

BUS IDENTIFICATION & DETECTION SYSTEM FOR VISUALLY IMPAIRED PEOPLE

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ABSTRACT — This paper demonstrates a bus detection system to assist blind people to travel smoothly and independently from one place to a different by providing complete and clear information about the following: the existence of blind people at the bus station to alert the bus driver, the approaching bus station, and the buses arrival and their routes at a bus station. The plight of the visually impaired people in reference to public transportations has been inadequate and hence resulted in the societal gap between the general populace and the impaired populace. 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. This not only enables the visually impaired to be self-sufficient but also helps them navigate effectively and efficiently between buses. Vision impairment affects people of all ages. For the precise case of a public bus system, individuals with visual disabilities have to gather information about their physical surroundings and therefore the visible information that appears at bus stops and terminals like schedules, routes, etc., so as to use the public bus system safely, effectively, and autonomously. Unfortunately, most visually impaired and blind people may experience difficulties taking the proper bus and getting off at the right destination.

Keywords - Visually Impaired, User Module, Bus Module, Bus Station Module, RF signal

1. INTRODUCTION

Society works essentially through the smooth trade of merchandise, administrations, and brotherhood. The societal framework and trade system are intended to streamline the opportunity, working, and delight in located individuals confronting the visually impaired with rejection from this system. Being visually impaired limits their exposures to these marvels and expands their risk to the perils.

Mainstream thinking has dependably fought that visual deficiency drives specifically to lack and insufficiency. Our point is to add to making their lives ordinary in the little way that we can. For a big number of visually impaired persons especially within the developing world, conveyance is, often, not a matter of choice but an absolute necessity. Helping visually impaired people use public transport can increase their chances of education and employment and reduce the financial burden on their families. In most physical environments, the visually impaired have difficulty accessing information about transport stops, terminals, vehicles, schedules, maps, and directories, which prevent them from using conveyance effectively. According to a survey in Taiwan on the living demands of disabled people, using conveyance was the foremost critical problem for the visually impaired, amounting to 71.04% of 602 visually impaired people. The survey results showed that only 14% of visually impaired people used public transport (city bus, mass rapid transit, train, etc.).



Difficulties in mobility due to suspension of public transport few volunteering to help. Isolation because of fear of contracting the virus. Loss of livelihood, struggle for food & medical expenses. Loneliness, mental health issues. Navigating digital platforms/online transactions can be daunting. Physical distancing has hindered the examination process.

1.1 . SIGNIFICANCE

- This project aims to develop a system which aids the visually impaired to navigate and avail the bus services available for the public.
- This project comes under the Digital India concept which is introduced by Govt. of India.
- The project alerts the visually impaired passenger about the arrival of the bus at the bus station by announcement at the station using the bus station module and personal alert to the blind via their blind stick.
- The project's main focus is to make it easier for visually impaired people to go about their lives. Since the majority of the blind population of India comes from a poor origin, it creates the need for such technology as it is more convenient, necessary and economical for such people to avail the bus services.
- The project may also be extended to be installed in railways stations (alerting the blind passenger of the platform and the arrival of the train), metro stations (aiding the blind passenger to the platform and alerting about the arrival of the metro) or simply in school buses where blind students can independently board the school bus. This is especially helpful to the common people as it makes them independent of others to go about their lives.

1.2 .OBJECTIVES

The plight of the visually impaired people in reference to public transportations has been inadequate and hence resulted in the societal gap between the general populace and the impaired populace. 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. This not only enables the visually impaired to be self-sufficient but also helps them navigate effectively and efficiently between buses.



The objectives of our research includes the following:

- Each visually impaired individual faces different challenges supporting their specific level of vision. And our project aims to make it easier for them through the proposed system.
- To use technology for the welfare of the society which includes visually challenged people. The project outcome is indirectly related to the —Digital India concept which is introduced by Govt. of India.
- To design and create a new and useful user friendly system especially for the disabled (namely, visually impaired) to enhance their public transportation experience.
- To make the proposed system not only simple to use but easily accessible to the desired demographic.
- To embed an obstacle detection sensor along with the bus detection system to ensure safe boarding of the visually impaired.
- To design a cost-effective portable device which helps blind people in navigation.
- Provide real-time information about buses received the station without using
- any Web-based technology

The proposed system curbs the mentioned hindrances and will result in an efficient structure which will minimize the difficulties faced by the differently abled i.e. visually impaired people in specific to experience a seamless episode of public

transportation while being independent of anyone around.

