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Smart Walking Blind Stick For Visually impaired Using Iot

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Abstract - ***It is very challenging for visually impaired people to detect the object coming from the front, left, and right sides while walking on the street or crossing the traffic signal. If the individual has a hearing disability along with blindness, it becomes very difficult to travel out of the home. Being blind in this modernized generation is very difficult to survive because they face lots of problems in their day-to-day life. There is always fear in their family that while crossing the road, traveling by train, he might not get injured. To make it a little bit more simple and easy, we came to a solution in the form of a blind stick. This stick consists of three ultrasonic sensors, a buzzer, a potentiometer, three vibrating motor, an Arduino Uno, and a transmitter.***

***Key Words*: blind, buzzer, Arduino Uno, transmitter, ultrasonic, potentiometer, visually impaired .**

1. INTRODUCTION

In accordance with recent figures, there are about 285 million visually impaired people worldwide.Out of which, 39 million are completely blind. These many people cannot see this beautiful planet. Often they face lots of problems in their daily life. Many of them do have a responsibility to look after their family and do their job. While going for the job, which is very difficult for them to find, they do face obstacles. The blind stick is a gift for them. The new blind stick will help them to navigate using advanced technology. As this stick also consists of a vibration module which will be helpful for people who can't hear, as they can feel the vibration in the stick in three different directions, which would help them to detect an object. They can also adjust the distance of the obstacle using a potentiometer which will be installed on the stick.

2. LITERATURE REVIEW

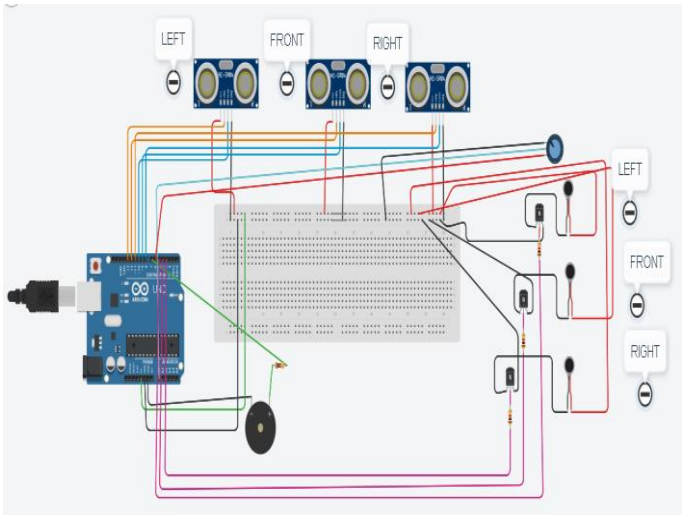
[A] Harpreet Singh, V. B. Kirubanand proposed Smart Stick for Blind People Using IoT .In which they discussed the Yolo algorithm and compared it with the existing method. Keeping the cost of the stick minimal, they used the GPS tracking for the blind stick. Their future scope also was to make the entire process fast and more efficient for the detection of objects.

[B] Niveditha K, Kavya P D, Nivedha P , Pooja B, Lakshmikantha G C suggested virtual Eye for Blind using IoT. They used GPS technology which was integrated with pre-programmed locations which helped to determine the optimal route to be taken. They used raspberry pi as the main device because of its compatibility with the ARM processor.

[C] Antara Ghosal, Anurima Majumdar, Palasri Dhar, Adrija Kundu, Avirup Mondal, AnanyaBiswas,Bikram Saha, Palabi Ghosh proposed Smart stick for blind using iot.They used an ultrasonic sensor, Flame sensor, and water level detecting sensor which showed a good result for detecting obstacles for a range of 4 meters. The system was low cost and effective

