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Navigation System for Visual Imperial Person

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***Abstract*: Talking signs, guide cane, echolocations are all useful in navigating the visually challenged people to reach their destination, but the main objective is not reached that it fails to join them with traffic In this project we propose a bus system using wireless sensor networks (WNs).The blind people in the bus station is provided with a RF unit which is recognized by the RF in the bus and the indication is made in the bus that the blind people is present in the station. So the bus stops at the particular station. At the bus stop receiver is present. So when particular bus is coming then it has some coded message and will be received wirelessly when the bus is 1 KM apart (ideally). But in our demo we treat that distance as 20 Meter. So if bus is in near to 10 meter then signal is received at the bus stop and according to message the announcement will be there.**

***Keywords*: Wireless sensor network, Radio Frequency, bus module, navigation system.**

1. Introduction

According to World Health Organization 285 million people are visually impaired worldwide: 39 million are blind and 246 million have low vision due to various reasons. Blindness makes their life despondent because they are not able to pursue a good education since study materials available in Braille are very expensive. Mobility and travel is highly visually oriented with signage in ink print. There is no possibility that this information can be provided to a blind person in Braille. If there is a device which could deliver information about the user environment then it could assist them to move around independently, therefore they could achieve many things in their life which is not feasible at present.

2. Scope and objectives

- Objective of our project is nothing but design a system to Visually Impaired Person which will live normal life with less effort and minimum cost
- Development of Navigation System for VIP is very efficient than other techniques as discussed in project background.
- We will design a system which will remote based which is quite simple and user friendly system.

3. Literature survey

[1] N. Nandini: In this paper we report on the system kept stationary at the bus stand that can effectively help the public to participate in the bus transportation facilities to its fullest. A bus that is few meters away from the bus stand is identified by this passenger infotainment system and the details of that particular bus is provided to the passenger. The bus identification process involves usage of radio frequency technology and bus details are announced by voice and displayed in liquid crystal display (LCD) unit. The summary of current research provides details about the integration between microcontroller and RF transceiver. LCD display and voice announcement. The future work intended to be done is also mentioned.

[2] Babar Chaudary: The design and development of tele-assistance services have taken a great consideration in the domain of healthcare lately. With the growing proportion of dependent people (ageing, disabled users) in the society, tele-assistance and tele-monitoring platforms will play a significant role to provide an efficient and economical remote care. It will allow aged or disabled persons to maintain their independence and lessen the burden and cost of care by caregivers. The concept of proposed tele-guidance system is based on the idea that a blind pedestrian can be assisted by spoken instructions from a remote caregiver who receives a live video stream from a camera carried by the visually impaired persons (VIP). The ICT based assistive tools have acceptance issues by visually impaired persons. It is important while designing navigation tools for the VIP to keep in view the factors that restrain them from the adoption of assistive technology. This paper presents a tele-guidance based navigation assistance system for the VIP and blind persons and reports a qualitative study about attitude of VIP towards technological navigation assistance.

4. Motivation

There are systems which are using video sequence learning algorithm and RFID technologies; both are very costly, heavy weight, inconvenient to carry, not circumstantial and need internet accessibility always. This makes blind people to keep away from using assistive technology, refer Figure 1. So here we are proposing a low cost, easy to carry, less power consuming, lightweight system that could deliver voice

messages through mobile phone about the user environment. Hence the proposed system solves above mentioned problems to a great extent.

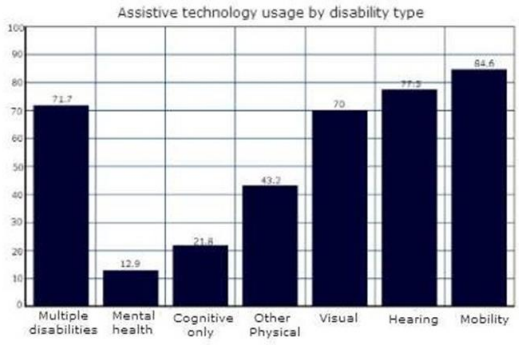

Fig. 1. Assistive technology usage: statistics

5. Block diagram

A. *Forward Module: Module*

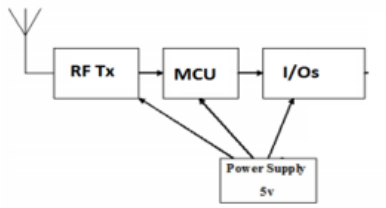

Fig. 2. Functional block diagram of bus unit

Working: The blind person waiting on bus-stop will press a button by reading bell language on the board. That will transmit a particular code for that respective bus. Whenever the bus by which the blind person is willing to go comes in the range an announcement is made in the bus that "A blind is waiting on next bus stop and we should take him in properly."

