VISUAL PERCEPTION FOR VISUALLY IMPAIRED PEOPLE BY USING VOICE ALERT AND NAVIGATION TOOL

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Abstract : The significance of sensor technology is constantly growing. These devices help monitor our surroundings in ways we could not even begin to imagine a few years ago. Mobility is one of the main problems encountered by the blind in their daily life. Over time, blind and visually impaired people have used some methods and devices, such as the long white cane and guide dog, to aid in mobility and to increase safe and independent travel. There are commonly known as electronic travel aids. In order to help blind travellers to navigate safely and quickly among obstacles and other hazards faced by blind pedestrians, an obstacle detection system using ultrasonic sensors and vibrators has been considered in this aid.In our proposed system, the blind person can be guided through the voice alert about the object present in the environment. We describe an approach to aid blind people in detecting the presence and proximity of obstacles in their path by means of Ultrasonic which is used to find the obstacle, if found it is intimated to the person through the respective vibration motor and headset. A GPS navigation device can help navigate turn-by-turn directions. With it, you can reach any destination you want with relative ease, without needing persons.

Keywords: Ultrasonic Sensor, GPS, Voice Board

1. INTRODUCTION

Visually impaired people feel uncomfortable when walking alone without the aid of humans. There is a deep sense of regret for these people as they do not perceive any kind of information through their eyes and they live in a dark world. A sensor is a device which is able to read physical conditions emanating from the environment, like heat, light, pressure, motion and many more. Then this sensor converts that information into a process able signal which can be used by another instrument. The advances in technology can be put to use to make life easier for the blind people. Moreover a Global Positioning System (GPS) tracking system is employed to track and intimate the source and destination to the visual impaired people.

2. RELATED WORK

This section describes existing works on the development of White Cane for Visually Impaired people.

According to Jayant Sakhardande . Et al., [1], smart cane is one of the assisting tool for visually impaired people. The main advantage is low cost, thus increasing the existing functionality of smart cane and recognising only the above-knee obstacle detection.

According to Experimental Investigation of Electromagnetic Obstacle

Detection for Visually Impaired Users [3], technology can help in reducing many barriers that visual impaired disability face. This kind of technology is referred as Electromagnetic Technology (EM). EM is used to detect obstacles which are of short range (<1m in front of user's feet).

In this project A Navigation Aid for Blind People [5], we are presenting a Navigation aid which will help the visually impaired people to navigate safely. In this system we find that the errors are reduced considerably which are caused by the accelerometer and double integration of its output in order to measure the distance travelled. Here the foot switch proves to be highly advantageous as without the foot switch drift errors due to the accelerometer and double integration would be considerably higher in magnitude and would reduce the effective range of the Navigation aid.

Today the country has made lot of technological changes and discovered new methods for the visually impaired. Currently a variety of portable system has been navigated which made their life easier. Now-a-days they use electronic travel aids like Electronic Orientation Aids (EOA's) and Position Location Description (PLD's). In which ETA is vastly used as an electronic travel aid.

According to A Wearable System for Mobility Improvement of Visually Impaired People [7], this survey is widely used for portable or wearable walking support which has the advantage and disadvantage for the researchers to collect the information about the Visually Impaired people.

According to Effective Fast Response Smart Stick for Blind People [10], this stick is designed with infrared sensor to detect the objects present around them. It has the speciality of detecting objects ranging 4 meter during 39 ms and gives a message to move twice his normal speed and they feel safe.

Visually Impaired people have contact with outer world by their sense of touch and hearing. According to Sylvain Cardin et al.,[7], While they move in this environment they use an obstacle discovered by researchers. It uses multi-sonar system which is used to detect an obstacle present around them. This system has given confidence to the Visually Impaired people to lead their life in this technological world.

3. PROPOSED WORK

This section describes the design and development process.

