Virtual Eye for Visually Impaired People Using IoT

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Abstract- ***Eye Sight is considered the most important sense for people. Many Technology are helps the blind people. Blind people and impaired people are also part of this world. So, it provided blind people were as a particular hardware devices such as talking blind Products, identifying obstacle. In this project, we try to present an application called SMART SHOES. It is very useful for blind people and impaired people for their struggles.***

Indexed Terms- Blind People, Communication, Impaired People

I. INTRODUCTION

Recently many automated assistive devices have been developed to help the blind to move freely in dynamic environments as well. There are a wide range of navigation system and tools existing for the blind to navigate quickly and safely against obstacles and other hazards faced, but very few of them have proved efficient. These tools are termed as ETA – 'Electronic Travel Aids'. The main objective of this proposed system is to develop an embedded reliable automated assistive device for the visually impaired, using sensors, and to assist the blind to move safely. This proposed method aimed at developing guidance system named 'an embedded guiding system for visually impaired persons' that is much more efficient and reliable and economically cheap compared to the existing systems. The study hypothesis that the use of this system alerts the visually impaired about the obstacles along the path and helps them in moving with fewer accidents.

II. PROPOSED FRAMEWORK

Since the visually impaired people facing several problems with the existing modules it is necessary to develop a useful and convenient design. In this project, we have designed a smart shoe with several features to provide VIPs with a means for safe, independent mobility and continuous contact with their families or caregivers. The system relies on sensors to detect objects at some distance in front of the blind person and alert them by speaker. In the sequel, the PIR sensor will detect the motion of animals or human crossing them and notify them through a voice message. When the blind people stumble over the system will suddenly sends an alert message along with the location to the caregiver through IOT. When figure 1 shows the proposed framework architecture. Since IOT is very fast growing technology, it is implemented in our proposed design to enhance the design much better. The entire system is powered by piezoelectric via battery. Every status will be displayed through LCD in our prototype module.

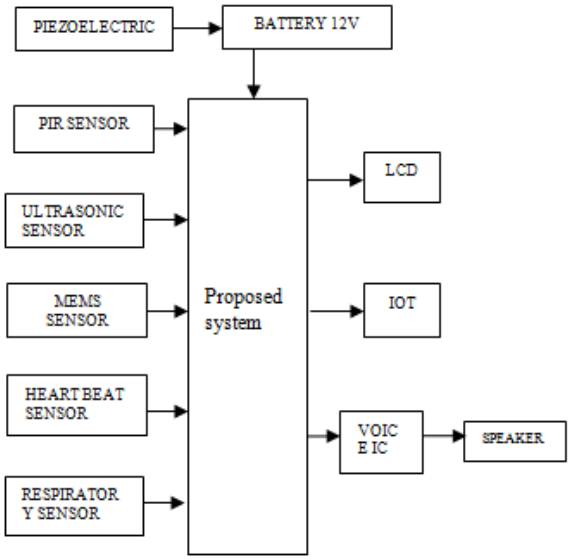

Figure 1 Architecture of the Proposed Framework

A. Microcontroller ESP32

ESP32 microcontroller is used for this project. When figure 2 shows the ESP32 microcontroller architecture diagram. This is very useful for embedded programming and also it is an simplest method for learners. For that purpose only if we using this chip.

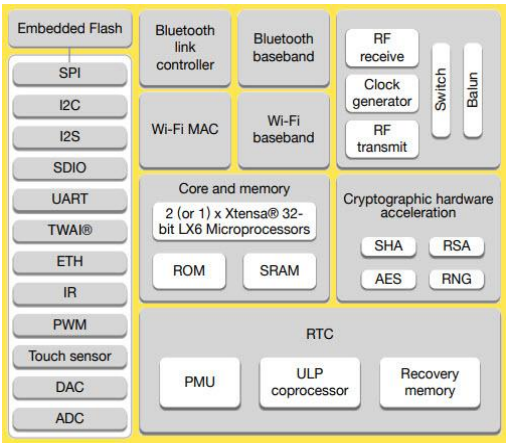

Figure 2 The architecture of the Microcontroller ESP32

B. Mems accelerometer

Acceleration is used to measure vibrations for blind people. When figure 3 shows the accelerometer diagram.This is very useful for blind people. Because it is very useful impaired people to find the obstacles.

Figure 3 Accelerometer

C. Ultrasonic sensor

Ultrasonic senor is used to find the direction of the obstacles. At last the ultrasonic receiver would stop timing when it receives the reflected wave. When figure 4 shows ultrasonic sensor diagram. The distance of sensor from the target object is calculated. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package. Working Voltage: 5VDC. Quiescent Current: <2mA. Working Current: 15mA. Detecting Range: 2cm - 4.5m. Trigger Input Pulse width: 10Us.

Figure 4 Ultrasonic Sensor

D. Piezoelectric Sensor

A piezoelectric sensor is used to measure the pressure, acceleration, temperature and strain for blind and impaired people. When figure 5 shows the pyro electric effect diagram.

