DON'T CRASH!

Autonomous Motor Response to Getting too Close

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Physical Electronics Lab Open House

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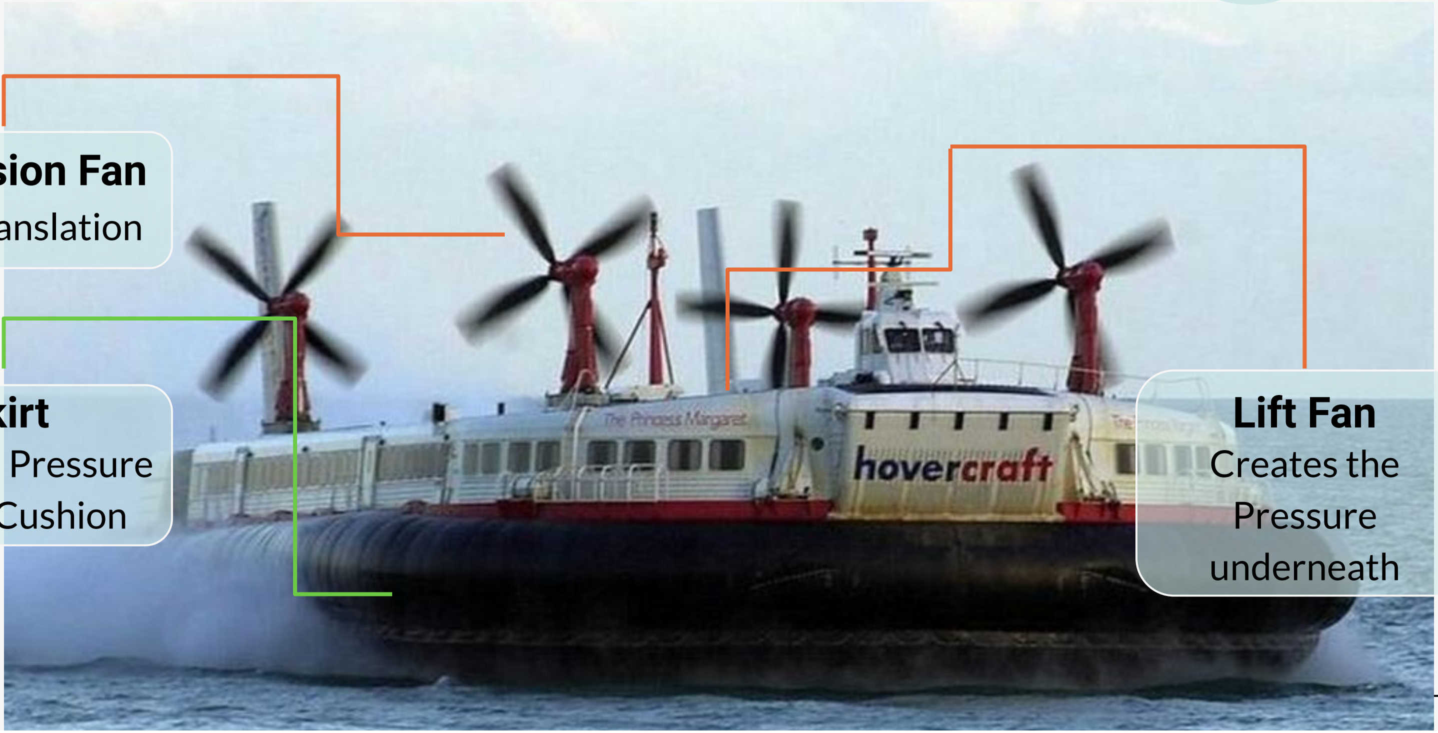
OBJECTIVE

Don’t Crash!!!

Prevent collision with motor shutdown.

