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IOT Based Smart Shoe for the Visually Impaired With Live Location

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ABSTRACT: Those who are blind or have low vision have a far more difficult time travelling independently. There have been attempts to address the needs of the visually handicapped, but the problems that these solutions have failed to address have persisted. To help the visually impaired with everyday navigation and recognizing persons around them, the project proposes a novel concept for a smart blind shoe equipped with a facial recognition technology. A smart shoe, equipped with many sensors, will be developed as part of this project to assist the visually impaired. The specially-designed shoe can detect potential dangers such as stairs, water, object, and it can then notify the visually impaired individual of these threats through haptic and auditory input. A blind person's loved ones may be immediately notified of any assistance needs with the Stick's "help me" button and the device's Internet of Things (IoT) modem allows for real-time position tracking. The proposed method establishes a connection to a server in the cloud by means of Internet of Things protocols and an Android web application.

KEYWORDS: Arduino UNO, Ultrasonic Sensor, Water Sensor, Shoes, Panic Switch

I. INTRODUCTION

Visually impaired people have a harder time interacting with and perceiving their surroundings. A person with visual impairments has trouble making physical touch with their environment, moving about, and recognizing potential barriers [1]. Therefore, travelling from one place to another might be quite a hassle. Without the help of loved ones or friends, those who are visually impaired would be unable to get from one location to another independently [2][3]. Therefore, they rely on their family for everything, both materially and emotionally. There are a lot of systems out there that assist the visually impaired, but they all have their limits. Researchers have been attempting to comprehend their needs and create a solution to assist them for decades [4]. In further research, the "Smart Stick" proved to be an indispensable tool for the visually impaired, providing them with the necessary information to navigate safely and avoid hazards [5]

A. Objectives

The use of a blind shoe allows the visually impaired to more easily move about in crowded public spaces. The blind individual is required to clear the path ahead of him by adjusting the stick. For a

blind individual, the stick represents information about obstacles and the necessity to modify their course when they encounter them. The purpose of the smart blind shoe is to help the visually impaired individual see more clearly the way ahead. A few of ultrasonic sensors and a camera allow us to do this. With the use of a camera, the cane can identify when a blind person is getting close to a barrier. The purpose of the smart blind shoe is to help the visually impaired individual see more clearly the way ahead. A few of ultrasonic sensors and a camera allow us to do this. With the use of a camera, the cane can identify when a blind person is getting close to a barrier. The data is obtained from an Android device when the impediment is recognized and analyzed.

Over Bluetooth ear buds, the blind individual receives spoken instructions based on the received data, which represents the identified impediment. For the purpose of detecting impediments on each side, the stick is equipped with ultrasonic

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sensors. Because of this, we are able to educate the blind person more effectively on how to safely avoid the barrier. An Arduino UNO is used to manipulate the data of the ultrasonic sensors. Our goal is to develop a more effective and user-friendly navigation system for the visually impaired by utilizing the data collected by these technologies. With the use of this stick, they are able to become more independent. Prioritizing comfort and safety, the system is also economical.

B. System Applications

The proposed work's primary requirements and uses are as follows.

(i) Orientation in indoor as well as outdoor settings is possible with this technology.

(ii) An extra layer of security can be provided by constantly monitoring the whereabouts of a blind individual.

(iii) Uses vibration warnings and verbal output to notify the blind individual of impending danger. Below as a flow chart of system work

