Bus Identification and Detection system for Disabled People

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Abstract: In order to let blind persons move from one location to another easily and independently, this research presents a bus detecting system. The project aims to bridge the gap by creating a system specific to transportation via buses such that the visually impaired can avail these services without being dependent on another individual or the sympathy of the fellow passengers. To operate a public bus system successfully, securely, and independently, people with visual impairments must become familiar with their physical surroundings as well as the visible information that shows at bus stops and terminals, such as timetables, routes, etc. Our transportation system places a strong focus on safely and promptly dropping off those with physical and mental disabilities as well as older citizens. As a result, our system may be a tremendous helping hand for such individuals to assist them gets at their destinations on time. Due to the fact that the route numbers in the bus transportation system are only visible on the number plate, a visually impaired person must rely on sighted help, which increases their dependency on others and diminishes their sense of self-worth.
Keywords: Public Transport, Disabled People, Raspberry Pi.

1. Introduction

Helping and assisting people who are visually impaired is one of the most popular vocations in the world today. Because to their restricted surroundings and difficulties seeing what is going on around them, these people are less active in a number of areas, including education and transportation since they rely only on their own intuition. Also, as the population matures, there are more VIPs. Society functions primarily on the efficient exchange of goods, services, and brotherhood. The societal structure and economic system are designed to provide opportunity, employment, and enjoyment for sighted people while excluding the visually handicapped from this system.

The ability to travel independently for those who are blind or visually impaired depends heavily on public transportation because they cannot operate a vehicle on their own without sight. However, for the majority of them, using a public bus is the only practical way to socialise, pursue school, job, and leisure activities. Yet, utilising a public bus does not grant blind people full independence. They still have to rely on other people to help them board the right bus that takes the appropriate journey. Twenty percent of the 36 million blind individuals worldwide live in India, where there are 7.8 million blind people. Thus, we wanted to find a solution that would improve the quality of life for those who are blind or visually impaired by implementing a system that enables them to use public transit on their own without any assistance.

In order for blind people to move freely and independently from one place to another, they urgently require certain needs and services, such as public transportation. One of the requirements for ease and enjoyment in

living life is the ability to autonomously go from one place to another utilising a variety of forms of transportation, such as cars, the metro, etc. But, some groups of persons with disabilities, like others, cannot simply rely on themselves when travelling. Blind persons, who have significant mobility issues, fall into one of these groups. For instance, blindness restricts the types of transportation a person may utilise; as a result, the blind may experience more delay than someone without the condition.

161 million of the 6.7 billion people on the planet have vision impairments. Depending on their distinct degree of vision, each visually impaired person has a unique set of obstacles. Many persons who are blind and visually impaired now have access to school and other opportunities because to the growth of several support-based organisations. Yet, blind people still have a lot of navigational challenges, particularly when walking down the street and using public transportation to get to remote locations. Reading street signs and traffic lights can be exceedingly difficult, if not impossible, for someone who is vision challenged. A vision impaired person may utilise a waking cane, a guiding dog, and a sighted guide to get through these obstacles. These substitutes, sometimes known as assistive gadgets, can be useful to the blind, although they are not very efficient. The sighted guide can be very helpful and comforting in social situations, but also limits the blind person's independence. A more autonomous mode of transportation is made possible by guide dogs and walking canes, however they have limitations when used in foreign settings. Although RFID is practical and affordable, it is best suited for indoor communication only. Moreover, it offers a very limited range of identification and just one way communication. Blind persons may navigate outside using a system that includes a semacode/data matrix-tagged walking cane, augmented glasses, and recognisable objects.

Those who are completely blind or have congenital blindness typically encounter issues if they leave their homes, places of employment, or familiar locations. They must learn the locations of every object or barrier in their environment in addition to the various problems they confront every day whether travelling or even just strolling along a crowded street. To live comfortably and effortlessly, one must be able to travel freely, readily, and independently from one place to another using the means of transportation. Yet nobody can rely on others for their travel requirements in the same manner as some sorts of disabled people do (particularly those who are visually impaired).

