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Smart Stick for Blind Person using Arduino Uno

Rutvik B Nikam, Divyanshu M Bochara, Prajwal R Sawle, DR. D.V. Rojatkhar

Department of Electronics and Telecommunications Engineering, Government College of Engineering, Amravati, Maharashtra, India

ABSTRACT: This project uses the concept of Arduino, Ultrasonic sensor, GPS, and GSM module and creates the stick which makes the daily life of a blind person easy. Research done by World Health Organization (WHO) says 30 million people are permanently blind and 2.85 million people with vision impairment. If you notice them, you can very well know about they can't walk without the help of others. The person has to ask the guardian to walk them to their destination. They face too much difficulty in their life. But now using the smart stick the person can walk more confidently because these sticks detect the object surrounding the person and give a response to the user or through command. If any kind of emergency occurs then after the user press the emergency button then coordinates of the same are shared through the text with the relatives.

KEYWORDS: Ultrasonic sensor, Arduino UNO, GSM & GPS module, Voice Module

1. INTRODUCTION

According to the WHO if visual acuity is worse than 6/12 to 6/18 considered to be mild distance vision impairment (DVI), if visual acuity is worse than 6/18 to 6/60 considered to be moderate DVI, if visual acuity is worse than 6/18 to 6/60 considered to be severe DVI, and if it is worse than 3/60 then person considered to be the blind person. One survey is done by WHO in 2011, which concluded that about 1 percent of the human population enables to see clearly and among them, about 10 percent are totally blind, and other are with low vision. The main problem faced by blind people is how to reach a destination because without the help they might encounter some dangerous situations. So such people always require help from others.

The smart stick uses the applications of Arduino UNO. It detects the obstacle from the right, left, and ahead. The main objective of this project is to improve their daily life activities and alert them about the obstacles before the collision and ease the suffering they are having. The obstacles detection is done by a warning signal, a Voice module used in the circuit that outputs the voice commands with reference to the direction of the object, for example, if the object is on the Left then it will say 'Turn Right', if the object is detected at right then it will output the command like "Turn Left", and if object detected ahead then the output of voice module will be like "Object Ahead".

The Blind person is walking to the destination. In between, he has some emergency situation then the person can press the emergency button which is already present on the smart stick then through the contact number of relatives that are already saved in Arduino Uno code they get to know about the blind person who is in some kind of emergency and he needs the help. Through the location coordination of blind person received from SMS caretaker able track and go to the shared location.

II. LITERATURE REVIEW

There are various projects to help a blind person to improve their daily life activities. So it is an interest of various researchers. A number of researchers had helped in this field and so many research papers or journals have been published. Till now using the concept of ultrasonic sensor, a blind person is able to detect the object surrounding him through voice commands or vibrations and avoid a hazardous situation. But what if the blind person is in danger and there is no one to help him or he doesn't have any means to contact anyone.

Using the concept of GPS and GSM module now the user will press the emergency button then the GPS will locate the user. Through the GSM the guardian or relative gets the emergency SMS which contains the longitude and latitude acquired from GPS then using the coordinate's caretaker can track the blind person.

III. IMPLEMENTATION

The proposed system provides improvements to the existing system by adding the location sharing feature, and voice command for navigation. It is easy to handle, a user-friendly device, and affordable to all persons.

A. Block Diagram

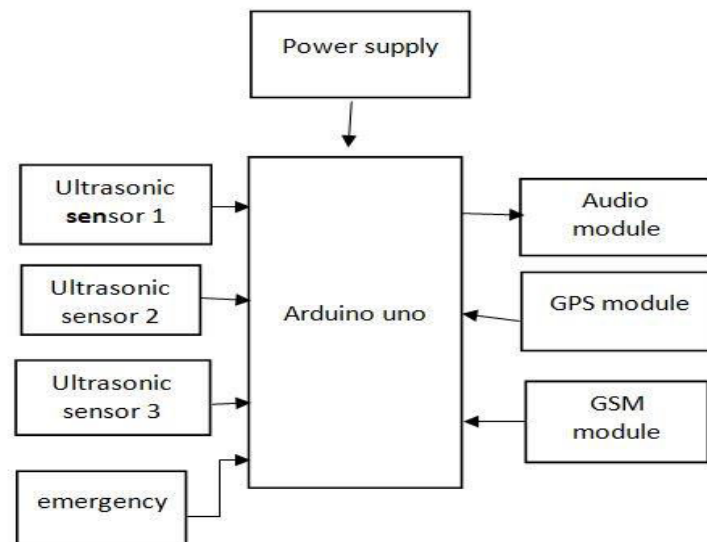


Figure 1. Block Diagram of Smart Stick

As shown in figure 1, requires the following Hardware components to implement the system:

- Arduino UNO
- Ultrasonic sensor
- Audio module
- GPS module
- Switch

Software Used

- Arduino IDE
- Embedded C

B. Working

The working of the Smart stick is quite simple and very user-friendly. All the connections are made with reference to the Arduino codes port allocation. The device is powered by a power supply. As shown in fig 2 all GSM, GPS, and Arduino lights will blink which means all devices got powered. The sim card inserted in the GSM if the sim card got the connection with the network then the status led will blink with a delay of a few seconds. In the voice module first, the switch of Voice module set on the recording mode, the sounds recorded in it and later on these sounds were activated when specific conditions met which we know through the program of Arduino like in our smart stick we are using the three ultrasonic sensors, if the object is detected by the front ultrasonic sensor then sound command of Object Ahead produces, for the left sensor we get the turn right command and for the right sensor turn left. The distance of the sensor can be set manually for now keeping it to the 10cm for all sensors.

