

Smart Assistance for Visually Impaired Person

Pavithra S¹ Sathya S² Pradheepa S³ Ramana Vijay K G⁴ Veerakumar S⁵

^{1,2,3,4}UG Student ⁵Assistant Professor

^{1,2,3,4,5}Department of Electronics & Communication Engineering

^{1,2,3,4,5}Knowledge Institute of Technology, Salem, India

Abstract— In the modern world, people are busy with their day-to-day routine chores. They don't have enough time to help old age and visually challenged people. Visually challenged people need help from other persons. To avoid this situation the project is more helpful for them to travel one place to another without third persons help. The proposed system consists of both hardware and software. Some of the hardware systems are Arduino Uno, Ultrasonic sensor, Heartbeat sensor, Accelerometer, Voice IC, GPS, and GSM module. IDE (Integrated Development Environment) is Arduino software. It connects to the Arduino and Genuine hardware to upload programs and communicate with them. GPS and GSM modules used to receive the signal and send the alert messages to the already registered mobile numbers. An emergency button is also used to send the emergency alert to the concern persons. Ultrasonic and Heartbeat sensor is used to detect the obstacle and to detect the heartbeat rate. This project will help the blind people for improving their communication ability and not to depend on anyone during walking in unknown areas.

Keywords: visually challenged, Arduino Uno, Accelerometer, GPS, GSM, IDE, emergency alert, Heartbeat rate

I. INTRODUCTION

In the fast running world, the living standards of the people have improved. People have become so materialistic that everyone has forgotten how the physically disabled people live a tough life. They undergo rigorous, apathetic and indifferent behavior towards them for being physically disabled. Blind and impaired persons always depend on other people for their locomotion. "Of all the senses, sight must be the most delightful," said Helen Keller. In India, the blindness rate goes on increasing every year. According to the blindness statistics, 18.7 million blind people in the year 2000 and 24.1 million blind people in the year 2010. There is no current trend to decrease the blindness. In 2020, the blindness rate has reached up to 31.6 million. They need more physical strength to face this challenging society along with their blindness.

This project is more helpful for the visually challenged or blind people to overcome the fear and reluctant things and those who often have to rely on others. This project is an innovation that helps visually impaired people to move around and go from one place to another with speed and confidence by knowing the nearby obstacles using the help of the wearable band which produces the ultrasonic waves which notify them with buzz sound or vibrations. It allows the user those who are visually impaired to walk freely by detecting the obstacles. They only need to wear this device as a band or cloth on their body. After analyzing many of the literature surveys, this project has implemented. Some of the references are Shraga

Shovel, Yuan D, Benjamin JM, Sabarish S, and Espinosa MA. Blind people handle this project more efficiently and also more comfortable for them.

II. METHODOLOGY

Visually challenged people or old age people walk on their own without any other support using the smart assistance for visually challenged person's kit.

A. System Specification:

1) Hardware Requirement:

- Arduino Microcontroller.
- Ultrasonic Sensor
- Heartbeat Sensor
- Accelerometer
- Voice processor IC
- Speaker

2) Software Requirement:

- PCB DESIGNING
- ARDUINO IDE

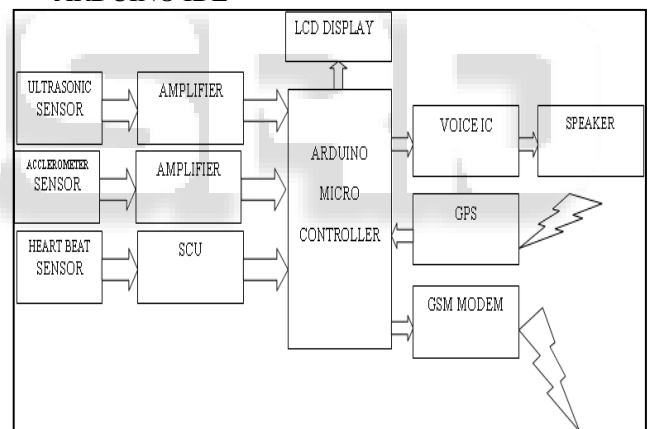


Fig. 2: Block Diagram

III. DESCRIPTION

A. Arduino Uno:

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button.



Fig. 1: Arduino Uno

1) *Arduino Software:*

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuine hardware to upload programs and communicate with them.

B. *Ultrasonic Sensor:*

Ultrasonic sensors used to detect the objects when they come close to blind people and which interface with the microcontroller. It measures the distance between the blind people and the approaching object. When the distance becomes low, the controller will switch on the particular voice for sign and vibration motor to show vibration. So the user can easily find that someone is near. When the object detects at a distance of 20 to 40 cm, an "object detected" voice message to be heard.

C. *Heartbeat Sensor*

Heartbeat sensor was used for sensing heart rate. This device allows one person to measure their mean arterial pressure (MAP) in about one minute. Meanwhile, the heart rate becomes strange at that time the blind person's spot with an alert message sent to registered numbers.

D. *Accelerometer:*

An accelerometer is a device that measures proper acceleration, the acceleration accomplished on free fall. Single and multi-axis models are available to detect the size and direction of the acceleration as a vector quantity and sense orientation, acceleration, vibration shock, and falling. Micro machined accelerometers are usually present in portable electronic devices and video game controllers, to detect the position of the device.

