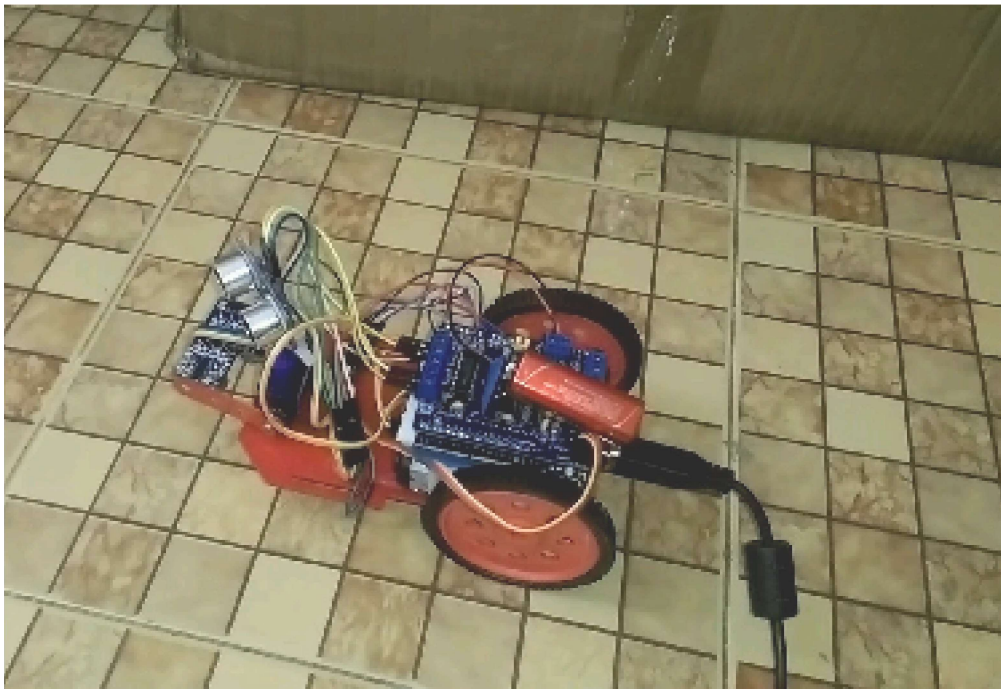# A I B O D

Arduino Interfacing Bot for Obstacle Detection

ABSTRACT

This project involves the building of an autonomous robot that can detect and avoid obstacles and can also detect and avoid edge of a surface on which it is placed. This is achieved by two ultrasonic sensors, one placed on a servo for edge detection and another placed at the bottom of the robot, facing downwards, for edge detection.

INTRODUCTION

Avoiding obstacles is the basic feature of any autonomous vehicle. Be it a self driving car or an army vehicle on a reconnaissance mission.

This robot detects the presence of an object and takes appropriate action to evade it. The ultrasonic sensor placed on a servo checks for the presence of an object in a 180 degree wide area. The sensor placed at the bottom checks for the presence of an edge.

As soon as the presence of an object is detected to be closer than the safe range, the bot backtracks and checks if it is clear of the object. This is achieved by 2 DC motor attached to the wheels.

LITERATURE SURVEY

This project uses the basic principle of an Ultrasonic sensor.
"**Ultrasonic transducers** are divided into three broad categories: transmitters, receivers and transceivers. Transmitters convert electrical signals into ultrasound, receivers convert ultrasound into electrical signals, and transceivers can both transmit and receive ultrasound." -source: wikipedia

METHODOLOGY

The project uses the following materials:

- 2 DC motors
- 1 Arduino board
- 1 Adafruit motor shield
- 2 Ultrasonic sensors
- 1 plastic chassis
- Connecting wires.

