



Line Follower Workshop

07/04/18



Things to do while you're waiting!

Download the Arduino IDE

arduino.cc/en/Main/Software

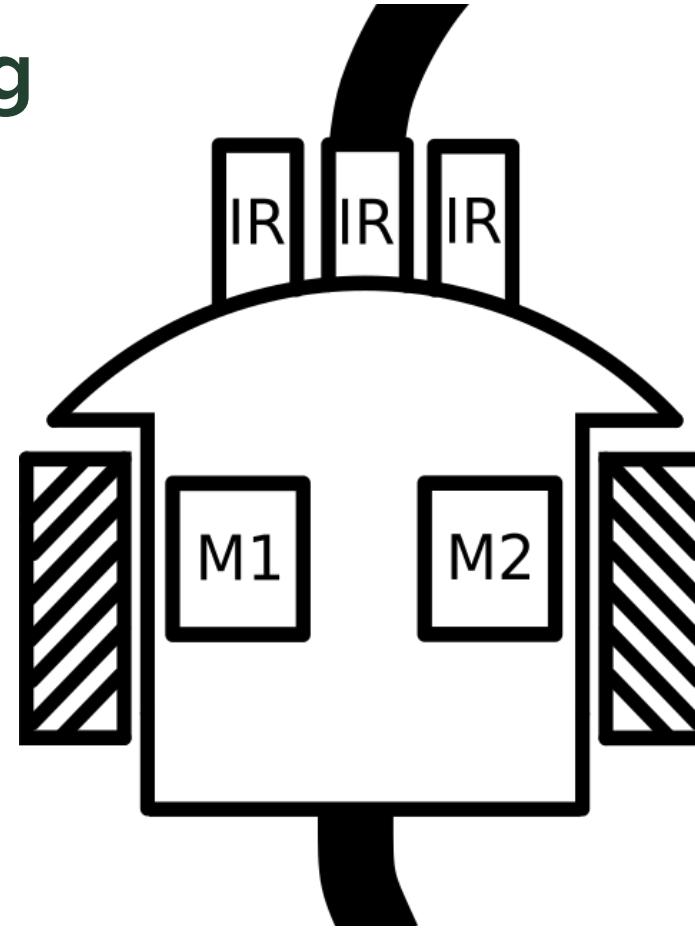


**Get these slides on
your computer!**

tinyurl.com/created-line-follower