HOVERCRAFT OVERVIEW

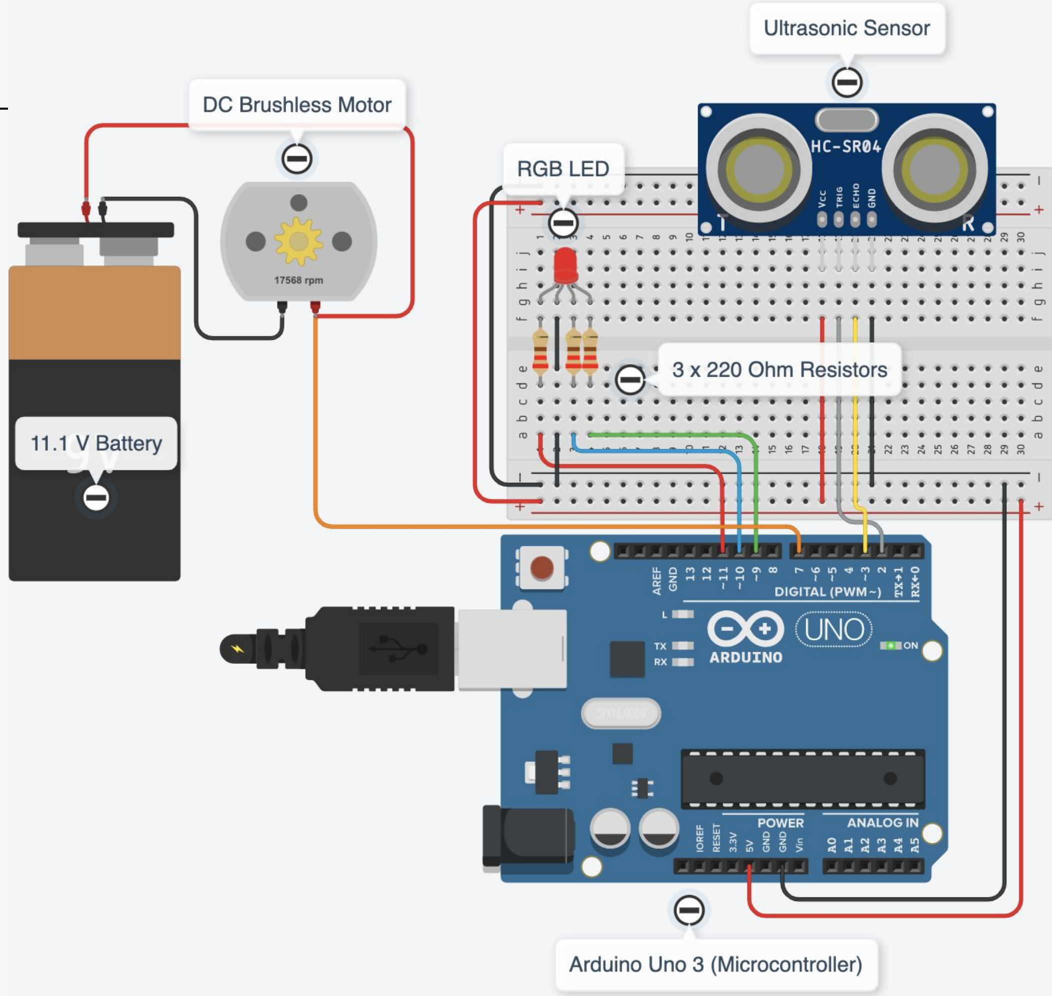


Propulsion Fan
X & Y Translation

Skirt
Maintain Pressure for Air Cushion

Lift Fan
Creates the Pressure underneath

CIRCUIT SCHEMATIC



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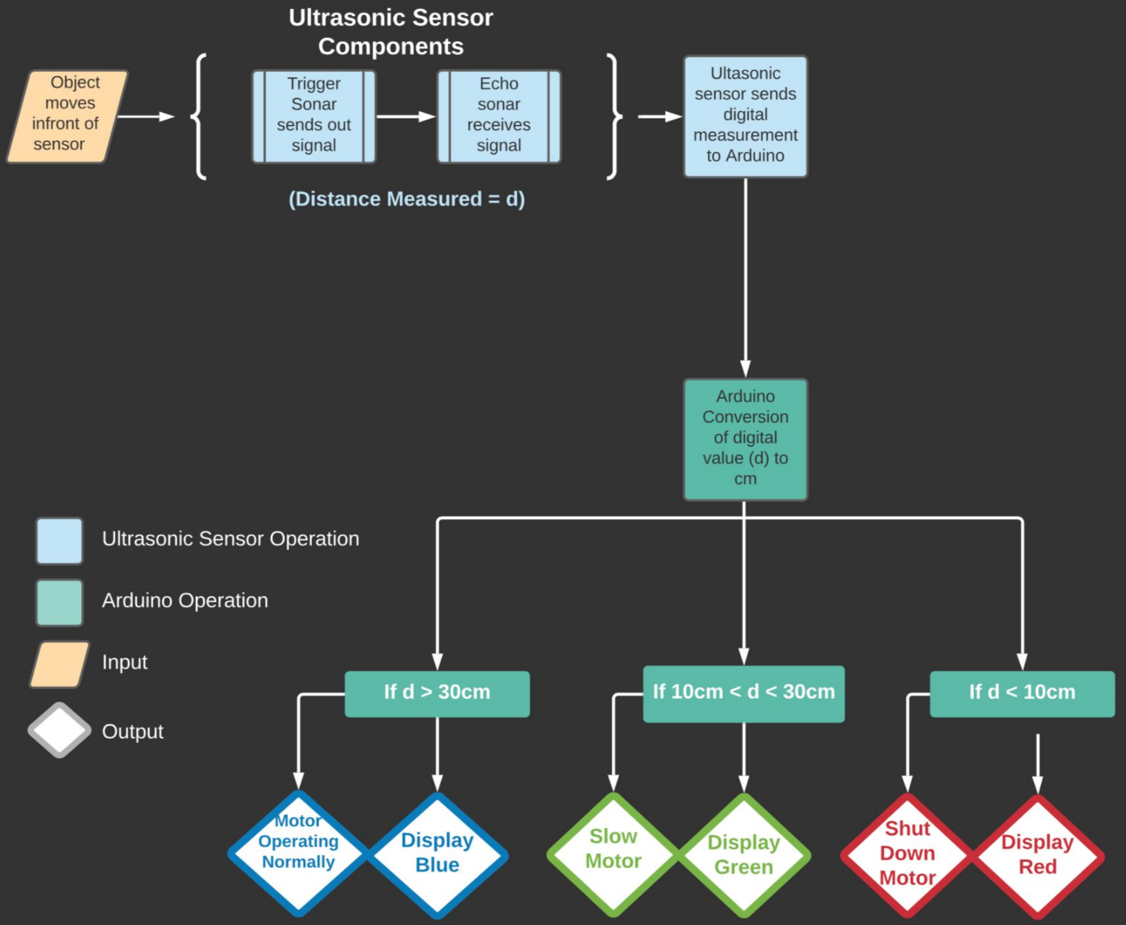
FLOW CHART


Ultrasonic Sensor Components
Object moves infront of sensor
Trigger Sonar sends out signal
Echo sonar receives signal
(Distance Measured = d)
Ultasonic sensor sends digital measurement to Arduino
Arduino Conversion of digital value (d) to cm
