Bus Identification for Blind

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Abstract: 'BUS IDENTIFICATION FOR BLIND' outlines implementation of RFID for a bus detection mechanism to help blind in travelling from one place to another. Several solutions have been proposed like walking stick or white cane, guide dogs and GPS guidelines to deal with this difficulty. This paper intends to fill that cavity. Most systems provide only one-way communication and require high-cost and complex equipment. Therefore, this paper aims to develop a bus detection prototype using Radio Frequency Identification (RFID) for blind. RFID has the potential to be useful aids with further standardization of RFID tags and improvement of current RFID readers. Visually impaired people have difficulty accessing information about public transportation systems. Many technologies 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 Radio Frequency identification.

1. Introduction

Radio Frequency Identification (RFID) has been an emerging technology in recent years. The applications 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. 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. 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. Helping visually impaired people use public transport can increase their chances of education and employment and reduce the financial burden on their families.
WHAT RFID IS? It is a non contact system that uses radio frequency electromagnetic fields to transfer information to another for the purpose of automatic identification. RFID is feasible and cost effective but it is more suitable for indoor communication only. Also it provides only one way communication and a very short range of identification.

2. 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. This system mainly consists of two parts: Bus transmitting segment and VIP receiver segment. Once the device is switched ON the transmitter will start radiating the information up to some distance of radius, say 10 m. The buses in the vicinity will be recognized by the VIP accordingly that VIP will do to find the desired bus. The information (route and final destination) will be informed using a headset without interfering others.

3. Block Diagram
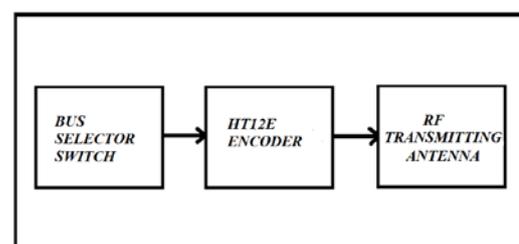

Transmitter block diagram
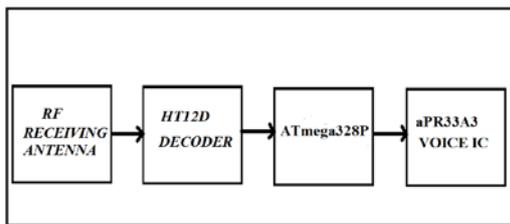
Receiver block diagram

4. Implementation and component details

The overall hardware mainly is classified into power supply unit, sensor system, signal conditioning, microcontroller, R. F. transmission and reception along with encoder and decoder, and the audio logging and playback unit. The power-supply unit consists of two 9V supply, one for transmitter in the bus and another for the receiver module in the hand of blind man.

Encoder: The 2^{12} series of encoders begin a 4 word transmission cycle upon receipt of a transmission enable. The HT12E and the transmitter circuit diagram is shown below
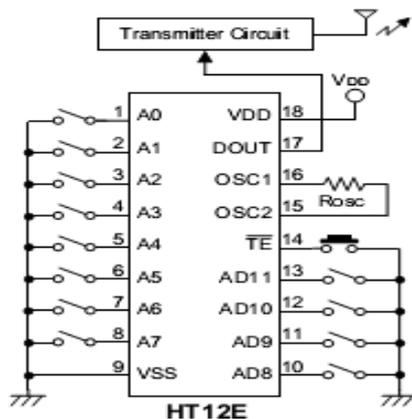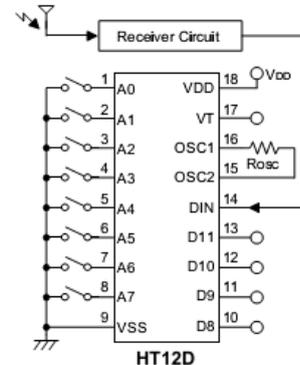

HT12E encoder connection diagram

This cycle repeats itself as long as the transmission enable is low. Once the transmission enable returns high the encoder output completes its final cycle and then stops. The transmission timing is as shown in Figure below
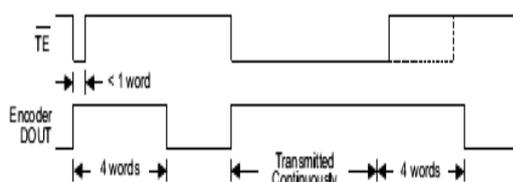

Transmission timing for the HT12E

Timing diagram of HT12E

Decoder: The 2^{12} series of decoders provides various combinations of addresses and data pins in different packages so as to pair with the 2^{12} series of encoders.

