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BLIND NAVIGATION SYSTEM

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ABSTRACT

Navigation in indoor environments is highly challenging for the severely visually impaired, particularly in spaces visited for the first time. Several solutions have been proposed to deal with this challenge. 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.

This paper presents a navigation system that was designed taking into consideration usability as the quality requirement to be maximized. Our long-term goal is to create a portable, self-contained system that will allow visually impaired individuals to travel through familiar and unfamiliar environments without the assistance of guides.

The system, as it exists now, consists of the following functional components: (1) ultrasonic sensor for obstacle detection, (2) multiple sensor for fire detection, water detection and stair case detection. Various systems detect this type of problem and weep the buzzer but this is confusing hence our system remove this type of problem with the help of vibration of vibrator.

Keywords: Fire detection, Keil software, Obstacle detection, Stair detection ,Vibrator, Water detection.

I. INTRODUCTION

People with visual disabilities, i.e., partially or totally blind, are often challenged by places that are not designed for their special condition.Several ―everyday objects that are present in most built environments become real obstacles for blind people, even putting at risk their physical integrity. Simple objects such as chairs, tables and stairs, hinder their movements and can often cause serious accidents.

Several proposals have tried to address this challenge in indoor and outdoor environments. However most of them have limitations, since this challenge involves many issues (e.g., accuracy, coverage, usability) .Therefore, this can still be considered an open problem.

In this modern world providing security to each and every human being in life gains a major consideration. Everyone has realized the need to secure themselves against hazards and unauthorized dealings. This work aims at providing the navigation for the visually impaired persons, by designing a cost – effective and more flexible navigation system. It is our belief that the recent advances in technologies could help and facilitate in day – day operations of visually impaired persons.

II. BACKGROUND

The blind navigation system catering needs of the blind people who are not able to move from one place to other place without the help of others. Recent survey source India is now become the world's large number of blind people. Legally blind refers to a person who has less than 20/200 vision in either eye, or a limited field of vision. Many virtually impaired people use walking sticks and
guide dogs to move from place to place.

2.1 Traditional Method

2.1.1.White Can: The most popular mobility hand held aid usually foldable and adjustable to the height of the user. A blind person using swing-like movements "scan" the path in front in approx. 1 m distance.

2.1.2.Guide Dogs: A specially trained dog assisting the blind in obstacle avoidance, but usually not aiding in way finding.

2.1.3.Human Guide : A blind person walks hand in hand with a sighted guide. In practice not a permanent solution for aiding the blind in mobility and navigation. A blind person lacks privacy and can have a feeling of being a burden to his or her guide.

2.2 Motivation

God gifted sense to human being which is an important aspect in our life is vision. We are able to see the beauty of nature, things which happen in day-to-day life with the help of our eyes. But there are some people who lack this ability of visualizing these things. Our project is an attempt to help the visually impaired people to navigate through distances without any disturbances.

2.3 Objective

Blind navigation system is a very interesting and useful project. In this project we have used the ultrasonic sensor to sense an obstacle. We have used a microcontroller AT89S51 to transmit and receive ultrasonic waves. When an obstacle is encountered in the way of ultrasonic waves,the waves are reflected back. And through the help of vibrator the visually impaired person gets to know that there is a obstacle in the vicinity.

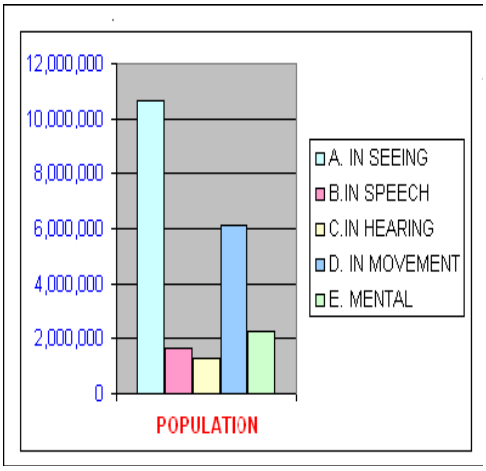

Fig 1:Statistical Analysis

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III. MODE OF PROJECT

There are four mode of this project.

