Smart Blind Stick

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Abstract - The smart walking stick helps to blind people to perform navigation and walk to do their work easily and comfortably. In normal stick, the detection of the obstacle is not done and normal stick is not efficient for visually impaired persons. That's ways Because the blind person does not know what type of things or what type of the objects are come in front of him or her. The person cannot recognize what is the size of that object/element and how far is he/she from the object. It is difficult for blind person to move here and there. In smart walking stick, the object is detected with the help of a camera and sensor also it measures the distance between objects by using ultrasonic sensor. If any obstacle comes in front of blind person, he/she can know about the obstacle by hearing the sound generated by the head phone. The system is very useful for people who are visually impaired and are often need help from others. This people walk easily on road by using this stick its very useful for like this blind peoples.in this there is an four side to detect an object through the sensor and sense object and pass the control to speaker or headphones and that system work and buzz the sound .so blind people also aware about that object.

*Key Words***:** Ultrasonic sensor, Arduino, Buzzer, Gsm / Gps, Water sensor.

1.INTRODUCTION

The main aim of this project is to detect the obstacle in front of the blind people of the stick and giving the alarm. This will assist the blind persons during the walk and provides an alarm if any object is detected with-In the set range This system mainly consists of a regulated power supply, IR transmitter, ultrasonic-sensor, GPS, IR receiver, control circuit and the output driver circuit. The IR sensor detects the presence of an obstacle in front of the person. The proposed system intended to provide low cost and efficient navigation aid for the blind which gives a sense of artificial vision by providing information about the environmental scenario of objects around them whilst providing real-time assistance via GPS. Smart walking stick is specially designed to detect obstacles which may help the blind to navigate care-free. The audio messages will keep the user alert and considerably reduce accidents. A voice enabled automatic switching is also incorporated to help them in private space as well. This system presents a concept to provide a smart electronic aid for blind people, both in public and private space The proposed system contains the ultrasonic sensor, water sensor, voice play back board, and speaker. The proposed system detects the obstacle images which are present in outdoor and indoor with the help of a camera. The Stick measures the distance between the objects and smart walking stick by using an ultrasonic sensor.

2. LITERATURE SURVEY

Now a days, in the society there are the wearable health monitoring system is the main application of Internet of things (IOT) [1]. In this like lots of wearable devices are designed for visually impaired people. Few systems are discussed here. In likewise smart stick, smart direction machine, smart detection systems [2]. an innovative stick is designed for the visually disabled people for their easy navigation. For the detection of object or water or any wall in front of that blind people. This use useful stick [3]. In addition to that, the detection distance of the system is 15 meters. However, the designing complexity of the system make it difficult to design and understand. Another study in the same field to help blind people uses the pulse echo technique in order to provide a warning sound when detecting the obstacles [4]. multitasking stick is designed to indicate safe path to visually disable people. The micro-controller based automated hardware allows a blind person to detect obstacles in front of them. The hardware part consists of a micro-controller which was incorporated with an ultrasonic sensor, voice play back module and additional equipment. The ultrasonic waves are used to detect the obstacles. The temperature sensors are provided to detect the fire or high temperature area [5].

3. PROPOSED WORK

In the proposed of this system, the ultrasonic sensor is used to sense the obstacle distance from the user. This starting distance can be used to decide whether the user can move or not that stick detect the object and sends the alert to blind persons through a buzzer. The ultrasonic sensors work on the basis of sound. The sound waves are transmitted ahead from the sensors towards the obstacle which can sense the distance up to a distance of 12 feet with a resolution of 0.3cm.
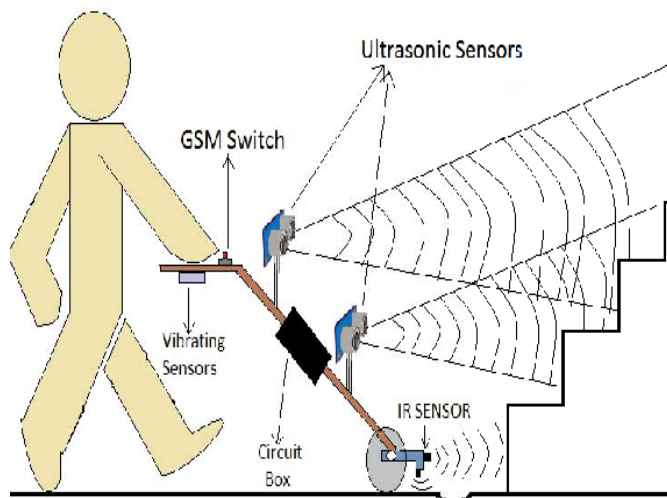

