Obstacle Sensing Stick

For visually impaired

Submitted by:

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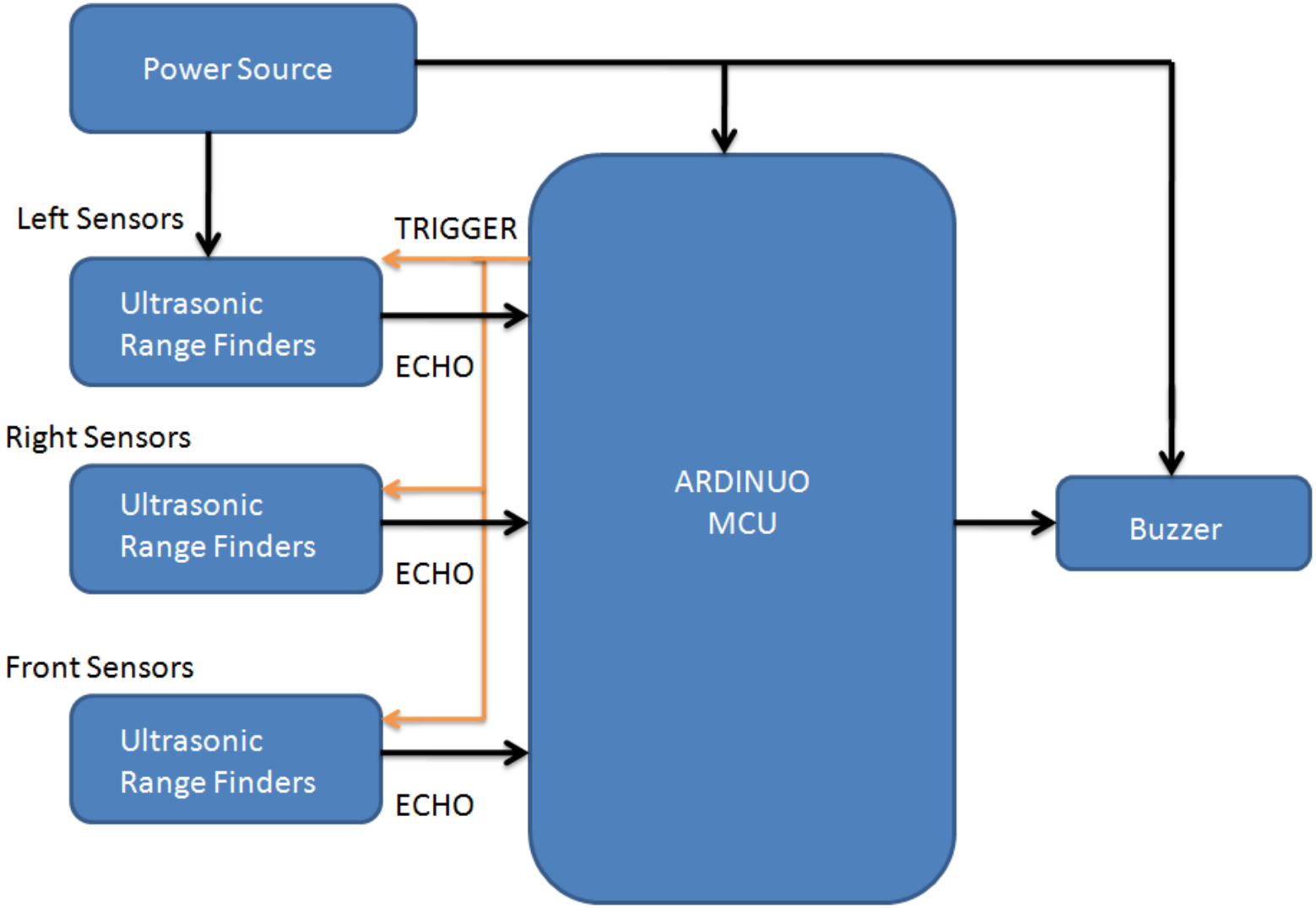
Contents

Introduction

- This prototype is designed to guide a visually impaired person to walk and avoid bumping into obstacles. Low cost ultrasonic rangefinders along with a microcontroller is used to measure the distance to obstacles and if they are close enough provide a feedback to the user in form of number of beeps.

