

Workshop V

Introduction

If you have not already, please download and install Arduino on your computer.

<https://www.arduino.cc/en/Main/Software>

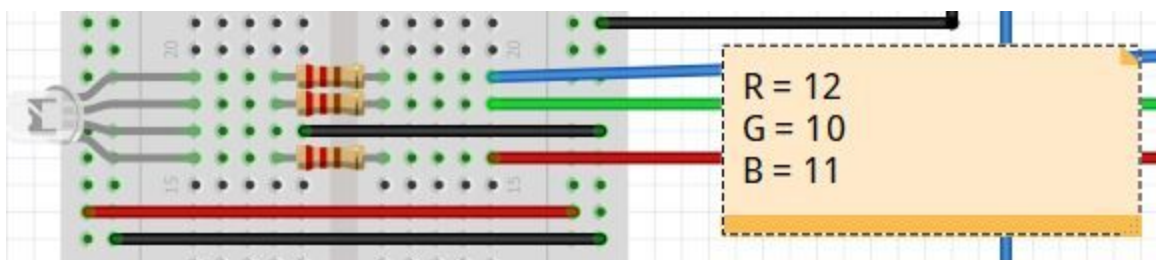
For this workshop, your team will add an ultrasonic sensor controlled by a servo motor, an RGB LED, and an LCD.

Parts:

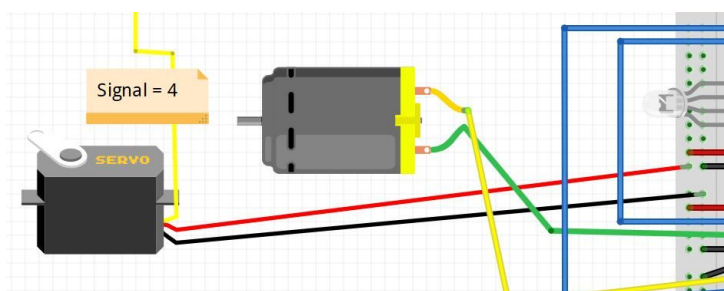
- Car from last workshop
- 10k potentiometer
- Four 330 Ohm resistors
- One RGB LED
- One LCD
- One Ultrasonic Sensor w/ plastic frame
- One Servo Motor

Fritz Diagram (Complete circuit at the end of the Fritzing section)

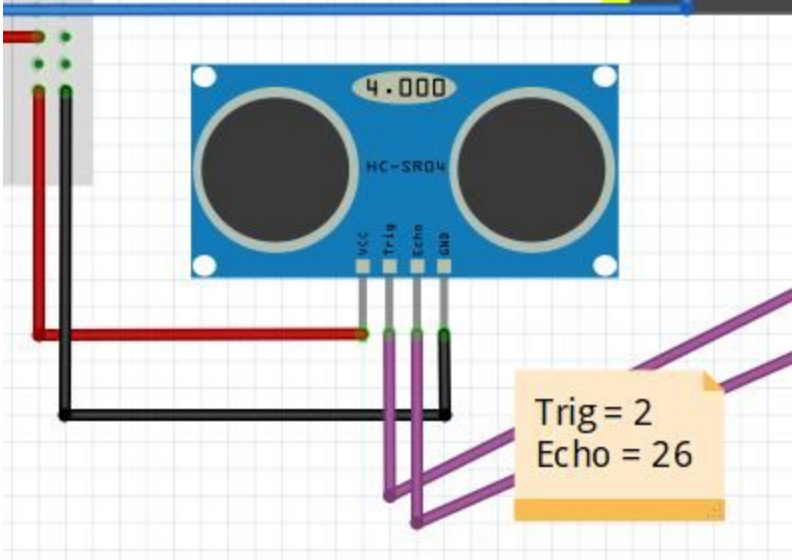
RGB LED Zoomed In (Longest pin is ground)



