

IOT BASED SMART SHOES FOR BLIND PEOPLE

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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 shoes 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, Ultrasonic Sensor, Buzzer, Switch.

1. 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 shoes 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.

2. METHODOLOGY

1. Requirement Analysis

The first step involves identifying the specific needs of visually impaired users. The key objectives of the smart shoe system include:

- Detecting obstacles in the user's path
- Providing real-time feedback through vibration or audio alerts
- Enabling GPS tracking for navigation and safety.

2. Hardware Selection

The system integrates multiple electronic components to ensure accurate obstacle detection, navigation assistance, and connectivity. The primary components include:

- **Ultrasonic Sensors:** Detect obstacles at varying distances and alert the user.
- **Vibration Motors:** Provide haptic feedback to inform the user of nearby obstacles.
- **GPS Module:** Tracks the user's location and assists in navigation.

3. System Design

The smart shoe system is designed to integrate these components efficiently while ensuring durability and usability. The system consists of:

- **Sensor Integration:** Ultrasonic sensors are placed at the front and sides of the shoes to detect obstacles from multiple directions.

4. Implementation & Programming

The microcontroller is programmed using languages like C/C++ (Arduino IDE) or MicroPython (ESP32). The implementation includes:

- Writing firmware to process sensor data and trigger alerts
- Configuring GPS and GSM modules for real-time communication
- Developing a mobile application for user interaction and tracking

3. MODELING AND ANALYSIS

1. System Modeling

1.1. Hardware Components:

- **Ultrasonic Sensors:** Detect obstacles in the path and measure distance.
- **IR Sensors:** Identify surface conditions (e.g., stairs, potholes).
- **Vibration Motors:** Provide haptic feedback for alerts.
- **GPS Module:** Tracks real-time location for navigation assistance.
- **Microcontroller (ESP32/Raspberry Pi):** Processes sensor data and communicates via IoT.
- **Bluetooth/Wi-Fi Module:** Enables connectivity with a mobile application.
- **Battery Pack:** Powers the system for portability.

1.2. Software Components:

- **IoT Cloud Platform (AWS IoT, ThingSpeak, Firebase):** Stores and processes navigation data.
- **Mobile Application:** Displays location, routes, and obstacle alerts.
- **Machine Learning Model (Optional):** Predicts user behavior and optimizes feedback.
- **Real-Time Embedded System:** Controls the interaction between sensors and actuators.

2. Functional Analysis

2.1. Data Flow:

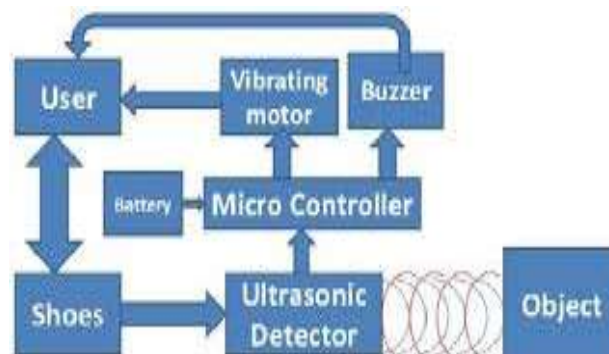


Fig.1

4. RESULTS



Fig.2 Smart Shoes

5. 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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