VIT-AP UNIVERSITY

A PROJECT REPORT

ON

SMART WALKING STICK FOR BLIND

SUBMITTED TO THE

VIT-AP UNIVERSTY

UNDER THE GUIDANCE OF

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Abstract:

The Smart Walking Stick for Blind , a simple yet innovative idea which is supported by interdisciplinary subjects such as Computer science, Electrical engineering, and Health sciences. Arduino Board is used to run and implement the code.

The project uses Ultrasound to detect nearby obstacles and notify the user in advance to help blind people move confidently and as safely as a normal person with full vision. The goal of this project is to develop a product that will help people who are visually impaired or who are often dependent on others or even use help for navigating while walking. According to the World Health Organization, there are approximately 37 million blind people worldwide. The proposed device is based on object detection using ultrasound sensors that capture the presence of an obstacle and warn the user beforehand so that the blind person can avoid obstacles which can sometimes be fatal. Most blind people these days, use canes or walking sticks to sense obstacles ahead. However, this cane is inefficient in some circumstances and also this cane can trip people walking around.

A GSM module is also added to the product which makes this product unique from many different blind aiding products. The use of this GSM Module is to help user send a SOS message to their family or others in case of any emergencies. This addition will be very useful for the user as their communication with others in the emergency situation will be easier.

Additionally, GPS module can be added which facilitates location tracking of the person with the cane. This feature comes at compromise of Battery Life.

Making the circuit integrated into the stick and with right placement of sensors, the blind stick can be folded and carried anywhere with ease.

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Key Words:

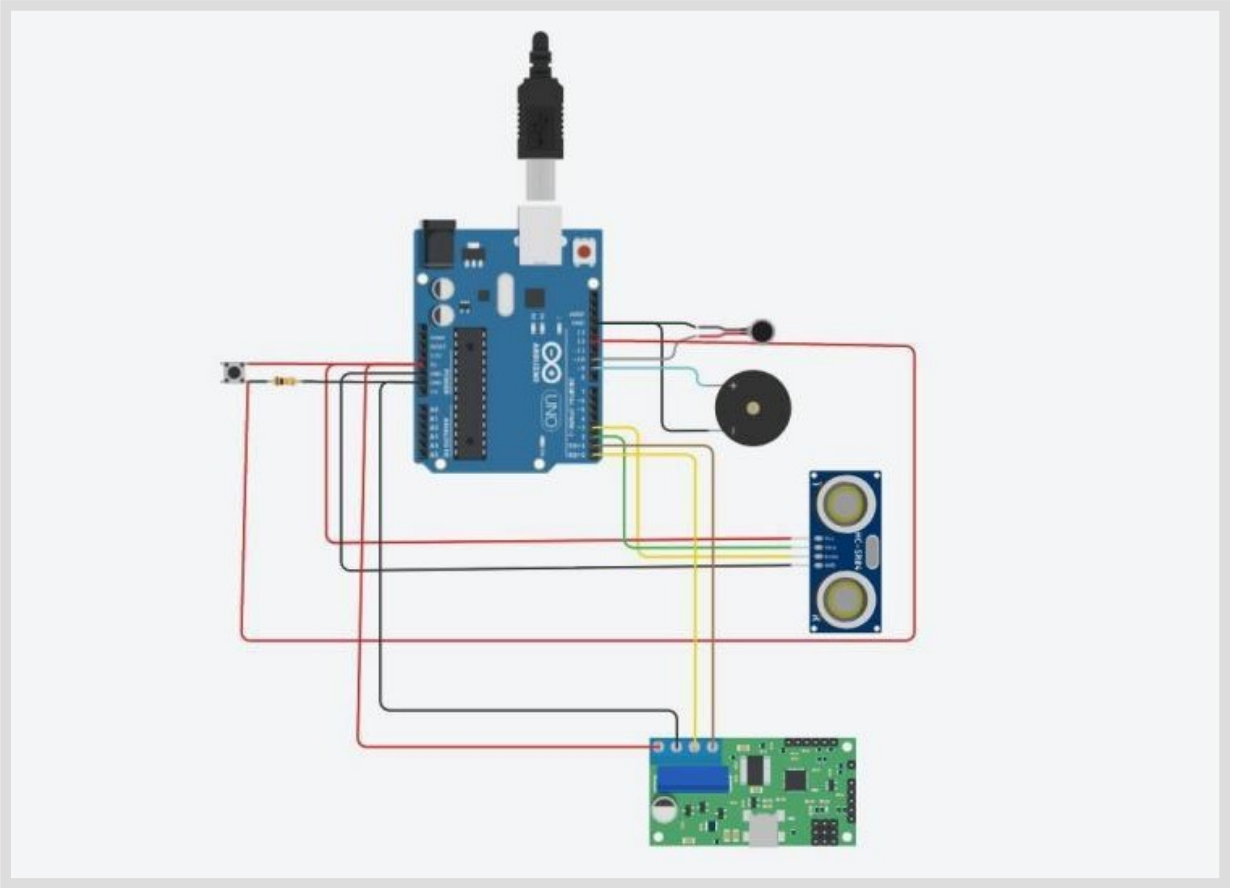
Arduino Uno: Arduino is a microcontroller-based open-source electronic prototyping boardwhich can be programmed with an easy-to-use Arduino IDE.