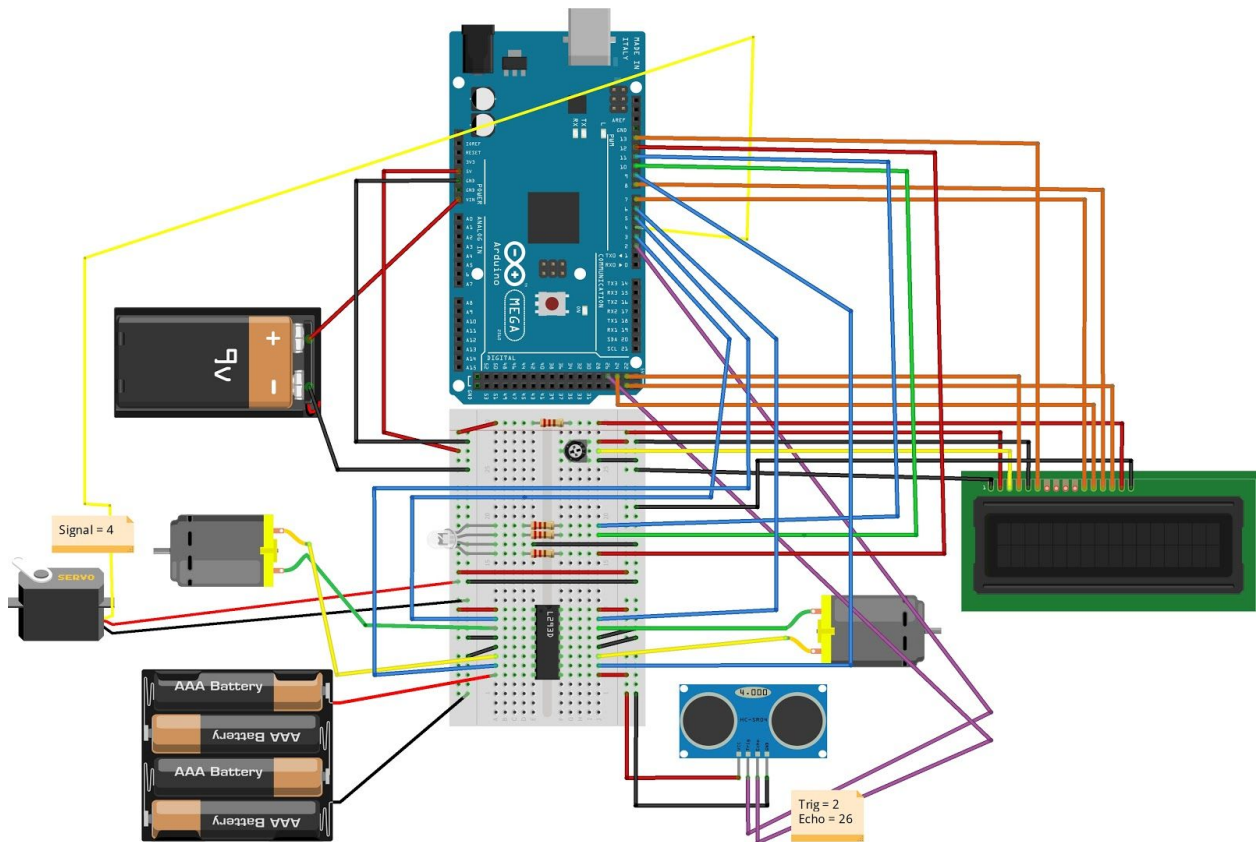
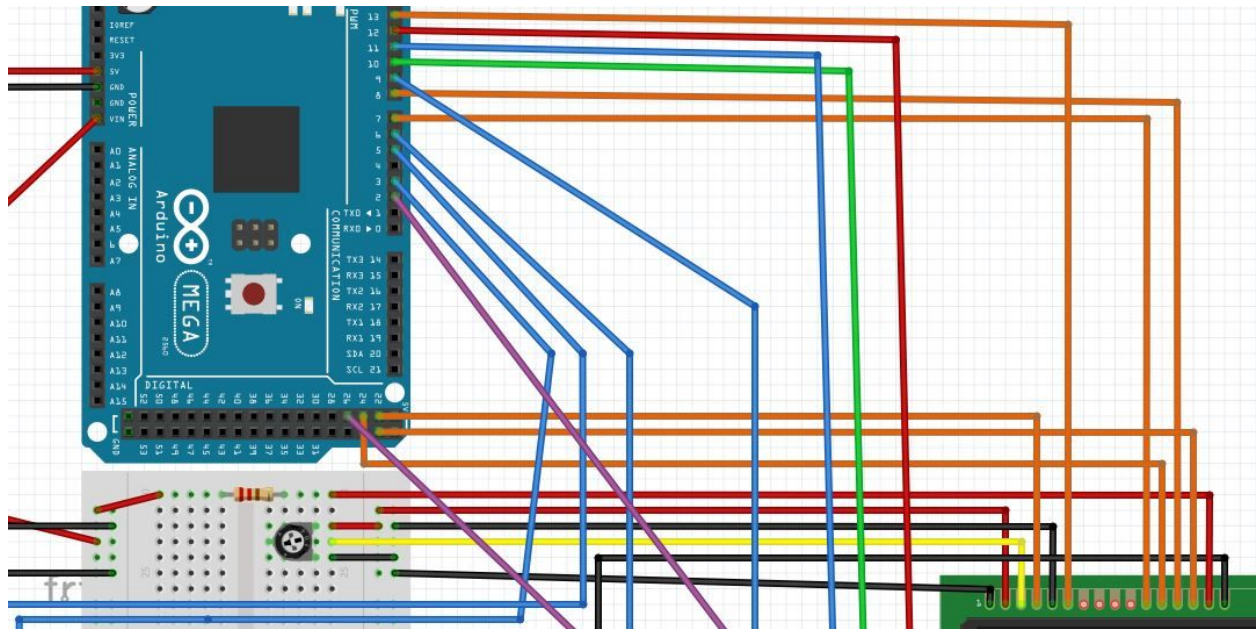
Servo Zoomed In