E. *Speaker:*

A loudspeaker (or "speaker") is an electro-acoustic transducer that converts an electrical signal into sound. The speaker moves under the variations of an electrical signal and causes sound waves to propagate through a medium such as air or water. After the acoustics of the listening space, loudspeakers (and other electro acoustic transducers) are the most variable elements in a modern audio system and are usually responsible for most distortion and audible differences when comparing sound systems.

F. *GPS (Global Positioning System):*

Global Positioning System (GPS) is a satellite-based system that uses satellites and ground stations to measure and compute its position on Earth. GPS is also known as Navigation System with Time and Ranging (NAVSTAR) GPS.

G. *GSM Module:*

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. It is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a

wireless modem sends and receives data through radio waves.

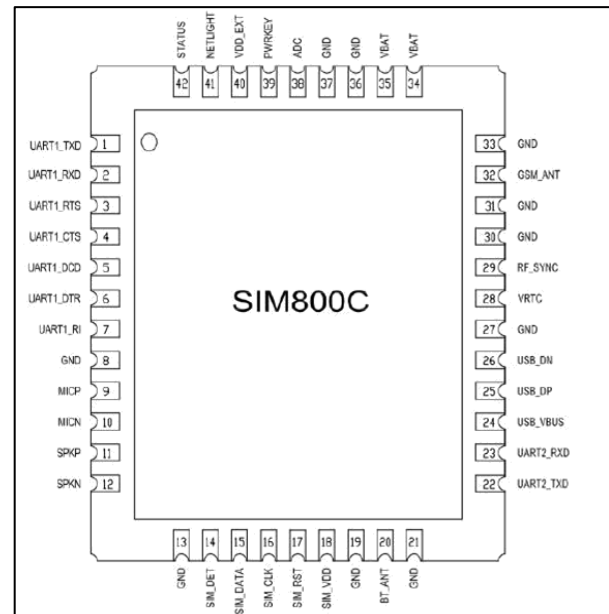


Fig. 2: GSM Module

1) *Advantages:*

- Compatible size.
- Low cost.
- Reduce the security tensions.

2) *Applications:*

- Used in banks, houses and industries for security system.

IV. RESULT AND DISCUSSION

The output of this project is the alert messages send for different situation. The Emergency alert message indicates that the person press the emergency button when he/she needs an emergency along with this location is also sent

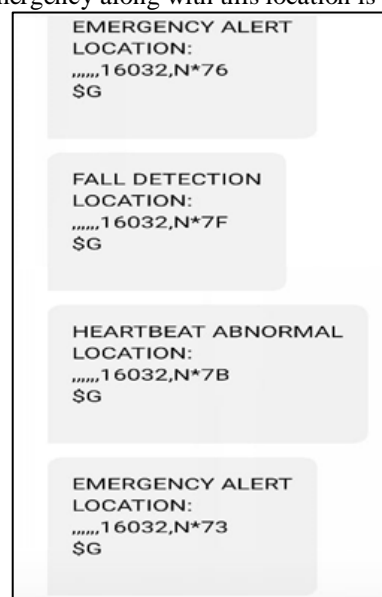


Fig 3: Output Message for an alert

The fall detection message shows that a person fell down or met with an accident. The heartbeat abnormal

message indicates that a person heart rate is beyond the limit.

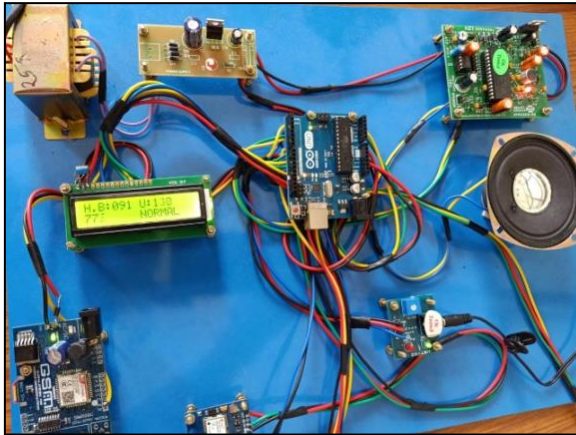


Fig. 4: Project Kit

Fig 4 shows output of the project for visually challenges people. The LCD Displays heartbeat rate is normal or abnormal and the object distance also displayed.

V. CONCLUSION

Thus, this project proposed the design and architecture of a new concept of Arduino based Virtual Eye for the blind people. A simple, cheap, efficient, easy to carry, configurable, easy to handle electronic guidance system with many more amazing properties and advantages are proposed to provide constructive assistant and support for the blind and visually impaired persons. The system will be efficient and unique in its capability in specifying the source and distance of the objects that may encounter the blind. It scans and detect the obstacles in the areas like left, right, and in front of the blind person regardless of its height or depth. With the proposed architecture, if constructed with at most accuracy, the blind will be able to move from one place to another without other's help.

VI. FUTURE ENHANCEMENT

The entire project can be made in the form of jacket, so that the device doesn't need to be wear one by one. By specifically suing the specialized boards that are designed, using them instead of Arduino and also by using high quality ultrasonic sensors makes and gives faster response which make the device capable of working in crowded places and thus this will be implemented in the future enhancement of this device.

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