Fig-1. Working of blind stick

In this Smart stick there is a sensor which senses the obstacles or walls from 1 or half meter range then this stick vibrates & makes buzz sound. This Smart Stick warns the blind person that there is an obstacle or wall in-front of him/her. Then that person will be warned from obstacle or wall. The sensors are placed in five locations in order to cover maximum sides possible with minimum usage of the sensors on the stick. The sensors are placed in left, right, middle left, middle right and bottom respectively. Generally, the blind person cannot see the objects present on the ground. So the bottom sensor keeps track of the ground clearance providing necessary security measures. And side sensors detect the side views of that stick. Bottom side of the stick there is an water sensor that's detect the water in below of the stick. Ultrasonic sensor detect the distance between person and another object and also the main working of is that the Arduino uno is used for implementing the code. How the stick work there all part how work.

4. BLOCK DIAGRAM
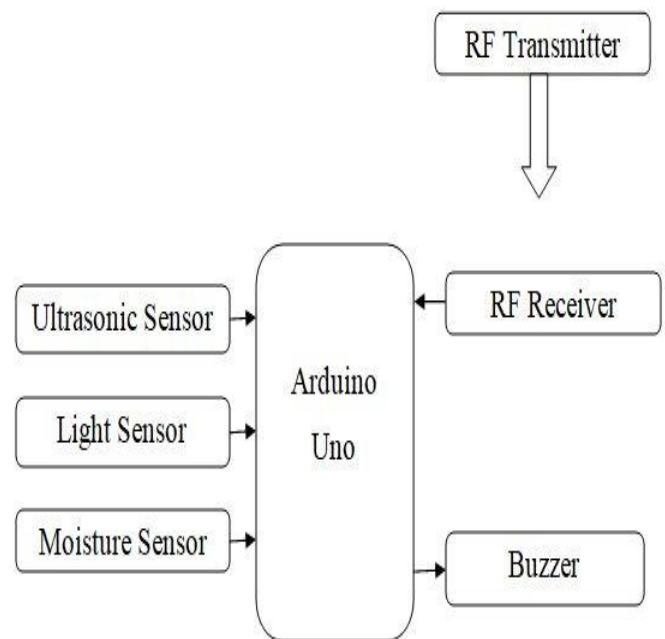
Fig-2. Block Diagram

5. FLOW CHART
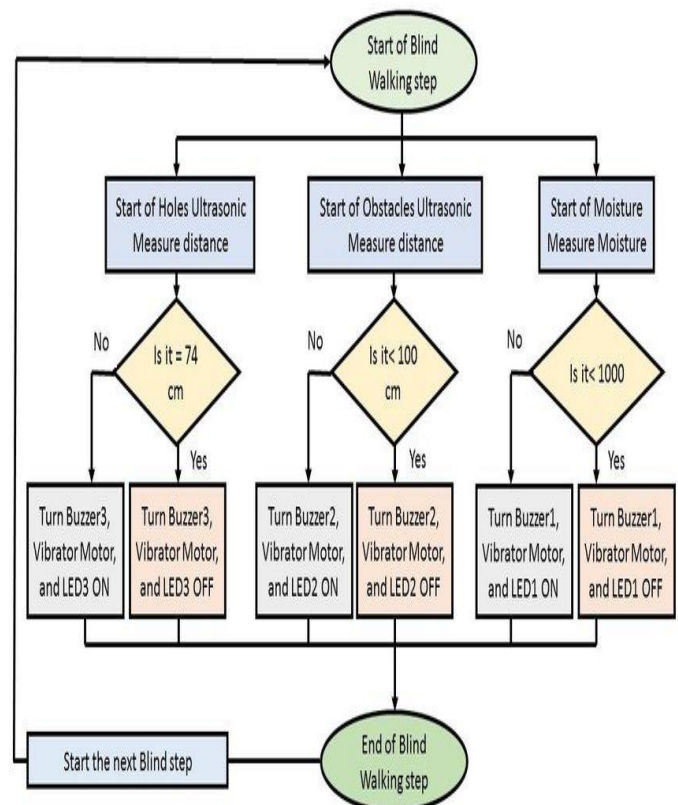
Fig-3. Flow Chart

6. SOFTWARE TOOLS

A] Arduino

Arduino is an open-source hardware and software. while software is licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL). Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

B] Arduino IDE

The Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

7. HARDWARE TOOLS

- **Arduino**
- **Ultrasonic Sensor**
- **Water Sensor**
- **GSM / GPS**
- **Buzzer**
- **Vibrate Motor**

A] Arduino Uno

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Fig-4. Arduino uno

B] Ultrasonic Sensor