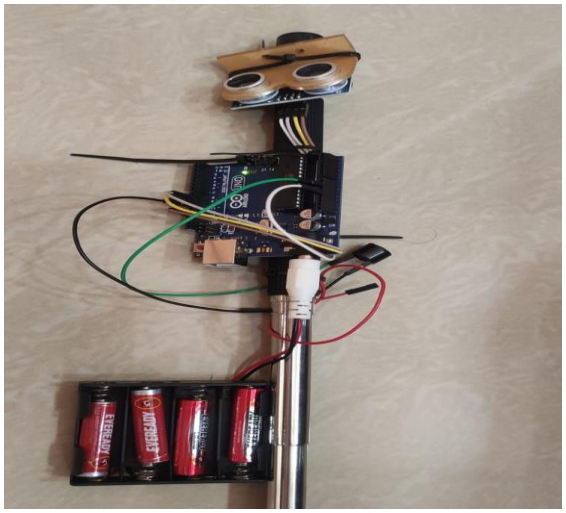
3. SYSTEM CONFIGURATION

The proposed smart blind stick as shown in fig 1.1 consists of three ultrasonic sensors placed in three different directions as shown in fig 1.1. When the object comes in the range of the ultrasonic sensor, it gets detected and furthermore, the buzzer sound get activated so that the person gets to know about some object. The sound of the buzzer is different in all three directions so that the person could know from where the object is coming toward him. There is also a vibration motor installed in the stick which will vibrate after obstacle detection and on the same side of the obstacle. These vibration motors will be helpful for the person who has blindness as well as hearing problems. The potentiometer will help to set the range of obstacles to be detected. This will be controlled by the blind person in the stick.



(fig 1.1)

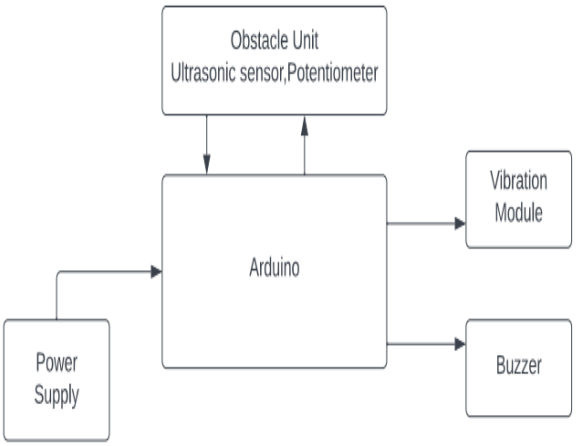
In figure 1.2, hardware implementation can be seen on one side. Where an external power supply is used. The similarly ultrasonic sensor will be fitted on the rest two sides to detect objects from the left and right side.



(fig 1.2)