Line Following

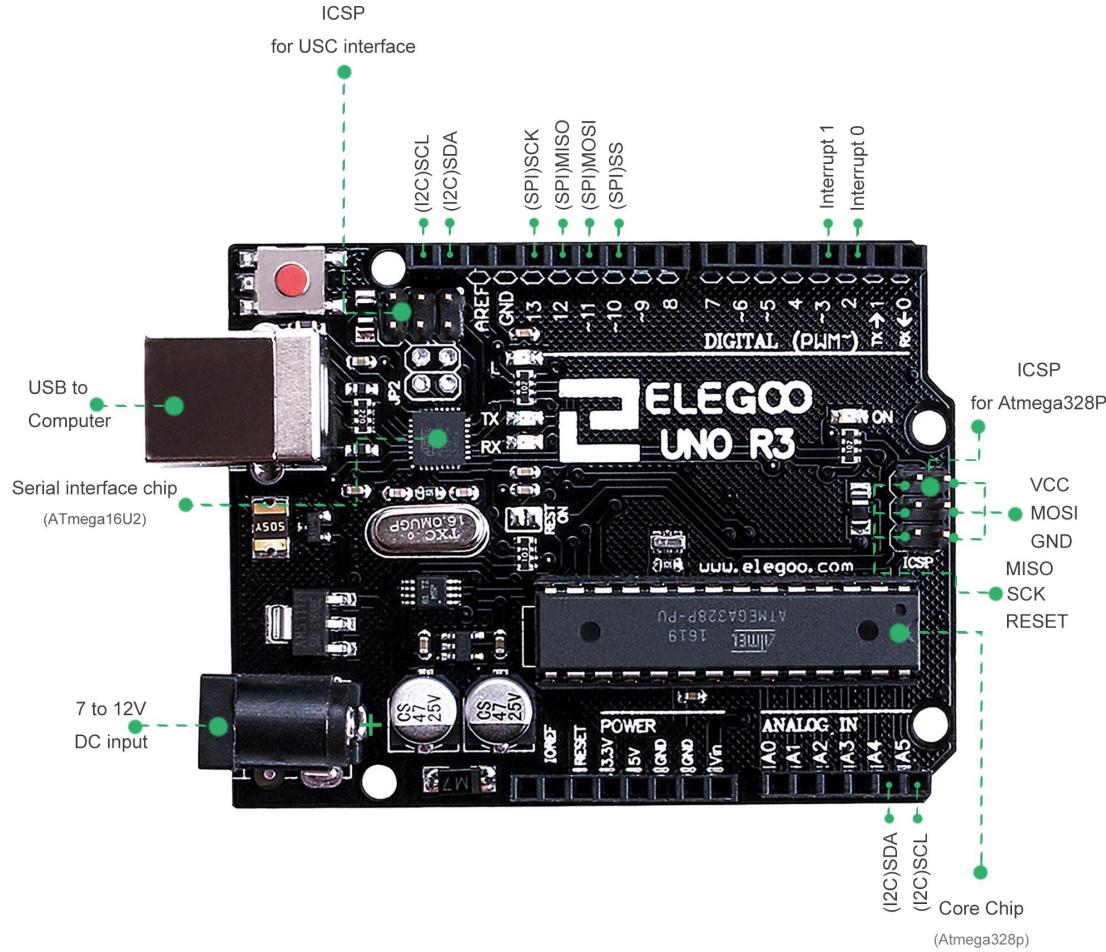




Motor Control

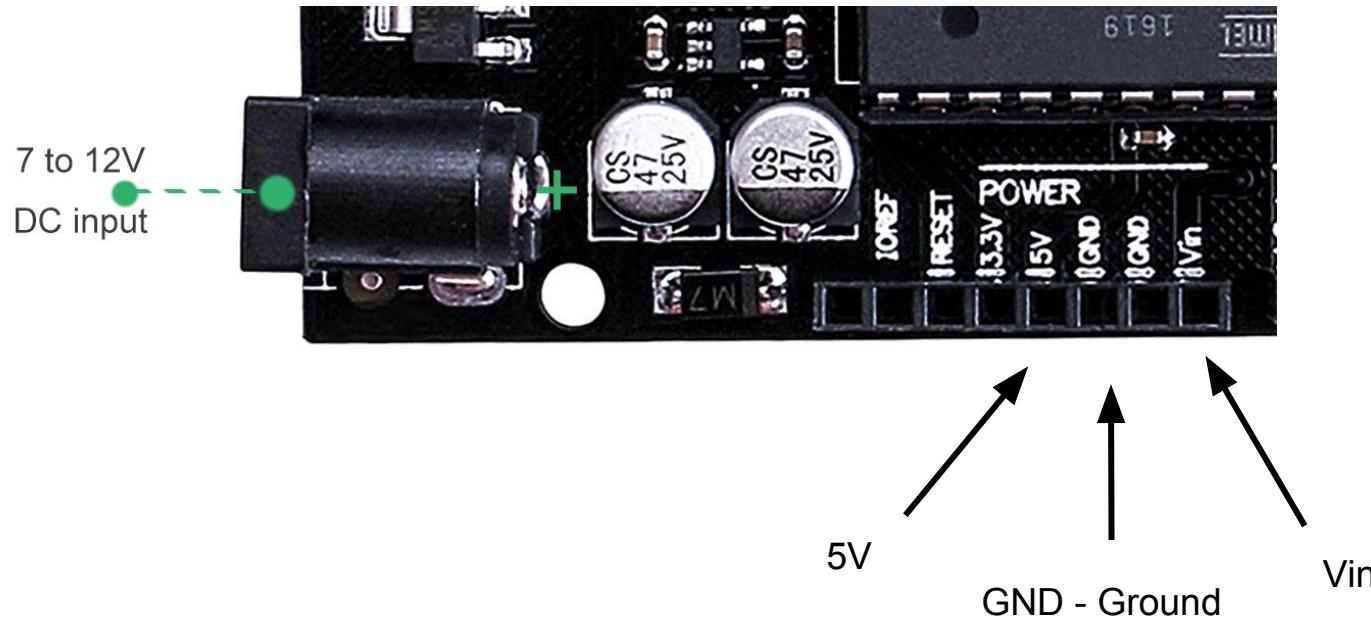


