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IoT based blind stick

Sathiyaseelan R
PG Student, MCA, Mepco Schlenk Engineering College, Sivakasi, India
Email: sathiyaseelan1651@gmail.com

Neethidevan V
Assistant Professor, MCA, Mepco Schlenk Engineering College, Sivakasi, India
Email: neethidevan@mepcoeng.ac.in

***Abstract*---**Today visually impaired person have to face lot of struggles in their day to day life. In this system proposed a novel approach to help them in the form of blind stick which is used to guide them, by producing buzzer to alert them with a beeps sound. With the help of ultrasonic sensor any object such as obstacles could be easily find. Using GPS technology system could easily track a blind person easily. If any relative of the visually impaired people wants to know the current location could be known with the help of microphone and speaker. In case any problem they could send messages for a relative with the help of GSM. Hence this work entitled "IoT Based Blind Stick" is proposed to help visually impaired person. This proposed system is implemented using Arduino. An IoT project is useful for the blind person and sensors are also connecting to a blind stick. They can use this stick for safe walk and they could move from one place to another place.

***Keywords*---**Arduino UNO R3, Ultrasonic Sensor, IR Sensor.

Introduction

Vision impairment is a problem in a world. Globally, at least 1 billion people have a near or distance vision impairment that is preventable or is yet to be addressed, according to the world health organisation. The majority of people with vision impairment and blindness are over the age of 50 years. Maximum prevalence of blindness was seen is 80+ age group (11.6 %), followed by 70-79 age group(4.1 %), 60-69 age group (1.6 %) and 50-59 age group (0.5 %). This type of blind stick can beused for blind people to walk easily and comfortably. The IoT based blind stick is small idea help to blind people can use the day to day life. This paper proposes a novel IoT based blind stick for vision impairment people.

Materials and Methods

In the authors Dey. N, Paul. A, Ghosh. P, Mukherjee. C, De.R and Dey. S proposed an approach that uses ultrasonic sensor and buzzer. A Ultrasonic Sensor is used to detect the object and alert a buzzer only. This system does not use for the location indication and emergency message.

In the authors Subbiah .S, Ramya .S, Parvathy Krishna .G and Nayagam .S Proposed an approach use raspberry pi , ultrasonic sensor, GPS&GSM module, IR sensor and camera module. IR sensor is detecting the pothole and ultrasonic sensor is detect obstacles. GPS module is use to know current locations and GSM is also sent message for relatives. This system doesn't use for the voice recognition.

In the authors Loganathan. N, Lakshmi. K, Chandrasekaran. N, Cibisakaravarthi.R. S, Priyanga.H .R and Varthini.H.K proposed an approach can be used to a ultrasonic sensor, Vibrator, radio frequency transmitter and receiver. Thus the radio frequency transmitter and receiver help wants know the current location stick with the help of buzzer. The vibration motor which is placed in the smart stick gets activated and produces a vibration. This stick use for RF remote transmitter and receiver. If the stick is displaced can be only in a certain meter range of signal. Otherwise a blind people will not able to find a blind stick. This system doesn't use the light sensor.

In the authors Rajeswari. S, Niraja .S Rayen P proposed an approach uses the ultrasonic sensor and LDR sensor. The ultrasonic sensor is used to obstacles present in a path. A buzzer is used to alert sound. If the place is dark and light we can used to a LDR sensor. This system is only use for buzzer mode indication sound only. Otherwise we couldn't use for voice module.
In the authors NellutlaAman Srinivas, Diwakar P, Thiramidas Srikanth, PagidojuSaiteja, ChilukuriMadhusudhan proposed an approach uses the ultrasonic sensor and RF remote. The RF remote using blind person remotely located his a blind stick. An ultrasonic sensor is used to detect the obstacles. This system doesn't use for location identifier for a blind person and RF remote only certain meter range is use.

This system used to a ultrasonic sensor detects any obstacles in present in its way. This sensor passes this data to the Arduino. The Arduino to search any obstacles to near blind stick. The obstacle is close to a send signal to a buzzer sensor. A buzzer sensor is alert warning sound to a blind person. This ultrasonic sensor is detecting object. And flame sensor used to a blind stick. Blind person is a surrounding (or) near the heat source is presence to detects a flame sensor and buzzer to a warning sound. A blind person walk night time the place is dark to use a light sensor. A GPS is used to track for a blind people. In case emergency blind people to send message and call to a relative is use the GSM