Block Diagram



Pin Configuration

Digital Pin 1	-
Digital Pin 2	Trigger pin of Left Sensor
Digital Pin 3	Echo pin of Left Sensor
Digital Pin 4	Trigger pin of Front Sensor
Digital Pin 5	Echo pin of Front Sensor
Digital Pin 6	-
Digital Pin 7	Trigger pin of Right Sensor
Digital Pin 8	Echo pin of Right Sensor
Digital Pin 9	Positive terminal of buzzer

Major Components used

- HCSR04 Ultrasonic Sensors

For interfacing with microcontroller it provides two lines namely TRIGGER and ECHO. The trigger pin is an input pin, the MCU sends a 10uS high pulse on this line to tell the HC-SR04 to start a taking a measurement.

- Arduino Uno Board

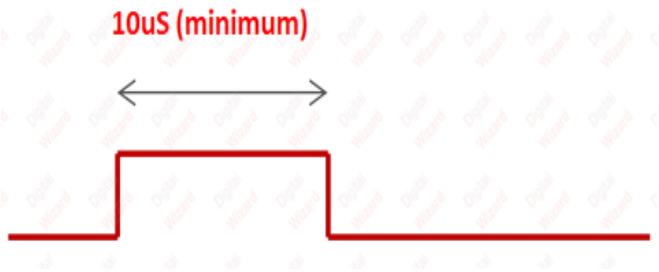
It reads distance to obstacle using the sensor and also commands the buzzer. We here use the microcontroller- ARDINUO.
This microcontroller board is the most user friendly and easy to program.

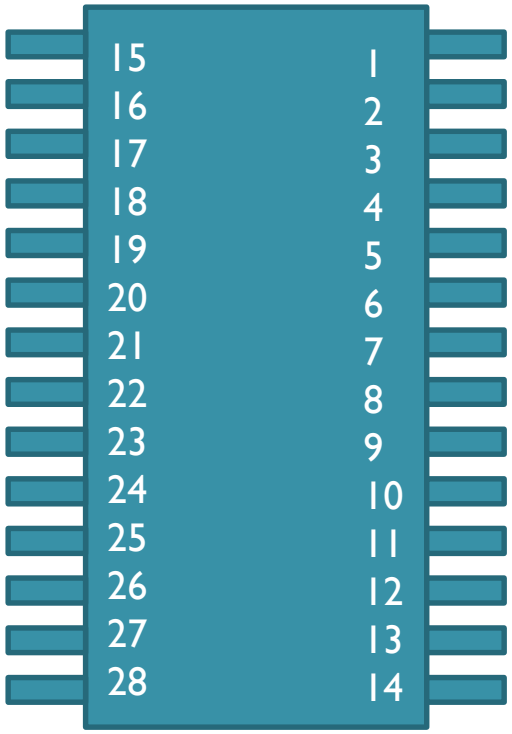
Working

Sensor	Number of alert beeps	Attached to Pin No.
Front	3 beeps	Pin 4,5
Left	2 beeps	Pin 2,3
Right	1 beep	Pin 7,8

*The sensor sensing the nearest obstacle gives the alert beep at that time. The minimum distance is calculated by algorithm.

