

Bus Indication for Blind People using RFID & Raspberry Pi

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Abstract – In this paper we discuss about Bus indication for blind people using RFID (Radio Frequency Identification) for visually challenged People to make them easier traveling without depending on others. This system consists of two sub systems Bus indication system & Bus Station system. Here RFID Reader is placed 100mts away from the bus station. Whenever the bus going to reach the certain bus station the RFID Reader reads the RFID Tag which is attached to the bus. If it gets detected and identified then it is reported as a voice command to the blind people in the bus station. Because every bus has a unique RFID tag to detect and the blind people were detected by IR sensor (Infrared Sensor) and this indication is given by led light.

Key Words: Raspberry Pi, RFID, IR Sensor, System Integration, Blind People Detection, Internet of Things (IoT).

1. INTRODUCTION

Now-a-days travelling became major part in our lives. Normal person have the ability to travel from one place to another place easily without any assistance. While in the case of blind people, they are facing many problems to travel from one place to another because they are mostly dependent on others, as they cannot see. If they want to travel to any place in their city with the help of local buses, it is not an easy task to blind people because in the local bus stops the information of the buses will be displayed through LCD's. Moreover the blind people cannot read the bus number to identify the correct bus to board unlike normal people who travel independently.

For this problem, we can develop a solution by using Internet of Things (IoT). IoT is connecting the devices using internet to act smartly and accurately. In present scenario IoT is spreading worldwide, so that everyone is using in their daily life to save time and resources. We came up with a solution which provides an announcement of the bus details in the local bus stops and provides LED light as the indication of the blind people for the bus driver.

2. Literature Survey

Many applications are designed in order to help the blind people to overcome the problems faced by them while travelling but they can't provide a complete solution for the problem. One of the existing system detects and recognizes the bus route numbers by capturing the images of the buses. In order to capture the images, they designed a hat

embedded with two web cams. Then the information of the bus route numbers is extracted and recognized from the highly resolute images by using GUI-based application. This information is sent to the database which consists of the bus details. By the captured image the bus route number is verified in the database. This detail is converted to speech. Therefore blind people can recognize which bus is in front of them and can travel easily from source to destination.

The main drawbacks with the current device are the captured image should be clear because if the image is inconsistent then the database treats the image as the noisy data and can't give accurate results about the bus details. Another problem is the time complexity for processing the details from the database is very high. Moreover blind people should carry the hat and smart pc every time which is not effective. Suppose if blind people forget to carry the hat and pc then can't recognize the bus. which is very risky for them So we proposed an idea that can definitely produce a better result which is very useful for the blind without any risks. In our proposed system we have combined the ideas that are implemented on various systems and we developed a Raspberry Pi system which gives the information of the bus to blind people through speaker in the bus stop. It also consists of the LED light which is used as the indication of the presence of the blind people for the bus driver.

3. PROPOSED SYSTEM METHODOLOGY

We proposed a solution for blind people which can help them to travel easily from one place to another place. We will attach the RFID tag to the bus which contains the details of the bus and we will place the RFID reader 100mts away from the bus stop. When bus passes through the RFID reader it reads the tag and sends the tag number to the Arduino UNO serially. Then this tag number will be sent to the Raspberry Pi which checks the particular details related to that tag number. Then using the Espeak package the text will be converted to the speech which comes from the speaker which is placed in the bus stop. LED is placed in the bus stop which indicates the bus driver if there is any person in the bus stop through IR Sensor. The block diagram of our proposed system is shown in below Figure 1. It consists of Raspberry Pi (3B+), RFID Tag, RFID reader, speaker, LED, Arduino UNO, IR Sensor.