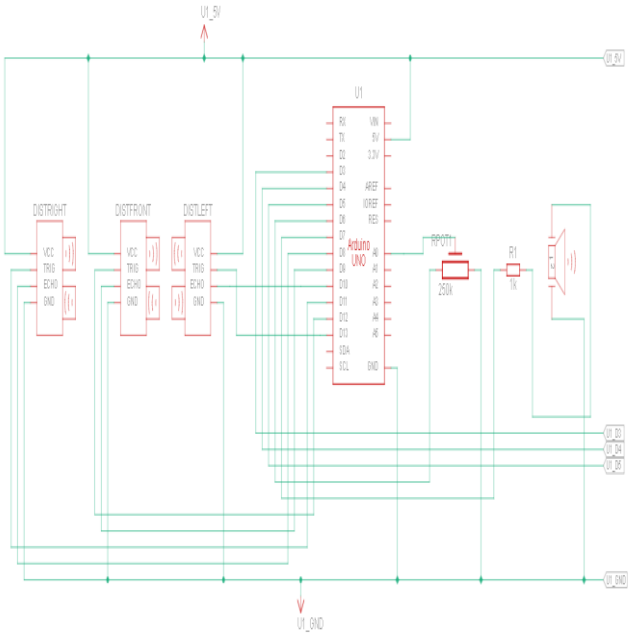
4. METHODOLOGY

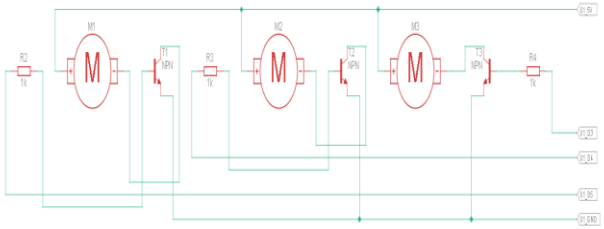
We have introduced a blind stick that not only helps visually challenged people but also people with hearing disabilities along with blindness to navigate safely. The blind stick is combined with an ultrasonic sensor and a potentiometer. This project will use ultrasonic sensors to find the obstacles using ultrasonic waves. After detection, the sensor will then transfer the information to Arduino Uno. Then the Arduino UNO processes the info and determines whether or not the obstacle is close to enough. If the barrier isn't closing the circuit, nothing can happen. .If object is near the sensor then the alarm will get activated . The Smart Stick block diagram is shown in Fig.2.



(Fig 2)

[A]. CONNECTION DIAGRAM



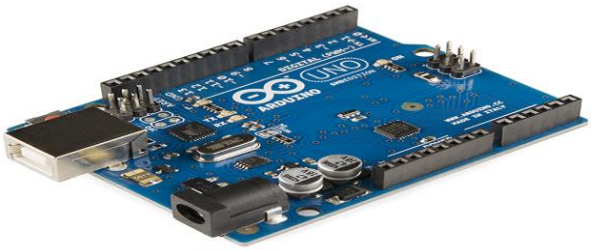


(Fig 1.4)

- The Vcc attach to the 5V Arduino.
- The trigger and echo pin of the Left side ultrasonic sensor attach to Arduino digital pin 13 and pin 10.
- The trigger and echo pin of the Front side ultrasonic sensor attach to Arduino digital pin 12 and pin 9.
- The trigger and echo pin of the right side ultrasonic sensor attach to Arduino digital pin 13 and pin 10.
- The potentiometer is connected to the Arduino analog pin A0.
- The buzzer is attached to Arduino digital pin 7.
- The negative end of all three vibration modules is attached to the transistor collector end. The emitter end of all three transistors is attached to the ground.
- The transistor base for the left, front, and right vibration motor attach to Arduino digital pin 5, pin 4, and pin3 respectively.

[B] ARDUINO UNO

Arduino Uno is the microcontroller board that is based on the ATmega328P. The board consists of 14 digital pins. There consists of 6 analog inputs as well as 16Mz quartz crystal. Along with these, a power jack, reset button, a USB connection, and an ICSP header.



(Fig 2)

[C] ULTRASONIC SENSOR

The Ultrasonic sensor at the core consists of 2 transducers from which one will act as the transmitter which work is to convert an electrical signal into 40 kHz of the ultrasonic sound pulse. The other one acts as the receiver listens to the transmitted pulse. After receiving the pulse it will produce an output pulse.

The sensor detection range is between 2cm to 400cm with an accuracy of 3mm. There consists of 4 pins including Vcc, Echo, Trigger, and GND in the sensor.

(Fig 3)

[D] VIBRATION MOTOR

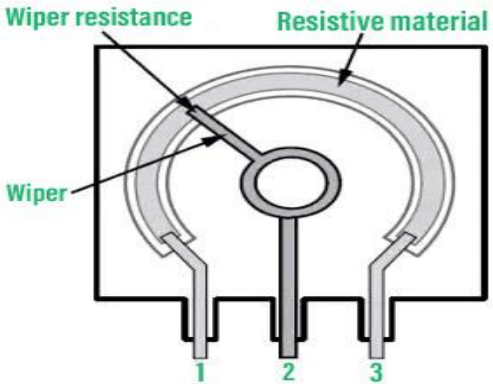
A vibration motor is a DC motor in a compact size that is used to inform the users by vibrating on receiving signals. It has no sound.

(Fig 4)

[E] POTENTIOMETER

It is a three-terminal variable resistor. Over here the resistance is varied manually to control the flow of the electric current.

It's just like a voltage divider.