HT12D decoder connection diagram

Arduino Uno: The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to Support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC Adapter or battery to get started.
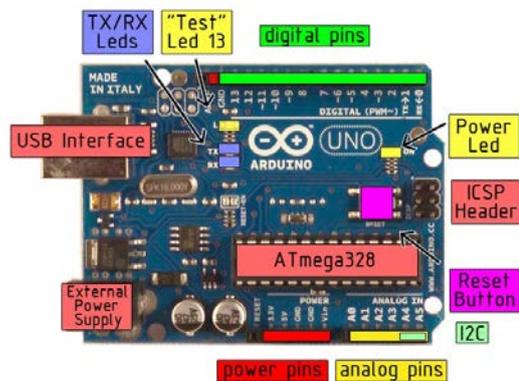
Arduino Board

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards

Audio Playback System (aPR33A3): The Audio playback system gives appropriate voice commands to the VI person through earphone. The system consists of a powerful 16 bit audio processor (APR33A3) which has a built in high resolution ADC and DAC. The system also has an audio

recording microphone amplifier through which the user can record the voice messages at 8 different channels. In this project we used only four voice commands left, right, bus number1 and bus number 2 which are recorded at 4 different channels. The recorded voice can be played back by selecting respective channels through MSP430 micro-controller. The final product is made wearable and is compact. It is portable and light to carry around for outdoor navigation.

The aPR33A series are a fully integrated solution offering high performance and unparalleled integration with analog input, digital processing and analog output functionality. The aPR33A series incorporates all the functionality required to perform demanding audio/voice applications. High quality audio/voice systems with lower bill-of-material costs can be implemented with the aPR33A series because of its integrated analog data converters and full suite of quality-enhancing features such as sample-rate convertor.

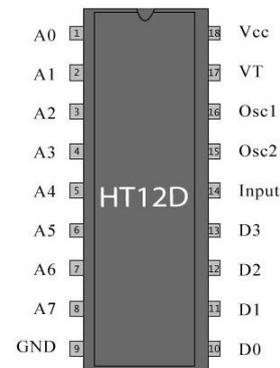|			
M6 / MSEL0	1	28	SRSTB
M7 / MSEL1	2	27	RSTB
M4	3	26	ROSC
M5	4	25	VLDO
VSSP	5	24	VDDL
VOUT2	6	23	MICG
VOUT1	7	22	MIC+
VDDP	8	21	MIC-
M3	9	20	VCM
VDD	10	19	VREF
VSSL	11	18	VDDA
/REC	12	17	VSSA
M0	13	16	VCORE
M1	14	15	M2
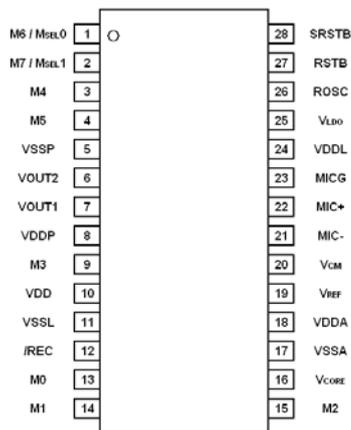
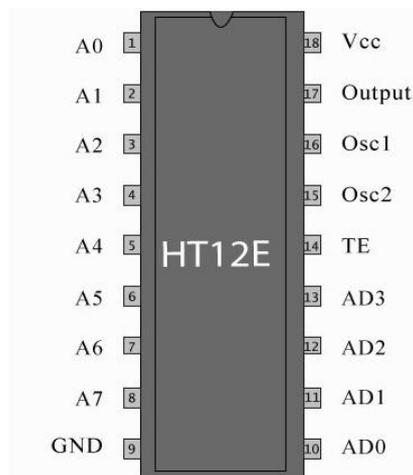aPR33A3 pin diagram

Here we have considered two units.

