

Smart Shoes – An Aid To Blind People

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Abstract: Power of sight is considered as the most important of all senses. Blind people are often dependent on others for their daily tour. Over time several advancements in technology has helped in increasing entertainment and comfort for the blind. "Smart shoe" can assist the blind on their daily routine and can act as a comfortable and safe companion on their journey. Common assistances provided earlier for the blind include walking sticks or guide dogs. It includes ultrasonic sensors with a step counter that can alert the person of the impending obstacles. The technology results can improve their ways of growth and can drive them to lead their independent lives.

Keywords: Visually impaired, Navigation, Step counter, Sensors, obstacles

I. INTRODUCTION

Blindness is a term used to signify visual impairment . The loss of vision associated with both the eyes can be total or partial. In India a person with vision 6/6 after adequate spectacle correction is considered blind as per National Programme for Control of Blindness (NPCB). As per WHO almost above 49 million people are blind. Over the decades there has been an increase in the count of blind people due to cataract, refractive errors, glaucoma etc. More technological advancements and research have been working on a cure for most of the avoidable or preventable blindness which may be caused due to cell damage in the eye. It focuses on design a smart shoe which will be able to detect and alert the blind people of the incoming obstacles in the route and also provide information regarding the exact distance and direction of the obstacle from the user. The shoe is connected via an android application to the user to provide an audio output through speakers or headphones. The shoe consists of ultrasonic sensors to detect any obstacle in the path and a step counter that can count the number of steps to the point. We believe that this smart shoe will help the blind people to have a more user friendly experience and a much cooler assistance.

II. LITERATURE REVIEW

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.[1]

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 stereoscopic sonar 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 a 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. 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.

IV. PROPOSED SYSTEM

The proposed system consists of the following sections

- Sensor
- Power supply
- Controlling unit
- Output section

Sensor- This paper includes ultrasonic sensors, pedometer sensor module, water sensor. The ultrasonic sensors will detect the obstacle within 3m. The water sensor will detect the presence of water, step counter will count the number of steps to the obstacle.

Power Supply- A DC power supply of 12V is used in Smart shoes.

Controlling unit- Arduino Uno is used in this system as Arduino boards are inexpensive, assembly of the boards are easy and can run on various operating systems.

Output Section- It consists of Buzzers and Vibration motors. An android app is connected at the output section through a Bluetooth module which gives speech output to the user.