2. ARCHITECTURE

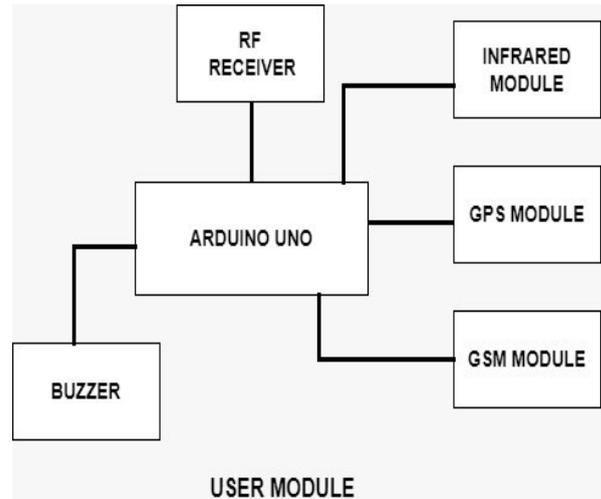
The project comprises a designed system which co-operates in order to derive the required function out of them. The architecture of the project is described below and breaks down each and every detail regarding it. The architecture of the project describes the work flow of the project, the detailed analysis of the required components.

2.1 . MODULES

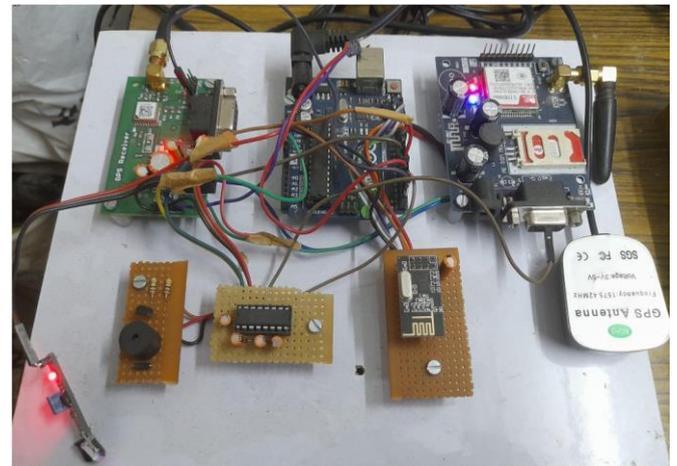
The project consists of various modules which coordinate together such that the desired working is obtained. This project consists of three such modules namely, user module, bus module, bus stand module. These modules are connected such that the visually impaired person is informed about the arrival as well as details of the bus and can board the desired bus using obstacle detection without getting hurt. The mentioned modules are explained in detail below.

2.1.1. USER MODULE

User module consists of Arduino Uno, IR sensor, Buzzer, GPS receiver and GSM unit to send SMS to the driver. When the bus is arriving at the station, it sends out the first RF signal to the bus station and the user module. The user module receives this signal and turn after the announcement about the bus route is made, the user decides whether to board the bus or not.



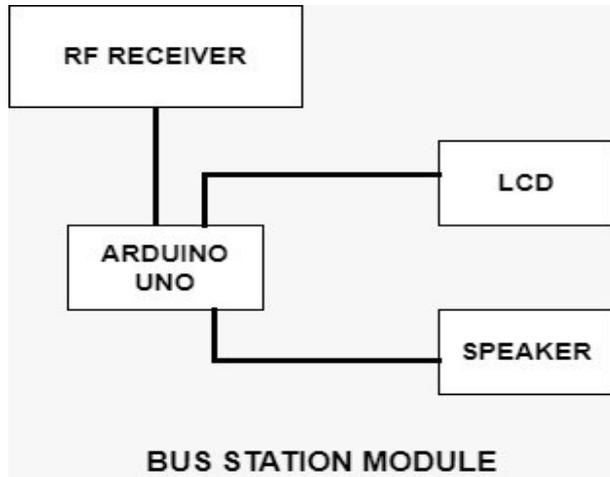
If the user wants to board the bus then, the user pushes a push button which sends the current location of the user to the bus driver. The bus driver receives the location of the user and then turns on the acknowledge button which sends another RF signal. The buzzer in the user unit starts beeping. When the bus arrives at the user location, an announcement is made at the station alerting the passengers that the bus has arrived at the bus station. Then the user boards the bus using the IR sensor installed in their unit which beeps in a pulsatile manner when an obstacle is detected.



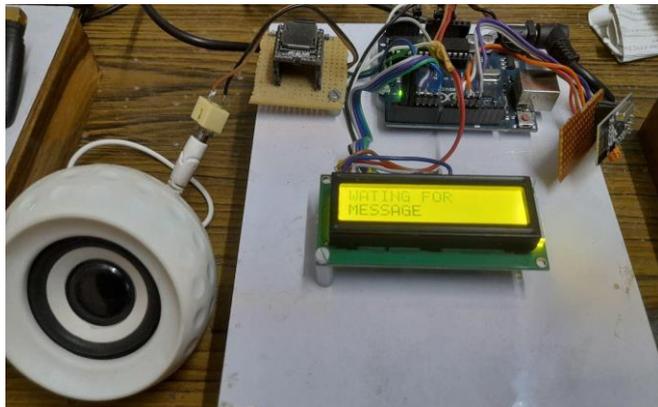
2.1.2. BUS STATION MODULE

It consists of Arduino Uno, 16x2 LCD, RF receiver and audio player. When the bus is about to arrive at the bus station then the driver turns on the first RF signal. The bus station module receives the RF signal and displays the information about the bus which is about to arrive. It also makes an announcement for visually impaired people about the arrival of the bus and the relative information about the bus. Upon the

arrival of the bus, another RF signal is transmitted which is received by the bus station