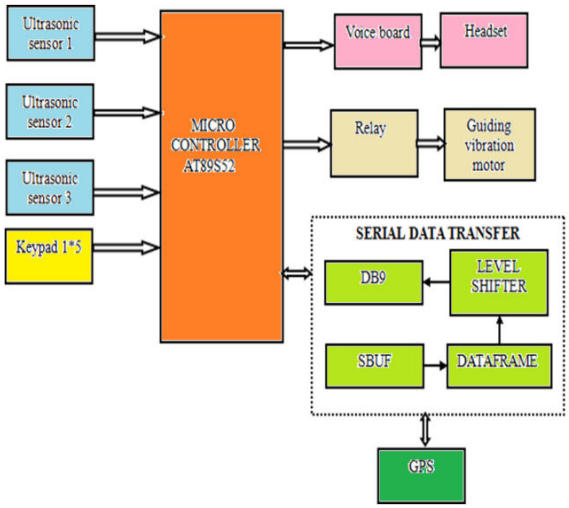


Figure 1. BLOCK DIAGRAM

3.1 MICROCONTROLLER

The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the Indus-try-standard 80C51 instruction set and pin out. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry.

Figure 2. MICROCONTROLLER

In addition, the AT89S52 has two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning.

The Power-down mode saves the RAM con-tents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

3.2 ULTRASONIC SENSOR

Ultrasonic sensors (also known as transceivers when they both send and receive) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object. This technology can be used for measuring: wind speed and direction. An ultrasonic transducer is a device that converts energy into ultrasound, or sound waves above the normal range of human hearing

Figure 3. ULTRASONIC SENSOR

3.3 GLOBAL POSITIONING SYSTEM (GPS)

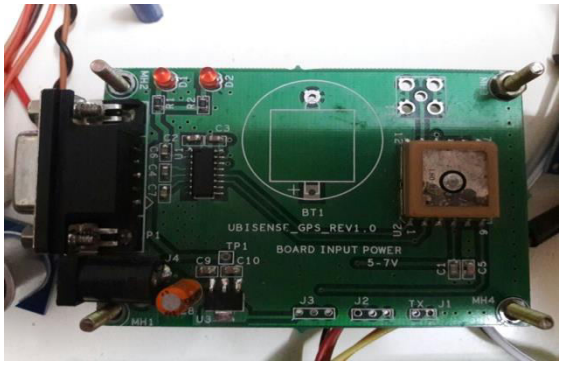


Figure 4. GPS

GPS satellites broadcast signals from space that are used by GPS receivers to provide three-dimensional location (latitude, longitude, and altitude) plus the time. A GPS receiver calculates its position by precisely timing the signals sent by the GPS satellites high above the Earth. Each satellite continually transmits messages which include

- The time the message was sent
- Precise orbital information (the ephemeris)
- The general system health and rough orbits of all GPS satellites (the almanac).

A few specialized GPS applications do however use the time; these include time transfer, traffic signal timing, and synchronization of cell phone base stations.

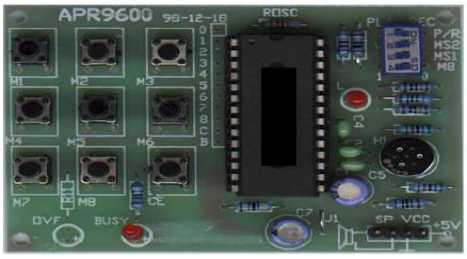
3.4 UNIVERSAL ASYNCHRONOUS RECEIVER AND TRANSMITTER (UART)

UARTs are commonly used in conjunction with other communication standards such as EIA RS-232. The Universal Asynchronous Receiver/Transmitter (UART) controller is the key component of the serial communications subsystem of a computer. The UART takes bytes of data and transmits the individual bits in a sequential fashion. A UART is used to convert the transmitted information between its sequential and parallel form at each end of the link. Each UART contains a shift register which is the fundamental method of conversion between serial and parallel forms. The MAX232 is an integrated circuit that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals.