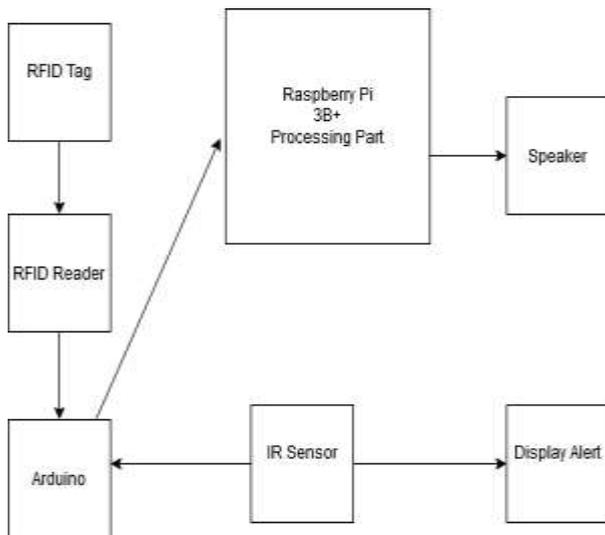


Fig-1: Block Diagram

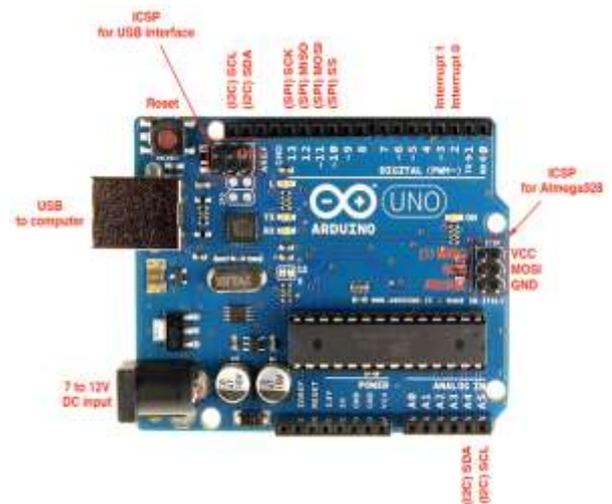


Fig-3: Arduino UNO

Hardware Components:

1. Raspberry Pi

Raspberry Pi has the ability to interact with the outside world and it works as a desktop computer like browsing the internet and playing the high definition video, word processing, playing games etc., The operating system used in it is Raspbian OS. It is useful to learn how to program in languages like python and Scratch. It is useful to generate voice also.

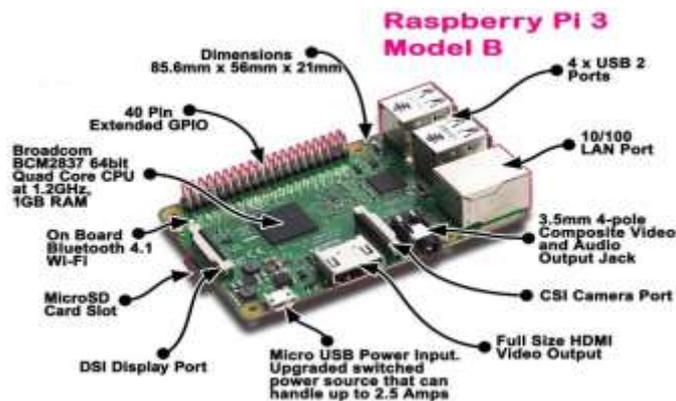


Fig-2: Raspberry Pi

2. Arduino UNO:

Arduino Uno may be a microcontroller board developed by Arduino.cc . The board is provided with sets of digital and analog input/output (I/O) pins that may be interfaced with varied expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analogs I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a kind B USB cable. It is often powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts.

3. RFID Reader:

RFID is the Radio Frequency Identification Tags which is used to read and capture the radio waves stored on the tag attached to the bus. The RFID tag does not have to scan directly rather than it can have the distance between 3 to 300 feet distance from the reader. The RFID reader has the capacity to scan the several tags and the fast identification of the tags and the tag id will be sent to the next level. Every RFID tag has the unique id.