Ultrasonic Sensor Operation
Arduino Operation
Input
Output
If d > 30cm
If 10cm < d < 30cm
If d < 10cm
Motor Operating Normally
Display Blue
Slow Motor
Display Green
Shut Down Motor
Display Red

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APPLICATIONS

HOVERCRAFT

Exploring braking technique

AUTONOMOUS VEHICLES

Autobraking safety measures

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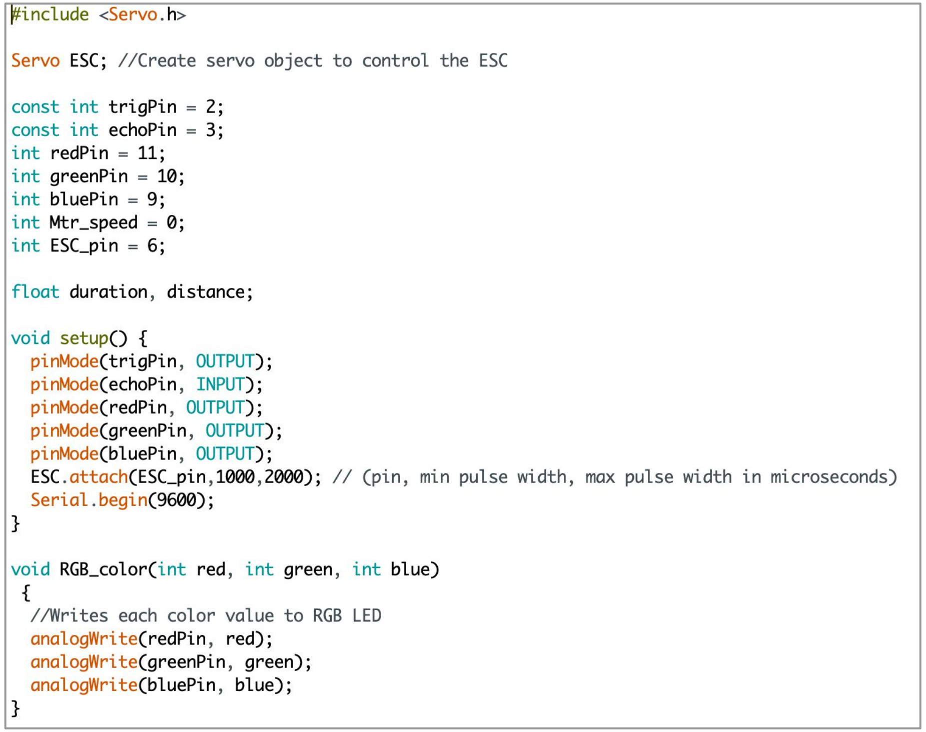
“I don’t have a fear of flying, I have a fear of crashing”