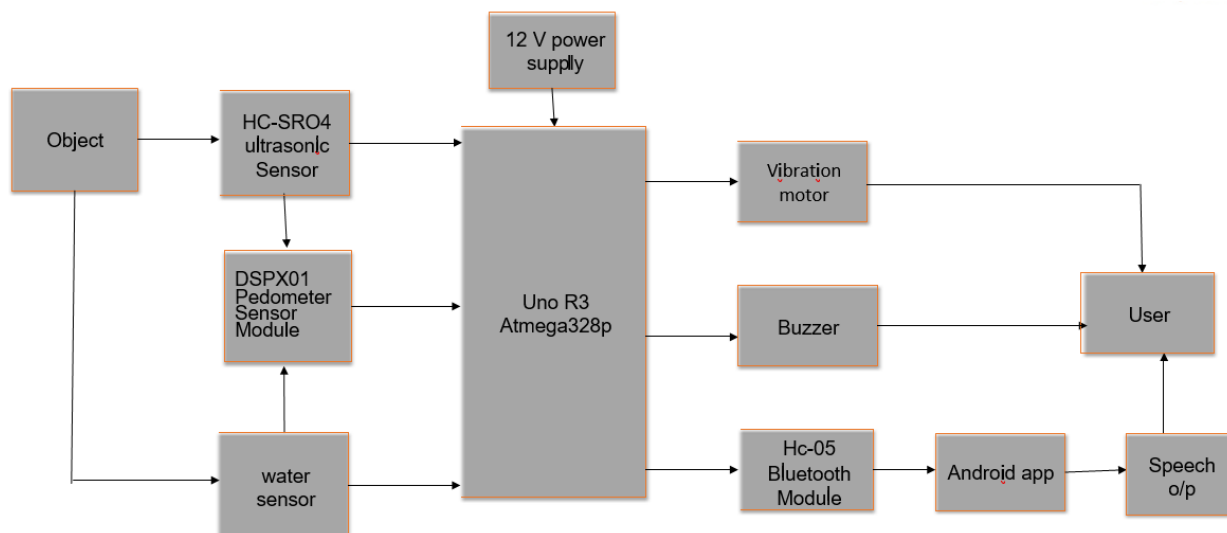


Fig: Block diagram



An android application is developed which is integrated with smart shoes. User will enter the destination in the phone and the route map is displayed to users. In our design, we use ultrasonic sensors to detect the nearby obstacle, it can detect the obstacle within 3m range, the buzzer will vibrate on obstacle detection and step counter will count the number of steps to the obstacle. According to the path of obstacle, Vibrators will vibrate along that path. If the obstacle is on right side, the vibrator on right will vibrate, if it is on left, the left vibrator will vibrate. If water is detected by the water sensor, then the buzzer will beep indicating the presence of water. Bluetooth connection is provided through which mobile and electronic part can be connected.

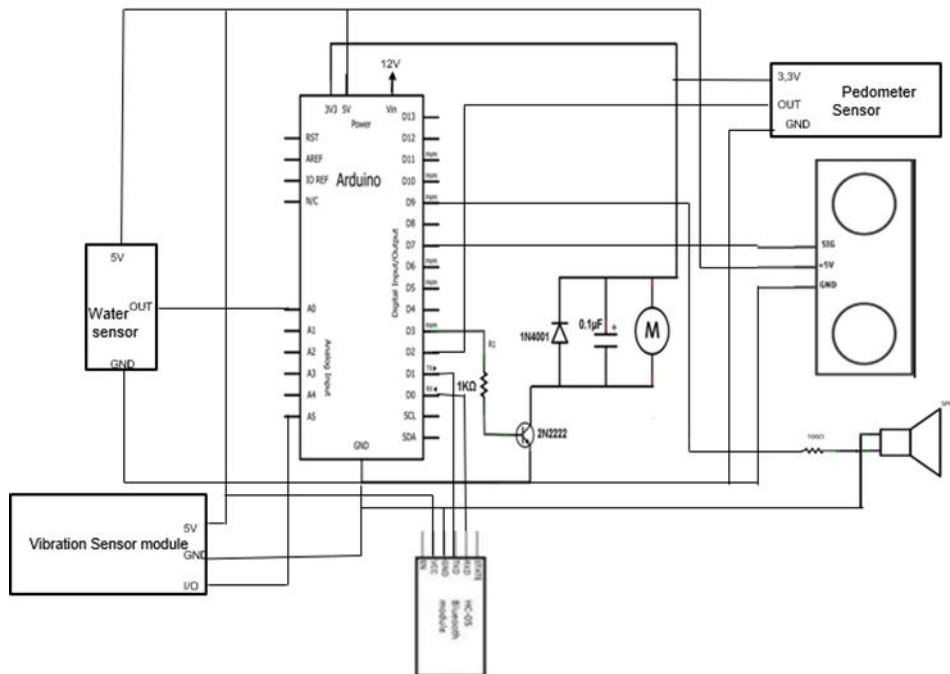


Fig: Circuit diagram



Fig: 3 D model of proposed system

V. ADVANTAGES

1. It is an user friendly system
2. Smart shoes can locate the exact position of obstacle
3. It provides navigation assistance while travelling
4. It helps the user to reach his destination without getting distracted

**VI. CONCLUSION**

In India most of the people are facing the problem of visual impairment which are preventing them to become independent. The smart shoes help the visually impaired to get rid of cane and travel independently. It is accurate in detecting the obstacle and alerting the visually impaired person find their way by passing every obstacle that comes on their way to the destination. The shoes are designed such that it is comfortable and user friendly. The shoes can further be improved by adding piezoelectric material to the sole of the shoe such that when the person walks energy is generated which can be used for the working of the shoe thus eliminating the use of battery.

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