Ultrasonic sensing is one of the best ways to sense proximity and detect levels with high reliability. An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. Generating, detecting & processing ultrasonic signals Ultrasonic is the production of sound waves above the frequency of human hearing and can be used in a variety of applications such as, sonic rulers, proximity detectors, movement detectors, liquid level measurement.
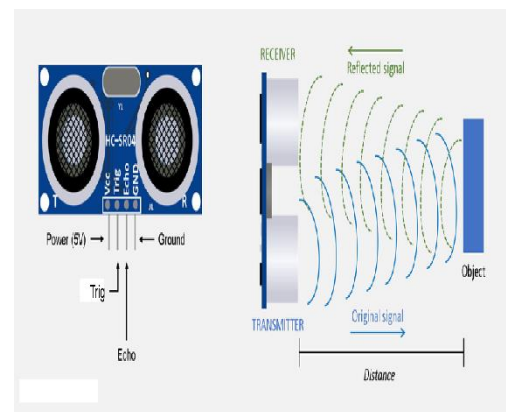
Fig-5. Ultrasonic Sensor

C] Water Sensor

Water sensor brick is designed for water detection, which can be widely used in sensing rainfall, water level, and even liquid leakage.
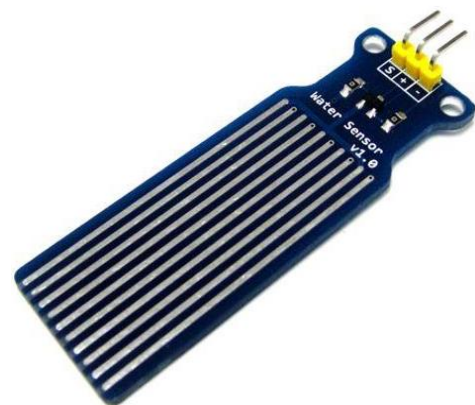
Fig-6. Water Sensor

It can be used to detect the presence, the level, the volume and/or the absence of water. While this could be used to remind you to water your plants, there is a better Grove sensor for that. The sensor has an array of exposed traces, which read LOW when water is detected.

D] GSM / GPS

When GSM modem receive a message the microcontroller will process the message with the keyword saved in it. Then, it will get the location of the stick from the GPS modem and transmit the location to the GSM modem in order to respond to the sender. In case of an emergency, the user of the stick can press the emergency button the microcontroller access the location from the GPS modem and transmit the location to the GSM modem which will send a SMS messages to the all saved numbers in the microcontroller.


Fig-7. GSM

E] Buzzer

A transducer (converts electrical energy into mechanical energy) that typically operates A buzzer is in the lower portion of the audible frequency range of 20 Hz to 20 kHz. This is accomplished by converting an electric, oscillating signal in the audible range, into mechanical energy.