B. *Reverse Module*

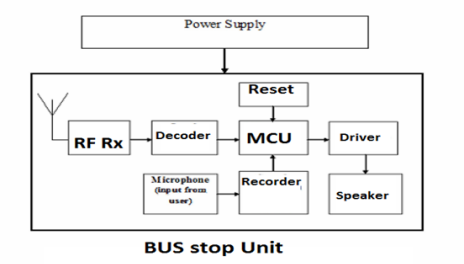

Fig. 3. Reverse module

Working: The bus driver will decide by which route he is willing to go and will press the route code on the remote. This code will continuously transmitted, whenever any bus stop comes in the range. Bus stop unit receives this code and decodes it and an announcement is made on the bus stop that "the coming bus is going to this destination via this way."

6. Hardware design

A. *Microcontroller selection*

Microprocessors and microcontrollers are widely used in embedded systems products. Microcontroller is a programmable device. A microcontroller has a CPU in addition to a fixed amount of RAM, ROM, I/O ports and a timer embedded all on a single chip. The fixed amount of on-chip ROM, RAM and number of I/O ports in microcontrollers makes them ideal for many applications in which cost and space are critical. The Intel 8052 is Harvard architecture, single chip microcontroller (µC) which was developed by Intel in 1980 for use in embedded systems. It was popular in the 1980s and early 1990s, but today it has largely been superseded by a vast range of enhanced devices with 8052-compatible processor cores that are manufactured by more than 20 independent manufacturers including Atmel, Infineon Technologies and Maxim Integrated Products.8052 is an 8-bit processor, meaning that the CPU can work on only 8 bits of data at a time. Data larger than 8 bits has to be broken into 8-bit pieces to be processed by the CPU. 8052 is available in different memory types such as UV-EPROM, Flash and NV-RAM. The present project is implemented on Keil vision. In order to program the device, preload tool has been used to burn the program onto the microcontroller. The features, pin description of the microcontroller and the software tools used are discussed in the following sections.

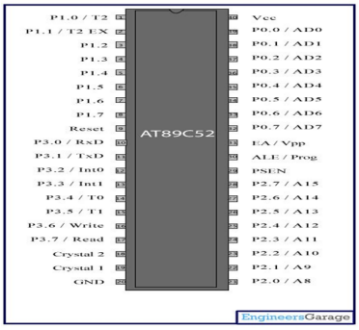

Fig. 4. Microcontroller

B. *Audio recorder*

Fig. 5. Audio Recorder (aPR 33A3)

Today's consumers demand the best in audio/voice. They want crystal-clear sound wherever they are in whatever format they want to use. APLUS delivers the technology to enhance a listener's audio/voice experience. The aPR33A series are

powerful audio processor along with high performance audio analog-to-digital converters (ADCs) and digital-to-analog converters (DACs). 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. The aPR33A series C1.X is specially designed for simple CPU interface; user can record or playback up to 1024 voices by 5 I/Os only. This mode built in one complete memory-management system. The control side doesn't need to be burdened complicated memory distribution problems and it only needs to be through a simple instruction to proceed the audio/voice recording & playback so it largely shorten the developing time. Meanwhile, Chip provides the power-management system too. Users can let the chip enter power-down mode when unused. It can effectively reduce electric current consuming to 15uA and increase the using time in any projects powered by batteries.

C. *Encoder*

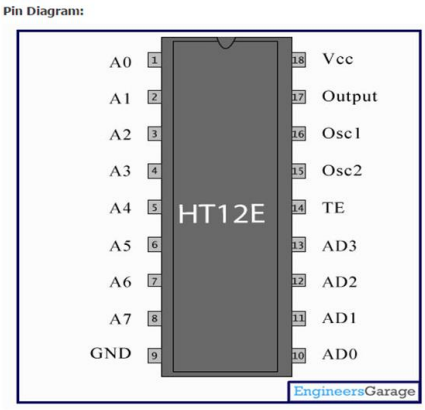

Fig. 6. Encoder

HT12E is an encoder integrated circuit of 212 series of encoders. They are paired with 212 series of decoders for use in remote control system applications. It is mainly used in interfacing RF and infrared circuits. The chosen pair of encoder/decoder should have same number of addresses and data format. 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.

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.

D. *Decoder*

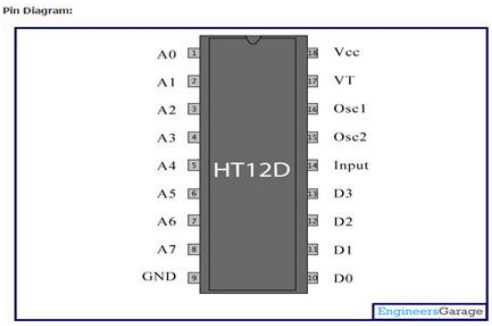

Fig. 7. Decoder

HT12D is a decoder integrated circuit that belongs to 212 series of decoders. This series of decoders are mainly used for remote control system applications, like burglar alarm, car door controller, security system etc. It is mainly provided to interface RF and infrared circuits. They are paired with 212 series of encoders. The chosen pair of encoder/decoder should have same n

Block diagram them to output data pins. The serial input data is compared with the local addresses three times continuously. The input data code is decoded when no error or unmatched codes are found. A valid transmission in indicated by a high signal at VT pin.

