Savvy Shoes for Visually Challenged

Geetha Ramani J, Swapna S, Selwyn Paul P, Sowmiya A

Abstract: This paper clarifies about the smart assistive shoes for visually-impaired individuals. Our undertaking expects to build up a gadget that would fill in as a directing help to them. It centers around planning a gadget for visual weakened (or visually impaired) individuals that would assist them with traveling freely and furthermore without any difficulty. One of the biggest problems that the visually impaired ones face is traveling. Because they walk in the indoors and outdoors which they are not aware of the data about the obstacles around them. The venture comprises of the smart shoes that alarms visually impaired individuals over hindrances dividing their ways and could help them in travelling with less crash. We will include a vibration framework which will demonstrate them about the area of hindrance and the item is predominantly founded on sensor innovation Sensors are used in order to find the hindrance. Arduino UNO is used to control the entire system. So the system will be more effective as well as simple. It mainly targets the visually challenged people all over the world.

Keywords: blind indication, cost efficient, savvy shoes, sensor innovation.

I. INTRODUCTION

Individuals with visual weaknesses face special difficulties in this evolving condition. They are visually challenged yet are intellectually solid. So as to cause them progressively more grounded we designed this smart assistive shoes with the goal that they don't have to depend on others for their day by day life schedule. Two-third of visually impaired individuals' visual deficiency can be restored. However, greater part of them need more cash for the activity. And furthermore the other 33% of visually impaired individuals' visual deficiency can't be dealt with or relieved by medical procedures. So they go for some other strengthening. The major beneficial strategies are having a guide dog or the cane. The guide dog or cane may cause discomforts to the blind people as they have to stretch their hands all over the day. The other advancements and medical procedures require more cash. In order to help the visually challenged people (the people with special talents) to move freely without depending upon others. In this paper, we have talked about the gadget which is intended to support the visually challenged individuals. Our multifunctional shoes depend on Arduino with ultrasonic sensors and moisture sensor. Our stick is likewise structured utilizing Arduino with ultrasonic sensor.

There will be a vibration framework and a buzzer which will show the user about the hindrances in their manner. Fig. 1. Shows that there is a gradual increase in the blind rate of our nation. It is our responsibility to help the people with visual impairments.

Smart assistive navigation devices for visually impaired people [1] uses IR sensors for the detection of the obstacles. Whenever the sensor detects an obstacle, the colour of the LED in the shoes change their colour from red to green and the caution message will be delivered in terms of voice via bluetooth through the wearable devices. Whenever a blind person is in a place full of noise, he could not able to hear the message delivered by the wearable devices. In order to solve this problem, we have added a vibration framework in our savvy shoes which will vibrate and make the blind person alert.
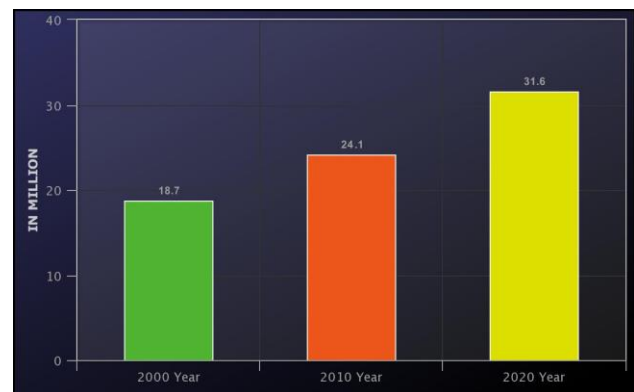

Fig. 1.Blind rate in India

Intelligent walker with obstacle detection technology for visually challenged people [2] uses ultrasonic sensor and passive infrared sensor in the walking stick and it delivers the caution message through buzzer. Whenever the blind person is in a crowdy area full of sound, he/she could not hear the sound and our main motto is to make the blind person more comfortable. Talking a walking stick in their hands all the day may not be comfortable to them. Because, they are unable to stretch their hands all over the day. So we have designed the savvy shoes which may not cause any discomforts since they keep walking as usual.

Smart glove for blind and deaf people [6] uses Arduino micro R3 and bluetooth module with braille system that converts the braille message to text and text to braille message. But there are some functional requirements such as blind person should know to read and write braille and the normal user should know to read and write normal messages. So communication with a blind can be made easily with this device but they need to move around freely without the help of others. For that purpose, our project paves a way.

II. METHODOLOGY

The problems of visually challenged people are incurable blindness, high cost for operation, depending others for travelling and misled by guide dogs. In order to solve this problems we have decided to design the savvy shoes that will indicate them about the hindrances on their way. We studied many components and finally decided to move with sensor innovation. Ultrasonic sensor and water sensor are used in our savvy shoes. Whenever an obstacle is found, the vibration system will indicate the blind person about the obstacle in their manner.

Fig. 2.Work flow of the system

III. ULTRASONIC SENSOR AND WATER SENSOR

Two sensors are used. A sensor in each shoes. The function of the ultrasonic sensor is to find if there is any obstacle in front of the blind person. The trigger and echo pin of the ultrasonic sensor is connected to the digital pin 8 and 9 of the microcontroller. A water sensor is also fixed in order to find if there is water on their way. It is connected to the digital pin 9 of the microcontroller. The implementation of these two sensors is the heart of this project. These sensors are cost efficient and they don't require frequent maintenance.

Fig. 3.Ultrasonic sensor and water sensor.