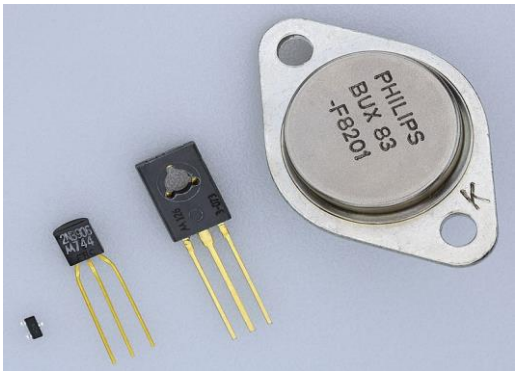


(Fig 5)

[F] TRANSISTOR

A transistor is a semiconductor device that is used for the amplification of electrical signals. It consists of three terminals for connection.

It consists of three pins including an emitter, base, and collector.



(Fig 6)

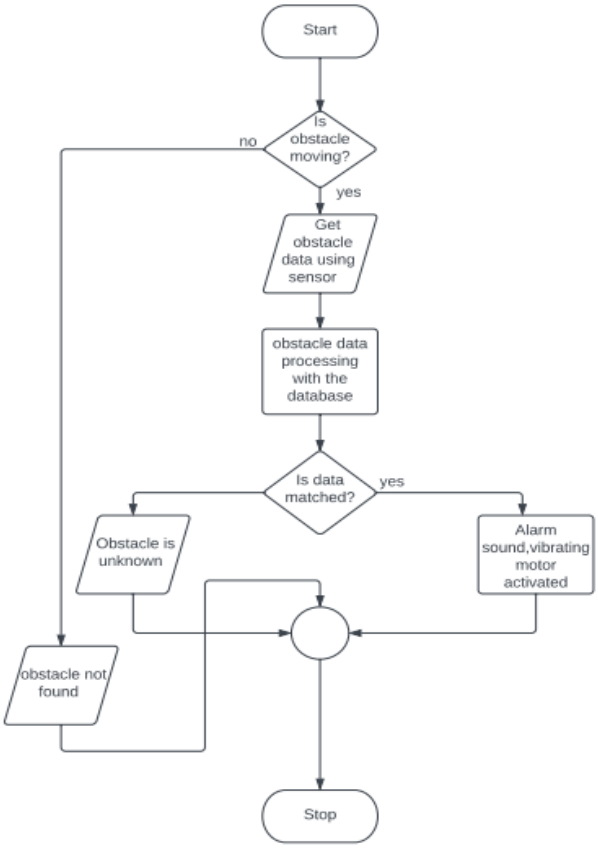
[G] BUZZER

It is an audio signaling device just like the buzzer which might be a piezoelectric type.

Its main work is to convert the signal from audio to sound. It has 2 pins including positive and GND.

(Fig 7)

5. FLOW CHART



6. FUTURE SCOPE

Our basic goal is to make this blind stick at a very minimal cost so that it can be easily affordable to all visually impaired as well as people with blindness and hearing problems. To add GPS to the stick, so that their family members can track them anytime, anywhere they are located . Also add an SOS button on the stick, so that in dangerous situation their family members can get alerted as well as know their location to help them.

7. RESULTS

This paper was successfully tested and implemented in tinder cad and partially implemented in the hardware model . In the software model, whenever the object came nearby to the sensor it got detected by the distance (dist1 = dur1 * 0.034 / 2) which was the default . The potentiometer was provided to change the distance accordingly and it give successful results for detecting objects. The tone of the buzzer was different for three sides which also sounded perfectly according to the input provided for a different frequencies. The vibration motor was also implemented successfully according to their object's direction it vibrated . In the hardware model prototype of the stick was made and one side detection was successfully tested.

8. CONCLUSION

This paper presents the detection of object using the ultrasonic sensor on a blind stick and to make alert them using a buzzer of a different tone with respect to their direction . The vibration motor was also alerted along with the alarm . Additional aspects of this device can be enhanced by wireless connectivity between system components, thereby increasing the range of the ultrasonic sensor and introducing technology to evaluate the speed of obstacles approaching.

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