Casira is hooked up to on PC and then choose the baud rate of 115.2K. The EAGdriver should now communicate with the Casira running the audio_gateway. This inquire for any headsets or Hands free devices in the area, pair & authenticate, connect and create an audio_audio connection with them. BlueLab docs directory.

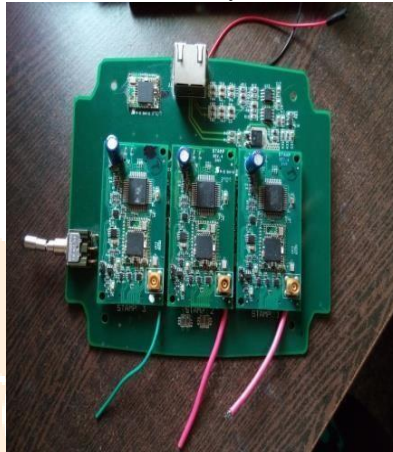


Figure 5: CSRBC3 Three stamps

This should get up and running. However run the Audio_gateway fully embedded and use certain PIO's to do the inquiring and connecting. Place 3 stamps together to establish a communication seven paired headset at a time. Each stamp can able to communicate two headset at a time, the main purpose of using this stamps voice communication taken between two or more as like conference call. If two Bluetooth devices know absolutely nothing about each other, one must run an inquiry to try to discover the other. One device sends out the inquiry request, and any device listening for such a request will respond with its address, and possibly its name and other information.



Figure 6: Pairing mode

Paging is the process of forming a connection between two Bluetooth devices. Before this connection can be initiated, each device needs to know the address of the other (found in the inquiry process). After a device has completed the paging process, it enters the connection state. While connected, a device can either be actively participating or it can be put into a low power sleep mode. The voice communication is established when the device is set to the communication mode Push buttons on headset to connect to the interface unit and to conference with each other in full duplex mode. Switch all the headsets off. Put the switch on the left to pairing mode. Power on the device using the adapter cable provided 5v. Press "Pair" and "Detach" button together for 6 seconds. A flicker will be seen on the LEDs above "pair" and "detach" switches. Switch the device off and Power the device on still keeping the switch on the right in pairing mode. Click pair button. The LED on Channel 1 and on Pair button will light. Switch ON headset 1.



Figure 7: Voice communication mode

Put the headset in pair mode and press the pair button again. In a couple of seconds the headset will be paired to the interface unit on channel 1. Press the pair button again. The LED on Channel 1 and on Pair button will light. Press the left arrow button so that the LED on Channel 2 is lit. Switch ON headset 2. Put the headset 2 in pairing mode and press the pair button. The headset will pair with the interface unit on channel 2 and for channel 3 and another headset. Repeat till all 6 headsets are paired with channels 4, 5 and 6. Channel 7 LED is for the purpose of detach ONLY. Press the "Pair" button and make sure all LEDs are off. Without powering off, put the switch in the "ON" mode this is procedure to establish voice communication.

IV. RESULTS & CONCLUSION

Module has been implemented to establish voice communication between Bluecore with Bluetooth headset to achieve voice communication between two modules. And also the voice quality while communication occur to achieve better performance of voice communication between the users.

V. FUTURE WORK

Future enhancement can use it as small circle communication like one department to another without using mobile phones where the phones are restricted and can communicate emergency code language, more over Bluetooth can intercom with different technology for secure voice communication.

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