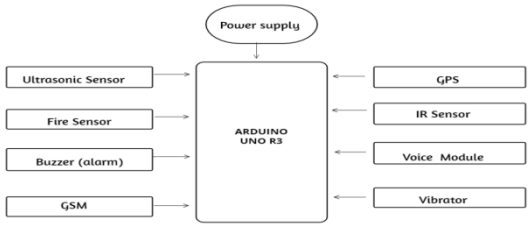


Figure 1. System architecture diagram

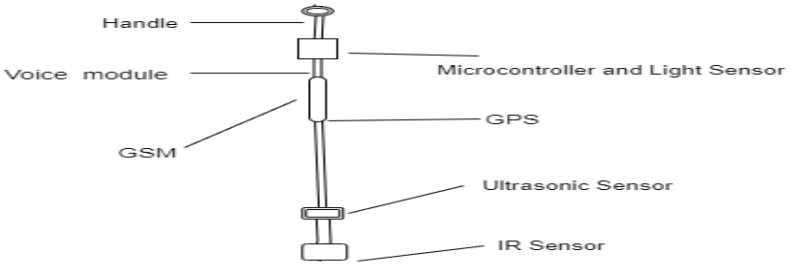


Figure 2. Stick Part Diagram

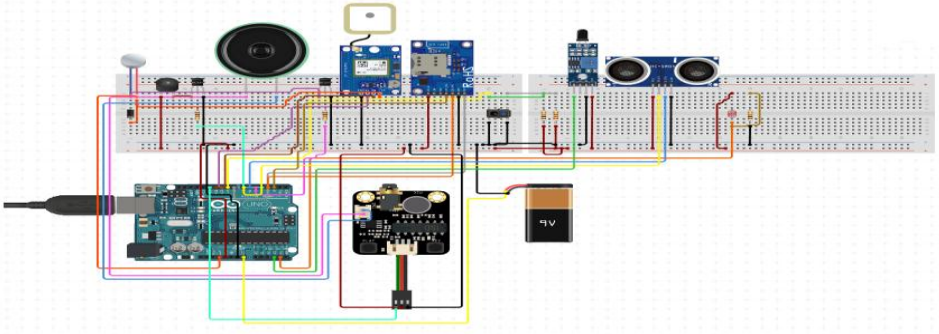
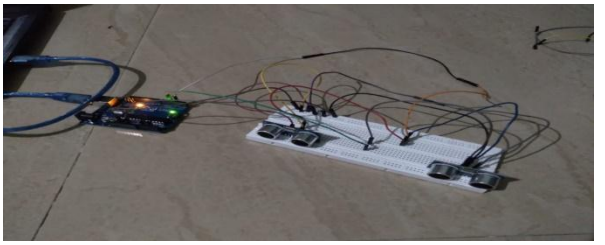


Figure 3. Circuit Diagram

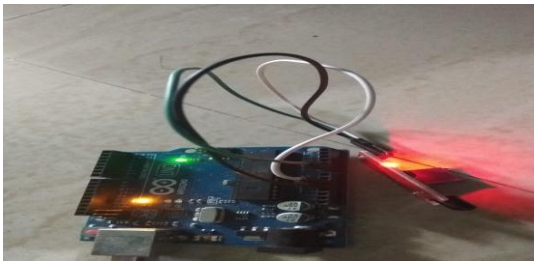
Ultrasonic sensor

The ultrasonic sensor is used for detecting the distance to an object using sonar. It emits an ultrasound at 40 KHz which travels through the air and if there is an object or obstacle on its path it will bounce back to the module. There are 4pins ultrasonic sensor is Vcc, TRIG, ECHO and GND.



Flame sensor

A fire (or) flame sensor is used to detect the presence of fire. This sensor can be built with an electronic circuit using a receiver like electromagnetic radiation. In this flame sensor are use 4 pins is Vcc, GND, Analog output and Digital output.

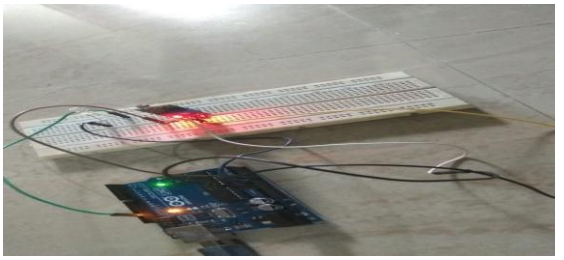


IR sensor

IR sensor is used to detect objects. It allowed measurements range from 2 to 30cm. It is capable of measuring and detecting an objects comes close to the sensor module by emitting and detecting infrared radiation. IR sensor is uses for the 3 pins Vcc, GND and OUTPUT pin.

LDR sensor

LDR sensor is used to detect the presence (or) absence of light. If the place is dark, the LED is ON and the place is light, LED is OFF. LDR sensor is uses for the 4 pins Vcc, GND, Analog and digital pins.