Arduino



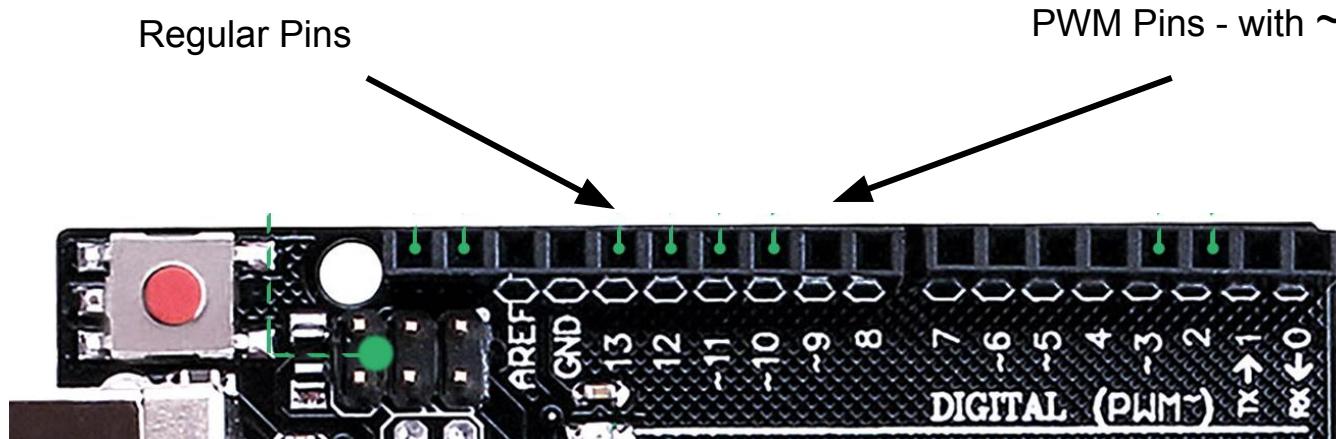


Arduino Power



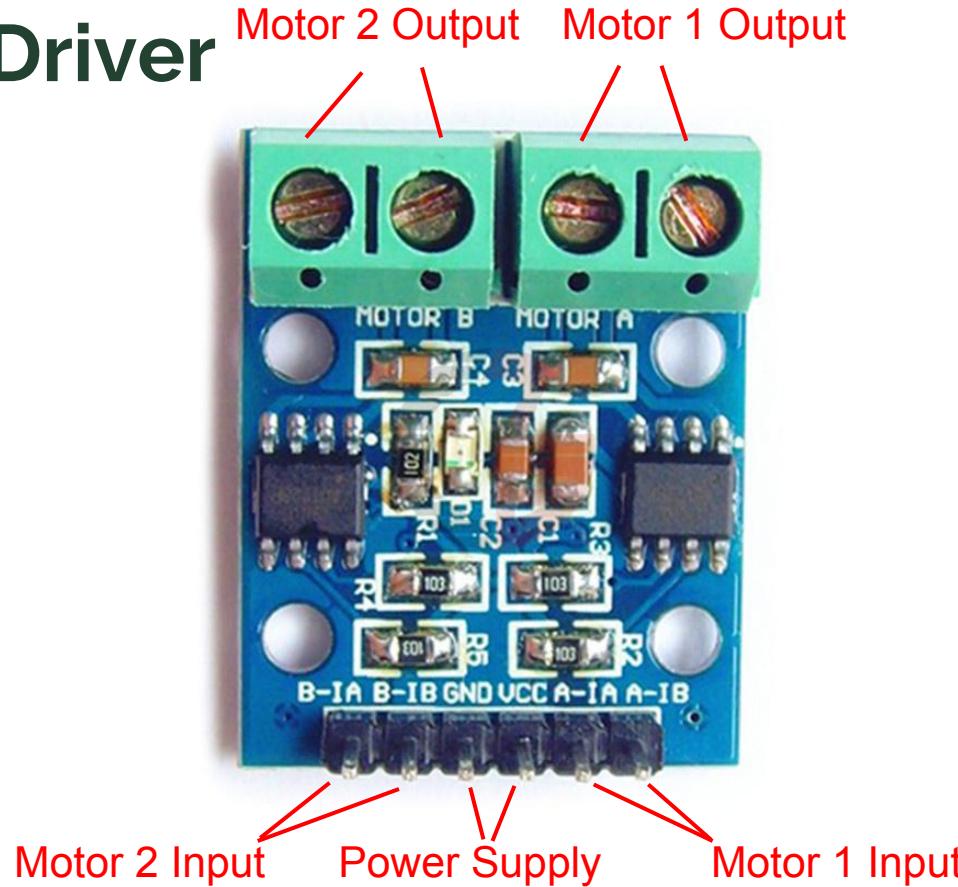