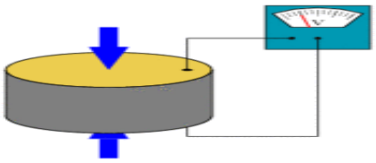

Figure 5 Pyroelectric effect

E. PIR Sensor

PIR sensor is used to utilize the detection of infrared that is radiated from all objects to detect the blind people. When figure 6 shows the PIR sensor diagram.

Figure 6 PIR Sensor

F. Web Server

Web server is used to provide real time sensor values for IOT based load control smart system. When figure 7 shows the real time sensor values.

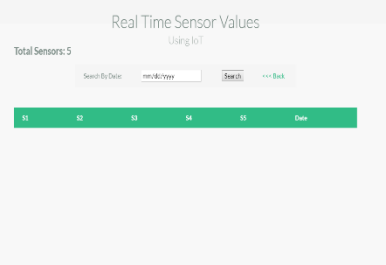

Figure 7 Real Time Sensor Values

G. Respiratory Sensor

This sensor used to find the blind and impaired people inhale and exhalation of the respiratory system. When figure 8 shows the respiratory sensor diagram.

Figure 8 Respiratory Sensor

H. Heart Beat Senor

Heart Beat sensoris used to find the Heart rate of the blind people. When figure 9 shows the heart beat sensor diagram. When the Heart Beat detector is working, the beat LED flashes in unison with each heart beat.

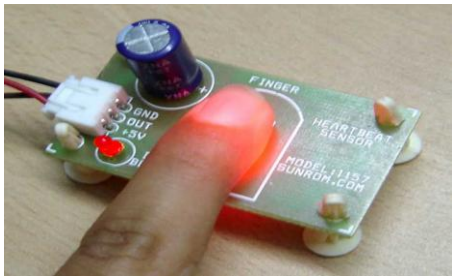

Figure 9 Heart Beat Sensor

I. Voice IC APR-9600

Voice IC is used to inform the message to the guardian and well wisher. When figure 10 shows the block diagram of APR9600.

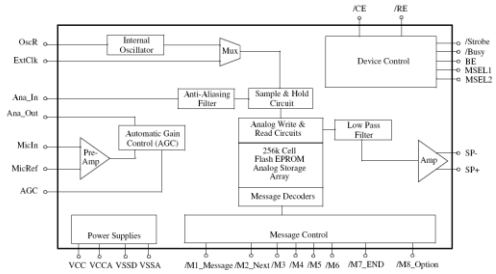

Figure 10 block diagram of APR9600

J. LCD

LCD is used to display the values and messages to the particular person for blind people. When figure 11 shows the LCD display diagram.

Figure 11 LCD

K. Arduino Software (IDE)

IDE is used to store the program for embedded c language. When figure 12 shows the Arduino setup.

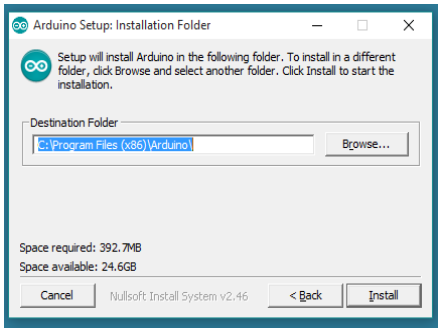

Figure 12 Arduino setup

Power up your Arduino UNO (either via USB or external power) Plug in your AVR ISP Programmer to your computer (make sure you have any required drivers installed) Connect your AVR ISP Programmer into your Arduino UNO Board via the ISP Header (the 2x3 header pins right above the Arduino Logo). When figure 13 shows the hardware setup output for this project.

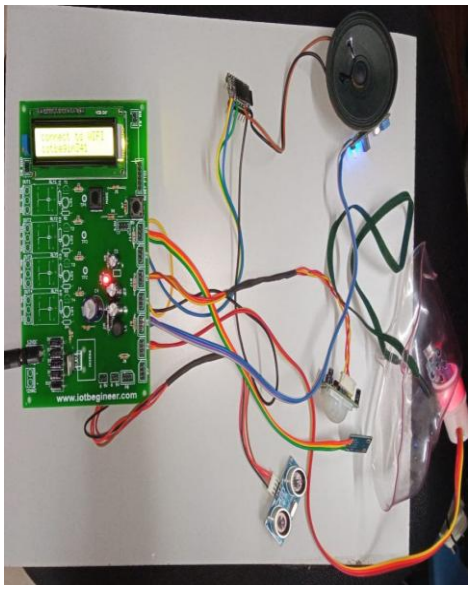

Figure 13 Hardware setup output

III. FUTURE ENHANCEMENT

The system application can be upgraded by providing navigation path by voice output. Using python image processing technique to recognize the object and providing the voice output.

CONCLUSION

Under ideal conditions, the device can be efficiently utilized by the visually impaired people to navigate themselves to a greater extent. It is quite cheap and affordable compared to other existing devices. The presence of the obstacle is communicated to the user immediately compared to other devices. The obstacle avoidance system is fast and can also be improved to work even more effectively. The range of the navigation area is high, which allows the user to navigate in a safer manner.

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