The major components of Arduino UNO board are as follows:

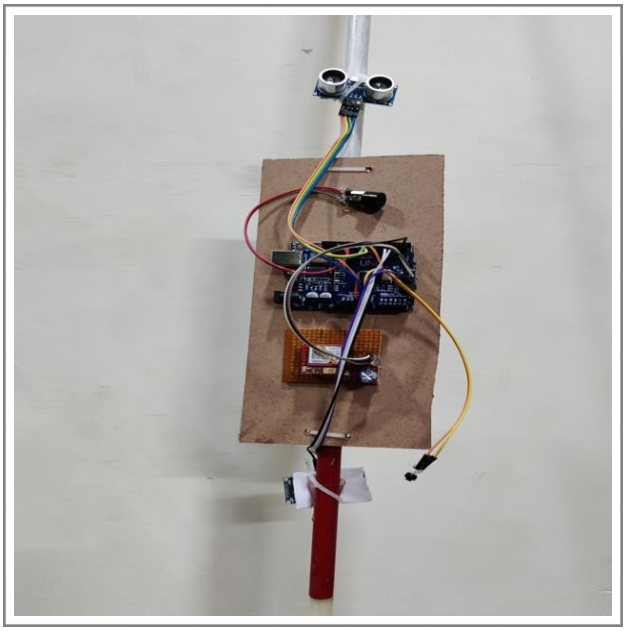
- USB connector
- Power port
- Microcontroller
- Analog input pins
- Digital pins
- Reset switch
- Crystal oscillator
- USB interface chip
- TX RX LEDs

GSM Module: GSM/GPRS module is used to establish communication between a computerand a GSM-GPRS system. Global System for Mobile communication (GSM) is an architecture used for mobile

Circuit Diagram:



Prototype Image:



Introduction

Smart walking Stick for blind is an innovation to help blind people to navigate with greater comfort, speed and confidence, while making use of ultrasonic waves to detect nearby obstacles and to notify the user through vibrations and beeps of a buzzer. The main aim of this project is to design a sound based alerting system using ultrasonic sensor which senses the obstacles in its path by checking by continuously emitting the ultrasonic waves and receives the reflected rays and finds the distance between the sensor and object in real time.

The controlling system of whole device is microcontroller 'ARDUINO UNO' for this project to integrate the buzzer, ultrasonic sensor and a GSM module. The GSM module helps the blind in emergency situations. Whenever the blind feels they are in emergency they can use the button present on their stick, when pressed, it sends an emergency SOS signal to the emergency contacts chosen.

