

To Develop and Implement Text-To-Speech Wireless Communication System Using Raspberry-Pi

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Abstract -This project is based on the text to speech conversion using the concept of IOT (internet of things) in which we can transmit the message or text in efficient manner. We will achieve an efficient and distortion free communication using internet as a medium, so that there is no restriction on the distance. The system will convert the text data into speech from anywhere. We are using the Raspberry Pi module to decode the data as well as convert it into the speech signal. The Raspberry Pi 2b module is a latest Embedded module, which having ARM 64 bit processor. This will make the operation faster.

This text to speech conversions system makes the information/data transmission easier. The system will have the transmitter which can be any electronic device like Computer or laptop. We can also use an Android phone also. The message / text will be transmitted via E-mail ID to the raspberry pi module at the receiver side.

This project can be applicable for the various organization as well as highly restricted areas. We can implement this project using IOT with GSM module.

Index Terms –IOT, Raspberry pi, wireless.

I. INTRODUCTION

The project is based on the IOT concept.

IOT Definition: The term Internet of Things generally refers to scenarios where network connectivity and computing capability extends to objects, sensors and everyday items not normally considered computers, allowing these devices to generate exchange and consume data with minimal human intervention. There is, however, no single, universal definition.

Text to speech (TTS) conversion transforms linguistic information stores as data or text into speech. It is widely used in audio reading devices for blind people in last few years, however used of text to speech conversion technology has grown far beyond the disabled community to become a major adjunct to the rapidly growing use of digital voice storage for voice mail and voice response system. For example, text to speech technology can convert electronic mail to voice mail for audio access by any electronic communication device.

What is TTS?

Any text to speech system consists of two major elements. Starting with the output, we need some sound generating mechanism whose functions are analogous to that of the human vocal track. A mouth by itself cannot talk, so we also need a module whose input is the text whose output drives the sound generating mechanism.

In modern technology, both of these components i.e. input as well as output are software. We can implement them in such a way that they can run on many kinds of hardware platforms.

The earlier work has focused on image to text and speech to text transmission, also the system designed was wired. Therefore major drawback of previous module was that the system was not efficient enough and distance limited.

The wireless communication system has become the need of the current generation. Hence, we are designing and implementing wireless text to speech converter based on IOT

concept using Raspberry Pi for transmission of information with minimum time delay.

Due to limitation of distance in the systems designed earlier, in current module we are implementing the system using the concept of IOT (Internet of things), this does not have any of the distance limitation and hence the data transmission can be done over a large distance also.

Recent advances in communication application demands highly efficient systems which can transmit the information worldwide using internet. Hence, we are designing the wireless text-to-speech communication system using the concept of Internet of Things.

