THIRD EYE FOR BLIND PEOPLE USING ULTRASONIC VIBRATING GLOVES WITH IMAGE PROCESSING.

Suprabha Potphode[1], Sneha Kumbhar[2], Prashant Mhargude[3], Parvin Kinikar[4]

[1,2,3]*Student -Bachelor of Engineering, Electronics & Telecommunication Engineering Department, Dr. Daulatrao Aher College of Engineering, Karad, Maharashtra, India.*
[4]*Assistant Professor, Electronics & Telecommunication Engineering Department, Dr. Daulatrao Aher College of Engineering, Karad, Maharashtra, India.*

---***---

Abstract – *The visually impaired face several challenges when performing their daily tasks. These tasks may be differentiating objects that have similar shapes or knowing the content of a restaurant menu. There is an increasing interest in developing effective solutions that can help the visually impaired to recognize objects. However, automatic techniques cannot answer most of the questions asked by the visually impaired. Besides, it can be seen that there is an obvious deficiency in the number of applications that target blind users. Therefore, to address all of these issues, there is a need to design an effective solution that can help blind people to identify any objects at any place without any restrictions. The proposed solution is developing an ultrasonic glove with an image processing hat that uses human-powered technology to help the visually impaired persons with the many challenges they face. As a result of evaluating the proposed application, it is shown that it is easy to use and useful and can be employed for many important purposes in daily life.*

Key Words: human computation, blind, identification, visually impaired, human-powered technology…

1. INTRODUCTION

For blind people, walk freely is a challenge due to lack of information about the destination addresses, obstacles, etc. For them, there are plenty of new technologies that could be employed to decrease the difficulties caused by this impairment, making the relationship between man and environment more harmonious as possible. Blind people use mainly the canes to move around and avoid obstacles. That is a very useful instrument and widely spread among blind people worldwide. Unfortunately, it is still a limited resource unable to provide independent navigation and it cannot be used to detect objects or people more than a few feet away or above the waist of the user. Related proposals are dealing with this problem based on modern technologies. Barathi and his associates presented a navigation technique using ultrasonic sensors on a cane and glasses to perceive obstacles on the ground level and above the head. They used standardized audio messages related to the perceived values to communicate with users. Xiangxin and Mates described the building of a dog robot guide that uses ultrasonic sensors and an intelligent cord to communicate with users. The hat also used a camera to capture images to recognize obstacles. Tian and his group proposed a tool that makes use of pre-estimated directions obtained by magnetic sensors, angular velocity calculus, gravity sensors, and RGB camera to guide their users. This work used Kalman filters to process data and to increase the location accuracy and the route calculations. Based on the already presented works and the specific needs of the local blind community we decided to develop a new low-cost tool able to help the indoor navigation through audio instructions. The guidance mode is done using visual markers arranged on the environment, linked as nodes in a bi-directionally connected graph. Detection of obstacles is made using computer vision and ultrasonic perception.
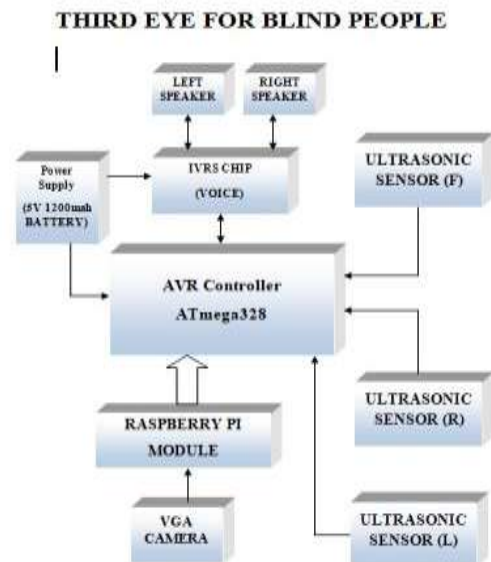
2. BLOCK DIAGRAM

Fig1.block diagram

2.1 Block diagram description-

2.1.1 SPEAKER

A transducer(converts electrical energy into mechanical energy) that typically operates A buzzer is in the lower portion of the audible frequency range of 20 Hz to 20 kHz. This is accomplished by converting an electric, oscillating signal in the audible range, into mechanical energy. It vibrates when an obstacle is detected. If the obstacle is close

the microcontroller sends a signal to sound a buzzer. It also detects and sounds a different buzzer if it detects water and alerts the blind. One more feature is that it allows the blind to detect if there is light or darkness in the room.

