IoT based Smart Shoe for Visually Impaired

Mr.M.Sai Sandeep[1] , Ms. H.Tejaswini[2] ,Mr. K.Rajashekar Raju[3] , Ms. E.Sowmya[4] Mr. V.Prem Kumar[5] (UG Student)
Dept: Electrical &Electronics Engineering , AITS (RJPT).

[1]*Assis-prof,Dept of Electrical&ElectronicsEngineering,AITS (RJPT).*
[2] *(UG Student) Dept: Electrical &Electronics Engineering , AITS (RJPT).*
[3] *(UG Student) Dept: Electrical &Electronics Engineering , AITS (RJPT).*
[4] *(UG Student) Dept: Electrical &Electronics Engineering , AITS (RJPT).*
[5] *(UG Student) Dept: Electrical &Electronics Engineering , AITS (RJPT).*

ABSTRACT:

IoT based Smart shoe system for visually impaired is a system made with the help of ultrasonic sensors, GPS and GSM module paired to an Arduino UNO board. Internet of things is all about making physical objects communicate with other objects or even with humans. Sightless people face great difficulty to travel independently. They must depend on others in many aspects of their life. The Major problem is when they walk on the road. With a stick in hand, they cannot detect every obstacle that comes in their way. The Smart shoe design provides a long-term solution for the blind to walk on roads independently. The smart shoe will help the Blind person to reach his destination independently. It is built using IoT Technology in which the shoe will be embedded with various sensors, Microcontroller, and buzzers. The shoe warns the user by making noise with the buzzer when he/she walks in front of an obstacle. The smart shoe communicates and coordinate with each other to ensure that the user does not collide with any obstacle in his way. Visually Impaired People face issues while travelling outdoors, this paper presents a literary review of overcoming such issues by making wearable sensors by planting them on shoes using IOT (Internet of Things). Use of ultrasonic sensors and buzzer to notify the end-user regarding upcoming obstacles.

Keywords: Arduino UNO, IOT, Sensors, Buzzer, GPS and GSM module.

I.INTRODUCTION

Internet of Things: The Internet of Things (IoT) is a system of interconnected computing devices, mechanical and digital machines, objects, and people that are provided with unique identifiers, unique roles, and the ability to transfer data over a network without requiring human-to human or human-to-computer interaction. Sight is considered the most important sense and blind people are observed upon with pity by others. Visually Impaired face difficulties moving and transporting from a place to another whereas normal people don't face such hurdles. Shoes are the basic common thing which the man uses and to provide wearable technology inbuilt with it makes it easier to track their tasks. Arduino is used for controlling whole the process with a GPS Receiver and GSM module. GPS Receiver is used for detecting coordinates of the vehicle, GSM module is used for sending the coordinates to user by SMS. Such technologies have already been implemented for mankind, but it is quite difficult for the Visually Impaired to view or understand what's going on in the surroundings or with the technology they are using. To make the life of Visually Impaired people easy going we

introduced this proposed study where they can track their footstep count, calories count and alert themselves to the surrounding chaos via voice command. We used wearable technologies and the Internet of Things (IOT). Wearable technology is an electronic device that can be worn as accessories like Fitbit, smartwatches and many more. Wearable devices are compact and unobtrusive to the users and one can work with them comfortably. In our proposed work we used Ultrasonic sensors to detect an obstacle. This wearable device is planted on the shoes and a buzzer will go on once it encounters any obstacle. IOT is a recent technology that creates a global network of devices that can communicate and exchanging data with each other through the internet. This technology makes it easier for the user to communicate with the device. The IoT brings the power of the internet, data processing and analytics to the real world of physical objects. For consumers, this means interacting with the global in format ion network without the intermediary of a keyboard and screen; many of their everyday objects and appliances can take instructions from that network with minimal human intervention. These devices gather useful data with the help of various existing technologies and share that data between

other devices. IoT (Internet of Things) technology is now being used for multiple operations including remote operations such as irrigation systems, military purposes, forests, etc. where human interference needs to be minimized. In practice, Internet of Things is an amalgamation of multiple technologies such as cloud technology, which leads to real time analytics, machine learning, commodity sensors, and embedded systems. Sensors, actuators, and other ICs are embedded with electronics, Internet connectivity, and other forms of hardware like LED lights and LED displays. These hardware components such as sensors and actuators interact with others over the Internet and provide the information collectively and can be monitored and controlled remotely with the help of cloud technology.

