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Bus Recognition System For Visually Impaired Persons (VIPs) Using RF Module

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ABSTRACT—
Manydevelopments have recently made noticeable changes in several domains. This paper will shed the light on the field of transportation to improve the life quality of visually impaired persons (VIPs) using some of these technologies such as Radio Frequency module. The Idea behind this paper is to develop a prototype that would use the technological advancements to assist the daily commuters,especially visual impaired person to access public transport.Furthermore, communicationsystem architecture and an appropriate design for its components will be proposed. This system will allow blind people to safely catch buses with the help of vibrating device, alarm and a tactile interface through a wireless communication system between the transmitter and the receiver. VIPs will have the opportunity to get information about bus arrival and departure time as well as assist the bus operator to know the presence of a VIP on the road. The motivation behind this project is that buses are vital in enabling blind people to participate fully in society, access to facilities and services.

Keywords- RF transmitter/ receiver, VIP, PDA(Personal Digital Assistant): VIPs hand held device, RF Module, Bus Module

I. INTRODUCTION

In major cities, 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 education, work and 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. In addition, as the population ages, the number of VIPs has increased. At present, statistic showed that 285 million people are visually impaired worldwide: 39 million are blind and 246 have low vision. As of India, around 8 million people in India are blind. India is now home to the world's largest number of blind people with 20% of the whole world.[1] 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.

Many papers have been published and much work has been done on this issue yet this paper presents an all new and simple approach towards the design. An IEEE paper, "Bus Identification System for Visually Impaired Person,", Next Generation Mobile Applications, Services and Technologies (NGMAST) has been referred. [2]

Many electronic devices have already been developed and implemented in some areas to assist the blind people like Sonic Guide, Mowat Sensor, Laser Cane and Navbelt. But all of them are to assist them while pedestrian crossing and there hasn't been developed any successful device to assist them boarding a bus. This paper intends to fill that cavity.

II. SYSTEM MODELLING

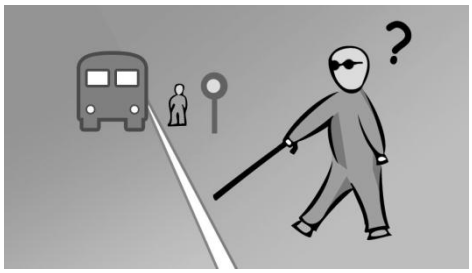

Image 1: System Model

A. System Architecture :

The architecture of system is based on a distributed model as shown in the figure 1.This system mainly consists of two parts: Bus transceiver segment and VIP transceiver segment. Through the device of the VIP person, one can set the bus number which he/she wants to board. Once the device is switched ON the transmitter of the device will start radiating the information up to some distance of radius, say 10 m. The buses in the vicinity will then respond to him/her through

another transceiver installed and thus the VIP will be acknowledged accordingly.

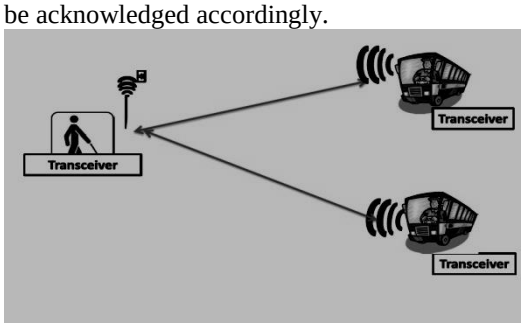

Figure 1: Architecture

Figure 2 illustrates the steps that VIP will do to find the desired bus and to inform the bus driver about his presence.

First, the VIPs will use a Braille keyboard that is included in the PDA (Personal Digital Assistant) in order to give the input to the device for the bus number. He may ask his family members to do the feeding for him before leaving the home.

