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# NETWORK BASED WIRELESS PA SYSTEM

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**Abstract** - The real-time speech transmission over wireless medium is being exploited by different latest of applications, with incremental query of Electronics products in the domain of the industrial & Consumer application, it gets necessary to come up with modern ideas of electronic products. In the field of communication, present real-time communication sound transmission uses technologies similar WiMAX, IEEE 802.11, 3G and Bluetooth. But sound-streaming through Bluetooth or radio waves have drawbacks of range and not safe as intruders can get streamed feed. In this project a fully-functional has been discourse which is able to stream or transmit sound in real-time over Wi-Fi (IEEE 802.11). This system uses a short credit card sized single board called Raspberry Pi, MIC, android smartphones, Wi-Fi and headphone/speakers. This system is a standalone system and does not need any single PC to take or allow the data from headphone/MIC and send to another user. Operating speed of this platform is in 700MHz and it supports live audio streaming. As it has on board Audio codec, it is possibility to connect to user by just accessing the IP address of another user. This system uses a short credit card sized single board called Raspberry Pi, display, webcam, Wi-Fi and headphone/speakers. This system is a standalone system and does not need any single PC to take or receive the data from camera and headphone/MIC and send to another user. Operating speed of this platform is in 700MHz and it supports live audio streaming. As it has on-board Audio codec, it is possible to connect to user by just accessing the IP address of another user. SSH (Secure Shell) is used for secure data communication, remote command-line login, remote command execution, and other secure network services between two networked nodes. Open source Linux based OS is used to keep the cost low.

**Keywords** - Raspberry Pi 3, Amplifier, USB Mic, Wi-Fi router, ICEcast2.

## I. INTRODUCTION

Public Address (PA) system is necessary in our daily live. This system mainly found at the public region likes electrical bus station, supermarket and hospital. The leading aim of this system is to instruct the people around anything. At the electrical bus station for example, the public-address system leading aim is to inform the passenger about the electrical bus instruction and their trip notice. The traditional Public-Address system is using the electronic circuit and it is manually restraint by human. It necessity full consideration to constrain the system work effectively. In this design, a modern Public-Address system using wireless connection with a whole Graphical User Interface (GUI) to instruct the departure and arriving of electrical bus to nearby cell phone using Bluetooth wireless connection. This perfectly automatic system will analyze nearby busses, check the inside information about the bus tip and send the notice to nearby Bluetooth side phones. The instruction will be emitting on inquire of the users or passenger. The inside information about this design will be clear up in this report.

## II. LITERATURE SURVEY

A public-address system comprises electrical equipment to greatly amplify a speaker's voice so it will reach a much larger assemblage than he could speak to unaided. Beginning with the presidential conventions of the two major parties in 1920 and the inaugural address of President Harding in March 1921, when a special address system installed by the telephone engineers enabled him to address an audience estimated at 125, -000, there followed in rapid succession, many public

events demonstrating the value of such systems. One of the most notable of these occurred on Armistice Day 1921, when the speeches, prayers and music at Arlington, Virginia, were heard, not only by 100,000 persons gathered there at the National Cemetery, but by some 35,000 in New York City and 20,000 in San Francisco. On this occasion the three public address systems, one for each of these cities, were joined by long distance telephone circuits.

The basic requirements of a sufficient public address system are naturalness of reproduction and broad range of output volume. The union of these two requirements for music verify more difficult than for speech. The pick-up project whether of the carbon mic difference or a condenser transmitter extremity not be position consolidate to the speaker's lips but will act satisfactorily when four or five feet away. The loud-speaking receiver mechanism is so designed that it will carry a power of several watts with short distortion. Under natural conditions, 40 watts diversified among a number of receiver-projectors ordered in a ring is munificent to gain a crowd of 700,000 persons. Digital PA Control Unit The digital PA control unit is adopted with digital two- way transmission system in a individual wire rope connection. That shorten the installing period as well as makes the installation easier and repairing faster. A digital PA control unit can support highest 64 individual sector, 8 grouping sector broadcast media by authentic hardware implementation. It can be array with 8-CH input mixer. Moreover, if the broadcast media sector is more than 64 sector, thus, we can also expand to 192 sector and 24 control groups by using devoted to control software process for reducing the cost of hardware. Moreover, it can support wire-breakage detection also.