Fig-4: RFID Reader



Fig-5: RFID Reader pinouts



Fig-6: RFID Tag

Software Components:

1. Python:

Python programming language is used as an interface between Raspberry Pi, Sensors and Database. Python is a flexible programming language with short code and it has multiple libraries. The interaction with Sensors and Raspberry Pi is easy with python programming language. Here we will use Thonny IDE and Numpy IDE

4. DESIGN FLOW

When the Raspberry Pi system is powered on, the Operating system gets loaded with a green signal blinking on it. Then all the connected components are initialized.

Explanation:

Step-1: When the RFID reader detects the RFID tag then it sends the signals to the processor. If it doesn't detects the RFID tag then it will again wait until the RFID tag arrives.

Step-2: Then the text will be converted into speech through Espeak package and resulted into a voice announcement in the bus stop by speaker.

Step-3: IR sensor detects the blind people and the presence of blind people would be seen by the driver by led light on the top right of the bus stop.

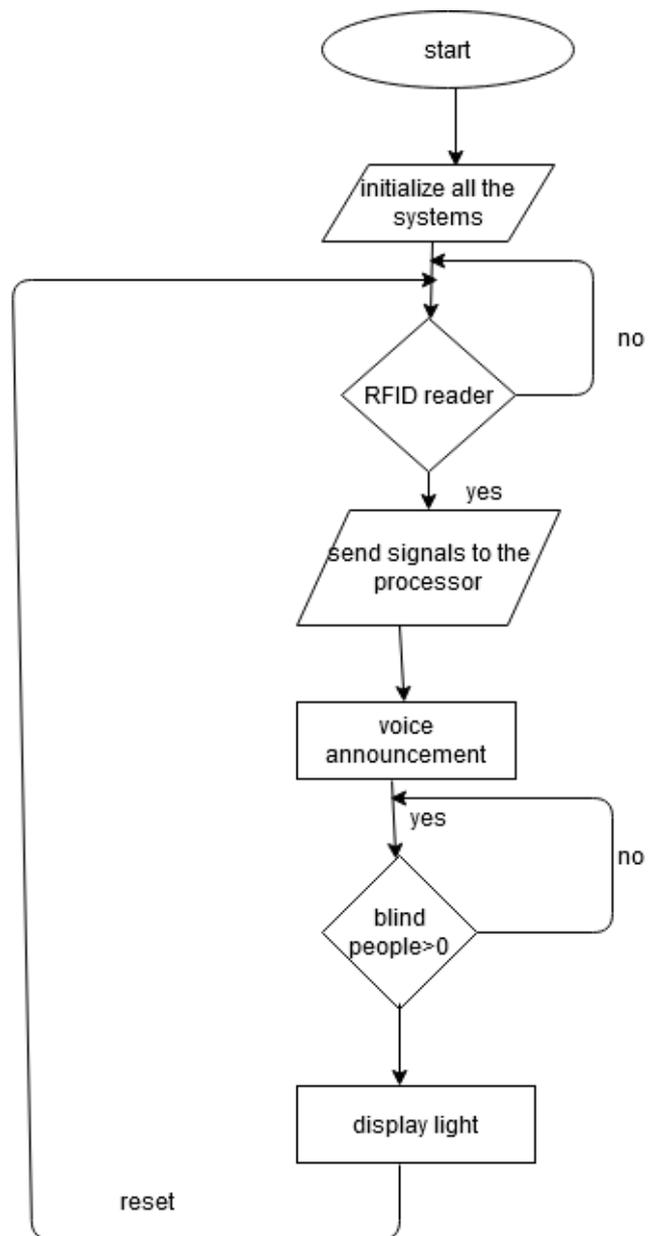
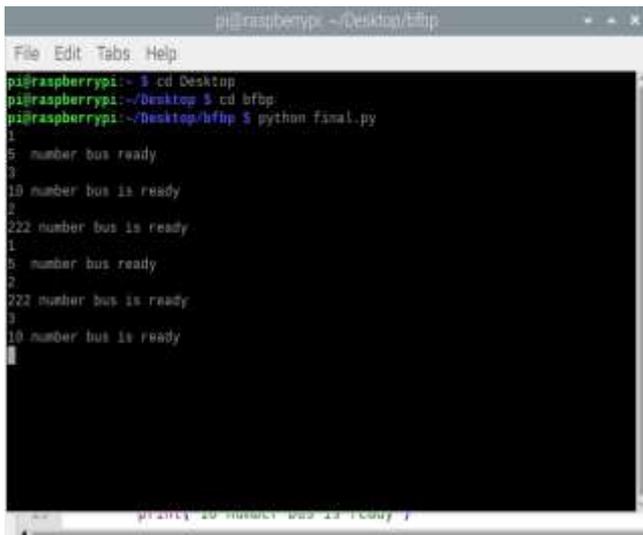