Working of Sensors



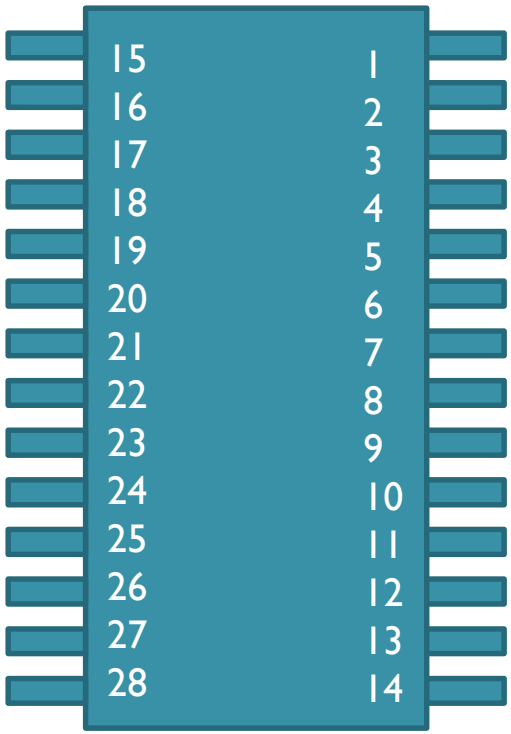


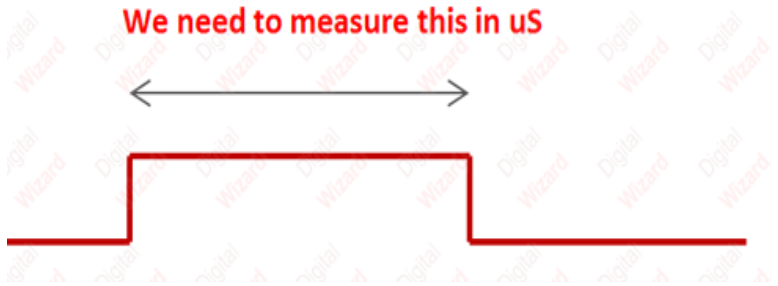
To trigger pin of Left Sensor

To trigger pin of Right Sensor

To trigger pin of Front Sensor

Contd..