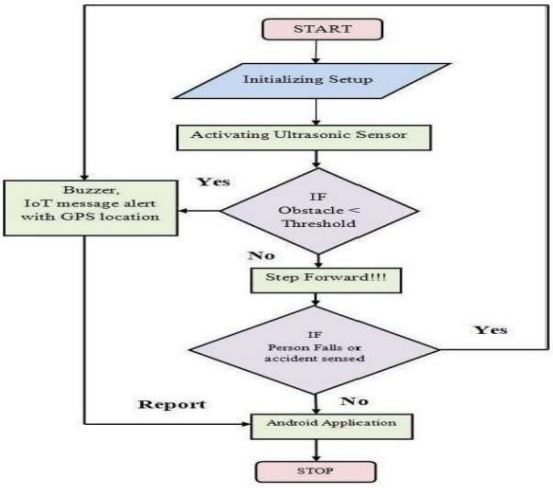

Fig. 1 Work Flow

II. RELATED STUDY

It is extremely difficult for a blind person to locate a lost stick and much more difficult for them to identify the existence of impediments. [6]Although aluminium cane has recently replaced wood cane, the former was the standard material for blind canes. Unfortunately, this walking stick won't be able to help the visually impaired keep their independence as we go farther into the contemporary day and the age of automation. Installing ultrasonic sensors at crucial locations allows the proposed SBS to identify possible obstacles. It also has sensors that may identify potential roadblocks for the user. By communicating with an Arduino-programmed microcontroller, the aforementioned sensors establish a connection to the security system.

The user is notified of obstacles with a vibrator and a buzzer by the alarm system. You may take this battery-operated device with you anywhere you go. The reliability of the equipment's results is assured by its meticulous construction. A smart stick allows the visually impaired to more easily traverse their environment, take part in social events, and become self-sufficient. In both public and private settings, it notifies the user with an automated switch that may be activated by voice command [7]. Using the Vilo Jones algorithm and an Arduino, the suggested solution intends to provide a visually impaired individual with a real-time electronic gadget. A state-of-the-art approach to rapid object recognition, Viola

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Jones can operate at a frame rate of up to fifteen frames per second. It has the capability to detect things in real-time, which was previously unheard of. This apparatus has a built-in camera that can identify both interior and outdoor impediments [8]. Equipped with an ultrasonic sensor, the smart blind shoe can determine the distances between various objects and itself [9]. When an impediment in the path of the smart blind shoe comes within range, the microcontroller will activate the speaker or earphones attached to the stick to play the name of the thing. Because of its small weight and excellent detecting capabilities, the smart blind shoe is a joy to travel with [10]. The range, however, is constrained by its own size. As a result of using this device, people who are visually impaired are able to move about more freely, travel more easily, and achieve more physical and financial independence. To those who are visually blind, an easy-to-use navigational gadget is like a guide who fills them in on their surroundings.

III. METHODOLOGY

Existing system

Sticks are provided to blind as an aid to navigation. Blind people can find the obstacles on the path using sticks but always need a support for finding the path. They always rely on someone for navigation, thus Sticks are not effective. Another option is to provide blind with the guide dogs. Guide dogs are specially trained dogs for assisting the blind. These dogs are trained as per the owner requirement. However, everyone can't afford Guide dogs as they are very expensive.

Proposed system

The outline depends on an exceptional wearable gadget in light of the Arduino board which can be worn like a material for blinds or a band. This gadget is furnished with five ultrasonic sensors, comprising five modules which are associated with the diverse parts of the body. Among them, two for both the shoulders, another two for both the knees, and one for the hand.

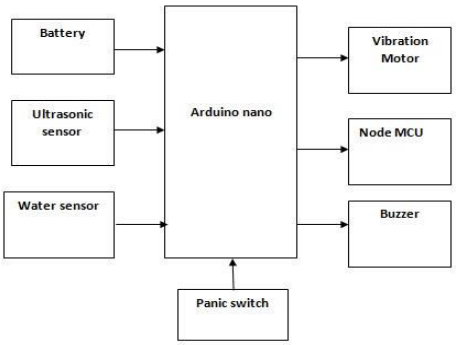

Fig.2 Block Diagram

There are two parts to this system, and they are the blind shoe and the head unit. Utilizing an ultrasonic sensor, we outfit the blind stick. Objects at a certain distance can be located with its help for the visually impaired. To determine how deep the blind walking region is, a conductivity sensor is utilized. In this apparatus, an Arduino Nano controller is employed. Figure 2 shows the perspective of the Arduino Nano controller used in the suggested strategy.