Ultrasonic Sensor Zoomed In



LCD Zoomed In



Code:

```
/*  
*  
* Vehicle with integrated servo, LCD, LED, and an ultrasonic sensor. The car drives forward,  
changing LED's color accordingly, if supersonic reads 30 cm or less, it backs up, takes left/right  
reading and moves in the direction of bigger space. LCD displays if moving forward, stopping, or  
backing up.  
*  
*/
```

```
#include <LiquidCrystal.h>
```

```
#include <Servo.h>
```

```
int trig = 2;
```

```
int echo = 26;
```

```
int leftForward = 3;
```

```
int leftBackward = 5;
```

```
int rightForward = 6;
```

```
int rightBackward = 9;
```

```
int const RED = 12;
```

```
int const GREEN = 10;
```

```
int const BLUE = 11;
```

```
const int rs = 22, en = 13, d4 = 7, d5 = 24, d6 = 8, d7 = 23;
```

```
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
```

```
Servo servo; // create servo object to control a servo
```

```
int left, right, dist;
```

```
void setup()
```

```
{
```

```
  Serial.begin(9600);
```

```
  // set up the LCD's number of columns and rows:
```

```
  lcd.begin(16, 2);
```

```
  servo.attach(4); // Attaches the servo on pin 4 to the servo object
```

```
  servo.write(90); // Sets servo to 90 degrees
```

```
  delay(1000); // Gives the servo one second the position itself to 90 degrees
```

```
  pinMode(trig, OUTPUT);
```



```
lcd.print("Right Value = ");  
lcd.print(right);  
delay(1000);
```

```
lcd.clear();  
lcd.print("Backward");  
setColor(0,0,255);//Blue  
servo.write(90);  
analogWrite(leftBackward , 255);  
analogWrite(rightBackward , 255);  
delay(1000);  
analogWrite(leftBackward , 0);  
analogWrite(rightBackward , 0);  
delay(1000);
```

```
if(left < right) {  
  lcd.clear();  
  lcd.print("Turn Right");  
  setColor(255,0,190); //Purple  
  analogWrite(leftForward , 255);  
  analogWrite(rightForward , 100);  
  delay(600);  
}  
else if(left > right) {  
  lcd.clear();  
  lcd.print("Turn Left");  
  setColor(255,0,190); //Purple  
  analogWrite(leftForward , 100);  
  analogWrite(rightForward , 255);  
  delay(600);  
}
```

```
analogWrite(leftForward , 0);  
analogWrite(rightForward , 0);  
delay(2000);  
}
```

```
//Executes if sensor reading is greater than 30CM  
lcd.clear();
```

```
lcd.print("Forward");
servo.write(90);
setColor(0,255,0); //Green
analogWrite(leftForward , 255);
analogWrite(rightForward , 255);
delay(10);

}
////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
```

```
void setColor(int red, int green, int blue){
  analogWrite(RED,red);
  analogWrite(GREEN,green);
  analogWrite(BLUE,blue);
}
```

```
int radar()
{
  int distance;
  int duration;
  digitalWrite(trig,LOW);
  delayMicroseconds(2);
  digitalWrite(trig,HIGH);
  delayMicroseconds(10);
  digitalWrite(trig,LOW);

  duration=pulseIn(echo,HIGH);
  distance=duration*0.034/2;
  return distance;
}
```