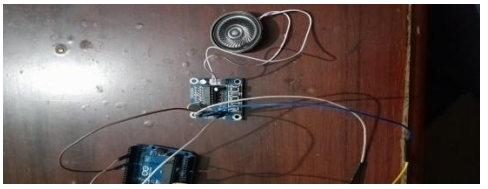


Vibrator

Vibrator is used to detect vibrator. They over sound pollution a person can't hear the sound to use the vibrator. Vibrator is uses for the 3 pins Vcc, GND and sig pins.

Voice Module

The voice module is used to speech commands and to store in the voice recorder. There are 3pins is used to Vcc, ground and voice recorder/playback pin out.



NEO- 6M GPS Module

GPS module is used to identify the correct path travelled and is decoded format to get the latitude and longitude value. There are 4pins is used to Vcc, ground pin, Receiver and transmitter pin.

Buzzer

Buzzer is used to alert and beep warning sound. There are two pins one is power supply pin and another is ground pin.

GSM Module

GSM module is used to send the emergency calls and message. There are receiver and transmitter pins and power supply pin and ground pin.

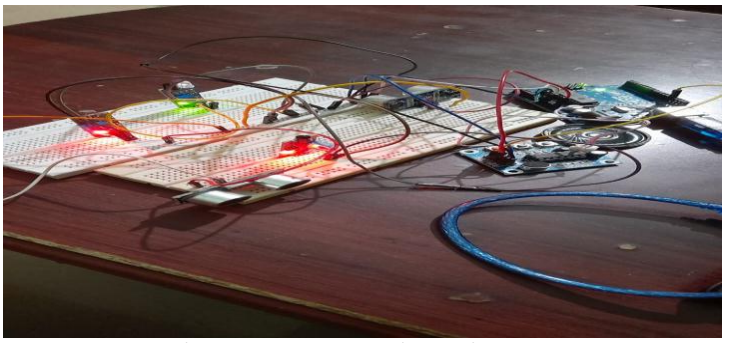


Figure 4. Connection Diagram

Results and Discussions

An IoT based blind stick prototype has been implemented. The various sensors data reading taken and results are entered in the table and the various charts have been drawn. The various ultrasonic sensor is used to find the accuracy level. The system consists of Arduino IDE platform which is used to do programming and the code is uploaded in the micro controller. When the ultrasonic sensor detects any object in a range of distance it alerts a beep sound. The Figure 5 is a graph that shows the difference between actual distance between the objects with respect to different sensors. Again this blind stick can make use of LDR sensor, used to measure the light intensity of any obstacle. The Figure 6, shows a graph that related dark and light intensity of various objects. If system uses GPS module, then the latitude and longitude value is derived and used to trace in a Google map to identify the correct position of the blind person.

Table 1
Ultrasonic reading table

S.NO	Distance (cm)	Val 1st	Val 2nd	Val 3rd	Average	% Error
1	5	5	5	6	5.33	6.6
2	12	14	12	13	13	8.3
3	18	18	20	21	19.67	9.2
4	25	26	25	25	25.33	1.3
5	30	30	30	30	30	0.0
6	45	47	45	47	46.33	2.9
7	60	60	63	62	61.67	2.7
8	75	76	75	78	76.33	1.7
9	90	90	90	90	90	0.0
10	100	100	105	103	102.67	2.6
11	120	122	121	121	121.3	1.0

Table 1 Ultrasonic sensor reading to calculate for the percentage error. The actual distance (cm) and measurement distance (cm) to calculate the average.

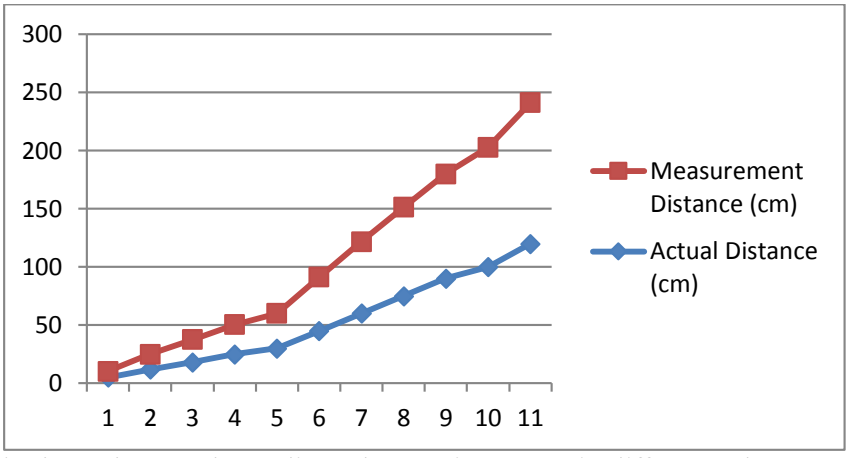


Figure 5. show the graph reading ultrasonic sensor is difference between Actual distance and the measurement distance