**TABLE I.   Classification Of Visual Impairments And Blindness**

Disease	Rate
Cataract	37.5
Glaucoma	18.7
Refractive error	12.5
Corneal opacity	12.5
Optic atophy	9.4
Pterygium	9.4

IV. ARDUINO UNO

Fig. 4. Arduino UNO

Arduino UNO is used to process the details given by the ultrasonic sensors and water sensor. It is programmed to trigger the vibration motor module once the obstacle is detected by the ultrasonic and water sensors. The distance of obstacle detection is defined while programming the microcontroller for ultrasonic sensor.
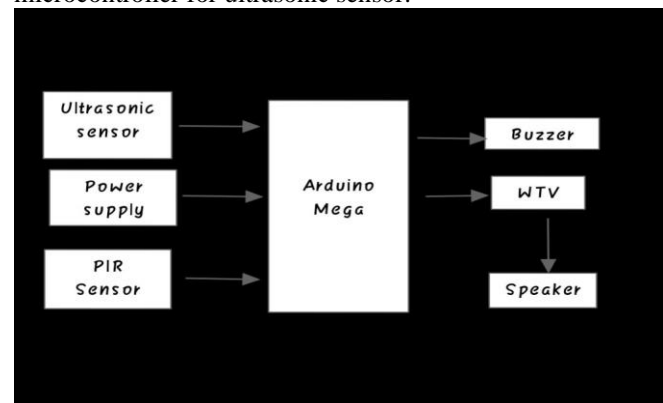
V. VIBRATION MOTOR MODULE

Vibration motor module is a small built-in vibration motor module after inputting 5V to the module we can control it to be in ON/OFF state or vibration intensity. In our project this is used as an output part. Whenever an object or water is detected by the sensors, they give information to the Arduino UNO and make the vibration motor module vibrate and alert the blind person about the obstacle in their manner. Here the positive terminal of the module is connected to digital pin 3 and 4 of microcontroller and the negative is grounded.

Fig. 5. Vibration motor module

VI. POWER SUPPLY

A 9v volt rechargeable battery with 600mah power is used in this gadget as power supply to the microcontroller to run. It can be recharged fully and can be used for minimum 3 hours to maximum 4 hours.

VII. EXISTING SYSTEM

With an aim to help the visually challenged people the walker is fixed with Arduino Mega connected with ultrasonic sensor and passive infrared sensor and given a power supply. Whenever a hinderance is detected the buzzer connected with the Arduino mega will make sound. RF transmitter and receiver are also fixed. The major advantage of this project is it can detect obstacles upto 3m. The major disadvantage is the walker can't be kept in their hand and stretch their hands all over the day. And also this system will deliver the caution message by sound. It cannot be heard by the blind person when he is in a busy area or whenever a blind-deaf uses this device.
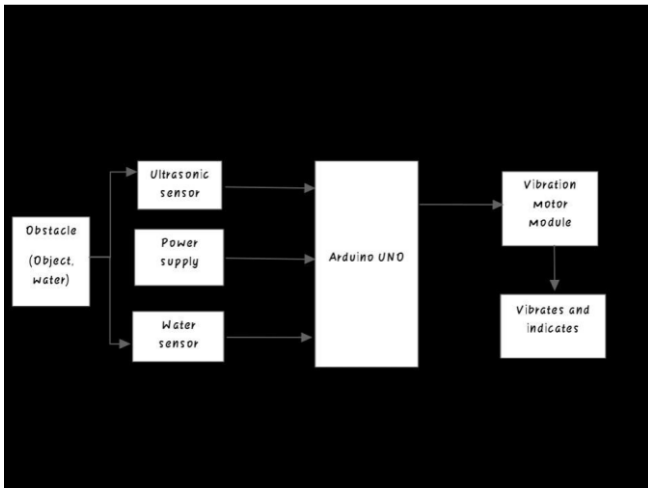

Fig. 7. Proposed System Block Diagram.

VIII. PROPOSED SYSTEM

This savvy shoes involves the sensor technology that is ultrasonic sensor and water sensor. These sensors are connected to the Arduino UNO and the respective program for these sensors are made. Then the vibration motor module is connected to the Arduino UNO and power supply is given then. Whenever an obstacle is in front of the blind person (in front of the shoes), the ultrasonic sensor detects the obstacle and gives information to the vibration motor module and the vibration motor vibrates and alerts the blind person. Whenever there is water in the floor, the water sensor senses it and informs the system. The system alerts the blind person by vibration.

IX. RESULT AND DISCUSSION

Table II shows the comparison of certain factors between existing and proposed system. The proposed system is more efficient in cost. Cost is the major factor that affects the blind people. So this will be a better solution to their problem. The blind person will be more comfortable with this device. It is very easy to use and the user doesn't need any prior knowledge.

TABLE II. Comparison Between Proposed and Existing Method

Characteristics	Existing system	Proposed system
Cost efficient	No	Yes
Easy to use (without prior knowledge)	Yes	Yes
Detection of water	No	Yes

45% of blind people are affected by cataract and are old aged. There are a lot of chances where they may slipped in water just because they are not stable. In order to avoid this, water sensor is added to our system that will indicate when water is detected on the floor. Fig.8. and [7] describes the education level of the visually challenged people in our nation. [6] involves braille system which helps the people to translate text to braille. [3] involves a braille system based keyboard for smartphones specially for blind person. This helps them to use smartphones for their needs. So, In few days there will be no differentiations between normal users and blind persons.

X. CONCLUSION

People with visual impairments can easily use our savvy shoes. The major problem with the previous project is the blind person cannot stretch his hands all over the day. So we have made it available in shoes. The details from ultrasonic sensor and water sensor are detected by the microcontroller and it triggers the buzzer and it makes the blind person to know about the obstacle on his way.

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