International Journal of Scientific Engineering and Applied Science (IJSEAS) - Volume-1, Issue-3, June 2015
ISSN: 2395-3470
www.ijseas.com

# Implementation Of RFID For Blind Bus Boarding System

B.N.Kiran
Assistant Professor
Department of Information Science
The National Institute of Engineering
Mysore-570008
Karnataka, India
bnkiran@gmail.com

Smitha.B.C
8th semester Computer Science & Engineering
The National Institute of Engineering
Mysore-570008
Karnataka, India
smithabc31@gmail.com

Sushma.K.N
8th semester Computer Science & Engineering
The National Institute of Engineering
Mysore-570008
Karnataka, India
sushmakn21@gmail.com

Varsha.R.Gowda
8th semester Computer Science & Engineering
The National Institute of Engineering
Mysore-570008
Karnataka, India
varsha.varsha.rgowda@gmail.com

***Abstract*— This paper outlines implementation of RFID for a bus detection mechanism to help blind in travelling from one place to another. Generally, journey in a bus is a safe and comfort factor but navigation in outdoor environments is highly difficult for those who have congenital blindness or blindness from a very young age. Several solutions have been proposed like walking stick or white cane, guide dogs and GPS guidelines to deal with this difficulty. Although some of them have shown to be useful in real scenarios, they involve an important deployment effort or use artifacts that are not natural for blind users. Therefore, this paper aims to develop a bus detection prototype using Radio Frequency Identification (RFID) for blind. RFID has the potential to be a useful aid with further standardization of RFID tags and improvement of current RFID readers. Interfacing reader with microcontroller (ATMEGA328-PU), using IR sensor for wireless communication design aids in improved navigation.**

*Keywords*—RFID reader, RFID tag, Microcontroller (ATMEGA328-PU), IR sensor.

## I. INTRODUCTION

Radio Frequency Identification (RFID) has been an emerging technology in recent years. In the recent few years there have been a lot of advancements in the field of RFID. The application of RFID technology have been numerous and the usage of this technology has led to many application specific designs and models that are today being used in many control system. The purpose of this paper will be to develop a design and propose a plan to implement RFID technology that will help the blind people navigate in outdoor environment. This system will help us to understand and develop a prototype model which will be used as a system by people to fulfill their requirement of navigation and identification. This will bring into the market the application of RFID technology towards a social cause, which will have its own economic future.

For visually impaired people, outdoor pedestrian mobility is very difficult and often dangerous. The visually impaired commonly rely on a cane or walking stick and a guide dog to assist them in efficiently reaching a desired destination without harm. However, this approach is successful only if the majority of the path to the destination is already known to the blind (or to the guide dog).

Buses play an important role for the transportation. For a majority of blind and visually impaired persons, public transport is the only viable mobility option to seek social connectivity. Those people live in a limited environment and have difficulty to sense what happen around them, which reduces their activities in several fields, such as education and transportation since they depend only on their own intuition. Hence, we need to make their lives more comfortable by introducing a system that helps them enjoy transportation services independently and freely like ordinary people, without relying on others. Thus to help the visually impaired people and to make them to gain confidence to move around freely is to make use of RFID

## II. OVERVIEW

The given RFID system consists of two fundamental components: tags and readers. The reader and the tag communicate via the transmission of electromagnetic waves. A reader is what the user interfaces with to transmit information to and from the tag, and tends to be much larger

than the tag. Tags store and process information, and can be extremely small, on the order of 3 mm. There are two types of tags : active and passive tags. Active RFID systems use self-powered RFID tags that continuously broadcast their own signal. Active RFID tags are commonly used as "beacons" to accurately track the real-time location of assets or in high speed environments such as tolling. Active tags provide a much longer read range than passive tags, but they are also much more expensive. Passive RFID systems use tags that are powered by the electromagnetic energy transmitted from an RFID reader. Passive RFID tags have applications including access control, tool tracking, race timing, supply chain management, smart labels, and more. The lower price point per tag make employing passive RFID systems economical for many industries. To intimate the presence of a blind person in the bus stop to the bus driver through wireless communication we make use of IR sensor. The IR Sensor-Single is a general purpose proximity sensor that offers important advantages as a form of wireless communication. The purpose here is to provide a generic solution for implementing an IR transmitter (a remote control device) and receiver. We make use of IR sensor to help the blind while boarding the bus. Here we use it for collision detection for the blind while boarding bus to detect bus door. Also we use a mike setup interfaced to microcontroller (ATMEGA328-PU) mounted on arduino board (UNO) for the sake of destination input from the blind at the bus stop.

## III. EXECUTION AND WORKING OF RFID IN BLIND AID.

The working of the product is split into Four parts
1. Signaling to bus driver.
2. Destination input (voice) by the blind .
3. Tag identification and destination matching.
4. Buzzering and bus boarding using IR sensor.