Figure 6. show the graph reading LDR sensor is difference decreases level graph is place is dark and increases level graph is place is light

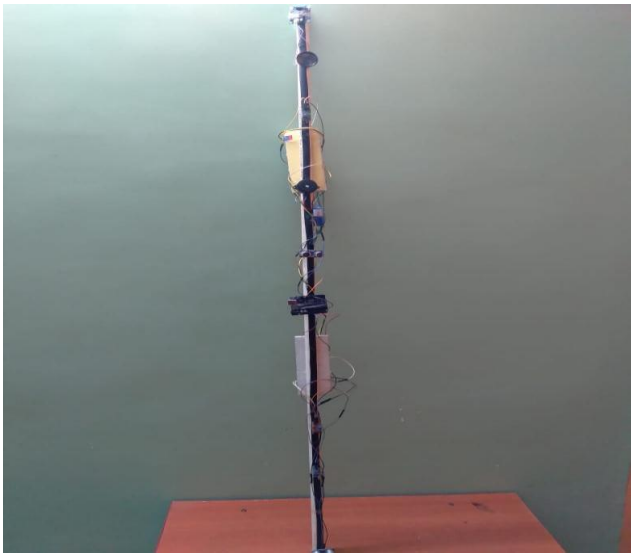


Figure 7. Shows the Blind Stick diagram

Conclusion

This paper has main aim to help the blind person to solve the day to day problem they face in daily life. If the visually impaired people use this stick then it will be is comfortable one. With GPS technology, system could able track the person location and could able to help them. The ultrasonic sensor is used to detect the obstacles present in their way and the system will produce warning signal and also vibration also take place. IR sensor is used to the detect the obstacles and path hole. If they use the flame sensor, then it could detect the fire is surrounding in a blind man place. LDR sensor is used to check the presence (or) absence of a light. If the place is dark then buzzer will alert the blind people and voice command is also be used. Finally if a blind people use this stick they could lead a normal life without any problem.

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References

Anantharajan, Shenbagarajan & Gunasekaran, Shenbagalakshmi. (2021). Automated brain tumor detection and classification using weighted fuzzy clustering algorithm, deep auto encoder with barnacle mating algorithm and random forest classifier techniques. International Journal of Imaging Systems and Technology. 31. 10.1002/ima.22582.

Dey . N, Paul . A, Ghosh. P, Mukherjee . C, De.R and Dey. S, "Ultrasonic Sensor Based Smart Blind Stick," 2018

International Conference on Current Trends towards Converging Technologies

(ICCTCT), 2018, pp. 1-4, doi: 10.1109/ICCTCT.2018.8551067.

Gopi, Amrutha & Selvaraj, Arivazhagan & Jebarani, W. & Veena, S.T.. (2021). Hybrid convolutional neural network architecture driven by residual features for steganalysis of spatial steganographic algorithms. Neural Computing and Applications. 33. 10.1007/s00521-021-05837-7.

https://www.electronicsforu.com/resources/gsm-module

https://en.wikipedia.org/wiki/Sensor

https://www.electronicwings.com/sensors-modules/gps-receiver-module

https://en.wikipedia.org/wiki/Arduino_Uno.

Loganathan. N, Lakshmi. K, Chandrasekaran. N, Cibisakaravarthi.R. S, Priyanga.H .R and Varthini.H.K, "Smart Stick for Blind People," 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS), 2020, pp. 65-67, doi: 10.1109/ICACCS48705.2020.9074374.

Learning under Google COLAB" GRD Journals-Global Research and Development Journal for Engineering vol5. Issue 7,pp.53-57, June-2020, DOI: 0

Neethidevan. V published "Image Classification using Pre-Trained Convolutional Neural Network in COLAB" GRD Journals-Global Research and Development Journal for Engineering vol5. Issue 7,pp.40-45, June-2020, DOI: 0

NellutlaAman Srinivas, Diwakar P, Thiramidas Srikanth, PagidojuSaiteja, ChilukuriMadhusudhan," Smart Blind Stick using Arduino. Journal of Emerging Technologies and Innovative Research. Vol7,Issue 4, April 2020.

Rajeswari. S, iraja .S Rayen P" Smart Blind Stick Using LDR and Ultrasonic Sensor," International Journal of Advanced Research in Basic Engineering Sciences and Technology (IJARBEST). Vol 4, Issue 11, November 2018.

Subbiah .S, Ramya .S, Parvathy Krishna .G and Nayagam .S, "Smart Cane For Visually Impaired Based On IOT," 2019 3rd International Conference on Computing and Communications Technologies (ICCCT), 2019, pp. 50-53, doi: 10.1109/ICCCT2.2019.8824893.