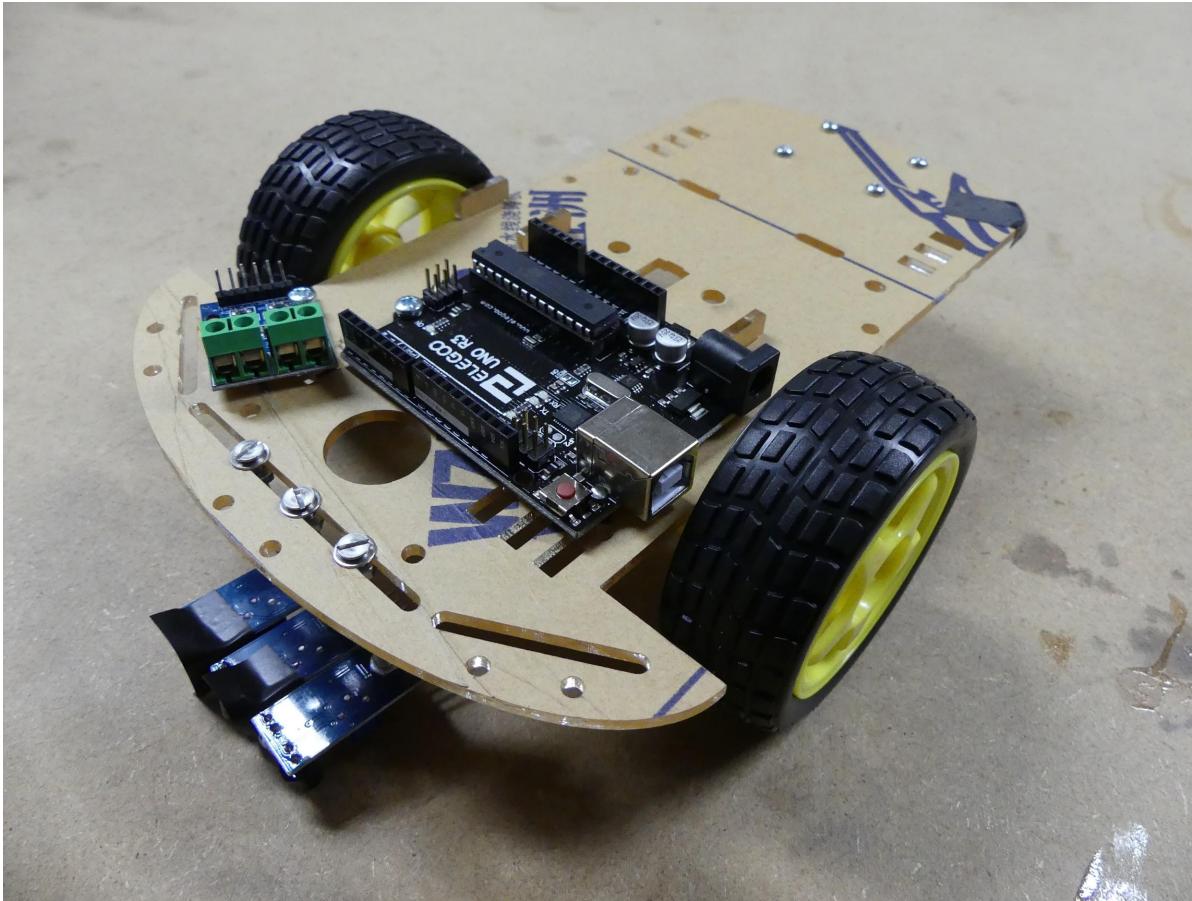
Arduino I/O

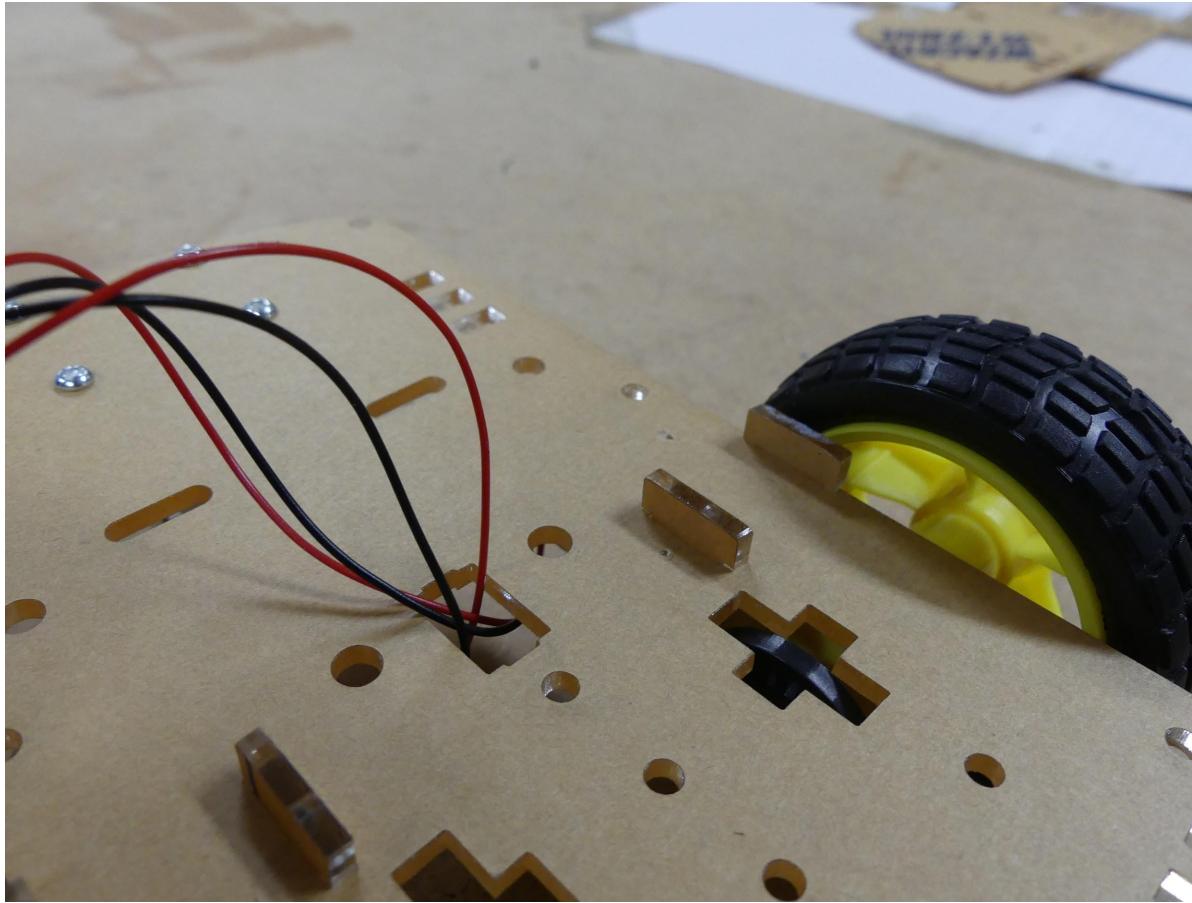