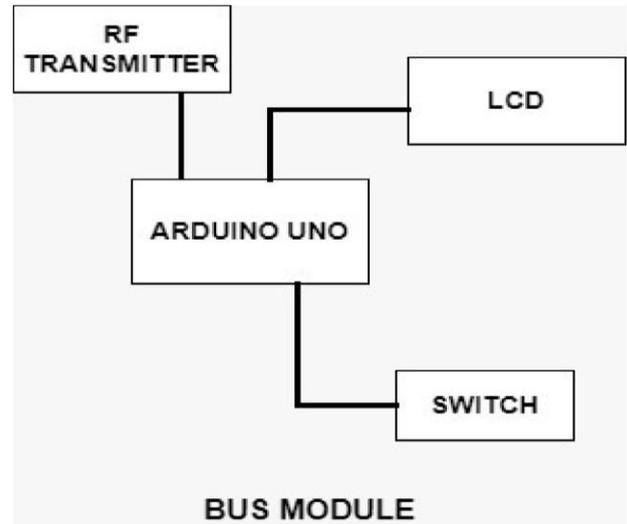


module which alerts the passengers about the arrival of the bus by not only announcing the bus information but also by displaying the same message on the LCD displays for fellow visually paired individuals.

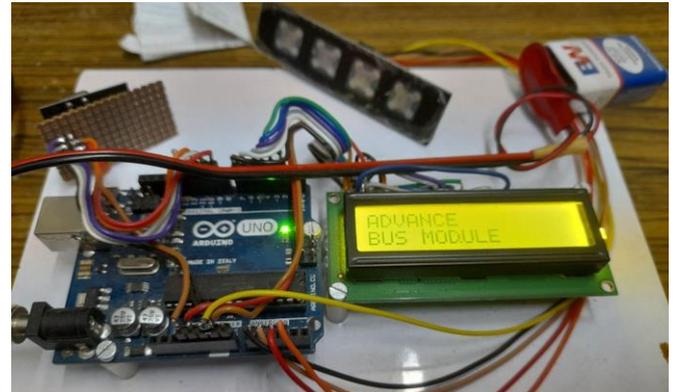


2.1.3. BUS MODULE

Bus module consists of Arduino Uno, 16x2 LCD, RF transmitter. When the bus is about to arrive at the bus station, the driver transmits the first RF signal. This triggers an announcement informing the passengers about the arrival of the bus at the bus station. This message is also displayed on the LCD present in the bus.



The bus driver then checks SMS on his mobile and gets the location of the visually impaired person. When the bus has arrived at the station, particularly at the location of the user then another RF signal is sent alerting that the bus has arrived according to which the user boards the bus.



3 . SYSTEM DESIGN

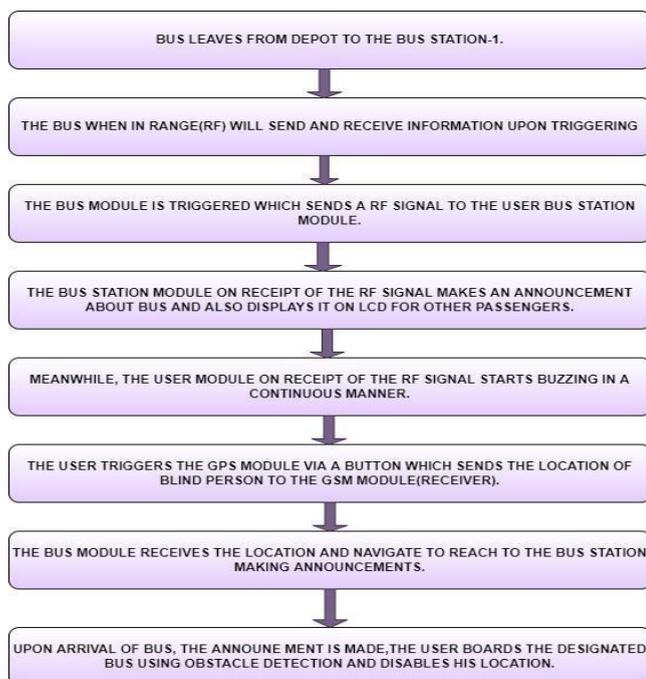
The project uses three modules for its working including the user module, bus module and the bus station module. These modules each have their unique functioning which helps get the desired working. The three modules communicate with each other via RF communication to ensure seamless boarding of the visually impaired person onto the bus.