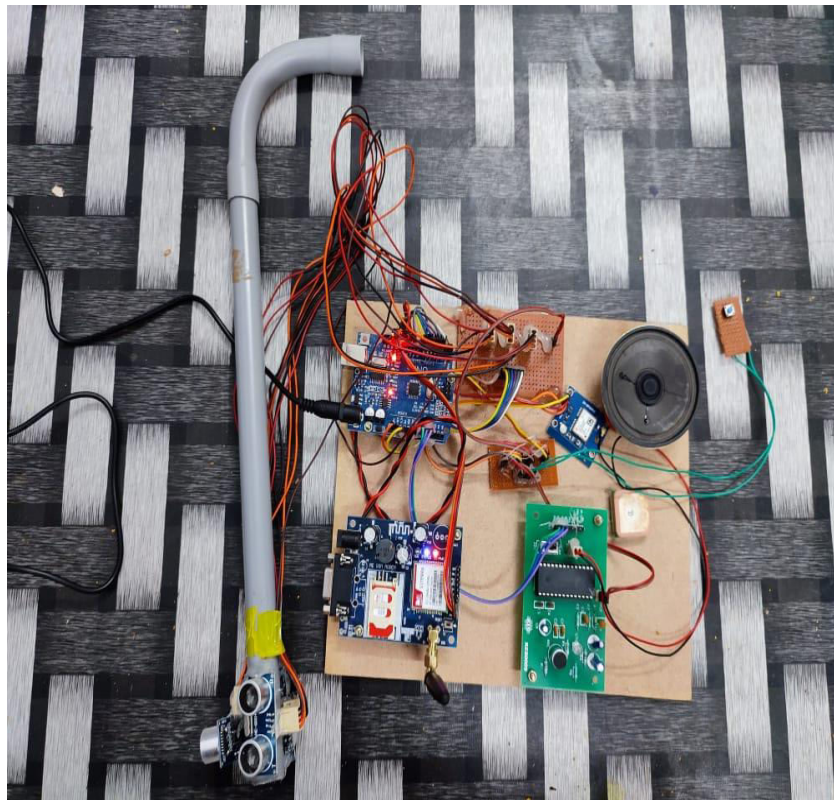


Figure 2. Photo of Working module

Smart stick one more feature is an emergency button, if a blind person is stuck in any kind of emergency then after pressing the emergency button the Arduino send the signal to the GPS for the longitude and latitude of a user location then both location combines together in Arduino, sent to the persons whose number is saved in as an emergency contact, that person receives text message contents location coordination. The format of the text message is shown in fig 3.

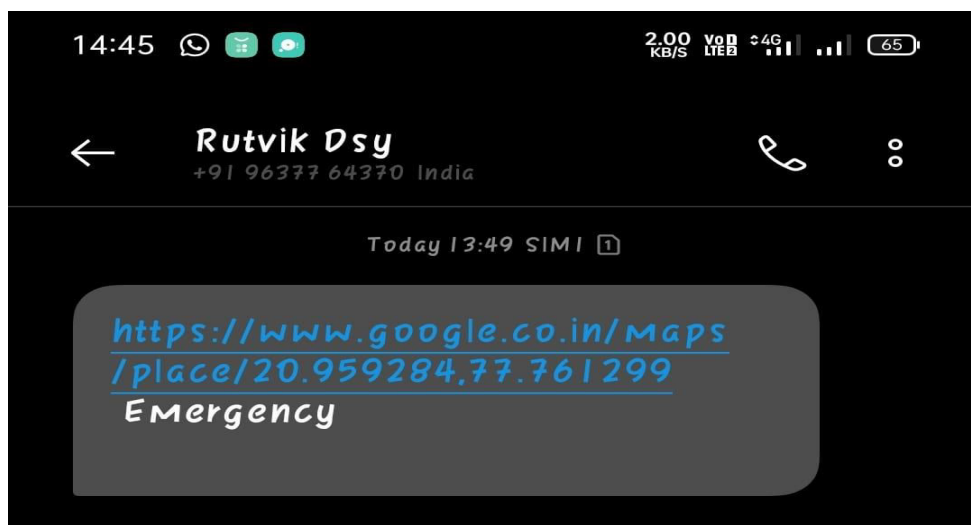


Figure 3. Text message of User location

As we can see in above figure, GSM has sim card with number 9637764370. Once the emergency switch pressed, longitude and latitude of user location shared with the saved number in this case that is 7350208089.



IV. CONCLUSION AND FUTURE WORK

We are trying to help Blind people to be normal in their daily activities, do each work with ease like walking. So we design and implement the smart stick device for the blind and has been a huge success. As not only the user can walk with fewer worries but also he can call for help whenever he needs it. Using the new concept like IoT or any other technologies we might enhance it further and can contribute to a better society, like we can do the continuous monitoring of blind person for 24*7 hours, or/and like object recognition and so many things we can try in future.

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