Secondly, he will move to the spot from where he wishes to board the bus and he will switch on the device by setting the bus route number. His device will instantly start emitting the request along with the bus number wished by the subject. Any and every buses in the vicinity will be informed. After receiving the request of the VIP through a buzzer and LCD installed over the panel of the driver, the bus driver who is moving towards the same destination having the same bus number which the VIP wishes to reach, will send an acknowledgement to the person. The PDA will have a buzzer or a Vibrator installed over it, so the person will get to know that his bus is coming and he will get ready for that by giving the acknowledge signal to bus driver.

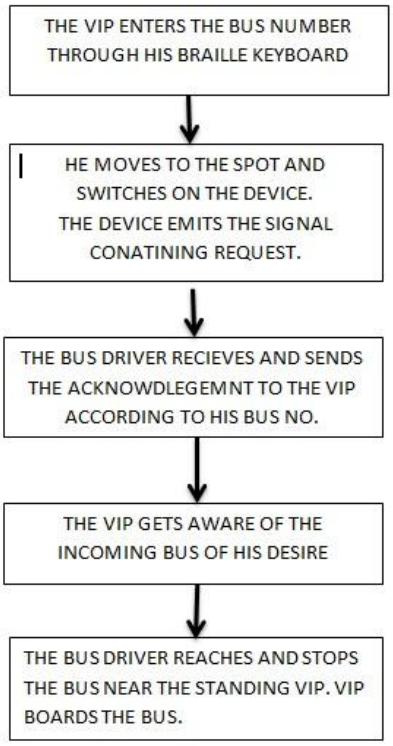

Figure 2: Illustration of the working of VIP's PDA

B. Circuit Designs

Here we have considered two units. First is Bus module circuit of which is shown as Figure 3.

i) The bus module is a transmitter plus receiver circuit which has an LCD screen to show the bus number desired by the commuter. As shown in the circuit, an Encoder IC HT12E has been interfaced with the microcontroller AT89C51 to encode the