1.Making of stick : In this mode we design a stick that attach ultrasonic sensor ,water sensor, fire for water and level sensor.

2.To design sensing concept: In this mode we use the ultrasonic sensor that sense the obstacle detection .

3.Checker mode: In this mode we use the different sensor for checking proper place on the bases of sign.

4.Sensing mode: In this mode we use water sensor and fire sensor that attach to microcontroller with the help of comparator. It sense if any condition and it operate voice activation.

IV. PROPOSED METHOD

In order to provide the cost effective and user friendly system for blind navigation, the following designed is carried out.

Project Description

4.1 Microcontroller (at89s51)

The 8051 microcontroller is an 8-bit microcontroller and is one of the most popular general purpose microcontrollers in use today. Some of the features that have made the 8051 popular are:

- 4 KB on chip program memory.
- 128 bytes on chip data memory(RAM)
- [32 bank reg + 16 bit addressable reg + 80 general purpose reg]
- 4 reg banks.
- 128 user defined software flags.
- 8-bit data bus
- 16-bit address bus
- 16 bit timers (usually 2, but may have more, or less).
- 3 internal and 2 external interrupts.
- Bit as well as byte addressable RAM area of 16 bytes.
- Four 8-bit ports, (short models have two 8-bit ports).
- 16-bit program counter and data pointer.
- 1 Microsecond instruction cycle with 12 MHz Crystal.

4.2 Ultrasonic Sensor:

Ultrasonic transducers are transducers that convert ultrasound waves to electrical signals or vice versa. In order to provide the Obstacle Avoidance, Ultrasonic sensor is used. The Ultrasonic sensor has the maximum range of 10.7 metres, which is far more than normally required. The current consumption is about 2.5 Amps during the sonic burst is exposed. It has the short 10uS pulse as the trigger input to start the ranging. The sensor will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo line high. It then listens for an echo, and as soon as it detects one it lowers the echo line again. The echo line is therefore a pulse whose width is proportional to the distance to the object. By timing the pulse it is possible to calculate the range in inches/centimetres or anything else. If nothing is detected then the sensor will lower its echo line anyway after about 36mS.

4.3 Water Sensor

A water detector is an electronic device that is designed to detect the presence of water and provide an alert in time to allow the prevention of water damage. A common design is a small cable or device that lies flat on a floor and relies on the electrical conductivity of water to decrease the resistance across two contacts.

4.4 Level Sensor

Level sensors detect the level of liquids and other fluids and fluidized solids,

including slurries, granular materials, and powders that exhibit an upper free surface. Substances that flow become essentially horizontal in their containers (or other physical boundaries)because of gravity whereas most bulk solids pile at an angle of repose to a peak. The substance to be measured can be inside a container or can be in its natural form (e.g., a river or a lake). The level measurement can be either continuous or point values. Continuous level sensors measure level within a specified range and determine the exact amount of substance in a certain place, while point-level sensors only indicate whether the substance is above or below the sensing point. Generally the latter detect levels that are excessively high or low.

4.5 Vibrator

The vibrator is used in this project for guiding the visually impaired persons to navigate independently.

4.6 Software Used

Language used for coding: Assembly Language.

Proteus software. For circuit designing.

Kiel software. for coding.