Fig-7: Flow chart

5. RESULTS

Generally we can connect Raspberry Pi to our PC with USB. We can also connect Raspberry Pi to our PC wirelessly by using VNC Viewer. We have to provide IP address of Raspberry Pi to VNC Viewer. From VNC Viewer we can perform any operations on Raspberry Pi. Whenever the RFID reader detects the RFID tag which is attached to the bus, through Espeak package the details of the particular tag will be converted from text to speech and resulted as a voice announcement through speaker. Then the compiler result will be shown in below figure.



```
pi@raspberrypi:~/Desktop/bfip
File Edit Tabs Help
pi@raspberrypi:~$ cd Desktop
pi@raspberrypi:~/Desktop$ cd bfip
pi@raspberrypi:~/Desktop/bfip$ python final.py
1
5 number bus ready
3
10 number bus is ready
2
222 number bus is ready
1
5 number bus ready
2
222 number bus is ready
3
10 number bus is ready
```

Fig-8: Compiler result

Prototype :

When IR sensor detects the blind people and the presence of blind people would be indicated to the driver by led light on the top right of the bus stop.



Fig-9: Prototype of bus stop when the blind people does not exist



Fig-10: Prototype of bus stop when the blind people exist it can be shown using led light

6. CONCLUSION

This paper mainly focuses on providing the bus number indication to the blind people to board the bus easily. Our main theme was that the every blind people can travel to

anywhere at any time individually. As "BUS INDICATION SYSTEM USING RASPBERRY PI AND RFID" is set up for specifying the bus details to the blind people. It works on, when the RFID reader detects the RFID tag and sends the tag id to the Arduino UNO board serially. It verifies the tag id and sends it to the Raspberry Pi in an array format. The bus details in the Raspberry Pi are converted into the speech through Espeak package and give an voice announcement by speaker in the bus stop. When IR sensor detects the blind people and the presence of blind people would be indicated to the driver by led light on the top right of the bus stop.

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REFERENCES

- [1] B.N Kiran, Smitha B.C,Sushma K.N, Varsha R.Gowda,"Implementation of RFID for blind bus boarding system ,"International Journal of Science Engineering and Applied Science(IJSEAS)-Volume 1.
- [2] Quoc T.,Kim M., Lee H., Eomk, "Wireless Sensor Network apply for the Blind U-bus System," International Journal of u-and eService, Science and Technology Vol. 3, No. 3, September, 2010.
- [3]Myat K Khine, Thiri Thandar Aung,"RFID- based Audio Guidance Cane For Blind and Visually Impaired Person, International Journal of Engineering Research & Technology(IJERT), Vol. 3 Issue 8, August -2014.
- [4] New York Transportation Statistics. Available from: <http://transportation-modes-city.findthedata.org/q/1447/1033/Howmany-people-use-public-transportation-to-commute-in-New-YorkNew-York>. Accessed 25 Novmber.
- [5] Miesenberger, K. [et al.] [eds.] Computers Helping People with Special Needs, LNCS, vol. 4061 Springer Berlin / Heidelberg, 10th International Conference, ICCHP 2006, Linz, Austria, July 11-13, 2006.
- [6] Hersh, M.A., Johnson, M.A. Assistive Technology for Visually Impaired and Blind People, Springer, 2008