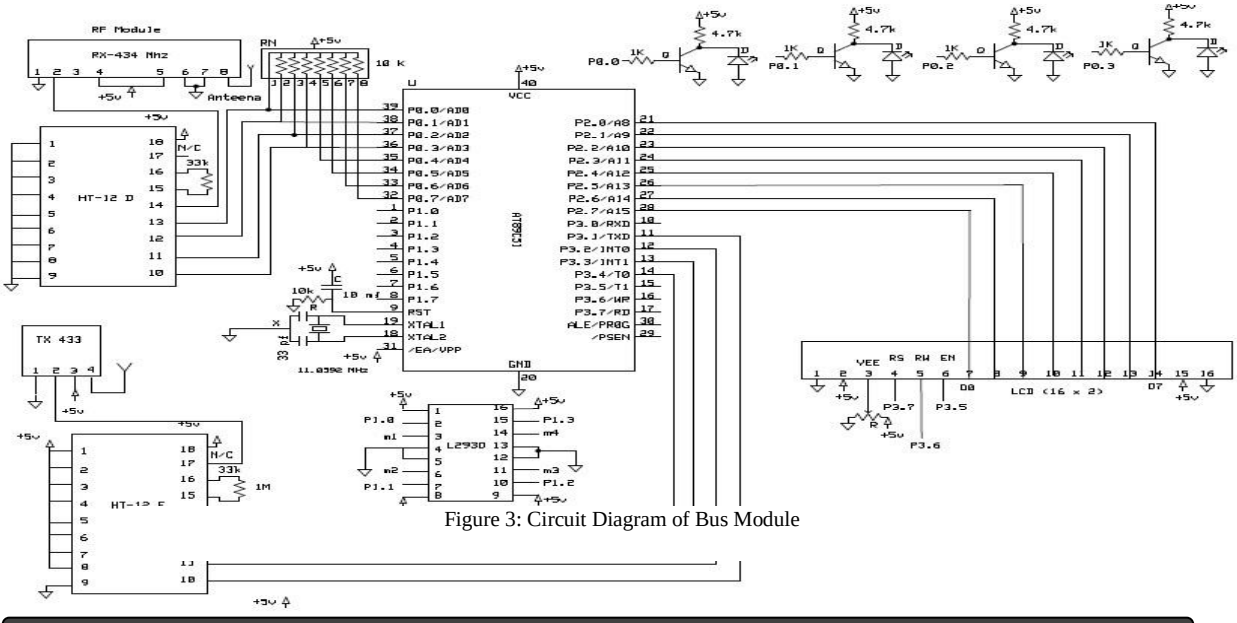

Figure 3: Circuit Diagram of Bus Module

signal sent by the VIP's PDA.

The Port 0 of the microcontroller has been interfaced with the HT-12D Decoder IC which is a sixteen pin IC. HT12D is a decoder integrated circuit that belongs to 2^{12} series of decoders. In simple terms, HT12D converts the serial input into parallel outputs. It decodes the serial addresses and data received by, say, an RF receiver, into parallel data and sends them to output data pins. The serial input data is compared with the local addresses three times continuously. HT12D is capable of decoding 12 bits, of which 8 are address bits and 4 are data bits. The data on 4 bit latch type output pins remain unchanged until new is received. Figure 4 gives the pin specifications of HT12D.HT12D has been connected to the Receiving terminal of the RF module.

The Port 2 of the microcontroller has been interfaced with the LCD to show the received information.The port 4 of the microcontroller is connected to the Encoder IC so as to encode the signal before it goes to the transmitting terminal of the RF module.Here, the acknowledgment is being sent to the VIP by the bus driver. The bus driver will send the signal only if he is going to stop the bus for him.

Simply put, HT12E converts the parallel inputs into serial output. It encodes the 12 bit parallel data into serial for transmission through an RF transmitter. These 12 bits are divided into 8 address bits and 4 data bits.

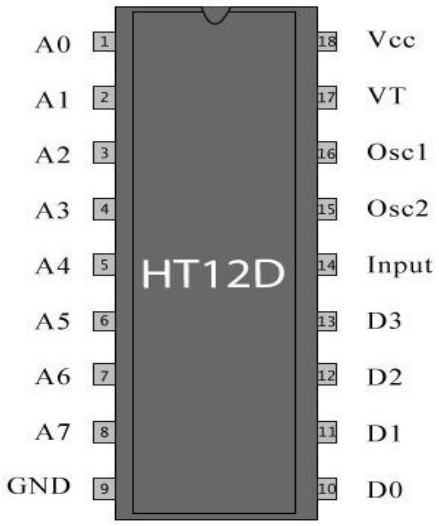

Figure 4: Pin Configuration of HT-12D

HT12E has a transmission enable pin which is active low. When a trigger signal is received on TE pin, the programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium. HT12E begins a 4-word transmission cycle upon receipt of a transmission enable. This cycle is repeated as long as TE is kept low. As soon as TE returns to high, the encoder output completes its final cycle and then stops.

Figure 5 shows the pin specifications of the encoder IC HT-12E.

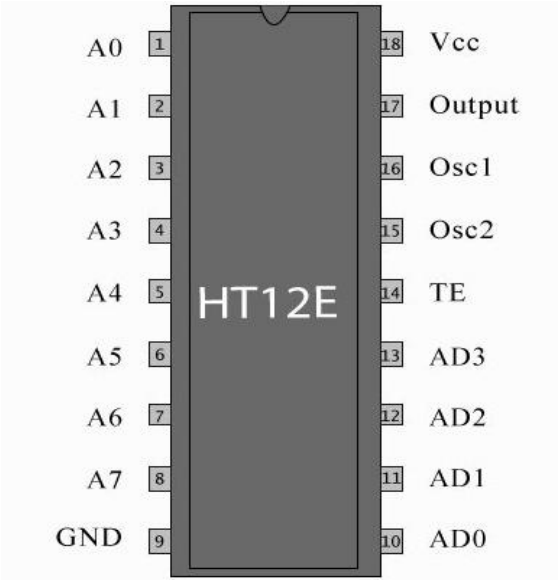

Figure 5: Pin Configuration of HT-12E

ii). The Second unit of this system is a VIP device or PDA (Personal Digital Assistant). Figure 6 shows the circuit design of the whole PDA.

