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Smart Blind Stick for Visually impaired people by using IoT

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Abstract: **Visually impaired people cannot identify any object by their eyes. They cannot do any kind of work without taking support of another person or an object. Usually blind people use stick to judge the path or object or anything. This paper proposes a technique for creating a smart blind stick for visually impaired people through which they can be aware for the upcoming obstacles. The proposed method uses ultrasonic sensor, arduino UNO board, buzzer and bread board through which the stick can identify the obstacles. The aim of this paper is to develop a smart blind stick for blind peoples in affordable price. This system will help blind people to go anywhere without getting help of any other person. Through this system, blind person will be aware about the obstacles. This study provides an approach that can avoid the chances of accidents.**

Keywords: **- Ultrasonic sensor, Arduino UNO board, Buzzer & Bread board.**

I. INTRODUCTION

World Health Organization (WHO) did the survey in 2011 and they found that there are 285 billions of people are visually impairment, And 39 billion of people are fully blind and 246 billion of people are with some small light vision, and in India there are around 15 millions of people are blind, WHO stated that this will be going to increase in upcoming years. Our aim is to develop a smart blind stick which will automatically detect the obstacles in front of a blind person and gives them a response by vibration of the stick. Through this, blind person will aware about the obstacles. Eventually it will reduce the risks of accidents.

II. LITERATURE REVIEW

Voice operated outdoor navigation system for visually impaired persons done by Somnath and Ravi (2012) [1]. They used a stick and attach ultra-sonic sensors on stick, GPS and small speaker. The stick contains GPS which will have Secure Digital memory card for storing different locations. The blind person can set the location by just speaking name of that location and then GPS will find the path of that location and then it will guide the blind person to distention. This system will also give the remaining distance to reach the distention. If there is an obstacle sensed by ultra-sonic sensors then the voice system will give the caution voice. This system can be said as low cost system and affordable to anyone. In addition to that, it can give audible guidance to the blind person. This system has the ARM processor which will be give more memory space, so it will give high operating speed. But, this system will not be useful inside the buildings because of the GPS. And the blind person must be guided about this system to use its full features. Prof Shruti (2011) [2]. Smart stick for blind people: This system also detects obstacles and gives guidance by GPS. It means this system have GPS to operate. This system also has small speakers. And this system has one additional camera which will be wear on blind persons head. The camera is programmed for identify obstacles which will come in front of blind person. There is one ultrasonic sensor added to detect the obstacles. The GPS system is added for to guide the blind person to its destination. The camera gives a high accuracy to the blind person. But this system has a complex structure and design so it is hard to understand. "Project Prakash" [3] is a "humanitarian mission". It was done for to help the blind people especially children. It gives training to blind peoples to use their brains smartly by putting some objects around them to learn. In this project the ping sonar sensor is added on stick to sense the distant between person and objects. This project also added a water sensor to detect the water. The PIC micro-controller is used in this project. The microcontroller is outside of the stick but it is provides with a password so it is secured. There is a vibrator for giving instruction to the blind person. In this project there are three sensors are used i) ultrasonic, ii) pit sensor and iii) water sensor. And it is also has a PIC microcontroller. To give instruction to blind person it used vibrator and speaker/headphones. And one more thing is there to give location that is GPS. But they didn't provide how the blind person is going to operate that system and also they didn't tell something about the size of a system. The project has made in that way if we want to remove the ultrasonic sensor and a vibrator it can be removed easily and can be attach on any other stick. The ultrasonic sensor can detect obstacles in the

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range of 3 meters. As much as the person goes nearer to that obstacle the vibrator will vibrate more and faster.

Sylvain Cardin, Daniel Thalmann and Frederic Vexo [4] used stereoscopic architecture (means that taking two photographs of same thing in different angles) to sense the obstacles more accurately. Firstly the sensor checks that the obstacle is on which side of person. And there are two vibrators one is at left and second is at right shoulder of person. After detecting obstacles direction then if that obstacle is at right side of a person then the right sides vibrator will be activated and if the obstacle is at left side of a person then the left vibrator will be activated. Because of that the person will know the position of an obstacle and then the person can avoid that by moving in opposite direction.

Osama Bader AL-Barrm, JeenVinouth [5] proposed that ultrasonic sensor identifies the obstacles which come in front of the blind person. He's system uses three devices i) a microcontroller ii) buzzer and iii) vibrator. When the obstacles come in front of a blind person then the buzzer will buzz a sound and vibrator start vibrating to inform to blind person that obstacle is in front of you. They also added the GPS t track the location and also added the SMS messaging system.