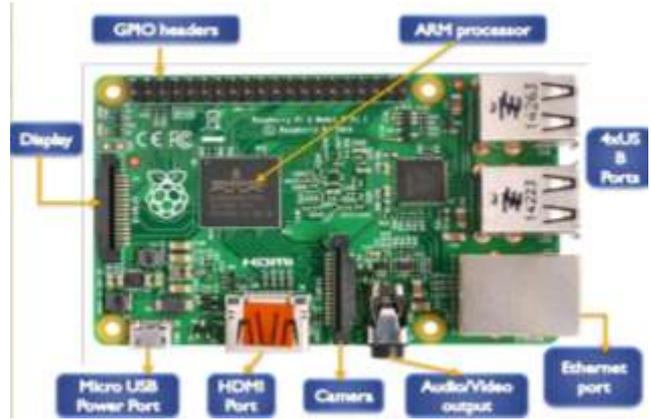


Fig. 2 Raspberry Pi 2b Module

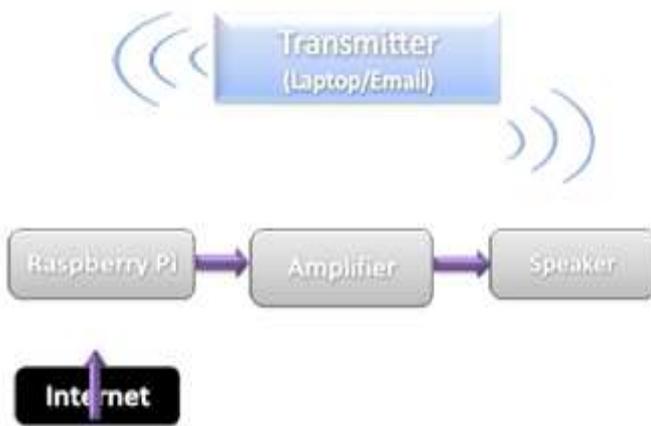


Fig. 1 Proposed Block Diagram

II. DETAILED DESCRIPTION

A. Raspberry Pi 2b Module

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing and to learn how to program in software languages like Scratch and Python. It is capable of doing everything you would expect a desktop computer or laptop to do, from browsing the internet and playing high-definition video, to making spread sheets, word processing and playing games.

The operating system used in Raspberry Pi is known as Raspbian. The language used to write the codes in the Raspbian operating system is known as Python. The Raspberry pi 2b module is a 40 pin device having four USB ports and 900 MHz low power ARMv7 Quad Core Processor. It has 1GB SDRAM. The figure below shows the schematic structure of the Raspberry pi module.

B. Software Details

The most important of the system we are going to design is raspberry-pi module. The operating system on which the raspberry-pi module operates is known as Raspbian. We are using Putty software to write a code using a well known software programming language used in Raspbian known as python.

Raspbian is a Debian-based computer operating system for Raspberry Pi, developed by a small team of developers. It is not affiliated with the Raspberry Pi Foundation, but the foundation provides a Raspbian image which is listed as an officially supported operating system. Raspbian is maintained by Mike Thompson and Peter Green et al. which completed the initial build in June 2012. The operating system is still under active development.

PuTTY is a free and open-source terminal emulator, serial console and network file transfer application. It supports several network protocols, including SCP, SSH, Telnet, rlogin, and raw socket connection. It can also connect to a serial port. The name "PuTTY" has no definitive meaning. PuTTY was originally written for Microsoft Windows, but it has been ported to various other operating systems. Official ports are available for some Unix-like platforms, with work-in-progress ports to Classic Mac OS and Mac OS X, and unofficial ports have been contributed to platforms such as Symbian, Windows Mobile and Windows Phone.

Python is an interpreted, interactive, object-oriented programming language. It is often compared to Tcl, Perl, Scheme or Java. It is a scripting language like php or asp for developing applications Python is an interpreted, object-oriented, high-level programming language with dynamic semantics. Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which

encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

C. Transmitter

The transmitter used is any smart phone, laptop, or any other electronic gadget that can access internet. As the system is IOT based the transmitter can be placed far away from the receiver. The only work the transmitter has to perform is to send the email or message that is to be converted is the speech signal by the receiver. The mode of sending the message used in this system is email. The user can use any email id to transmit the message but the receiver id is been made confidential so to increase the security of the system. The transmission of an email is shown in the following Fig 3. The steps followed by the transmitter to send the email is shown Fig 4.

hardware required is a raspberry pi 2b module kit, and speakers with an amplifier. An authorised email id is generated for the receiver which receives the mail from the transmitter. Further the text to be encoded is detected by the raspberry pi kit with the help of program coded to detect the text from the email. This Detected text is then given to the program which converts it into the speech signal. This speech signal is amplified using the amplifier. The signal is then broadcast using the speakers. The receiving of the email is shown in the following Fig 5. And the procedure used by the receiver is explained using the flowchart shown in Fig 6.



Fig. 3 Transmitter sending Email to the Receiver

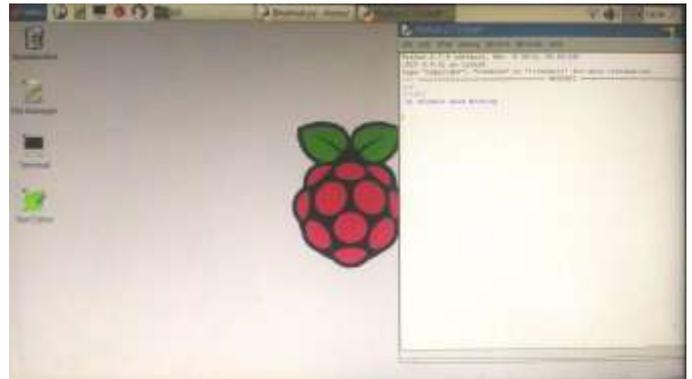


Fig. 5 Receiver receiving email from the transmitter.