The project is to be connected and assembled as follows:

1) DC Motors connect to the Motor Shield
2) Left Motor connect to M1 (If the motors run backwards, change the (+) and (-) connections)
3) Right Motor connect to M4
4) The Servo motor connect to the Motor Shield
    - The Servo1 input is connected to the Arduino Digital10 input
    - The Servo2 input is connected to the Arduino Digital9 input
    - Power for the Servos comes from the Arduino's on-board 5V regulator, powered

directly from the USB or DC power jack on the Arduino

5) The HC-SR04 Sensor connections

– The HC-SR04 Sensor VCC connect to the Arduino +5V
– The HC-SR04 Sensor GND connect to the Arduino Ground
– The HC-SR04 Sensor Trig connect to the Arduino Analog 0
– The HC-SR04 Sensor Echo connect to the Arduino Analog 1

6) Battery and on / off button connection

– The (+) from the battery is connect to a leg of the button
– Connect a cable to the other legs of the button. This cable is for Motor Shield (+)

7) 2 seperate DC power supplies for the Arduino and motors

8) Attach the wheels

IMPLEMENTATION

The project has been implemented using a programmed Arduino microcontroller board. A motor shield has been used to drive the motors.

The AFmotor library has been used to provide ease of controlling the motors.

This a video demonstrating the working of the bot:
http://www.tinyurl.com/lufhoy3
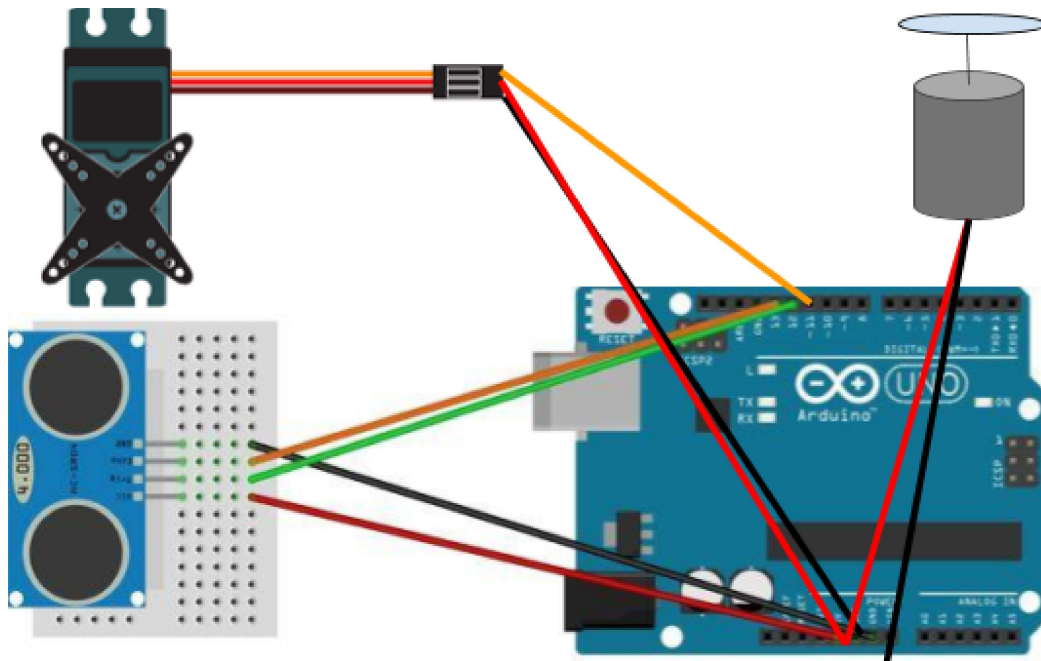
RESULTS AND FUTURE MODIFICATIONS

The project successfully avoids objects and navigates away from edges. Due of the underpowered motors the speed of the vehicle is slow. However this can be resolved by using more powerful motors and a set of higher voltage batteries

Future modifications for the motor could be using an application to remotely guide the robot or to make it controllable by voice.

Cameras can also be used on the robot for surveillance purposes. Also heat or IR sensors can be used to detect life forms, making it it closer to a reconnaissance vehicle.

REFERENCES

AFMotor Library :

- https://github.com/adafruit/Adafruit-Motor-Shield-library

Additional references:

- https://learn.adafruit.com/adafruit-motor-shield/overview

- http://playground.arduino.cc/Code/NewPing

- https://bitbucket.org/teckel12/arduino-new-ping/downloads