Background

There are 285 million visually impaired people in the world. The idea was inspired from bats, which also use sound waves of high frequency to move. The loss of one of the most important human senses causes them a lot of hardships in daily life. The affected ones have been using the traditional white cane for many years which although being effective it still has a lot of disadvantages. Alternatively, a pet animal such as a dog is also used. So the aim of this project is to develop a new, cheap, yet more efficient way to help the visually impaired navigate with more speed and confidence. There are so many instruments and smart devices for visually impaired peoples for navigation but most of them have certain problems. The major drawbacks is they need a lot of training to be used. The one of the main peculiarity of this innovation is, it is affordable for everyone, the total cost being less than (~2500INR).

Problem Statement

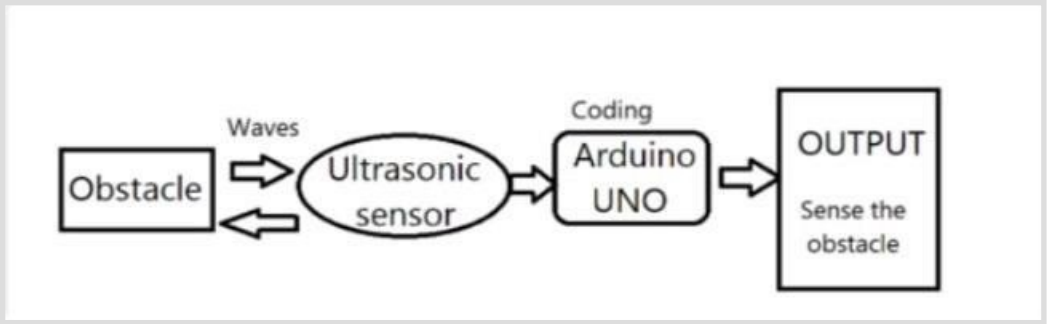
Visually impaired individuals face many difficulties and most common one is when they involve in self-navigation in an environment which is new for them. Physical movement is one of the biggest challenges for them. They can't easily recognise obstacles or stairs while using normal blind stick. The blind traveller should depend on any other guide like blind cane, people information, trained dogs, etc. About the 90% of the world's visually impaired live in developing countries implying there are no special provisions for the blind.

Objectives

In this project, the main objective is to develop a cheap and feasible and functional system for the visually impaired individuals. This system helps visually impaired individuals to avoid the obstacles such as people, animal or stairs. The main objective of this is to provide an application for blind people to detect the obstacles in various directions, detecting pits and manholes on the ground to make free to walk.

Methodology/Procedure:

In this project we have two different parts to be executed, first, object detection using ultrasonic sensor and other one is message transmission using GSM module. For implementing both the parts we will be requiring any type of Arduino board. Arduino-Uno is used in this project for implementing. Code is written and compiled on Arduino-IDE on a computer. For implementing the initial part we need ultrasonic sensor, buzzer and some jumper wires. Initially we will be connecting the wires linking the Arduino board and ultrasonic sensor we will be connecting the Rx and Tx with the respective ports of the ultrasonic sensor. Later the buzzer is connected to the Arduino board accordingly to the respective pins mentioned in the code.



After making the connections of ultrasonic sensor, now, we will be giving the power supply to the GSM module through the Arduino board itself. Next, we will connect the respective Rx and Tx ports of GSM and Arduino board.

After completing all the connections, we will compile the code in Arduino IDE and after successful compilation we will load it to the Arduino board. After successful execution we can attach the entire setup to a stick/cane to help the blind person carry it easily.

Results and Discussion:

By successfully implementing and the project using above methodology we can expect great results which include a successful detection objects in front of the stick and communication in case of emergency for the blind. This will help the blind very much since they can know if any obstacle is there in front or not it also has the feature of communicating message by the blind in case of any emergency.

