

# Smart Shoe for the Visually Impaired Using IOT

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## ABSTRACT

IOT based Smart shoe system for the blind is a system made with the help of ultrasonic sensors paired to an Arduino UNO board. In our India there are almost 40 million blind people among which 1.6 million are children. Blind people face great difficulty to travel independently. They have to 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 along term solution for the blind to walk on roads independently. It is built using IoT Technology in which the shoe will be embedded with various sensors, Micro controller and buzzers. The shoe warns the user by making noise with the buzzer when he/she walks in front of an obstacle.

**Keywords:** IOT, Arduino UNO, Node MCUESP8266, Ultrasonic sensor.

## I. INTRODUCTION

In our lives, there are many people who are suffering from different diseases or handicap. According to NCBI (1986), 1.5% of the population in Saudi Arabia is blind and another 7.8% have vision difficulties. These people need some help to make their life easier and better. The main goal of Smart Shoe is to help blind people and people who have vision difficulties by introducing a new technology that makes them able to walk independently. The functionality of smart shoe is similar to smart stick i.e. it helps or improves the efficiency of detecting objects. 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. The IOT brings the power of the

internet, data processing and analytics to the real world of physical objects.

An embedded system, often with real-time computing constraints, is a computer system with a dedicated purpose inside a larger mechanical or electrical system. It is also integrated as part of a complete unit, including hardware and mechanical components. Many devices in common use today are powered by embedded systems. The eyes are identified as the soul's window, which is the meaning of the eyes. The eye is a critical part of the human body that helps a person to learn about it. Blindness hampers a person's ability to do their survivor's everyday tasks and earn salaries. According to a recent World Health survey, The Organization (WHO) of India is home to approximately 30 percent of the world's total blind. India's population of visually disabled individuals has now crossed 12 million, which will rise in the coming days. From the numbers, it is clear how big the blindness problem in India.

There are about 40 million people in our country Blind people including 1.6 million children. Blind People need to rely on others for many aspects of their lives life. The main problem is when they walk down the street. With In their hands they can't see all the obstacles Get in the way of them. The design of smart shoes provides a long-term solution for the visually impaired to walk independently on the street. Smart shoes help blind people reach him independent travel destination. Based on IOT technology Various sensors are embedded in the shoes, Microprocessor.

## II. LITERATURE SURVEY

- 1. Smart Shoe for Visually Impaired**  
This paper presents a Shoes which is integrated with ultrasonic sensors, vibration sensors and Bluetooth. These shoes can direct the user to his destination and can alert him about the impending obstacles on the path via the attached vibration sensors. The system needs to be improved as there is no provision for water detection and the components of the shoes can get damaged if it comes in contact with water. Again there is no provision for counting the number of steps to the obstacle.
- 2. Smart Navigational shoes for the blind obstacle detection**  
This paper presents a Shoes with Sensors will detect obstacles and vibrators will vibrate according to direction. IR sensor is utilized for obstacle detection. In the project that the obstacle is distinguished out and about then buzzer will turn ON. Additionally if the water is available on street it will distinguish by water sensor lastly this information will show on LCD. However, this project needs to be modified as there no provision for counting the number of steps to the obstacle.
- 3. Advanced Shoes for blind people**  
Advanced shoes can detect the obstacles within a particular distance with the help of ultrasonic sensors and the vibration sensors will vibrate in the direction of detected obstacle. As this project doesn't have water sensor, the shoes will get damaged in presence of water. The project doesn't have the provision to find the route to destination as there is no attached GPS and also as there is no step counter, the exact position of obstacle cannot be determined.
- 4. Wearable Obstacle Detection System for Visually Impaired People**  
This paper presents an obstacle detection system that can alert the blind people about obstacles while travelling. The proposed system can detect the nearest obstacle via a ultrasonic sensor system and sends back a Vibro-Tactile feedback to inform the user about its location. The main aim of the system is to increase the mobility of visually impaired people by offering new sensing abilities. The system needs to be improved as there is no water sensor and shoes can get damaged in water, also a step counter need to be installed for locating the exact position of obstacle.
- 5. Wearable navigation assistance-a tool for the blind**

This paper describes tool for navigation for visually impaired persons. The system includes a multi-sensory system (comprising stereo vision, acoustic range finding and movement sensors), a mapper, a warning system and a tactile human-machine interface. The goal of the project is to provide an electronic tool for the blind to navigate. The system provides information about the direct surroundings to blind to help him move without collisions. The system needs to be improved as there is no water sensor and shoes can get damaged in water, also a step counter need to be installed for locating the exact position of obstacle.