The types of transportation that are accessible to blind people are constrained. In many countries, the great majority of blind people choose public transportation. Students struggle to recognise and predict when buses will arrive at bus stops in this situation. Also, they are unable to go through the bus selection to find the best bus to board.

2. Related Works

By developing and testing an Automatic Crash Notification System (ACN), an advanced in-vehicle technology that instantly notifies EMS professionals of the location and seriousness of an accident. Hampton C. Gabler, et al. proposed an "Automated Crash notification via the wireless web: System design and validation" [23] to significantly reduce Emergency Medical Services response time. ACN systems now in use are costly, frequently only offered for luxury automobile models, and are typically not suited for retrofit. Hampton talks about a novel method to ACN that integrates upcoming low-cost chip sets / single chip for wireless Web connectivity, crash detection and GPS position positioning for low-cost ACN.

The concept of "Remote monitoring of car diagnostics and position utilising a smart box with Global Positioning System and General Packet Radio Service" was proposed by M. A. Al-Taee et al. in 2007 [18]. A distributed system is built using OBSB, which includes an inbuilt GPS receiver, allowing remote monitoring of vehicle diagnostics and location. The procedures of local data capture and transfer of the collected data to the distant server through GPRS are managed by the software programme that drives OBSB.

Montaser N. Ramadan, et al. [8] proposed the use of an embedded system equipped with a GPS and GSM to develop an efficient anti-theft automobile security system. In this, the consumer utilises Google Earth to locate and contact vehicles via the system while also communicating with them.

A GSM modem attached to a PC or laptop receives the target current position and other data received by the vehicle's data port through SMS via GSM networks. Using GPS locators, users may follow the whereabouts of specified automobiles on Google Earth.

A study on accident detection and notification systems utilising smartphones was conducted by Hamid M. Ali et al. [4]. Because of improvements in the processing speed and sensor technology used in smartphones, researchers in this study examined the possibility of detecting traffic accidents using these devices. The majority of smartphone-based accident detection systems use the G-Force value and the high speed of the vehicle (both retrieved from the smartphone's GPS receiver) to determine if an accident has occurred. Yet, given that many sources claim that 90% of vehicular accidents happen at low speeds, researchers have focused on low speed accident detection in addition to high speed accident detection.

[6] provides a description of an RFID-based blind assistance system. Each bus in this place has an RFID tag attached to it that provides the bus number and upcoming destinations. Similarly, every individual who is blind should own a portable gadget. A headset, control subsystem, and RFID reader are all included in the portable gadget. The primary concept behind this system is that as buses approach, an RFID reader on a portable device would sense them and scan the information from their tags.

Each blind person will receive a customised audio message about the arriving buses through their headset using the bus information. Yet, using the recommended method, the driver is oblivious to the fact that there are blind people at the station.

Rathi and others [1] a method for understanding the dynamic hand motion and words used in Indian signs, as well as the transformation of the received signal into text and voice. Highlight extraction has been done using Eigenvectors and the Eigen esteem approach. A classifier that is mostly based on Euclidean distance and Eigenvalue worth has been used.

Using a hand motion interface, Hamid A. Jalab and Herman.K. Omer [2] addressed the widespread media player abuse neural system. Play, Stop, Forward, and Reverse are the exact hand signals that are recognised by the expected standard. Our standard is based on four steps: acquiring images, hand-dividing them, extracting alternatives, and classifying them.

3. System Design

The primary idea behind this effort is to facilitate travel for individuals with disabilities. The block diagram for a device for a person with visual impairments is shown in Figure 1 below.