## III. BLOCK DIAGRAM

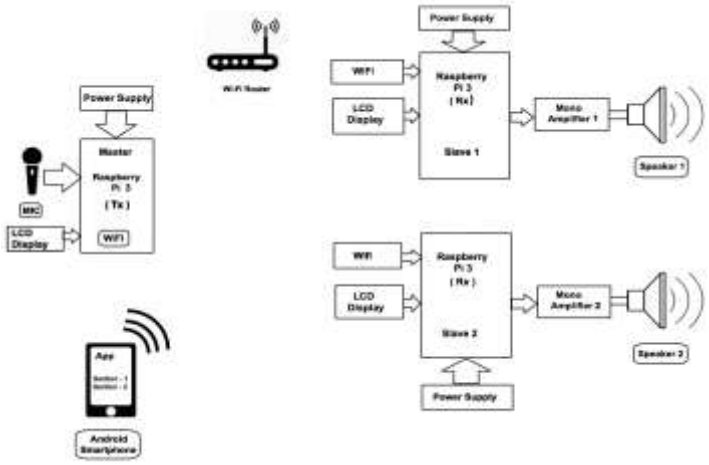


**Figure. 1 - Block Diagram**

Fig. 1 shows block diagram of the system. This all system will work under the LAN in which the the voice is transmitted over the network called as VoIP. The raspberry pi is connected to the Wi-Fi router and through that the voice is transmitted. We are using one raspberry pi 3 at side of input section it is master one and the other section we are using two raspberry pi 3 it is slave one as shown in fig. 1. This all raspberry pi and android app is connected to the LAN network which was crated by the Wi-Fi router network. As we see there is the two sections at the side of output section and that is section one and section two there is separated the two sections because we are operated that two section with the help of the android app which was develop by the java android app developer and it will help us to controlling and monitoring the directional sound transmission

At side of output there is amplifier use it will provide the amplified sound with clear voice and better sound. The user can speak from the input side master raspberry pi 3 and the all our network-based PA system can work on real time it will continuously streaming the audio sound and user's speech. The continuously streaming is possible using Wi-Fi (IEEE 802.11).

## IV. COMPONENT USED:

### 4.1 Raspberry pi 3:

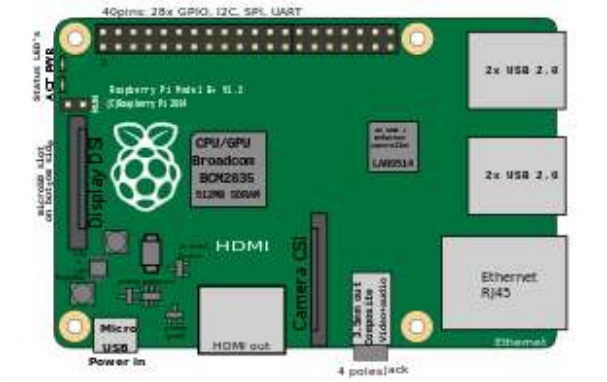


**Figure. 2 - Raspberry pi 3**

Raspberry Pi also gives you a lot of room to experiment and turn it into something else that is entirely different. The SD cards on the board can be easily switched, which allows you to change the functions of the device without spending a lot of time re-installing the software. The Raspberry Pi is a credit-card-sized electronic computer that stopple into your TV and a keyboard.

It is a capable little computer which can be used in electronics projects, and for many of the things that your desktop PC does, like spreadsheets, word processing, browsing the internet, and playing games. It also plays high-definition video. We want to see it being used by adults and children all over the world to learn programming and digital making. It uses a 1.2GHz 64-bit quad-core ARM Cortex-A53 CPU, has 1GB RAM, integrated 802.11n wireless LAN, and Bluetooth 4.1. and is the design we advise for usefulness in schools, due to its flexibleness for the beginner.

### 4.2 Amplifier:

An amplifier is an electronic design that enhance the voltage, current, or power of a signal. Amplifiers are application in wireless communications and broadcast media, and in sound equipment of all kinds. They can be categorized as either weak-signal amplifiers or power amplifiers. Weak-signal amplifiers are necessity originally in wireless receivers. They are also applying in auditory pickups, sound tapeline players, and solid disc players. A soft-signal amplifier is designate to share with exceedingly weak input signals, in some cause measuring only a few nano volts (units of 10-9 volt). the fundamental performance is to receive a sound signal, amplify the sound signal, and permit pass-through of the corresponding video signal to a display project such as a projector or a television set.