Motor Driver

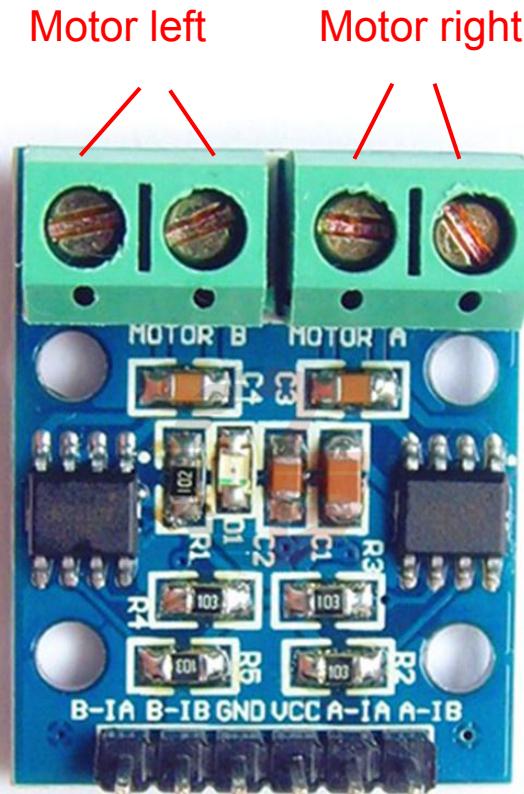


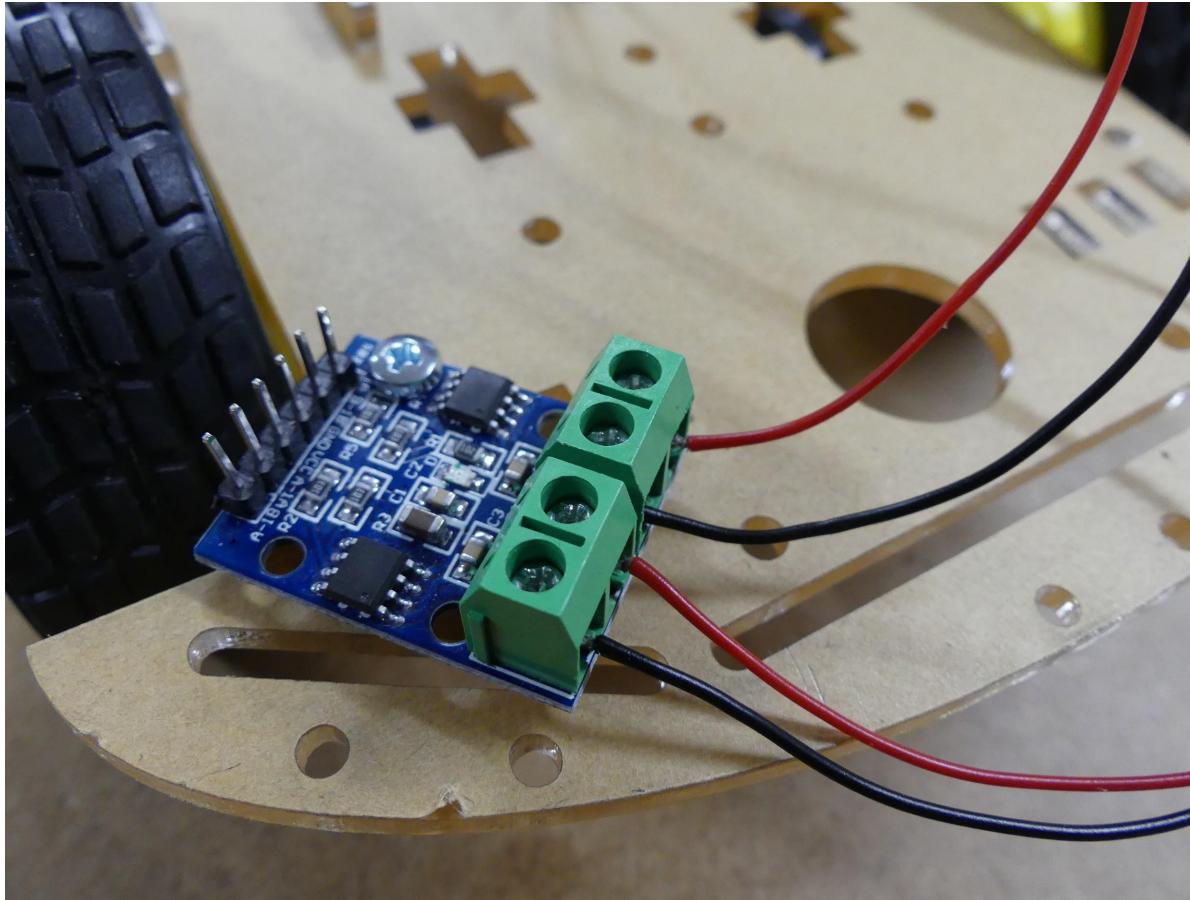