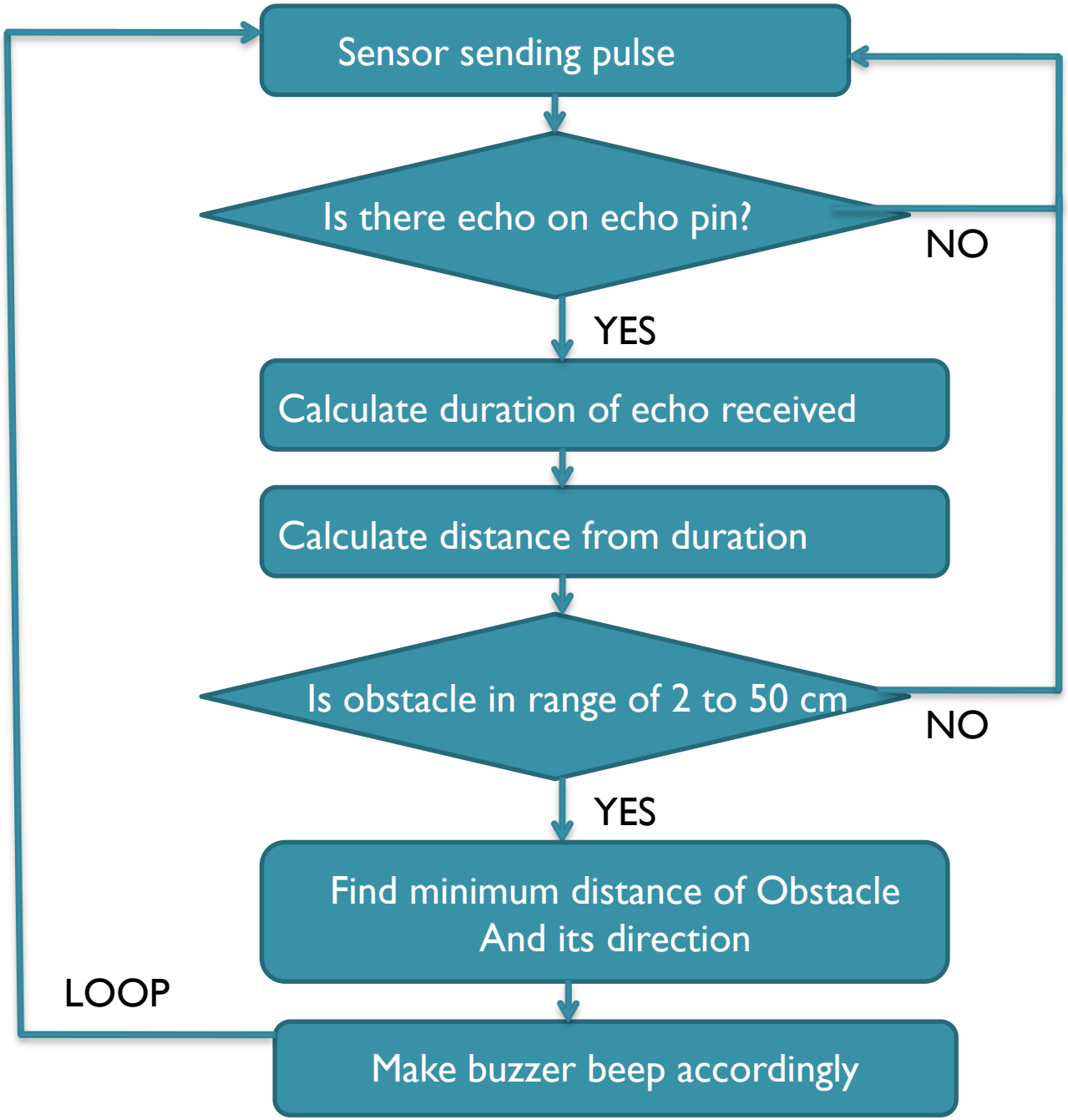


To echo pin of Left Sensor

To echo pin of Right Sensor

To echo pin of Front Sensor

ALGORITHM

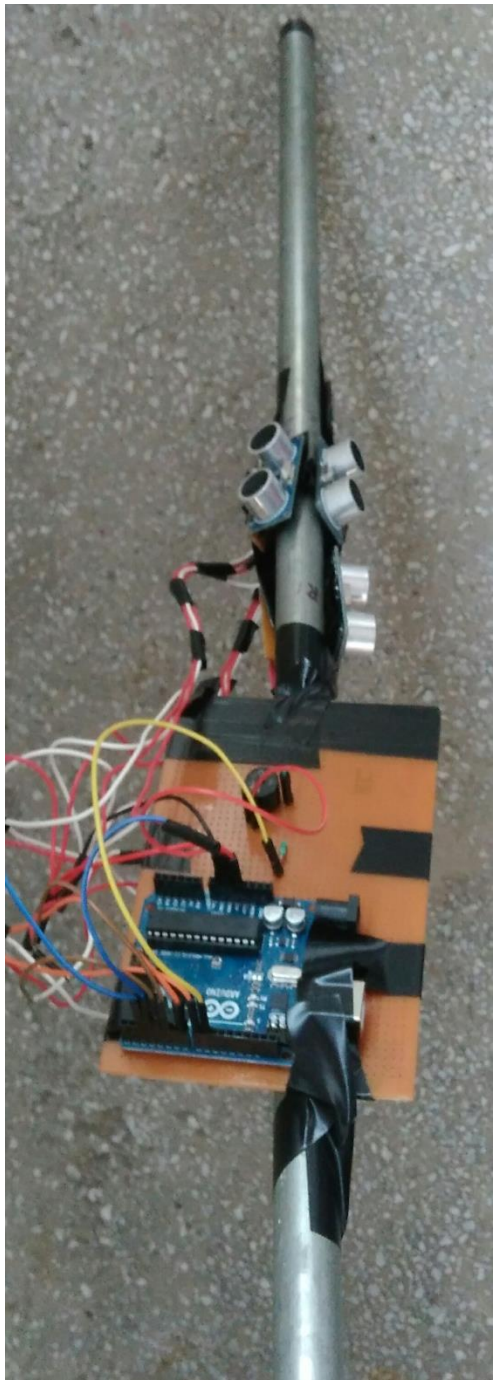

Sensor sending pulse
Is there echo on echo pin?
NO
YES
Calculate duration of echo received
Calculate distance from duration
Is obstacle in range of 2 to 50 cm
NO
YES
Find minimum distance of Obstacle
And its direction
Make buzzer beep accordingly
LOOP