## III. OBJECTIVE

People with visually impaired faced most of the challenges in the environment. The main objective of this project is to help the blind people to walk on roads independently and also protects them in walking with accidents by producing sound waves when it senses the obstacles.

## IV. EXISTING SYSTEM

**Stick detects obstacles in front of the blind. These solutions still have many disadvantages for example; They can't detect obstacles that are hidden but very dangerous for the blind such as downward stairs, holes etc.**



**Fig1:Smart Stick**

## PROPOSED SYSTEM

The device that we have developed consists of ultrasonic sensors, IR sensor and Temperature sensor for sensing the surrounding environment for obstacles and covering area up to ten meters connected to the Arduino UNO. These are integrated to buzzers which give feedback to the user about the position of the nearest obstacles in range. The idea is to make the user independent and protect him/her from potential obstacles which can be fatal for the user. This method propose a system consisting of smart shoes for the visually impaired people.



**Fig2:Smart Shoe**

The different components along with their intended purpose are discussed below:



**Block Diagram of Proposed System**

**1) Arduino Uno**

Arduino UNO is a low cost, flexible and easy to use programmable open-source microcontroller board that can be integrated into a variety of electronic projects. Arduino UNO is a



**Fig3: Arduino Uno**

**2) Node MCU (ESP8266)**

Node MCU is an Open Source Prototyping Board Design. Node MCU is a low cost and included firmware which runs on the ESP8266 WI-FI SOC shown in fig.



**Fig4:NodeMCU(ESP8266)**

**3) LCD**

An LCD (Liquid Crystal Display) screen is an electronic display module that uses the light modulating properties of liquid crystals. It is used for displaying output in digital formatting LCD is shown in fig.



**Fig5:16\*2LCD**

**4) Ultrasonic Sensor (HC-SR04)**

The ultrasonic sensor works on the principle of SONAR system which is used to determine the distance to an object.



**Fig6:HC-SR04**

**5) IR Sensor**

Infrared sensor is used to detect the slopes. The working principle of an infrared sensor is similar to the object detection sensor.



Fig7: IR sensor

#### 6) DHT 11 (Temperature and Humidity Sensor)

The DHT11 is a commonly used Temperature and humidity sensor. The sensor comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data.



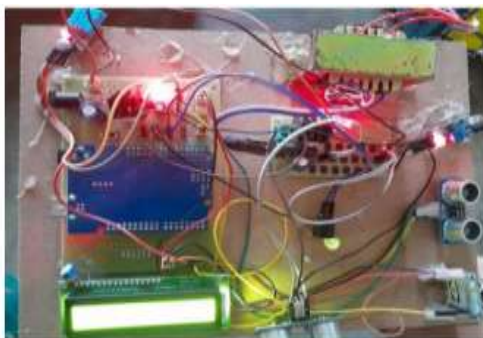
Fig8:DHT11



Fig9:Experimental Setup

As in the figure 9 shows that whenever the sensors sense any hurdles or obstacles it sends the information to the buzzer and lcd through Arduino uno, it displays object detected.

#### RESULT



#### V. CONCLUSION

The Smart Shoe for visually impaired persons is an application of embedded systems where the software and hardware were integrated each other so that to create an user friendly environment for the visually impaired persons. Sensors play a major role in this system where they were the major tools for the user guidance, due to this features it is best equipment for the visually impaired persons. hence this proposed method will solve the consequences faced by the visually impaired people.

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