The heart of this circuit is also AT89C51. This circuit is almost the same as the Bus Module Circuit. There are just a few changes. The Port 0 of the microcontroller is connected to the Decoder IC HT12-D.Port 2 of the microcontroller is interfaced with the Encoder IC HT-12E. A similar system is used in, Wireless Sensor Network apply for the Blind U-bus System". [3]

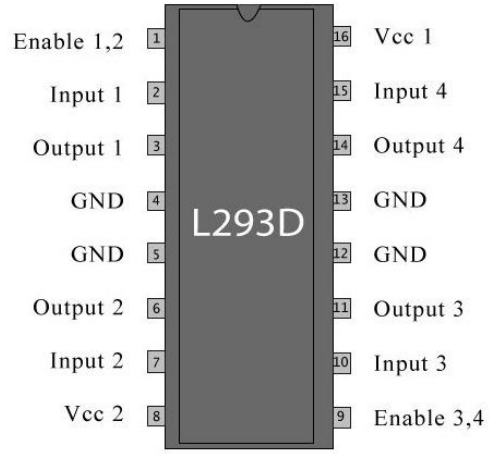

Figure 6: Pin Configuration of L293D

The VIP's device is so designed that, as soon as the bus driver gives the acknowledgement that he is driving the same bus and he is going to stop , the device of the VIP will start buzzing and vibrating. Here, a motor has been used as a vibrator and thus another L293D IC has been installed .