Smart Shoe: In our country there are almost 40 million blind people among which 1.6 million are children. Blind people must depend on others in many aspects of their life. The Major problem is when they walk on road. With a stick in the hand, they cannot detect every obstacle that comes in their way. The S mart shoe design provides a long - term solution for the blind to walk on roads independently. The smart shoe will help the Blind person to reach his destination independently. It is built using IoT Technology in which the shoe will be embedded with various sensors, Microcontroller, and buzzers. The shoe warns the user by making noise with the buzzer when he/she walks in front of an obstacle. This device has ultrasonic sensors paired to a servo motor in front of the shoe. The ultrasonic sensor detects the obstacles, and the servo motor helps the sensor to rotate to capture maximum coverage in front of the user. The smart shoes are equipped with piezo electric panels beneath the sole of the shoe which helps the user to generate electric current while he/she walks which can be used to charge the batteries. These piezo electric panels also eliminate the battery charging problem which is a common issue in the whole of IoT technology. The distance assigned will be 25cm, so if any object is detected within this range then the buzzer will start buzzing and its intensity will increase as the object comes closer. The data recorded by the ultrasonic sensor is sent to the cloud for further analysis and a machine learning based algorithm can be developed in future to make the system automated when the user is indoors. A guardian can monitor the graph and visuals on everyone in real time by logging into the cloud for future development and addition of other sensors there are a lot of ports left empty which can be made operational.

II. PROPOSED SYSTEM

Primarily, this device utilizes ARDUINO, Ultrasonic Sensor, Flame Sensor and GSM Module for further correspondence. Ultrasonic waves travel faster than the speed of audible sound (i.e., the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound

using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target). To calculate the distance between the sensor and the object, the sensor measures the time it takes between the emissions of the sound by the transmitter to its contact with the receiver. Vibration sensors are sensors used to measure, display, and analyze frequency, displacement, velocity, or acceleration. There are various types, but the most used vibration sensor is accelerometer. It produces electrical signal proportional to acceleration of vibrating component. Vibration sensors respond to repetitive mechanical motion. Most of the sensors are available with their contacts "normally open" type. The contacts close when the sensor vibrates in its designed frequency range. Frequency range and sensitivity are manually adjustable in some of the sensors. Mechanical sensors or switches which respond to displacement are best suited for low frequency vibrations. Piezoelectric sensors are sensitive to acceleration and hence are best suited for high frequency vibrations. With help of GSM module and GPS module location is updated in cloud periodically.

