

Arduino Based Smart Blind System With GSM and GPS

Dr. Prof. Mrs. S. R. Mahadik¹, Patil Vaishnavi Balasaheb²,

Sargar Rachna Arun³, Ketgale Pranjali Satish⁴

(Department Of Electronics and Telecommunication Engineering
Dr. J.J. Magdum College Of Engineering, Jaysingpur)

Abstract

This paper presents a model of Arduino based blind stick using GPS and GSM system. Blind stick is an innovative stick designed for visually disabled people for improved navigation. Generally, blind people use a traditional cane or stick for moving from one place to another place. Blind smart stick help them to detect places and to avoid obstacles. In this paper, it consists of Arduino, GSM module, GPS module, ultrasonic sensor, Vibration sensor, and buzzer, etc. This system is intended to provide overall measures object detection and real time assistance via GPS. This project aims at the help blind people to find obstacle free path.

Keywords:- Arduino Uno, Ultrasonic sensor, Vibration sensor, GPS module and GSM module, Buzzer, Stick etc.

1. INTRODUCTION

At Presently, blind people use a white stick as a tool for direction, when they move or walk an unfamiliar surrounding blind person might get confused. The main problem of blind people is how to navigate their way to wherever they want to go. Such people need assistance from others with good eyesight. As described by World Health Organisation, 10% of the visually impaired have no functional eyesight at all to help them move around without assistance and safely[1]. This study proposes a new technique for designing a smart stick to help visually impaired people that will provide them navigation. Our approach modified this cane or stick with some electronics components and sensors, the electronic devices are designed to solve such issues. With the rapid advances of modern technology both in hardware and software it has become easier to provide intelligent navigation system to the visually impaired.

The visually impaired people have to completely depend on other people to reach destination. So here we develop a smart stick for blind people to detect an obstacle or object using ultrasonic sensor. This tool which we can serve as a blind stick being more efficient and helpful than the conventional one. However in compare with other technologies many blind systems use ultrasonic sensor the reason behind is it has immunity to the environmental noise. Ultrasonic sensors have the capacity to detect any obstacle within the distance range of 2 cm-450 cm[2]. Therefore whenever there is an obstacle in this range it will alert the user.

The blind person can also send an emergency message to relatives through a GSM module for an emergency button. GPS module is used to know the current location where the blind person is present. GPS modules are used to enable a blind person to contact a mobile number that is stored in the microcontroller (Arduino) in case of any emergency. The model is aimed to be a cost-effective and user-friendly device.

After going to all the previous versions of blind sticks we have made so many extensions and came to a conclusion: The main working of the project is detecting an object or obstacle for a blind person. Our stick is designed to consist of a 5V power supply to the entire circuit so, we use an ultrasonic sensor in the circuit for detecting an object. So basically we use three ultrasonic sensors: one on the left, one on the right, and another in the front at some range detection respectively. Buzzer and vibrator are also integrated for the alert system. The working is like this: first when the object is detected through an ultrasonic sensor because an ultrasonic sensor can transmit and receive ultrasonic waves continuously so, when the object is near the ultrasonic wave it can transmit the wave to Arduino (microcontroller) and Arduino can pass a signal to the buzzer and buzzer can ring and parallelly a vibration motor will start vibrating the stick. Thus the user will be alerted and then act accordingly.

Apart from these sensors, we have used a GSM module and a GPS module to make the stick smart with the advancement in the feature. GPS is used to know the exact location of the user and this location can be sent as a message in any dangerous situation. The GSM module sends the message of the location to their family or guardian in an emergency case.

2. METHDOLOGY

After going to all the previous version of blind stick we have made so many extension and came to conclusion: The main working of project is detecting object or obstacle for blind person. Our stick is design to consist of 5v power supply to the entire circuit so, we use ultrasonic sensor in circuit for detecting object. So basically we use three ultrasonic sensor one left, one is right and another is front at some range detection respectively. Buzzer and vibrator are also integrated for alter system.

The working is like first when the object is detected through ultrasonic sensor because ultrasonic sensor can transmitting and reciving ultrasonic wave continuously so, when the object near ultrasonic wave it can transmit the wave to Arduino (microcontroller) and Arduino can pass signal to buzzer and buzzer can ring and parallelly vibration motor will start vibrating stick. Thus user will be alerted and then act accordingly.

Apart from these sensor, we have use GSM module and GPS module to make stick smart with the advancement in the feature. GPS is knowing the exact location of the user and these location can send a message if at any dangerous situation. GSM module send the message of the location to their family or guardian if at an hazardous case.