The project is based on a LM4508. The amplifier system been explaining here manufacture 20 Watt power at very light distortion. The explain Amplifier has inputs for sound rise such as CD player, MP3 player and FM/AM signals. Other restraint for the described amplifier system are Bass, Treble and Volume restraint. The amplifier puts out a striking amount of power, considering that it runs from a 12V AC 2A transformer. One reason this system performs so well is that it is supported on the National Semiconductor LM4508 20W sound amplifier IC. This IC has inbuilt thermal refuge so that even if you reproach it or short out its output, it won't be damaged.

### 4.3 Wi-Fi router

A wireless router is an electronic device that works as a router meaning it sends data from the internet cable to a device such as the smartphones laptops smart TV and as a wireless access point so this data can be shared through radio signals instead of another cable. A wireless router is a device in a wireless local area network (WLAN) that it create a network which wireless network. The data

transmission it is in the form of the packets and it should be forwarded toward its destination. A wireless router works in the same way as the router in a hard-wired home or business local area network (LAN), but allows greater mobility for notebook or portable computers. The Wi-Fi router will create the network and to that network all our system is connected. This network is private network so there is only know user can easily interact with the the PA system. The transmission of the voice is possible with LAN Network only.

**Figure 3- Wi-Fi Router**

**4.4 USB Mic:**

USB Microphones are used in number of applications such as PA systems for concert and public events, live concert and television broadcasting, and in computers for recording voice, voice recognition, VoIP.

**Figure 4 - USB Mic**

A USB mic having all the elements of a traditional microphone. The UBS mic is covert the voice single in to electric signal cause its having inbuilt ADC. This USB mic will directly plug into the raspberry pi model 3 USB port to getting users voices.

## V. SOFTWARE APPLICATION

**5.1 ICECAST2:**

Icecast2 is a streaming media audio and video over server which supports Ogg and MP3 audio format for streams. It can be used to create an Internet radio station or a privately running jukebox. ICEcast2 is a streaming server which allows radio stations to broadcast audio online and this is known as webcasting also. It is most powerful and stable, it means you can throw all of your internet radio traffic at it without having any problem or crashes. Audio listeners can access the stream through any live MP3 supported media player using IP address of sources audio transmission. ICEcast2 has many points meaning and automatically transfers listeners from the Auto

DJ to the Live stream and back again without needing to manually turn on or turn off. The user can easily access the the any audio from anywhere in the LAN network Through the ICEcast2.

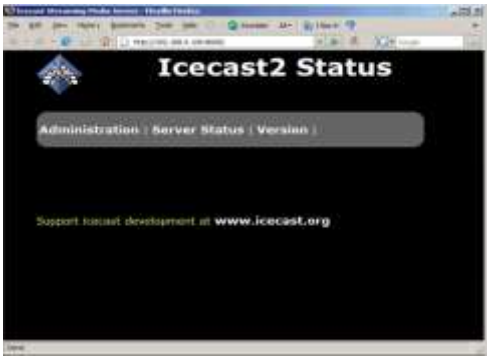


Figure 5 - ICECast2 Screen

**5.2 Basic4Android:**

Basic4Andriod has an Open Source License, so it is a free framework for mobile app development. It has a large community of developers for assembling new codes and modules to improve the quality of the apps built. One of the major benefits of Basic4Andriod is that it can be used for creating a single app that works on all mobile devices. It works on HTML5, CSS3, and JavaScript. Applications developed using Basic4Andriod work uniformly well over multiple platforms rendering the same look and feel. Moreover, the powerful backend system increases the speed of development of mobile apps. Another amazing feature of the tool is that it taps into the hardware of the device such as the camera, accelerometer, geo-location, etc.

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## VI. CONCLUSION

In this phase of the project, a secure connection, with the help of VOIP and SIP protocol, was established between three Raspberry Pi devices with a Wi-Fi connection. With the help of this connection, voice was recorded, played, streamed and give direction to the audio on demand from one Raspberry Pi to another raspberry pi module using a Python based GUI successfully. The attempt to live audio transmission between two raspberry pi modules was successfully achieved through VOIP server/client implementation maintaining operation of Raspberry Pi as a headless embedded system. The usage of open source, ICEcast2 media and OS kept the project cost low.

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