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 ATmega328. 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 212 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 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. 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.

A0	1	18	Vcc
A1	2	17	VT
A2	3	16	Osc1
A3	4	15	Osc2
A4	5	14	Input
A5	6	13	D3
A6	7	12	D2
A7	8	11	D1
GND	9	10	D0

HT12D pin diagram

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. Shows the pin specifications of the encoder IC HT-12E.

|			
A0	1	18	Vcc
A1	2	17	Output
A2	3	16	Osc1
A3	4	15	Osc2
A4	5	14	TE
A5	6	13	AD3
A6	7	12	AD2
A7	8	11	AD1
GND	9	10	AD0

HT12E pin diagram

The Second unit of this system is a VIP device. 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.As soon as the bus enters the desired range , the module in the blind man will receive an information about the bus through the headset with the help of voice IC APR33A3.

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5. Circuit Diagram

TRANSMITTER:
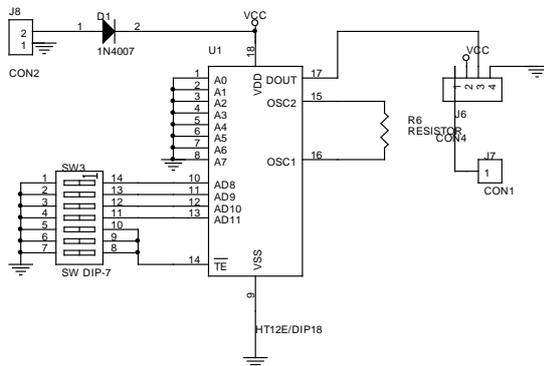
RECEIVER:
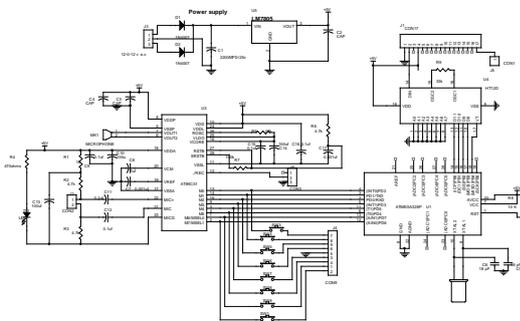
6. Working

Transmitter: Transmitter is used to transmit the details of bus to the blind. The transmission part consists of a bus selection dip switch; an encoder HT12E and a RF transmitting antenna at 434MHz. First four switches are connected to the address/data pin of HT12E. The other 3 pins of dip switch are connected to the transmission enable(TE-active low)pin.the address pins (A0-A7) are either connected to VSS or kept floating.HT12E converts the data from parallel to serial form. A diode is placed inorder to block the reverse current flow.

Receiver: the received data from the transmitter is three times continuously checked with the data in the local address and if there is no error or unchanged then the HT12D decodes the information. The voice IC aPR33A3 is used in recording and playback mode. If the pins for message mode selection and message bits are grounded IC record the message given at the microphone end. If it is not connected to ground then it play backs the already recorded message. This message is feed to the headset of the blind man.

7. Future scope, Advantages & Disadvantages

GPS based voice alert system for blind uses the current location and gives the alert to the blind person if it was his destination area. By including vibrating alert feature, which benefits for both blind & deaf. By the use of transceiver in both modules, we can make it as a two way communication. Thus by notifying the bus driver to stop the bus, there is a blind person waiting or wants to catch the bus. By this facility only the selected bus has to stop and other buses can pass. By implementing a speaker near to the door of each bus the blind can easily identify the bus entrance.

Cheap, less power consuming and compact. It's also able to give an alert for the arrival of bus by a predefined range.it is Easy to implement the hardware also Provides more Security.

When different bus comes from opposite side it is difficult to find the desired bus

8. 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. Also this model can be used by old aged people those who are illiterate to identify the bus.

9. Reference

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