HARDWARE:

BLOCK DIAGRAM

The working behind of block diagram of this blind stick system is shown in Figure 1., it is used for special purpose as a detect object for the blind people. The circuit provides 5V power supply for the circuit and maintains its output of the power supply at constant level. It is used widely to detect objects using ultrasonic sensor . If any object is present, the ultrasonic sensor detects the object by measuring the distance between the object and the user and sends the data to the arduino UNO. To determine the distance of an object, calculate the distance between sending the signal and receiving back the signal.

$\text{Distance} = \text{speed} \times \text{time}$.

The sensor are set to threshold limit of any obstacle found within range. The ultrasonic sensor is used for detecting object or obstacles. The signal is sent to microcontroller to operate a buzzer or speaker. The microcontroller reads the distance of the object using sensor and also commands of the buzzer.

The speed of the signal travelling through air is 341m/s. The Time is calculated between the sending and receiving back the signal. Since, the distance travel by the signal is double, it is divided by two i.e., $\text{Distance} = \text{Distance}/2$. Arduino processes with this data and calculates with the command conditions. If any object is found nearer, it sends the command to the user. In and additionally, the system designed with GPS module to track the position of the blind person, and GSM module send a message to their guardians, friends or family .when the user feels like he or she is in danger.

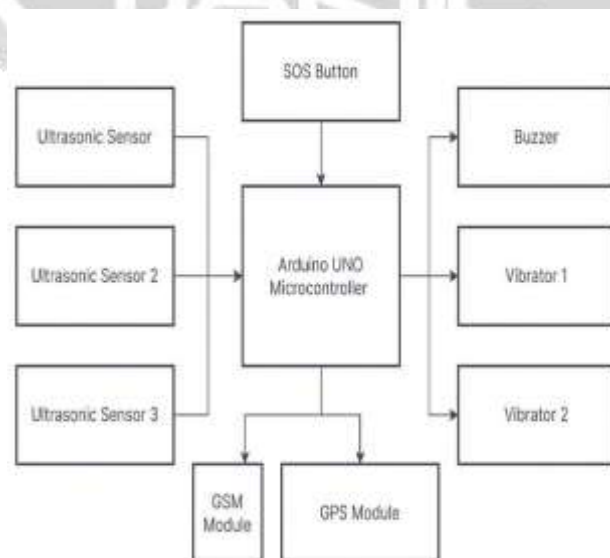


Figure 1. Block diagram of smart blind system

1. **ARDUINO UNO** :- The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable. It can be powered by the USB cable or by an external 9-volt battery, in spite of the fact that it accepts voltages between 7 and 20 volts.
2. **Ultrasonic sensor**:- Ultrasonic sensor has 4 pins-ground, Vcc, trigger and Echo. It ranging from 2cm to 500cm(5m). Mainly it has two opening one is transmitter which is used to transmit the signal and another one is receiver which is used to receive the signal.
3. **Buzzer**:- A buzzer is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on breadboard and widely used component in most electronic applications.
4. **GPS** :- The transmitter GPS sends information about the position and time to the receiver GPS at fixed intervals. The signals that are sent to the receiver devices are radiowaves.
5. **GSM**:- GSM projects include the development of mobile phone tracking systems, SMS-based remote control systems, and GSM-based intruder alarms. An important aspect of the GSM project is sending and receiving messages using SMS (Short Message Service) technology.
6. **Vibration sensor**:- Vibration is used for vibration. Vibration will start if it connected to a battery and it will off if not connected. These vibrators generate a noticeable vibration effect on the blind stick which alerts the user.

SOFTWARE:

Flowchart:

In this figure 2 is shown that A smart stick system has been built for the blind people that help to detect obstacles with the use of infrared and ultrasonic sensors. In this flow chart we shows that is we use three ultrasonic sensor which is used in left, right, and front and also we use arduino and vibration sensor.

So, basically it actually work like is when the object or obstacle near the ultrasonic sensor it can detect because ultrasonic sensor can transmit the signal and receive the signal continuously. When signal can arrive to receiver it can pass the signal to arduino and arduino can transmit the signal to buzzer. Buzzer will ring and vibrator sensor can vibrate. So, the bling user know there some obstacle or object near them it can act proper. In system we adding some feature is GPS and GSM module helps them to navigate and reach his destination and also gives information to his guardian where he is located. This makes it to know the exact locatione at any given moments. The idea behind the design of the stick was light weight, simple to use, low cost and easy to handle.