1. Signaling to bus driver.

This first step of application is to intimate the bus driver about the blind who is waiting in the bus stop so that the driver can provide a special attention at him/her while he/she is boarding bus. To implement which we can consider important advantages as a form of wireless communication of transmitters and receivers nature of infrared remote control protocols using STM32F0xx and STM32F3xx microcontrollers. So this section has two module IR transmitter and receiver module.

IR transmitter module:

The IR transmitter module has a TX-IR LED which is an infrared transmitter designed for infrared serial data links and remote control applications. Data present is modulated at the selected carrier frequency of 36 kHz or 40 kHz providing a simple, single-chip solution for infrared data communications and remote control applications. An infrared interface (IRTIM) for remote control is available on the STM32F0xx and STM32F3xx devices. It can be used with an IR LED to perform remote control functionality. The IR digital interface is designed to output a digital signal towards the receiver through wireless communication.

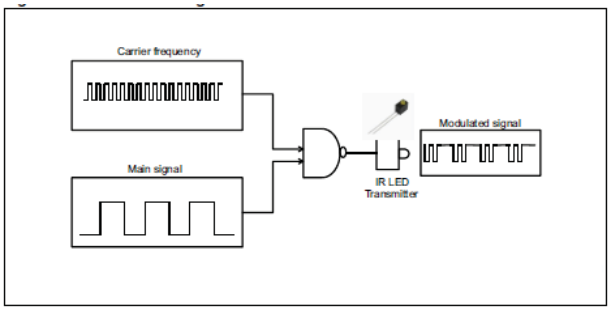


Fig 1 Circuit configuration of infrared transmitter.


Fig 2 IR transmitter component.

IR receiver module:

At the receiver side the IR pulses are modulated at around 36 kHz, 38 kHz or 40 kHz. The IR transmitted signal tries to lock that signal which is operating on the same frequency . The easiest way to receive these pulses is to use an integrated IR receiver/demodulator module which is a 3-pin devices that receive the infrared burst and output the demodulated bit stream on the output pin which is connected directly to buzzer which beeps on receiving signal from transmitter intimating bus driver about blind waiting in the bus stop.

2. Destination input (voice) by the blind .

The speech recognition system is a completely assembled and easy to use programmable speech recognition circuit. Programmable, in the sense that the words (or vocal utterances) we want the circuit to recognize can be trained. This board allows us to experiment with many facets of speech recognition technology. This device

can hear all sounds of the frequency between 20Hz to 20KHz. It has 8 bit data out which can be interfaced with any microcontroller (ATMEL/PIC) for further use. In this application we store output on microcontroller (ATMEGA328-PU) for further development (identifying the match with the data stored in the tag attached to bus).

Fig 3 Microphone interface able to ATMEGA328

3. Tag identification and destination matching.

Tag identification talks about the communication between RFID reader and tag.

RFID Tag:

The RFID tag or transponder has a sequence of metal pins or a bar code strip made of a magnetic material (differ from tags). The sequence of the metal pins or the bar code has a digital meaning behind it and it is unique to the particular tag. When the tag is interpreted or decoded, the sequence is displayed as numbers unique to the tag. Since it makes use of the Radio frequency interference technique, radio frequency helps in decoding the information. Each RFID tag has its own identification number i.e. Electronic Code Number (ECN). RFID tags can store more than just a tag ID. This additional memory on the tag is of Electrically Erasable Programmable Read-Only Memory (EEPROM) type. Data on an RFID tag can be updated through local processing. The idea is to find a suitable data format for data stored in the tags.

RFID Reader

The radio frequency used to decode the data in the RFID tag is produced by the RFID reader. When a radio frequency wave interacts with an RFID tag, the pins or the bar code energizes (only in passive tag) and produces its own magnetic field which has a unique interference pattern which when read by the RFID reader would obtain the unique number designated to the corresponding RFID tag. Thus the RFID reader obtains the address of the desired RFID tag (the address defers from each tag). This identified tag when attached to a real object (example: bus) will be the reference to that object. Thus the object is indirectly detected.

The below figure depicts the stages of RFID communication.

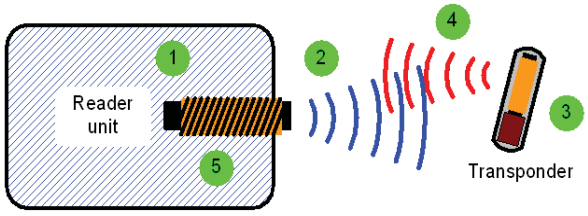


Fig 4 RFID Communication

1. The processor controlling RFID sending/receiving.
2. The antenna sending high frequency electromagnetic waves out.
3. The transponder, or tag, which converts the waves into an electric current.
4. The tag responding with its own unique radio wave.
5. The reader unit receiving the tag's wave, which is then processed to retrieve information.

Now destination voice input need to be matched with the tag data just decoded which is the responsibility of comparator in microcontroller (ATMEGA328) to compare with and providing the output result in the form of buzzer on finding match. For a microcontroller ATmega328 running at 16MHz, an interfaced buzzer/condenser can produce output of 1 or 2 watt.