—Billy Bob Thornton

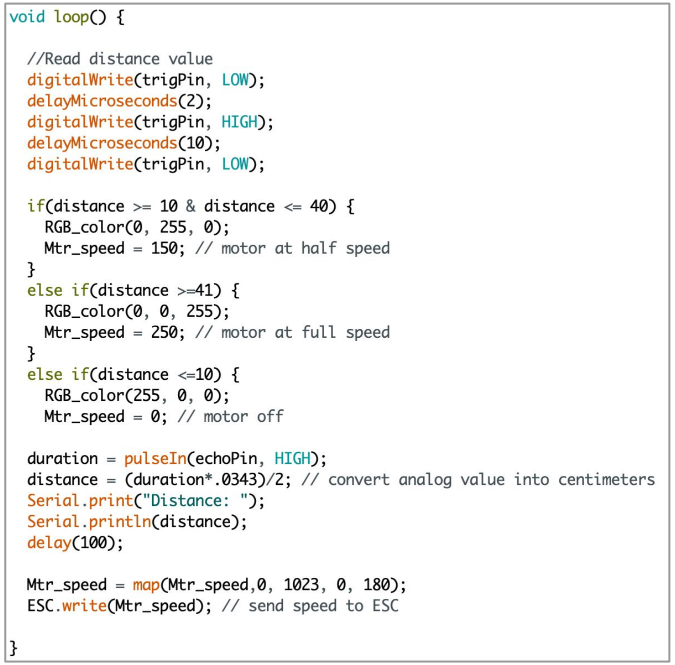
1960□749+€260⊓t-505∅+9/P+316

Appendix

Code



```
#include <Servo.h>

Servo ESC; //Create servo object to control the ESC

const int trigPin = 2;
const int echoPin = 3;
int redPin = 11;
int greenPin = 10;
int bluePin = 9;
int Mtr_speed = 0;
int ESC_pin = 6;

float duration, distance;

void setup() {
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  pinMode(redPin, OUTPUT);
  pinMode(greenPin, OUTPUT);
  pinMode(bluePin, OUTPUT);
  ESC.attach(ESC_pin,1000,2000); // (pin, min pulse width, max pulse width in microseconds)
  Serial.begin(9600);
}

void RGB_color(int red, int green, int blue)
 {
  //Writes each color value to RGB LED
  analogWrite(redPin, red);
  analogWrite(greenPin, green);
  analogWrite(bluePin, blue);
}
```



```
void loop() {

  //Read distance value
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);

  if(distance >= 10 & distance <= 40) {
    RGB_color(0, 255, 0);
    Mtr_speed = 150; // motor at half speed
  }
  else if(distance >=41) {
    RGB_color(0, 0, 255);
    Mtr_speed = 250; // motor at full speed
  }
  else if(distance <=10) {
    RGB_color(255, 0, 0);
    Mtr_speed = 0; // motor off

  duration = pulseIn(echoPin, HIGH);
  distance = (duration*.0343)/2; // convert analog value into centimeters
  Serial.print("Distance: ");
  Serial.println(distance);
  delay(100);

  Mtr_speed = map(Mtr_speed,0, 1023, 0, 180);
  ESC.write(Mtr_speed); // send speed to ESC

}
```