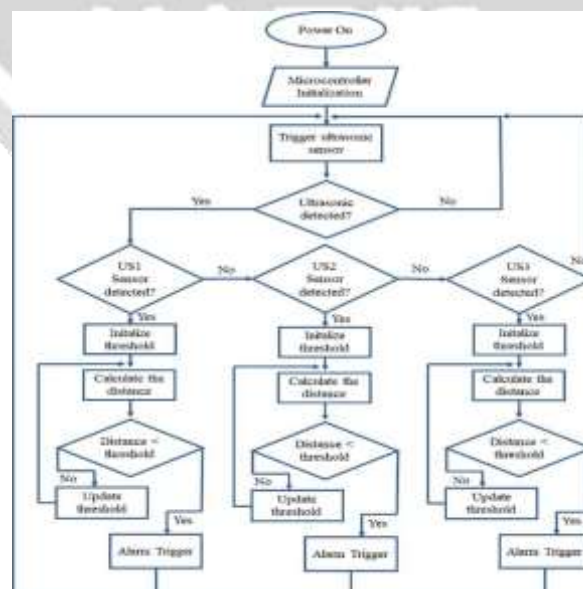


Figure 2. Flowchart of Smart blind system

3. RESULT

This paper has been successfully developed and tested by the smart blind stick system. Blind stick is tested for various obstacle heights and front door. Smart blind stick technology includes the use ultrasonic sensor. Here we use an ultrasonic sensor that alerts when obstacle is present. The system can handle seven states which can challenge the blind. The device will respond to each state according to a specific program in the Arduino microcontroller which is coded and mounted. It is suggested that a simple, inexpensive, configurable, easy-to-handle electronic guidance system provide effective assistance and help for blind and visually impaired persons.; It can search areas left, right, and in front of the blind person whatever their height or size. Those who took part in the test also favored it.

The ultrasonic sensor was extensively used to advance the independence of blind and visually impaired individuals in a healthy and independent manner. The system proposed in this help user walking a relatively safe environment reliably, such as indoors, parks and schools. That system not only make them more face, but also liberated their minds and throw away many worries and doubts. The effect of the system will reduce the dependency of other.



Figure 3. Flowchart of Smart blind system

4. CONCLUSION

Finally, the smart blind stick was turned into a product that can be used to guide the blind. The goal is to solve the problems that blind people face in their everyday lives. The project is also taking the step to guarantee their safety. The study's main purpose is to develop a project that can detect objects or obstacles in front of users and alert back. This program targets people with disabilities who are blind to encourage movement and improve health.

This is an Automatic System project. Allow people with disabilities to move around freely. The initiative will work to help all of our country's blind people make it easier for them to travel wherever they wish. This project is being done to help the blind man travel very well in front. This system provides a low cost, reliable, compact, low-power consumption and robust navigation solution with obvious short response time. Although the device with sensors and other components is hard-wired, it is light in weight. Without the help of any other person the blind people can walk easily.

5. REFERENCE

- [1] Ankit Agarwal, Deepak Kumar, Abhishek Bhardwaj- International Journal Of Engineering And Computer Science ISSN:2319-7242 Volume 4 Issue 4 (April 2015)
- [2] Assistive Infrared Sensor Based Smart Stick for Blind People, Ayat A. Nada| Science and Information Conference 2015 July 28-30, 2015 London, UK
- [3] Ayush Wattal, Ashuthosh Ojha, Manoj Kumar "Obstacle Detection Belt for Visually Impaired Using Raspberry Pi and Ultrasonic Sensors
- [4] B. Hoyle, D. Withington, D. Waters, "UltraCane", Available from: "<http://www.soundforesight.co.uk/index.html>". June 2006.
- [5] Benjamin and team members, "Smart Stick at Bionic Instruments Company Researches", 2011.
- [6] Bouhamed, Sonda Ammar, Imene Khanfir Kallel, and Dorra Sellami Masmoudi. "New electronic white cane for stair case detection and recognition using ultrasonic sensor." International Journal of Advanced Computer Science & Applications 4.6, 2013.
- [7] Design of non-weighing type desert plant lysimeter observation system based on PIC18. In Information Management, Innovation Management and Industrial Engineering (ICIII), 6th International Conference on IEEE, Vol. 3, pp. 42-44, 2013.
- [8] Direct mode ISD 1932. (2009, January 5) [Online]. https://www.futurashop.it/...PDF_ENG/7300-ISD1932.pdf
- [9] E. Kee, "iSONIC cane for the virtually impaired", Available from: "<http://www.ubergizmo.com/2011/01/isonic-cane-for-the-virtually-impaired/>", 2011.
- [10] G. P. Fajarnes, L. Dunai, V. S. Praderas and I. Dunai, "CASBLiP- a new cognitive object detection and orientation system for impaired people," Proceedings of the 4th International Conference on Cognitive Systems, ETH Zurich, Switzerland, 2010.