4. Buzz ring and bus boarding using IR sensor.

The IR Sensor-Single is a general purpose proximity sensor. Here we use it for collision detection (Blind while boarding bus to detect bus door). The module consist of a IR emitter and IR receiver pair. The high precision IR Receiver always detects a IR signal. The module consists of 358 comparator IC. The output of sensor is high whenever it IR frequency and low otherwise. The on-board LED indicator helps user to check status of the sensor without using any additional hardware. The power consumption of this module is low. The output line of IR sensor is provided as an input to microcontroller (ATMEGA328) which provides a buzzer output through D6 pin on controller.

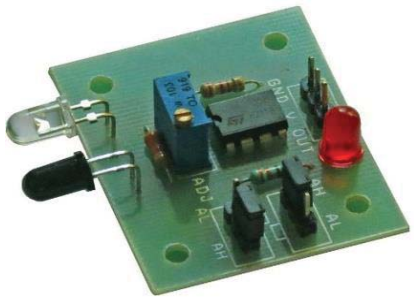

Fig 5 IR sensor with 358 comparator IC.

Some advantages of implementing this application using RFID:

- The RFID systems proves to be much efficient and useful compared to the GPS system.
- The RFID system implemented can be 100 times cheaper than the GPS alternative, and yet 30% more effective at the same time.
- RFID components (reader and tag) have very less weight and size.
- The most important advantage of using RFID for blind bus boarding system is its EASE OF SETUP.

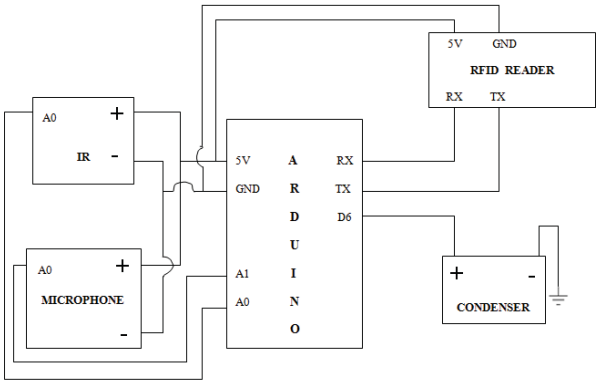


Fig 6 Circuit Representation.

## IV. CONCLUTION

An interactive wireless communication aid system for the visually impaired to use city buses was developed in this study. Using the ultra-high frequency radio waves, we have shown implementing a system which will use the RFID tag and reader setup along with customized program that will help the blind in identifying exact bus. Results of tests indicated that this system could help users to successfully board their desired buses, using the interactive communication modules. Thus showing the possibility of using the RFID technology to help the blind.

## ACKNOWLEDGE

We express our profound thanks to **Dr. G L Shekar, Principal, NIE, Mysore** for all the support and encouragement.

We are grateful to **Dr. G. Raghavendra Rao**, Prof. and Head of the Department of Computer Science and Engineering, NIE, Mysore for his support and encouragement facilitating the progress of this work.

We sincerely extend our thanks to our project Guide Sir.B.N.Kiran, Assitant Professor, Department of Information Science and Engineering, NIE, Mysore for his valuable guidance, constant assistance, support, endurance and constructive suggestions for the betterment of this paper.

Finally we thank our families and friends for being a constant source of inspiration and advice.

## REFERENCE

**[1]** Bin Ding Sch. of Manage. Univ. of Sci. & Technol. of China, "The Research on Blind Navigation System Based on RFID", ISBN: 978-1-4244-1311-9, Page(s) : 2058 – 2061, 21-25 Sept. 2007.
**http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=4340289&queryText%3Dblind+bus+navigation+system+using+rfid.**

**[2]**Lavanya G, Preethy W, Shameem A, Sushmitha R, "Passenger BUS Alert System for Easy Navigation of Blind", ISBN: 978-1-4673-4921-5, Page(s): 798 – 802, 20-21 March 2013.
**http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6529043.**

**[3]** Shantanu Agrawal, AnujaAnwane, Prasad Bulankar, Dhiraj K, "Bus Recognition System For Visually Impaired Persons (VIPs) Using RF Module", 12-13th April 2014, ISSN: 2248-9622.
**http://www.ijera.com/special_issue/ICIAC_April_2014/EN/V7/EN- 2604549.pdf.**

**[4]**Akshaybal,2009,
**http://generalengineering.sjsu.edu/docs/pdf/mse_prj_rpts/spring2009/RFID%20BASED%20IDENTIFICATION%20SYSTEM%20_By_Bal_EMD.pdf**.

**[5]** SaritaPais and Judith Symonds, "Data storage on a RFID tag for a distributed system", International Journal of UbiComp (IJU), Vol.2, No.2, April 2011.
**http://airccse.org/journal/iju/papers/2211iju03.pdf**.