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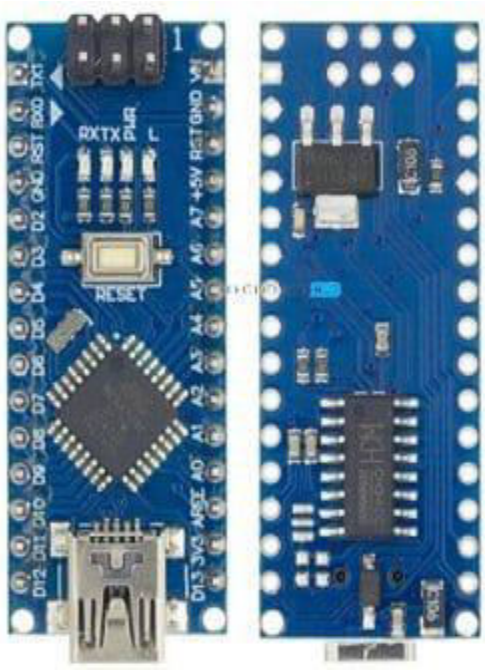

Fig.3 Arduino nano

The following figure, Fig-3 represents the view of Water Identification Sensor utilized over the proposed approach and the following figure, Fig-5 represents the view of Ultrasonic Sensor.

Fig.4 Water Identification Sensor

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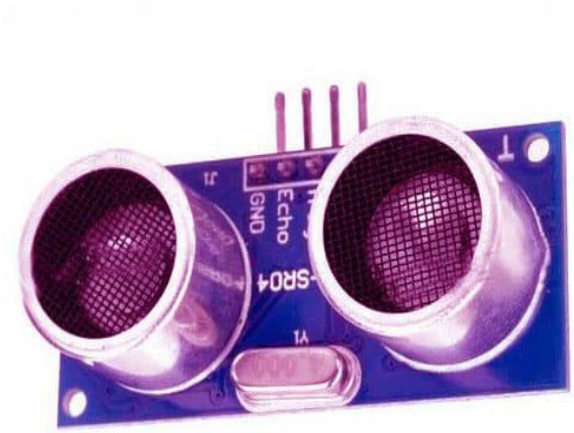

Fig.5 Ultrasonic Sensor

The following figures, Fig-6, Fig-7 and Fig-8 represent the view of Vibration Motor, Voice board and ESP-32 Cam Module utilized over the proposed approach.

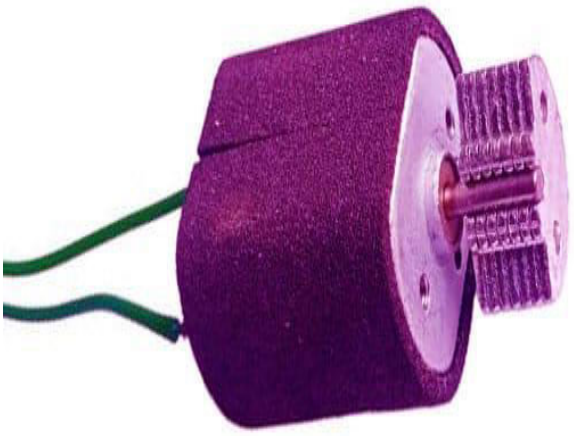

Fig.6 Vibration Motor

An auditory signalling tool is a buzzer. There are many different buzzer kinds, and here we use a 5V passive buzzer that can be mechanical, electromechanical, or piezoelectric. (piezo for short). Buzzers and beepers are frequently used as alarm clocks, timers, and to validate user input like a mouse click or keystroke. An electromagnetic squeaker called a passive buzzer is used to produce sound messages with various frequencies. Instead of automatically producing a tone, it needs an AC signal, where a changing input signal creates the sound. Connect one pin of this 5 volt buzzer to ground and the other to a microcontroller that has been set up to produce a square wave or a timer IC.