Block Diagram:
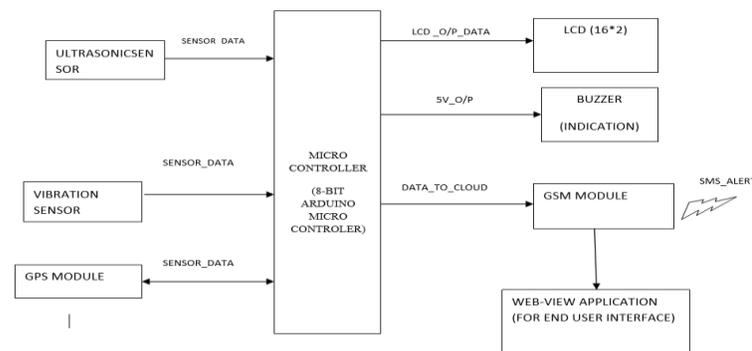
III. RESULT

The distance vs time graph is formed by the ultrasonic sensor in the Thing Speak cloud as on completion of the experiment. The graph represents the distance of objects in front of the person which is sensed by the ultrasonic sensor. Using the signal received when the distance is less than 100cm, the buzzer and Bluetooth module are triggered which warns the user of the oncoming obstacles. Time VS Distance curve is formed in the Thing Speak Cloud by the Smart Shoe Module as shown in figure.
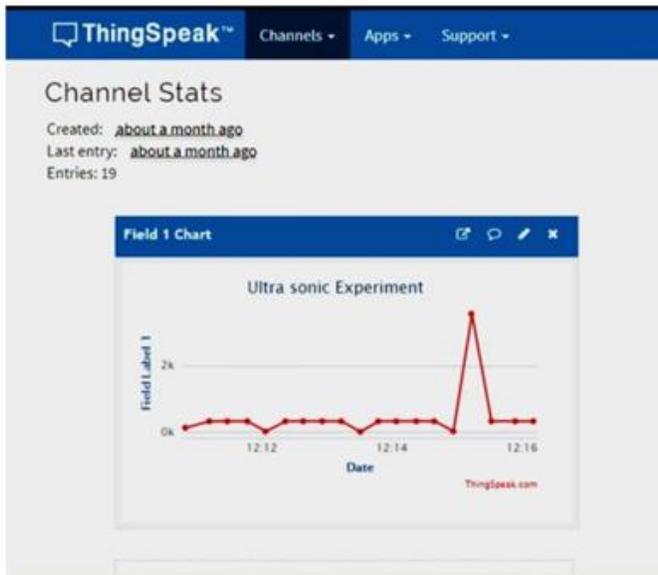
Time VS Distance curve formed in the Thing Speak Cloud by the Smart Shoe Module.

IV. CONCLUSION

In the proposed project, we want to integrate GPS to our system for helping the blind people to get source and destination route information and finds the shortest and the best path with real time co-ordinates and exact position. Arduino is used for controlling whole the process with a GPS Receiver and GSM module. GPS Receiver is used for detecting coordinates of the vehicle, GSM module is used for sending the coordinates to user by SMS. It also enables a guardian to monitor the activity of the user and helps the guardian to assist the user just in case. This system is low cost and user friendly, thus attracting more customers and increasing demand for it. It is convenient for Visually Impaired People as it helps them to be resistant to accidents without relying on others. The Internet has become a part of day-to-day activities. With the advent of technology, we introduced Smart Shoes using IOT and making it available to users anywhere at any time. Basically, we manifested that how wearable sensors can forward data and present it to the users in a desired way.

V.REFERENCES

[1] A. Balleri, K. Woodbridge; K. Chetty, "Frequency -agile non-coherent ultrasound radar for collect ion of micro-Doppler signatures," 2017 IEEE Radar Conference (RADAR).

[2] Feng Lan, GuangtaoZhai, Wei Lin "Lightweight smart glass system with audio aid for visually impaired people", IEEE conference, 2016.

[3] Tan, Bo; Woodbridge, Karl; Chetty, Kevin "A real-time high resolution passive Wi-Fi Doppler-radar and its applications".

[4] Mohan Kumar Ch, Shaik Shahbaz, Manikanta Varma, Tanu Shri, International Journal of Mechanical Engineering and Technology (IJMET) Volume 8, Issue 12, December 2017, pp. 529–535, Article ID: IJMET_08_12_053

[5] R.L.R. Lokesh Babu, D Rambabu, A. Rajesh Naidu, R. D. Prasad, P. Gopi Krishna, IoT Enabled Solar Power Monitoring System, International Journal of Engineering &Technology, 7 (3.12) (2018) 526-530

[6] "BUZZFEET: Blind Man Shoes", Varsha Singh, Savita Sindhu, Romisha Arora Department of Computer Science and Engineering, Manav Rachna International Institute of Research and Studies, Faridabad, India. 2019 International Conference on Machine Learning, Big Data, Cloud and Parallel Computing (Com-IT-Con), India, 14th -16th Feb 2019.

[7] "Human footstep detection using proximity compensation algorithm with accelerometer and time of flight sensor", Rosarium Pila1, Saurabh Rawat2[1] Sr. Manager, [2] Staff Engineer AMG Central Lab, STMicroelectronics Pvt. Ltd. Greater Noida, UP, India.

[8] "Wearable Smart Shoe Technology for Health Fitness using IOT", Sayali Meshram. Student, Department of MCA, YMT College of Management, Institutional Area, Sector -4, Kharghar, Navi Mumbai, Maharashtra 410210.

[9] "IOT Based Wearable Smart Insole", Jochen Wilden, Asti Chandrakar, Atul Ashok and Neeli Prasad. International Technological University, San Jose, CA.

[10] https://www.arduino.cc/en/Guide/ArduinoUnoWiFi