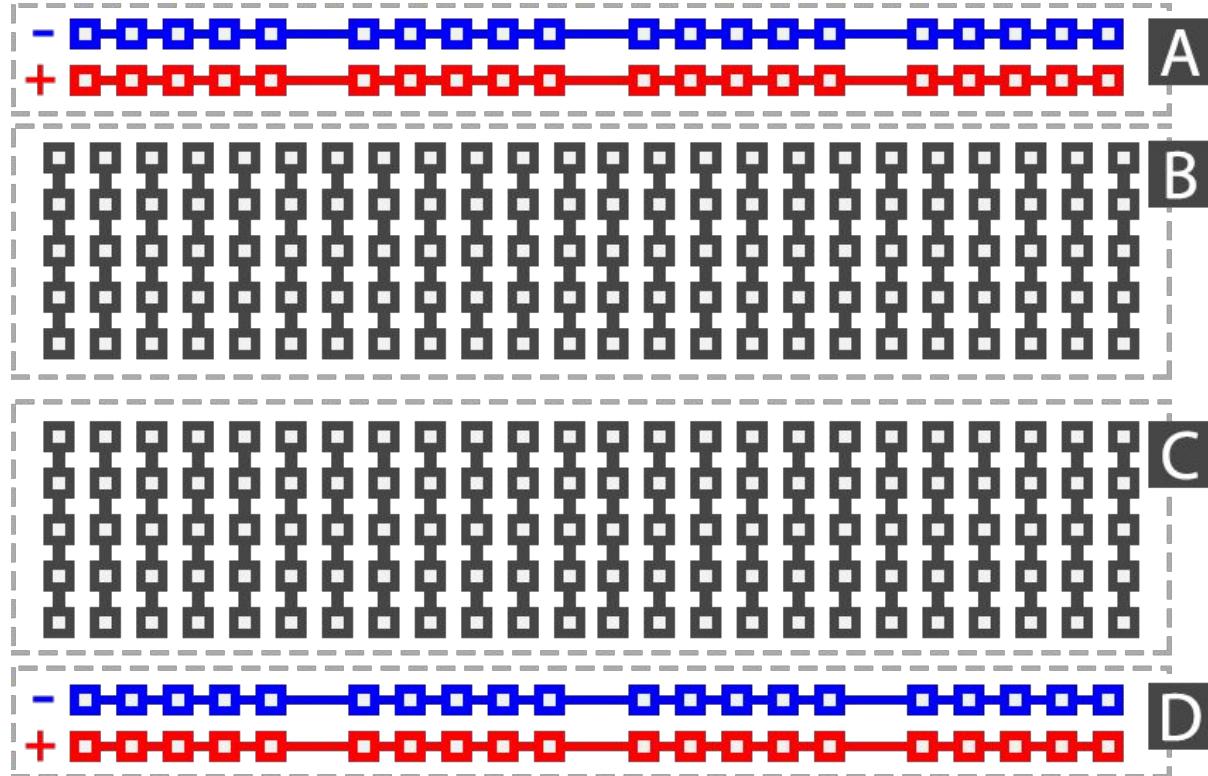
Connection

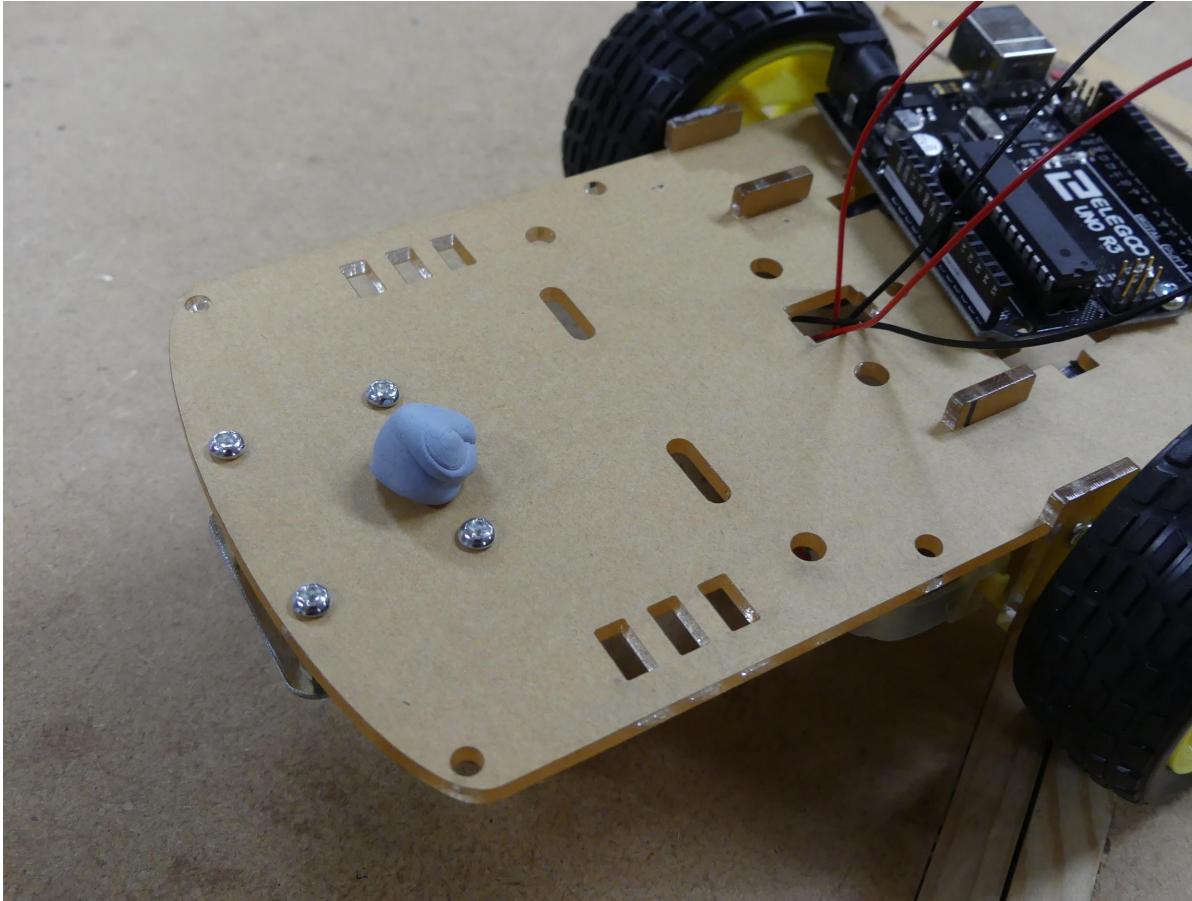


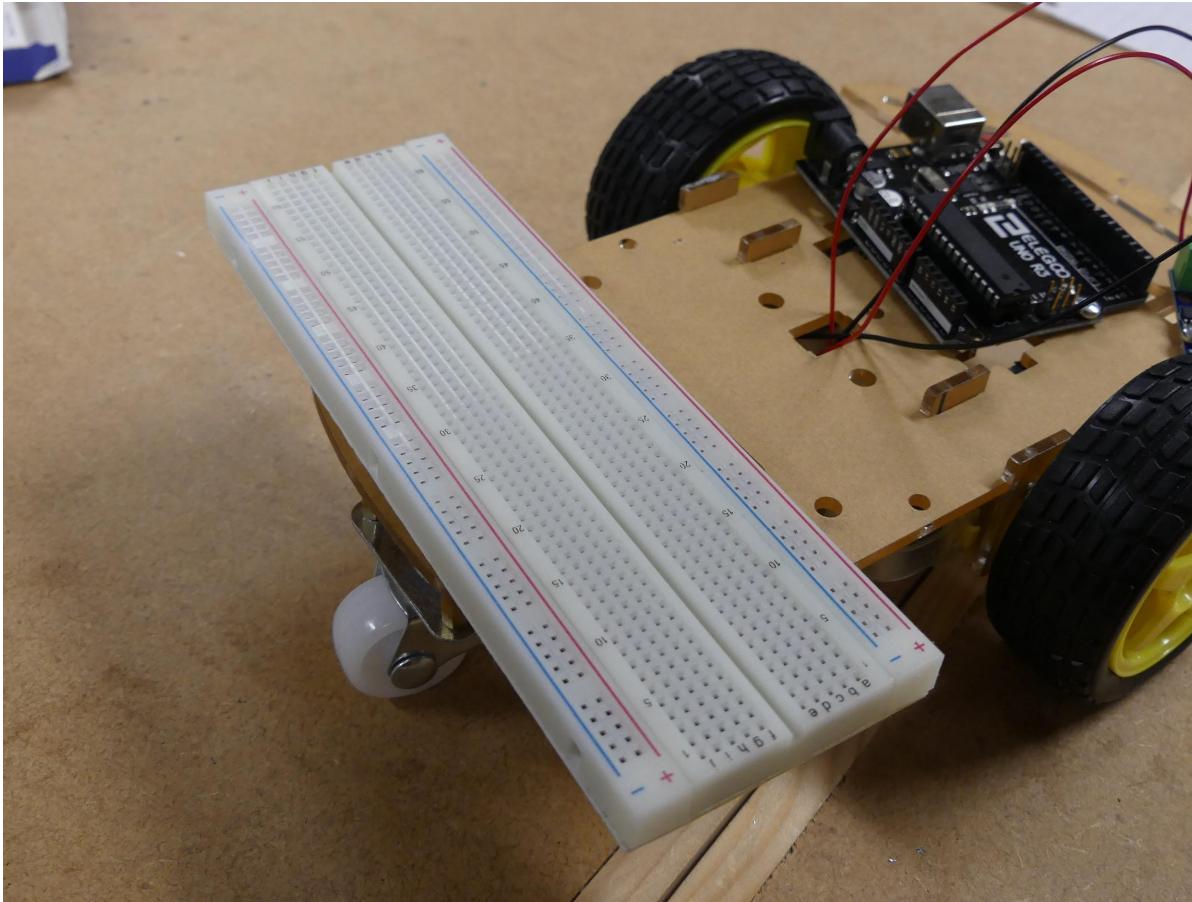