Fig-8. Buzzer

8. Working Principle

Circuit shown below operates using a minimum of 5V DC power supply (Across Vcc & GND pin of Arduino UNO). The Arduino itself requires only 5V to operate but considering the fact that it has to power three ultrasonic sensors, one piezo-electric buzzer & a vibrating motor we have used a 9V supply. Arduino has an inbuilt 5V voltage regulator so we also have the options to power it using a 6V or 12V supply.
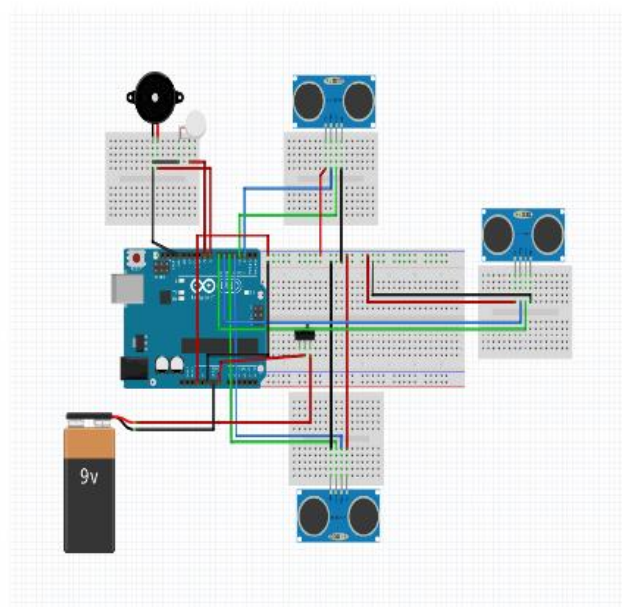
Fig-9. Circuit Diagram

The Arduino is programmed in such a way that on switching 'ON' the Arduino, it sends a LOW to HIGH signal on the TRIG pin of all the three Ultrasonic sensors. These ultrasonic sensors will send an Ultrasonic wave using the ultrasonic transmitter of the sensor. These ultrasonic waves travel through air and on colliding with an obstacle, get reflected back. Programming is done in such a manner, that when this obstacle is in the range of 1.4 m of the sensor, the Arduino will play the buzzer with different delay for obstacles located on the sides, and no delay for the straight ones. To further enhance its performance, if the obstacle is too close (less than 0.7 m from sensor) then the vibrating motor is also activated. For our calculation, we need only the one-way distance. This can be calculated by Arduino using the following formula:

$$Distance = \frac{\frac{Duration}{2}}{29.1}$$

9. CODE

```
// Smart Stick for Blind peoples //
const int trigPin = 3;
const int echoPin = 2;
const int buzzer = 5;
const int motorPin = 6;

long duration;
int distance;
int safetyDistance;

void setup() {
pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);
pinMode(buzzer, OUTPUT);
pinMode(motorPin, OUTPUT);
Serial.begin(9600);
}

void loop() {

digitalWrite(trigPin, LOW);
delayMicroseconds(2);

digitalWrite(trigPin, HIGH);
delayMicroseconds(10);
digitalWrite(trigPin, LOW);

duration = pulseIn(echoPin, HIGH);

distance= duration*0.034/2;

safetyDistance = distance;
if (safetyDistance <= 30){
  digitalWrite(buzzer, HIGH);
  digitalWrite(motorPin, HIGH);

}
else{
  digitalWrite(buzzer, LOW);
  digitalWrite(motorPin, LOW);

}



Serial.print("Distance: ");
Serial.println(distance);

}
```

10. RESULT AND DISCUSSIONS

Fig-10. Represents the proposed design of the blind stick with complete structure and a human holding the stick.

Fig-10. The proposed blind stick results

11. CONCLUSIONS

The smart walking stick, is made with the at most accuracy, will help the blind people to move from one place to another without others help. This stick reduces the dependency of visually impaired people on other family members, friends and guide dogs while walking around. there is an helpful project for blind persons. This stick easily assist to blind person to walk on road and detect the object in front of stick there is a sensors used to detect object. The proposed combination of various working units makes a real-time system that monitors position of the user and provides dual feedback making navigation more safe and secure. The smart stick detects objects or obstacles in front of users and feeds warning back, in the form of voice messages rather than vibration.

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