Conclusion and Future Scope

The project is a small scale innovation which helps the blind person to move around. This is mainly done with help of Ultrasonic sensors that capture obstacles within a specified range and alert the user through sound from the buzzer and also vibrations in some cases. In general, this work can be classified on the basis of Ultrasonic Sensors for detecting the obstacles, Buzzer for sound alerts, GSM Module for sending SOS message to any contacts when in emergencies. All the studies which had been reviewed show that, there are a number of techniques for designing this gadget for blind people. The product has a very promising future scope and a lot additions can be done to the project to make it best for the blind.

Thus, this project is made functional with a low budget and with useful features. A less complex portable, cost efficient, easy to manage an effective system with many more amazing properties and advantages are proposed to provide support for the blind. others, the blind person can move from one place to other and lead their regular lives independently.

Future additions include adding cameras, GPS Trackers and also enhanced object detection using Neural Network Models to let the user know about the kind of obstacle and position of the obstacle in real time.

Enhanced sensors provide precision in finding the location of the obstacle and optimised batteries provide more battery life.

Networks with better reachability and coverage will help in transmitting the distress signal to the selected contacts and the GPS module will help the contacts to find out the location of the person with the stick.

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Reference for the idea and working of the project:

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CODE:

```
#define TRIGGER1_PIN 5
#define ECHO1_PIN 4
#define TRIGGER2_PIN 9
#define ECHO2_PIN 8
#define BUTTON_PIN 11
#define BUZZER_PIN 12

void setup() {
  pinMode(BUTTON_PIN, INPUT_PULLUP);
  pinMode(BUZZER_PIN, OUTPUT);
  Serial.begin(9600);
  pinMode(ECHO1_PIN, INPUT);
  pinMode(ECHO2_PIN, INPUT);
  pinMode(TRIGGER1_PIN, OUTPUT);
  pinMode(TRIGGER2_PIN, OUTPUT);
  Serial.println("AT");
  delay(1500);
  Serial.println("AT+CMGF=1");
}

void loop() {
  int buttonValue = digitalRead(BUTTON_PIN);
  digitalWrite(TRIGGER1_PIN, LOW);
  delayMicroseconds(2);
  digitalWrite(TRIGGER1_PIN, HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIGGER1_PIN, LOW);
  int distance1 = pulseIn(ECHO1_PIN, HIGH) / 58.2;

  digitalWrite(TRIGGER2_PIN, LOW);
  delayMicroseconds(2);
  digitalWrite(TRIGGER2_PIN, HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIGGER2_PIN, LOW);
  int distance2 = pulseIn(ECHO2_PIN, HIGH) / 58.2;

  Serial.println("Distance 1:");
  Serial.println(distance1);
  Serial.println("Distance 2:");
  Serial.println(distance2);
  delay(1000);

  if (distance1 < 50 || distance2 < 50) {
    digitalWrite(BUZZER_PIN, HIGH);
    delay(500);
    digitalWrite(BUZZER_PIN, LOW);
  } else {
```

```
    digitalWrite(BUZZER_PIN, LOW);
  }

  if (buttonValue == LOW) {
    send_sms(1);
  }
}

void send_sms(int sts) {
  Serial.println("Sending SMS...");
  Serial.println("AT");
  delay(1000);
  Serial.println("ATE0");
  delay(1000);
  Serial.println("AT+CMGF=1");
  delay(1000);
  Serial.print("AT+CMGS=\"9866432559\"\r\n"); // Replace with recipient's mobile number
  delay(1000);
  if (sts == 1) {
    Serial.println("SOS Button pressed. The user is requesting your help!");
  }
  delay(100);
  Serial.write(26); // ASCII code of CTRL+Z
  delay(6000);

  Serial.println("AT");
  delay(1000);
  Serial.println("ATE0");
  delay(1000);
  Serial.println("AT+CMGF=1");
  delay(1000);
  Serial.print("AT+CMGS=\"9392513474\"\r\n"); // Replace with another recipient's mobile number
  delay(1000);
  if (sts == 1) {
    Serial.println("SOS Button pressed. The user is requesting your help!");
  }
  delay(100);
  Serial.write(26); // ASCII code of CTRL+Z
  delay(2000);
}
```