F. van der Heijden, P.P.L. Regtien [6]. This research is done for system which will navigate a blind person to its destination safely. This research includes stereo vision, sense of hearing range finding and movement sensors, a informing system and a human touch sensing machine. There are three major devices in this research i) stereovision, ii) optical flow, and iii) sonar.

III. PROPOSED METHODOLOGY

The blind people suffer from many problems daily. The major problem is while moving from one place to other place. They cannot go anywhere without anyone's help. The main problem occur on roads. They struggle with so many obstacles. Sometimes they get injured also. For the blind people this study paper proposes a smart blind stick to avoid or to reduce the ratio of accidents.

The smart blind stick will automatically detect the obstacles in front of a blind person and give them a response by vibration of the stick. Through this smart stick blind people will be aware of upcoming obstacles. Eventually it will reduce the risks of accidents.

The proposed method of the ultrasonic sensor is to detect the obstacles [7]. Its cost is around 200-300 Indian rupees. The aim of this method is to make it affordable so that common man can buy it. And to operate ultrasonic sensor this technique uses arduino UNO board (costing approximately 400 to 450 Indian rupees). The ultrasonic sensor can be connected with arduino board using mini breadboard (costing approximately 150 Indian rupees) through jumper wires [8] [9].

To give the obstacle alert two devices can be used namely i) Vibrator (approximately 200-250 Indian rupees) and ii) buzzer (20 Indian rupees). We can take the vibrator from broken old mobile phones. We need to solder that vibrator with PCB then solder two wires to terminals of motor [10].

The wiring can be done as follows: -

- Ultrasonic VCC to Arduino 5V.
- Ultrasonic GND to Arduino GND.
- Ultrasonic TRIG to Arduino D12.
- Ultrasonic ECHO to Arduino D11.
- Buzzer RED to Arduino D8.
- Buzzer BLACK to Arduino GND.
- Vibrator pin 1 to Arduino D7.
- Vibrator pin 1 to Arduino GND.
- 9-volt battery RED to Toggle switch pin 1.

Devices and Parts needed in the method:-

- Arduino UNO.
- Ultrasonic (HCSR04) sensor.
- 9-volt battery.
- Mini Breadboard.
- Toggle switch.
- Buzzer.
- Jumper wires.
- DC male power jack.
- Vibrator.
- 9-volt battery connector.
- ¾ inch diameter PVC pipe for stick.
- Insulation tape.
- Utility knife.
- Glue.
- Screwdriver.
- Screws
- Box to put circuit.

Figure 1: Ultrasonic Sensor

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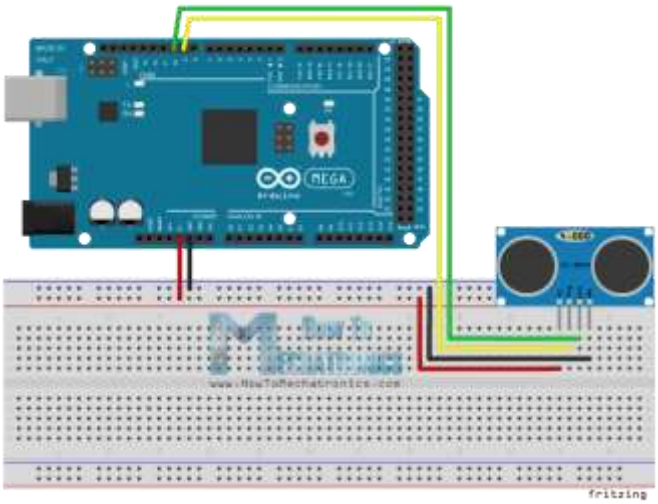

Figure 2: Arduino and Mini breadboard and connection with ultrasonic sensor.

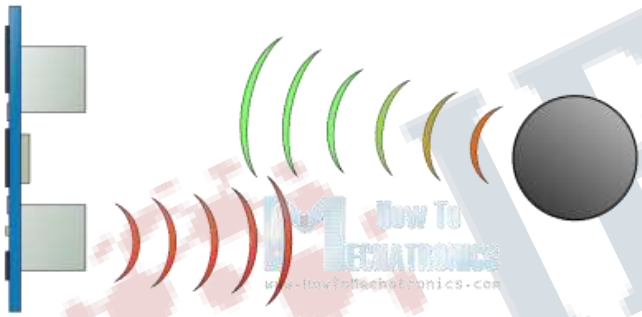

Figure 3: Working of Ultrasonic sensor

IV.CONCLUSION

The aim of this paper is to propose a method to develop a smart blind stick for blind people in affordable price. This system will help blind people to go anywhere without getting help of others. Through this system, blind person will be aware about the obstacles. Eventually it will reduce the risks of accidents. The other research related this method is analyzed and as the technology is improving faster this proposed methodology can be modified in future.

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