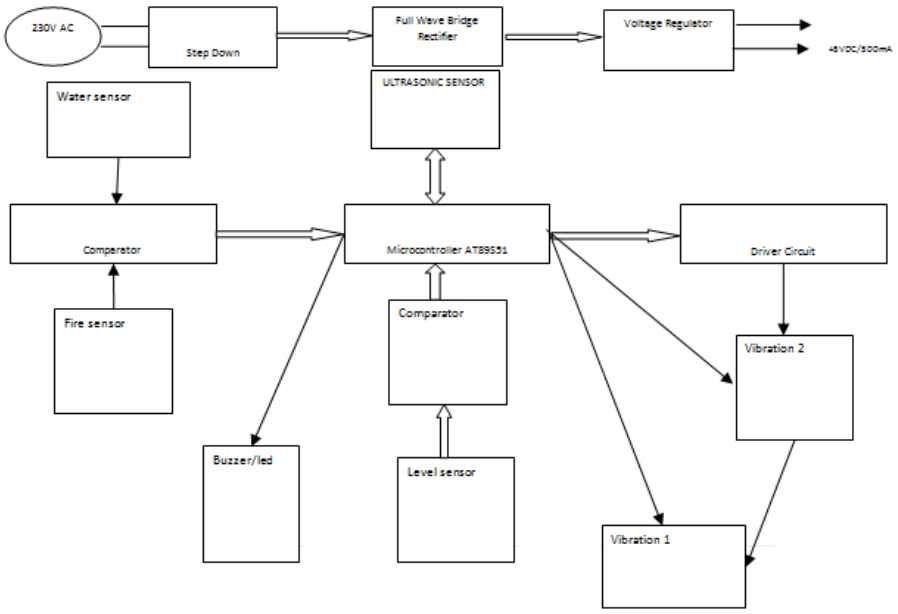

Fig 2: Block Diagram

V. IMPLEMENTATION

The project Ultrasonic blind navigation system is a very interesting and useful project for many industrial applications. In this project we have used the ultrasonic waves to sense the presence of obstacle in the vicinity of

the blind person.We have used a microcontroller AT89S51 to transmit and receive ultrasonic waves through 40 KHz ultrasonic receiver and transmitters.If the ultrasonic gets reflected back then there is an obstacle present in front and hence the vibrator will vibrate to inform the blind person.

The transmission & reception of ultrasonic waves is very complex in nature so it needs very sophisticated techniques to process these waves. The speed of ultrasonic waves is dependent on temperature. So before using ultrasonic waves for any measurement we need to calibrate the speed of ultrasonic waves in current atmospheric temperature. For this purpose we have implemented a special algorithm to calibrate the speed of ultrasonic waves through a known distance of 100 Cm. We have also used fire, water and tube sensor in our project so that the blind person gets to know about the presence of any hot body or any water body near him. A level sensor is also attached to the system so that if any stair case is in front of him,he can easily judge and walk accordingly. The liquid in the tube sensor will tilt on encountering stairs and thus will make the vibrator vibrate.

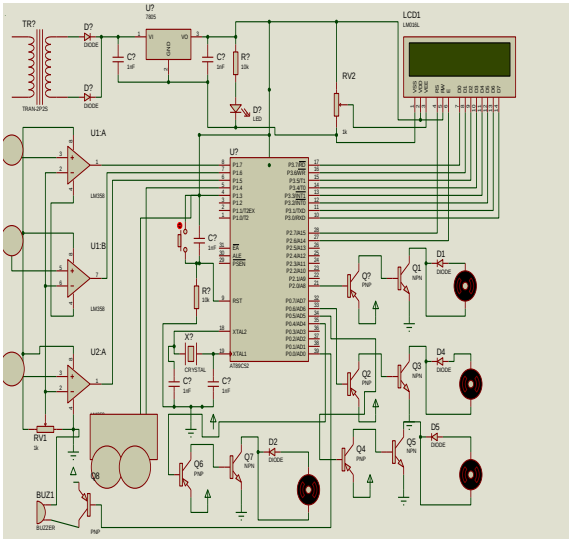

Fig 2: Circuit Diagram

VI. CONCLUSION

The project proposed the design and architecture of a new concept of Smart Electronic Guiding Stick for blind people. The advantage of the system lies in the fact that it can prove to be very low cost solution to millions of blind person worldwide. The proposed combination of various working units makes a real-time system that monitors position of the user and provides dual feedback making navigation more safe and secure.

VII. FUTURE SCOPE

If a visually impaired person wants to go to a city location, they can walk along a road or corridor using an ETA system in the local area. However, it is difficult to know one's position globally. Hence, a global positioning method will be the subject of further research. The global position of' the user is obtained using the global positioning system (GPS), and their current position and guidance to their destination will be given to the user by voice. A wall-following function will also be added so that the blind can walk straight along a corridor in an indoor environment .

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