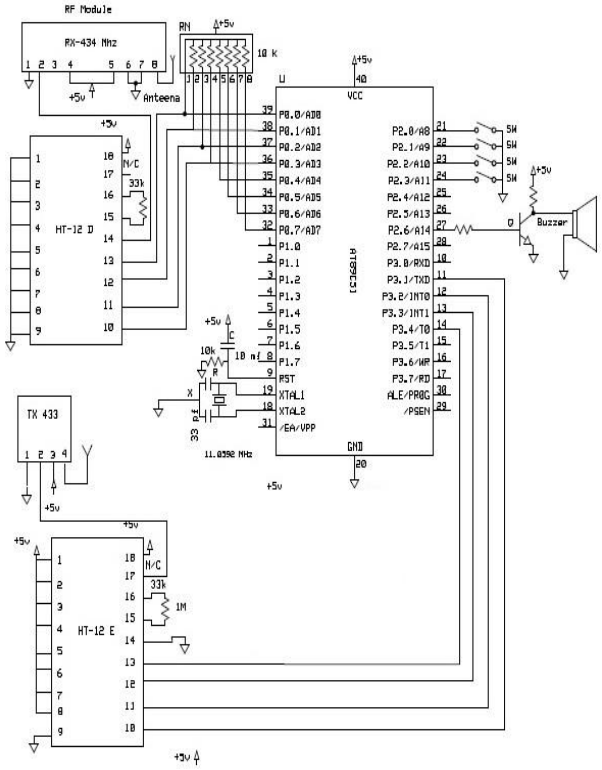

Figure 7: Circuit Diagram of VIP's PDA

III. CIRCUIT IMAGES

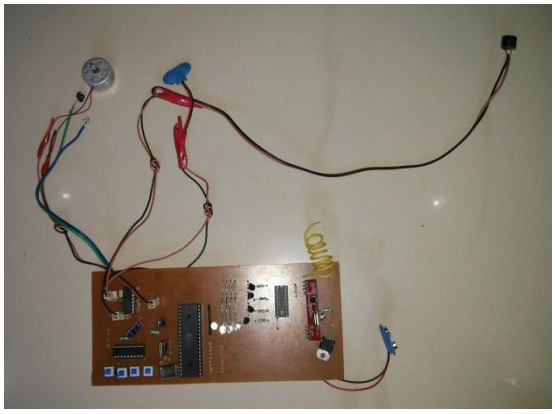

Image 2: VIP's PDA

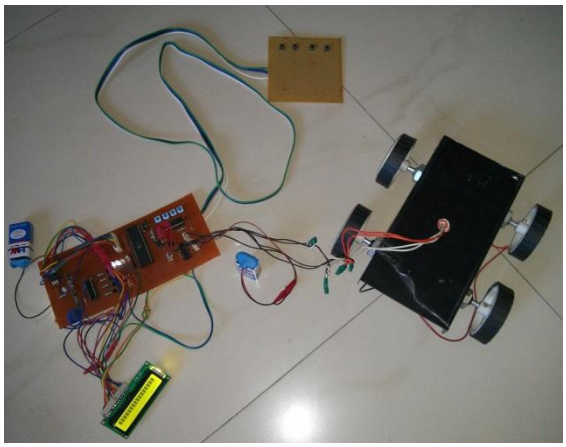

Image 3: Bus Module 1

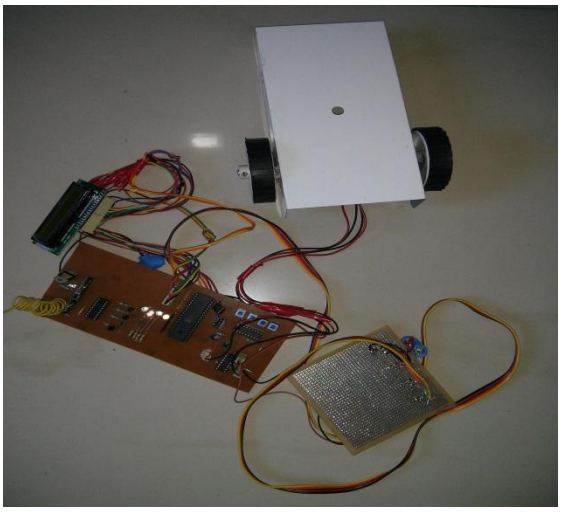

Image 4: Bus Model 2

IV. FUTURE SCOPE

This prototype to assist the Visionless people while boarding the bus has wide applications other than just helping the blind people inform their presence to the bus driver. In further stages of development this project can be used to enhance the safety and comfort of a larger section of society. Following are some of the anticipated future scopes:

1. This system can be installed over the taxies and not just public buses, all over the city so that people can very easily communicate with them.
2. This system, if manufactured commercially, is very economic and thus can be made available at the stores so that women, children, senior citizens or any section of society can use it.
3. With few changes in the hardware and programming, this prototype can be turned into a security device. Women may have this all the time with them while they are out of their homes. Each policeman will also be handed over one device. So whenever any woman feels any kind of danger,

whether she is having network in her mobile phone or not, she can instantly switch on her device, so that any policemen in that area will know and she can berescued. Looking towards the present scenario of the nation, this device can be proved to be very useful, as far as women security is concerned.

V. CONCLUSION

There are nearly 285 million blind people in the world which is a huge segment of society.Helping blind people to get familiar with technology in order to become more independent on their daily life is a necessity that everyone should be aware of. Thus, this paper presented a new approach to bus identification system for VIPs using RF. This new prototype has many advantages which make it a good alternative to the current approaches since it facilitates for the VIPs the searching of the destination and the finding of the appropriate bus number. With this added device, a whole life of those people will change and now they can contribute positively to their society and overcome their weaknesses related to the ability to move freely and without the help of anyone. Also, the financial analysis showed that the components of such a system are cheaper than other systems; however, the performance is higher.

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