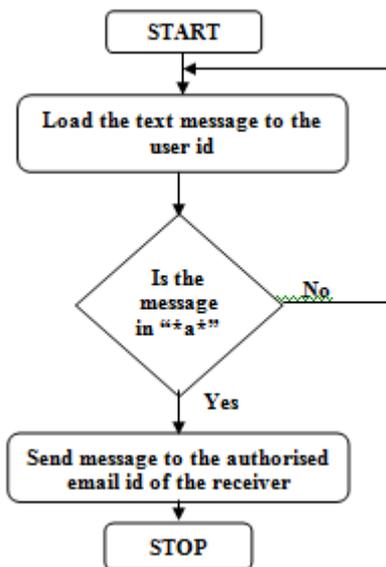


Fig. 4 Flowchart for transmitter

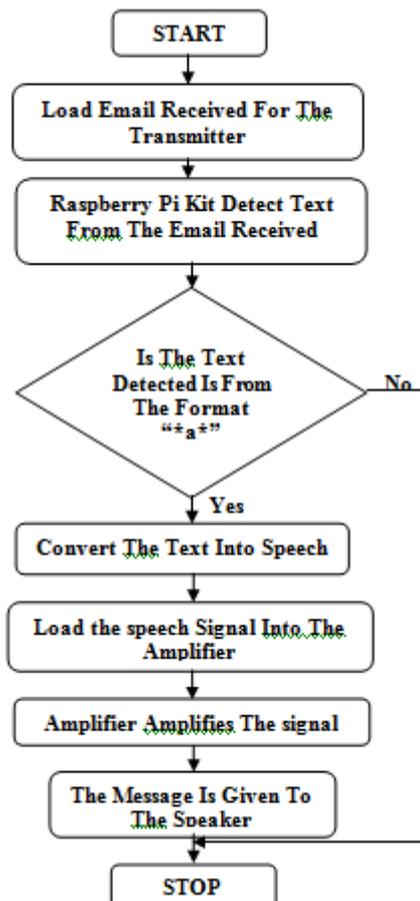


Fig. 6 Flowchart for Receiver

D. Receiver

The receiver uses the raspberry pi 2b module to encode the received message in the form of speech. At the receiver the

III. ADVANTAGES

- 1) The system is helpful for person having learning disabilities or visually impaired.
- 2) Prevents eye from strain and user can sit and listen comfortably.
- 3) Save time especially while driving, exercising.
- 4) Easy to use.
- 5) Help improving spelling, reading and writing skills.
- 6) This technology offers several benefits to consumers, businesses, personal users and educational institutions.
- 7) The system is time efficient.
- 8) It is easy to install.
- 9) The transferring of information from transmitter to receiver is easy.
- 10) The people who are deprived of vision can gathered the information using their hearing capability.
- 11) The data or information can be send worldwide.

IV. APPLICATIONS

- 1) Organizational purpose -
 - Institutes.
 - Schools.
 - Hospitals.
 - Research Centre.
- 2) Public sector –
 - High alert areas.
 - Bus stands.
 - Railway stations.
- 3) Commercial purpose –
 - Construction sites.
 - Industries.
- 4) Extend the reach of your content-

TTS gives access to your content to a greater population, such as those with literacy difficulties, learning disabilities, reduced vision and those learning a language. It also opens doors to anyone else looking for easier ways to access digital content.
- 5) Accessibility is relevant-

Making your online content audible helps the online population to better understand the text is read and highlighted simultaneously so that the reader may easily follow along.

V. FUTURE SCOPE

Presently we are using keyboard to type the text or information we will need to send, this takes little bit typing time. So in future, instead of using keyboard we may type the text by doing the hand gestures with the pen.

VI. CONCLUSION

We can conclude that the system is efficient in order to convert the text data into speech signals which was not implemented in

the systems designed earlier. The system will not create distortion in audio as in loudspeaker.

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