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Fig.7 Buzzer

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IV. RESULTS AND DISCUSSIONS

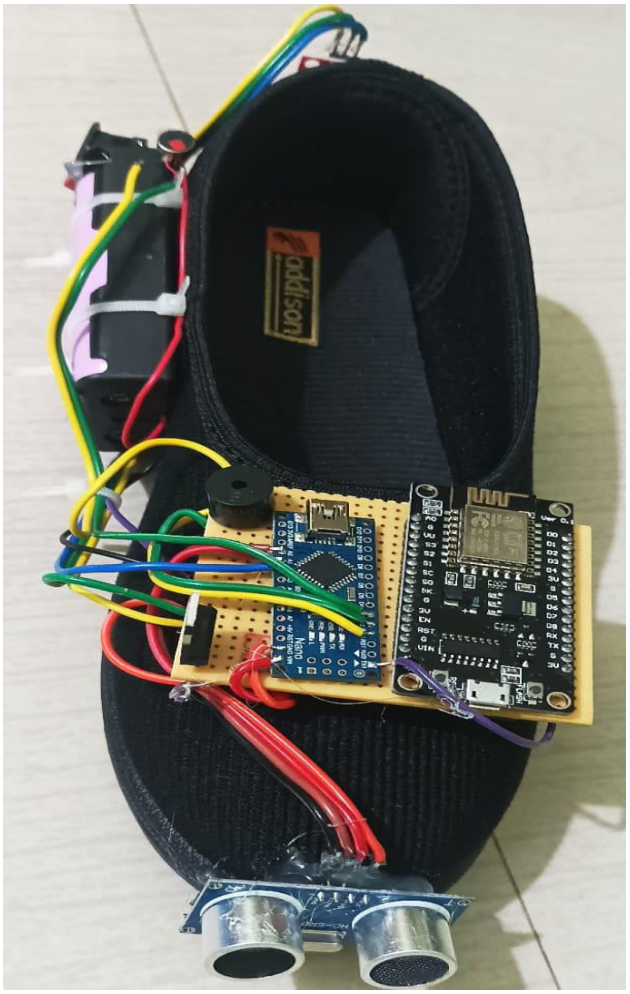

Fig.8 Proposed Hardware Prototypical Model

The following figures, Fig-10 and Fig-11 represents the view of proposed Internet of Things (IoT) login portal and the view of Location Details obtained from the hardware unit.

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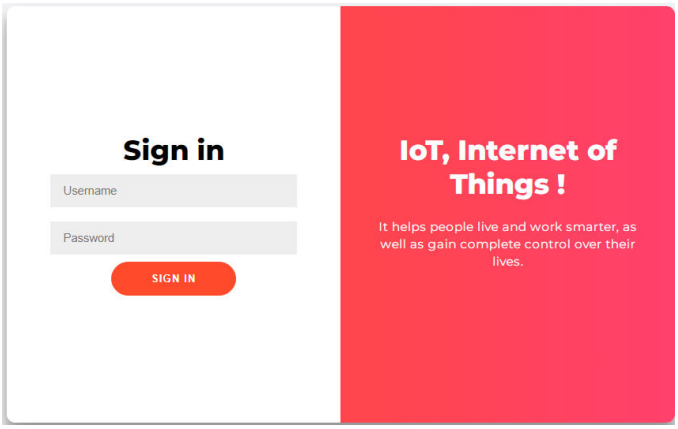

Fig.9 IoT Login Portal

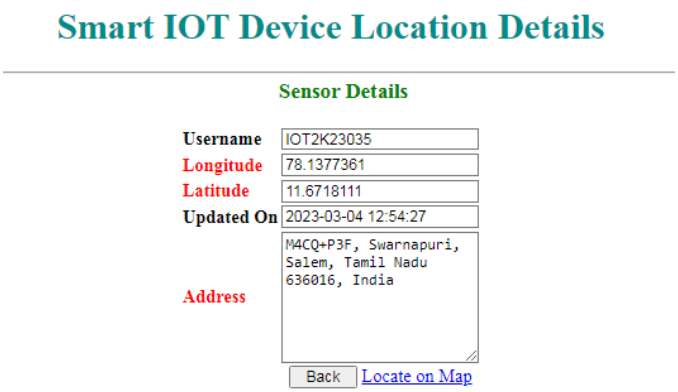

Fig.10 Location Details

CONCLUSION AND FUTURE SCOPE

The main focus of this paper is to implement various technology in the smart shoes for visually impaired people. The smart shoes use the most reliable source, light, to communicate data to the visually impaired. In future work we will be focused on the enhancing the better performance of the system and to reducing the load on the users.

V.FUTURE SCOPE

This work can be improved in many ways to increase usefulness and reduce false alarms. For instance, other sensors that increase measurement accuracy as well as sensors that monitor a patient's vital signs after a fall, like heart rate sensors, are both highly suggested. Additionally, it is highly desirable to test this prototype on a bigger population in order to pinpoint any system flaws and improve performance in later versions. Some of these gadgets can also output sound or speech, but doing so runs the risk of obstructing outside noises. This involves speaking through speakers to warn users of the presence and proximity of obstacles as well as wet floors.

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