2.2 ULTRASONIC SENSOR

The visually impaired have to face many challenges in their daily life. The problem gets worse when there is an obstacle in front of them. ... Ultrasonic sensors are used to calculate the distance of the obstacles around the blind person to guide the user towards the available path.

Fig -2: Ultrasonic sensor

2.3 VIBRATE MOTOR

A vibrator motor is included to enhance the overall feedback for the person who receives the warning against obstacles closeness in different formats of vibrations.

2.4 RASPBERRY PI MODULE

The organization behind the Raspberry Pi consists of two arms. The first two models were developed by the Raspberry Pi Foundation. After the Pi Model B was released, the Foundation set up Raspberry Pi Trading, with Eben Upton as CEO, to develop the third model, the B+. Raspberry Pi Trading is responsible for developing technology while the Foundation is an educational charity to promote the teaching of basic computer science in schools and developing countries.

fig 3. Raspberry Pi Module

2.4 VGA CAMERA

VGA was originally developed in 1987 by IBM as a means for its PS/2 personal computers to display higher-resolution graphics on a monitor. It was replaced in the early 1990s by the super video graphics array standard. Although VGA is no longer used for standard PC displays, it is still used today in some mobile and handheld electronics. Function: Digital cameras, including those using VGA, store their images directly inside the camera's memory or on a memory card. The images can then be transferred to a computer for printing or sent to a TV screen for public viewing using wireless Internet, Bluetooth or a USB cable.
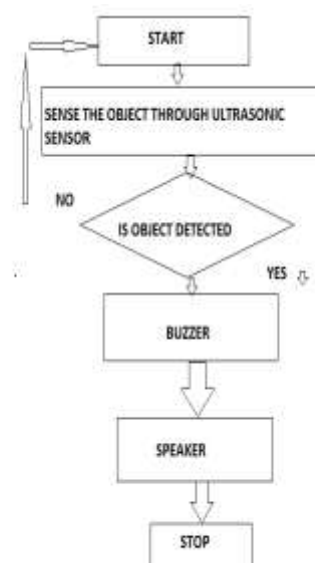
2.5 AVR CONTROLLER

The high-performance Microchip 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SRAM, 23 general-purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter and also programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power.

2.6 IVRS CHIP

IVR stands for Interactive Voice Response. It is a technology that allows a pre-recorded voice to interact with humans through voice and DTMF tones input via the keypad. Meaning, when you call, the voice on the other end will be computer-generated. You use your phone's keyboard to create a certain outcome.

2.7 FLOW CHART

3. WORKING

The existing system consists of the devices used for helping blind peoples to detect the obstacles and travel to places; It is a smart device like a torch for blinds. When an ultrasonic sensor detects the obstacle then vibrating motor vibrates and also there is audio to turn left or right. So the blind people move in a safe place. VGA camera captures the image and sends it towards the controller for the identification.

4. CONCLUSIONS

It is worth mentioning at this point that the aim of this study which is the design and implementation of a Third eye for the blind has been fully achieved. The ultrasonic sensor acts as a basic platform for the coming generation of more aiding devices to help the visually impaired to navigate safely both indoor and outdoor. It is effective and affordable. It leads to good results in detecting the obstacles on the path of the user in a range of three meters. This system offers a low-cost, reliable, portable, low power consumption and robust solution for navigation with the obvious short response time. Though the system is hard-wired with sensors and other components, it's light in weight. Further aspects of this system can be improved via wireless connectivity between the system components, thus, increasing the range of the ultrasonic sensor and implementing technology for determining the speed of approaching obstacles.

5. REFERENCES

[1] S. Alghamdi, R. Van Schyndel, I. Khalil, "Safe trajectory estimation at a pedestrian crossing to assist visually impaired people", Engineering in Medicine and Biology Society (EMBC), 2012 Annual International Conference of the IEEE, On page(s): 5114 - 5117.

[2] S.BHARATHI, A. RAMESH, S. VIVEK, Effective navigation for visually impaired by wearable obstacle avoidance system. International Conference on Computing, Electronics and Electrical Technologies (ICCEET), 2012.

[3] K. XIANGXIN, W. YUANLONG, L. MINCHEOL, Vision based guidedog robot system for visually impaired in urban system. 13th International Conference on Control, Automation and Systems (ICCAS), 2013.

[4] Y. Tian, W. R. Hamel and J. Tan, "Accurate human navigation using wearable monocular visual and inertial sensors", IEEE Trans. Instrum.