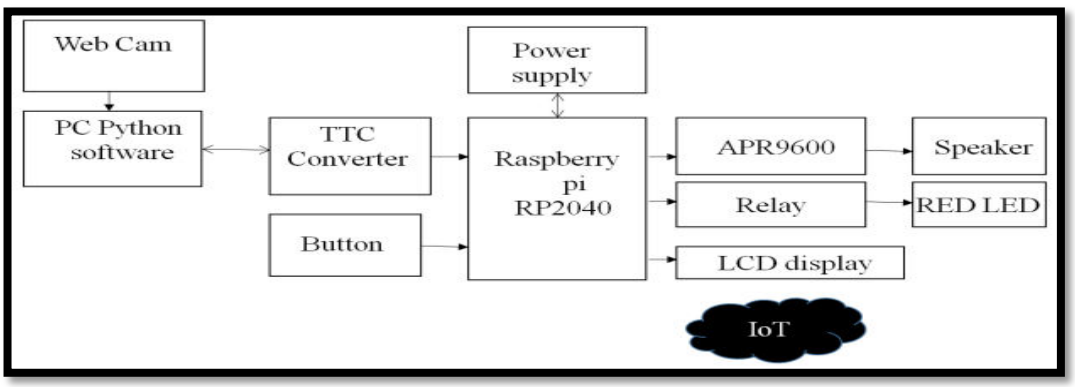

Figure 1 Block Diagram

Raspberry Pi

A GPU, multicore processor, Ethernet interface, I/O peripherals, ROM, USB host, DDR Memory, and micro HDMI are all included in the Raspberry Pi. This project used the Raspberry Pi board in bus indication system because it can help with many forms of process automation. A Raspberry Pi 4 board will supply power to the smart bus indication system.

Figure 2 Raspberry Pi

12V Power Supplies

One of the most often used power sources today is the 12V (or 12VDC) supply. It is common to use a transformer, diode, and transistor combination to change a 120VAC or 240VAC input into a 12VDC output. Regulated power supplies and unregulated power supplies are the two different types of 12V power supply. In addition, significant EMI filtering and shielding are used in acopian switching regulated power supply to reduce noise that is passed to the line and load in both common and differential modes. The system's power source, represented by the power supply block in the diagram, steps down the voltage from 230V to 5V in order to provide the system with the vital power it needs. The voltage is then further passed to the remaining system blocks after being stepped down to 5V.

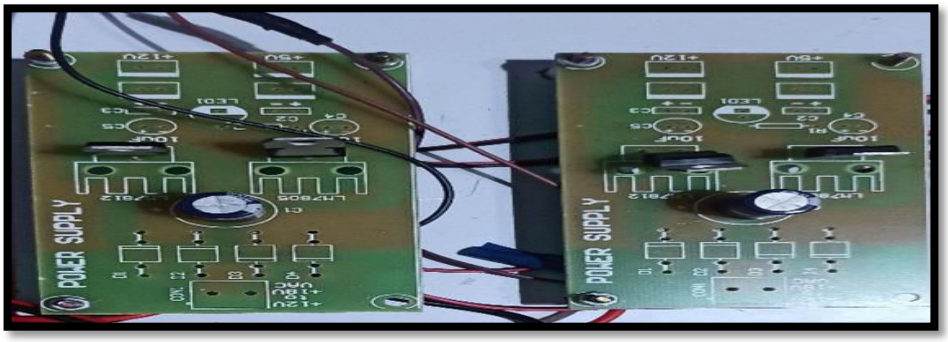

Figure 3 Power Supply

Relay

It is a switch that is turned on by electricity. A lever is pulled and the switch contacts are altered by the magnetic field created by the current flowing through the relay's coil. As the coil current can be on or off, relays have two switch positions and are double throw (changeover) switches.

Figure 4 Relay

ARP 9600

PR9600 DIP 60 Sec Playback and Recording The APR9600 was a popular sound record/play IC with cheap cost and great performance for embedded systems. With relatively few external components, the APR9600 supplied all the functions required for recording and playback the audio. Even when the module's power supply is disconnected, the recorded sound is still available. Replayed audio displays excellent clarity and little background noise. A 60 second recording time requires a sampling rate of 4.2 kHz, resulting in a sound recording and replay bandwidth of 20 Hz to 2.1 kHz. Nevertheless, a sampling rate as high as 8.0 kHz can be attained by altering an oscillation resistor.