3.5 VOICE BOARD

The APR9600 experimental board is an assembled PCB board consisting of an APR9600 IC, an microphone, support components and necessary switches to allow users to explore all functions of the APR9600 chip. The oscillation resistor is chosen so that the total recording period is 60 seconds with a sampling rate of 4.2 kHz. The APR9600 device offers true single-chip voice recording, non- volatile

storage, and playback capability for 40 to 60 seconds. The device supports both random and sequential access of multiple messages. Sample rates are user-selectable, allowing designers to customize their design for unique quality and storage time needs.



APR9600 Experimental board

Figure 5. VOICE BOARD

3.6 LIQUID CRYSTAL DISPLAY(LCD)

Figure 6. LCD

We have to prepare an LCD properly before the character we need, has to be displayed. For this a number of commands have to be provided to the LCD before inputting the required data. LCD doesn't know about the content (data or commands) supplied to its data bus. It is the user who has to specify whether the content at its data pins are data or commands. For this, if a command is inputted then a particular combination of 0s and 1s has to be applied to the Control lines so as to specify it is a Command on the other hand if a data is inputted at the data lines then an another combination of 0s and 1s has to be applied to the control lines to specify it is Data.

There are 2 very important registers in LCD

- Command Code register
- Data Register

3.7 DC MOTOR

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field.

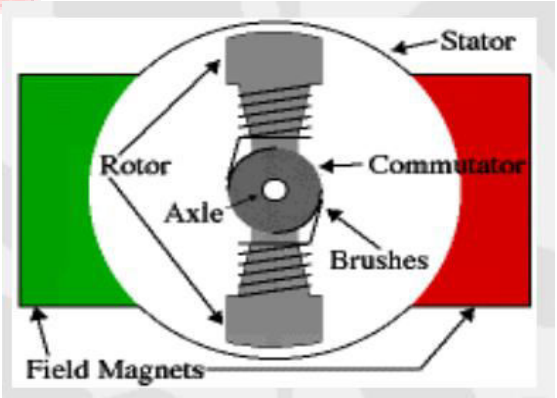


Figure 7. DC MOTOR

Every DC motor has six basic parts -- axle, rotor (a.k.a., armature), stator, commutator, field magnet(s), and brushes. The internal configuration of a DC motor

is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.

4. RESULT

This project discusses about the assistance that could be provided for the blind person with the help of sensor technology. The sensors for detecting obstacles, staircase and pits in the landscape are fixed to the walking stick of blind people.

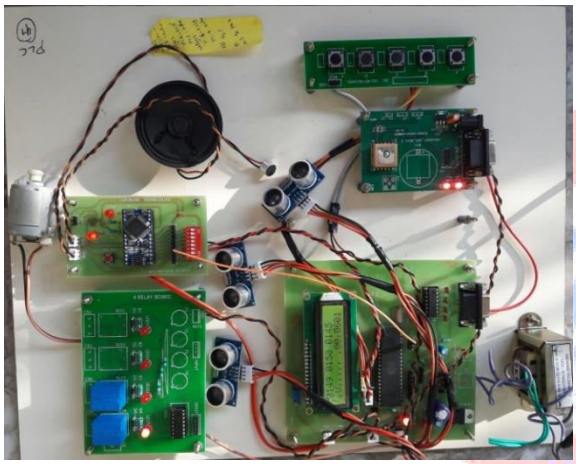


Figure 8. COMPLETE MODULES

5. FUTURE ENHANCEMEMT AND CONCLUSION

This project discusses about the assistance that could guide the visually impaired people efficiently. We can locate the blind person area by GPS and at the same time with the help of ultrasonic sensor that is placed in walking stick. The route is identified by the visually impaired people. Additionally, the blind person can know about their location with location based services and come to know the nearby places with the help of GPS tracking system. This system can be enhanced in future by adding more functionality to the stick such that RF transmitter and receiver to find the bus number and the destination routes are identified. Separate guiding vibration motor can be used if two obstacles found at the same time for the safe travel of visually impaired people.

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