The bus station module on receipt of the RF signal from the bus module makes an announcement via the speaker to alert the visually impaired people about the arrival of the bus along with the information about the arriving bus. Along with this,

an LCD has also been placed at the bus station for other fellow passengers.

Similarly, the user module also receives the RF signal from the bus module and on receipt of the signal, starts buzzing continuously in order to alert the user that the bus is nearby. The user decided whether to board the bus or not. After deciding to board the bus, the user pushes a push button which sends the current location of the user to the bus driver. This push button triggers the sending of SMS to the bus driver via the GSM module which allows the driver to access the blind person’s location. The location is visible as a GPS module is installed in the user module. The bus driver receives the location of the user and then turns on the acknowledgement button which sends another RF signal. After the bus arrives at the location of the blind person/user, they send another RF signal which makes the announcement that the bus has arrived at the bus station. This way, the blind person is informed that they can now board the bus. The blind person boards the bus using the IR module present in their user module which works as an obstacle detection system for the blind person. This way, the blind person boards the bus without any issue.

4. WORKING FLOWCHART



Upon the arrival of the bus, the announcement is made, the user boards the designated bus using obstacle detection and disables his location.

5. RESULTS

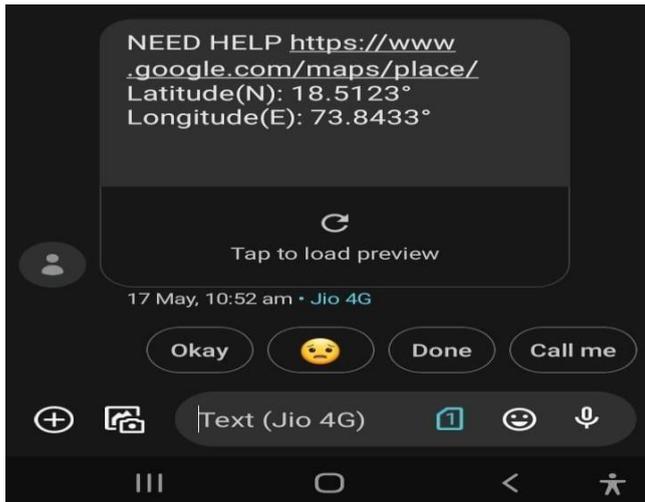
Bus is leaving the depot to reach the dedicated bus station. Now when the bus reaches in RF range, it will then send and receive the messages from the user module upon its triggering.



On triggering the bus module will send a RF signal to the bus station module. The bus station module on receipt of the RF signal makes an announcement about the bus and also displays the message on LCD. Meanwhile, the user module on receipt of the RF signal starts buzzing in a continuous manner.



Upon the arrival of the bus, the announcement is made, the user boards the designated bus using obstacle detection and disables his location. When the bus leaves the depot It will send the first RF signal. The RF receiver in the user module receives this signal and turns on the buzzer. Then the user pushes a push button which sends the current location of the user to the bus driver.



The bus driver receives the location of the user and then turns on the acknowledge button which sends another RF signal. The buzzer in the user unit starts beeping. Now when the bus arrives at the user location an IR sensor senses the bus and the buzzer turns off.

At the **Bus stop module** when the bus leaves the depot the driver turns on the first RF signal. The bus stop module receives the RF signal and displays Bus leaving the depot. Also it plays an audio message for it. When the driver switches on the second RF signal the message bus is just arriving is displayed on LCD and played back using audio player.



When the bus leaves the depot the driver turns on the first RF signal. This message is displayed on LCD. Then it checks SMS on his mobile and gets the location of the user. When the bus is near the desired location the bus driver turns on the second RF signal. This message is displayed on LCD.

6. CONCLUSION

This venture explains the plan and development of a bus detection system for visually impaired people which aids them to navigate through the entire process. The RF communication has a wide range which is enough for the timely

communication of the modules for proper functioning of the system.

The microcontroller was coded using Arduino IDE and the working helps the blind person to know and understand the surroundings as well as detect the upcoming bus and board it without difficulty.

The system has two Modules which are: the bus module and the bus station module. The project would be useful in following manner:-In providing viable commuting to visually challenged pedestrians without the help of sighted people. For locating the obstacles in its path and distinguishing it with different sounds to make him locate towards the door of the bus.

7. FUTURE SCOPE

The future scope of this project aims at improving the accuracy of the current system made and to increase its awareness about its vast applications. This system can be used in cab services as well. Once installed it would be easy to use. This system would work well for all the sections of the society once the technology is in circulation.

8. REFERENCES AND JOURNALS

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