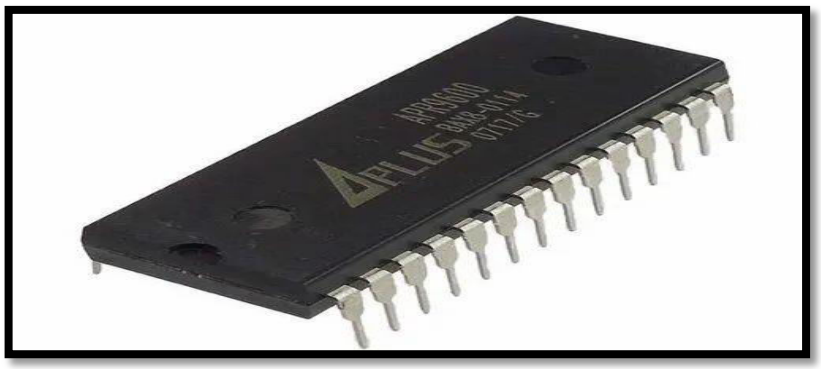

Figure 5 ARP 9600

LCD Display

There are two lines on an LCD panel, each with 16 characters. A 5x7 dot matrix makes up each character. The power supply voltage and whether messages are presented in one or two lines affect display contrast. LCD module at a temperature and relative humidity of 40% respectively. Lower temperatures can slow the display's blinking pace, while higher temperatures can cause the display's overall colour to change. The display will return to normal when the temperature falls within the established range. Heat and humidity can cause polarisation degradation, bubble production, or polarizer peel-off.

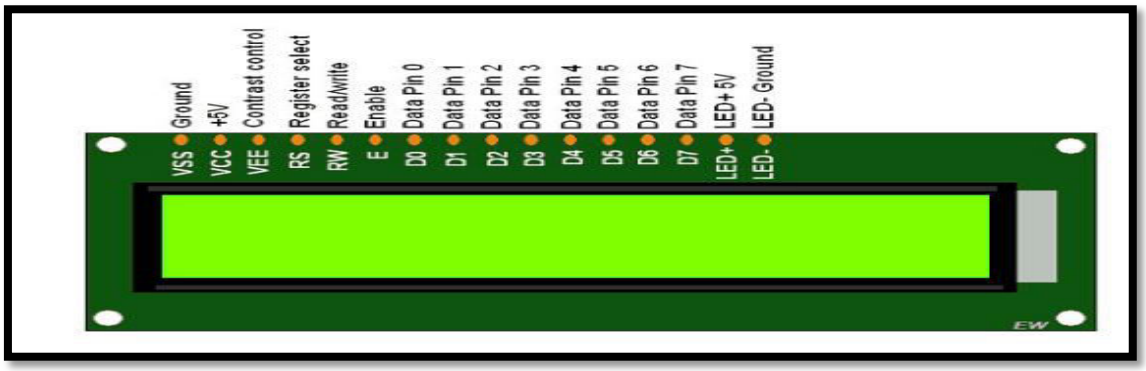

Figure 6 LCD Display

Red LED

Several packages of LEDs are produced for a variety of purposes. For usage as an indication, one or more LED junctions may be crammed into a tiny device. This experiment used red LEDs to tell the bus driver to stop at a certain bus stop and pick up a passenger from there who has a handicap and has communicated his desire to board the bus and be taken to his destination. This is how the LED block functions within the system.

Figure 7 Red LED

Button

The button serves as a signal for the bus driver to stop at a certain stop, and when the bus arrives at the precise place, a bell will announce its arrival to the individual so they may board and go on to their destination.

Speaker

It is used to tells the bus location to the blind person by a voice.

Figure 8 Speaker

Figure 9 IOT App

4. Result and Discussion

In this work initially the camera module will capture and scan the number and send to the TTC converter and it will convert into text and the text will be send to the raspberry Pi (RP2040) and the processor will send the text to the APR9600 text will be converted into Audio and bus data will be played through speaker and weight limit switch is used to ON the led light to indicate to driver. through IOT app we can gather the information about the bus.