E. *Power supply*

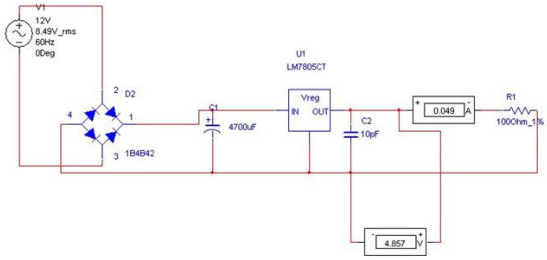

Fig. 8. Power supply

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. Here in our application we need a 5v DC power supply for all electronics involved in the project. This requires step down transformer, rectifier, voltage regulator, and filter circuit for generation of 5v DC power.

7. PCB Layout & Software

A. *Flowchart*

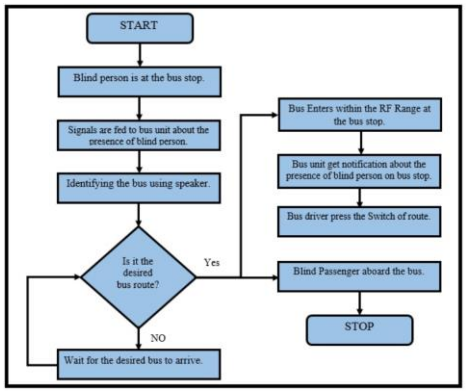

Fig. 9. Flowchart of design system

B. PCB Layout

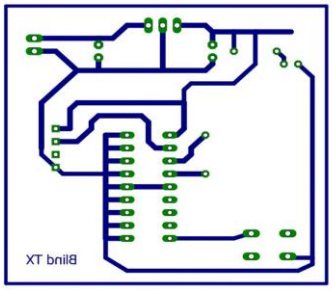

Fig. 10. Schematic of Forward Module

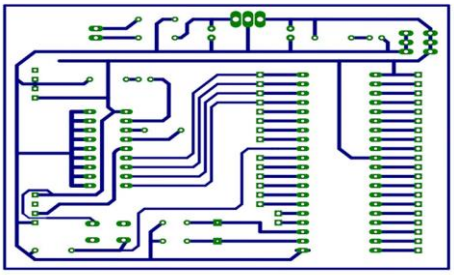

Fig. 11. Schematic of Reverse Module

C. Working of Principle

When the blind person is at the bus stop, he/she gives the notification about their presence at the bus stop through a RFID tag. A RF unit is stationary at the bus stop and this unit is recognized by the RF unit in the bus. The reader circuit detects the RFID tags possessed by the blind person. The MCu is accompanied with a RFID reader circuit which initiates the signals. The signals are further transmitted via RF module to the bus unit by MCu. The blind person is alerted about the bus entering the bus stop through a buzzer turning on as soon the bus is within the RF range. When the bus enters the bus stop, the LED in the bus is turned ON giving the notification about the presence of blind person at the bus stop. The switches are utilized by the bus driver to notify the bus routes and these routes are provided to the bus stop unit via a RF transceiver. These bus routes are converted into audio signals using a voice synthesizer (aPR33A3). The required bus that the blind want to aboard is notified to him/her with the aid of voice synthesizer and speaker system. The RF transceiver in the bus transmits the bus route to the RF transceiver at the bus stop, then the bus routes will be announced with the help of the speaker and blind person will decide whether to aboard the bus according to his/her required route to be travel.

8. Conclusions, Result and Future Plan

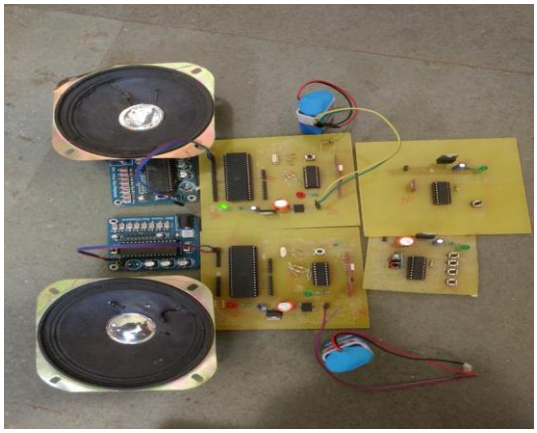

Fig. 12. Hardware setup of the project

A. Conclusions

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 project 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.

B. Future Plan

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:

- 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.
- 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.

- 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 be rescued. Looking towards the present scenario of the nation, this device can be proved to be very useful, as far as women security is concerned.

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