PCB Layout

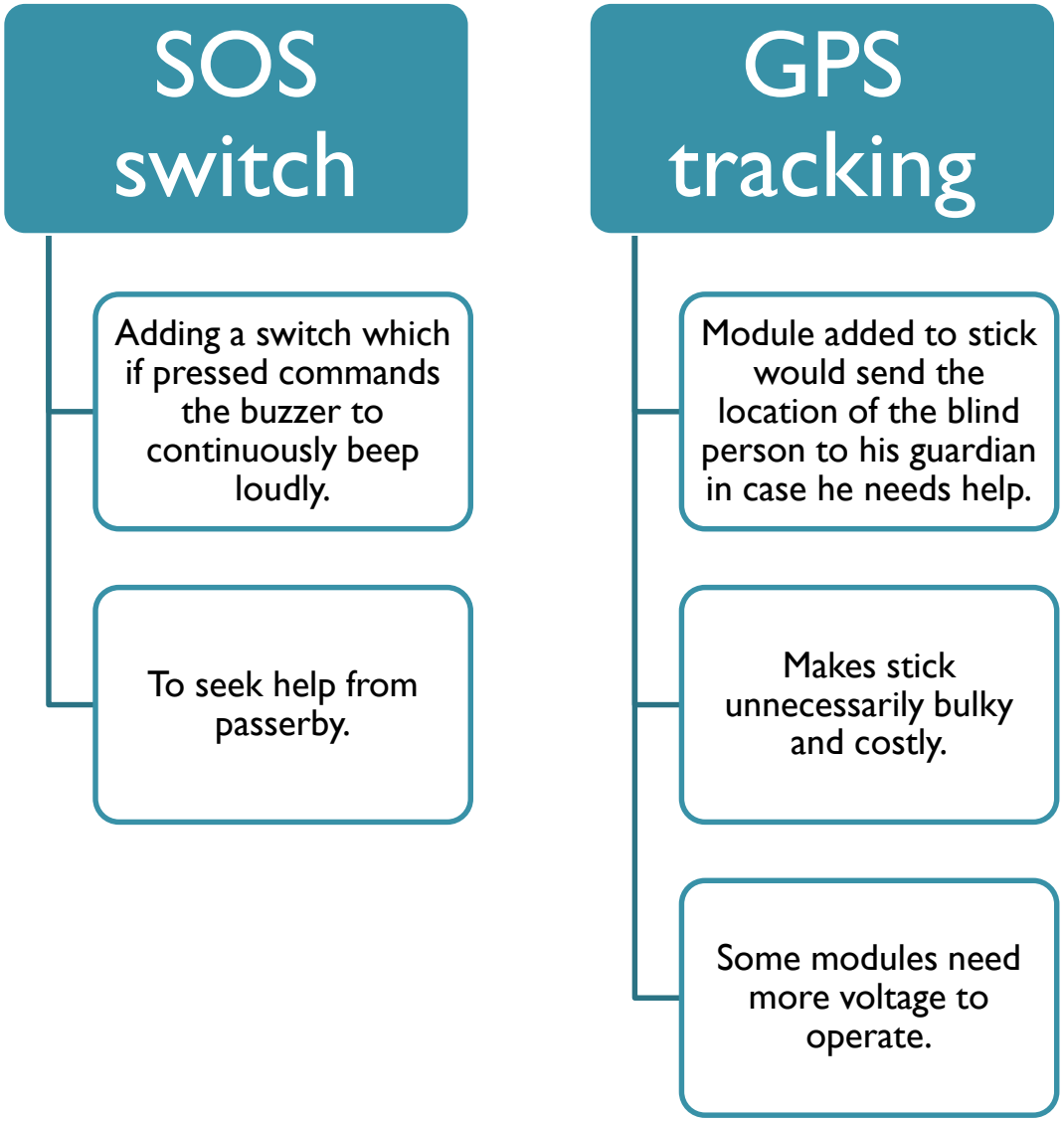
•The PCB holds all the parts of this project the microcontroller and the power supply circuit of the circuitry.

•The sensors are placed at special angle towards the bottom side of the stick to sense the objects better.

•They are connected to rest of the circuit through jumper wires.



Possible Modifications



GSM/ GPRS Module

- **SIM900 GSM Module -** This module supports communication in 900MHz band.
- Use : To send message to concerned mobile number.
- Operating Voltage : +12V
- Interfacing with Arduino Uno Board:

SIM900 GSM Module	Arduino Board
Rx pin	Serial - Tx pin
Tx pin	Serial – Rx pin
Gnd Pin	Gnd Pin
Vcc	+12V (external DC)

GPS Module

- GPS Module **SKG13BL** : It fetches the latitude and longitude of the current location from the satellite.
- Voltage : +12V

SIM900 GSM Module	Arduino Board
Rx pin	--
Tx pin	Digital Pin 11 *
Gnd Pin	Gnd Pin
Vcc	+12V (External DC)

* In programming we will include Software Serial Library to allow serial communication on pin 11.

Locating the Person

Message received to concerned person

Google map to show location corresponding to the latlng.

Thank You!