Figure 11 Bus Data Display

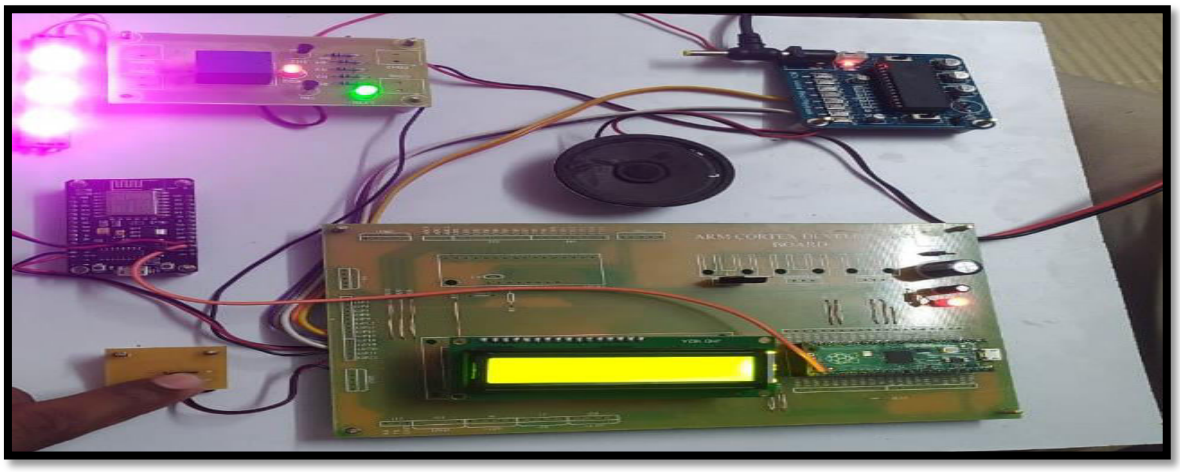

Figure 12 Hardware Setup

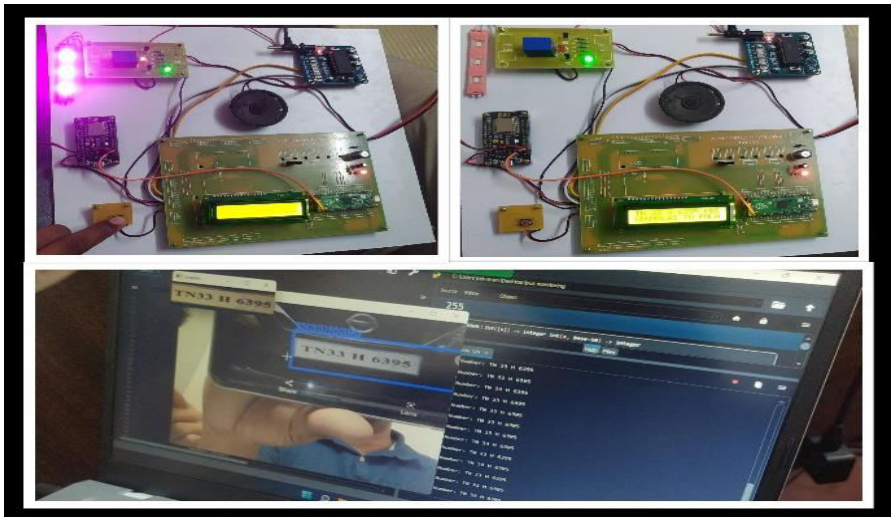

Figure 13 Experimental Result

5. Conclusion

In order to let blind persons move from one location to another easily and independently, this research presents a bus detecting system. The project aims to bridge the gap by creating a system specific to transportation via buses such that the visually impaired can avail these services without being dependent on another individual or the sympathy of the fellow passengers. To operate a public bus system successfully, securely, and independently, people with visual impairments must become familiar with their physical surroundings as well as the visible information that shows at bus stops and terminals, such as timetables, routes, etc. Our transportation system places a strong focus on safely and promptly dropping off those with physical and mental disabilities as well as older citizens. As a result, our system may be a tremendous helping hand for such individuals to assist them gets at their destinations on time. Due to the fact that the route numbers in the bus transportation system are only visible on the number plate, a visually impaired

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