Breadboards

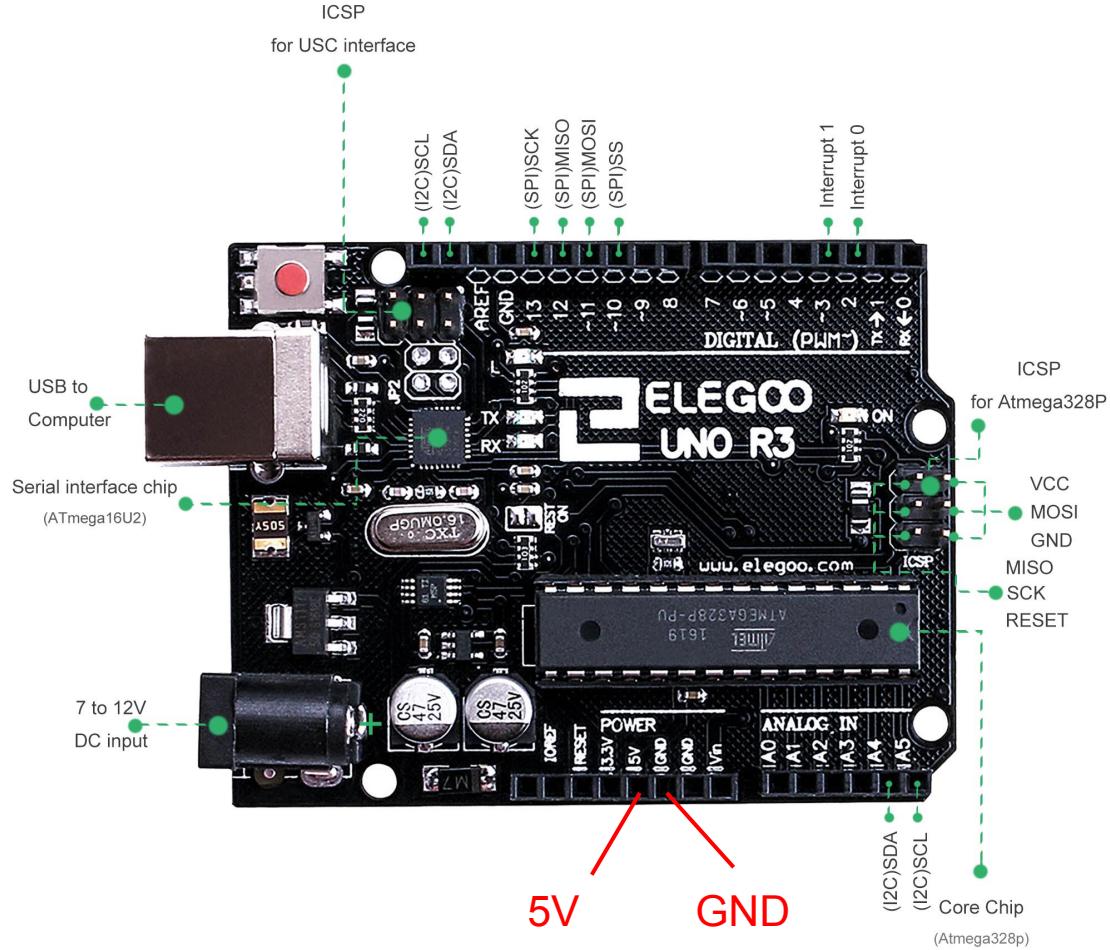






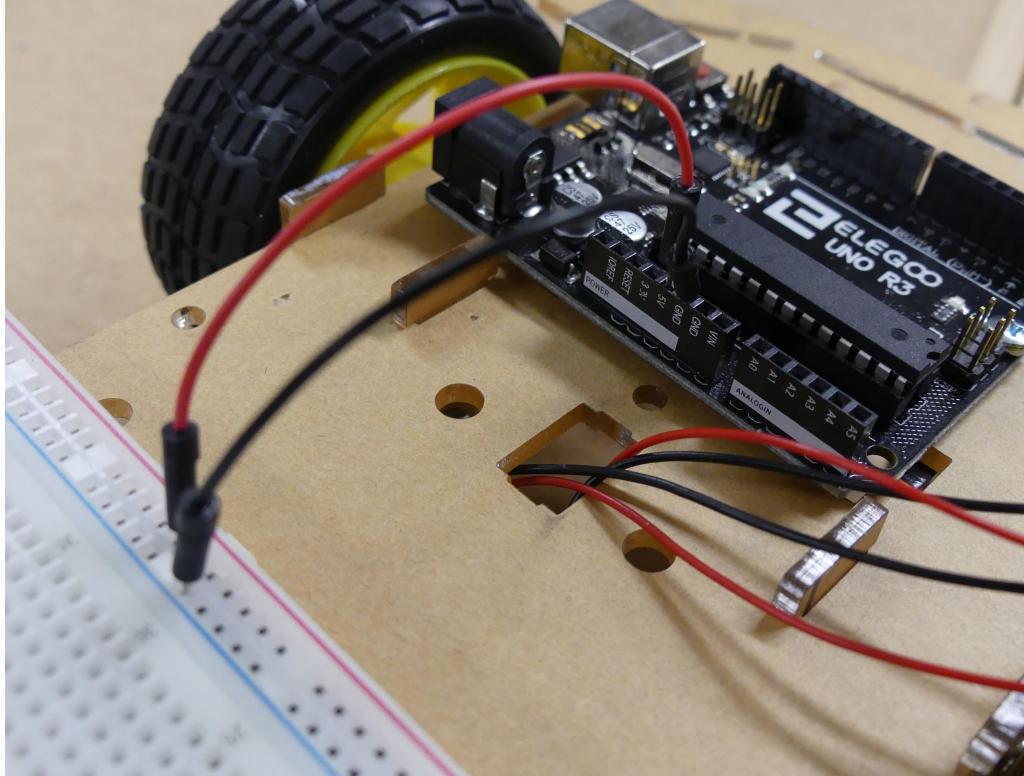


Arduino



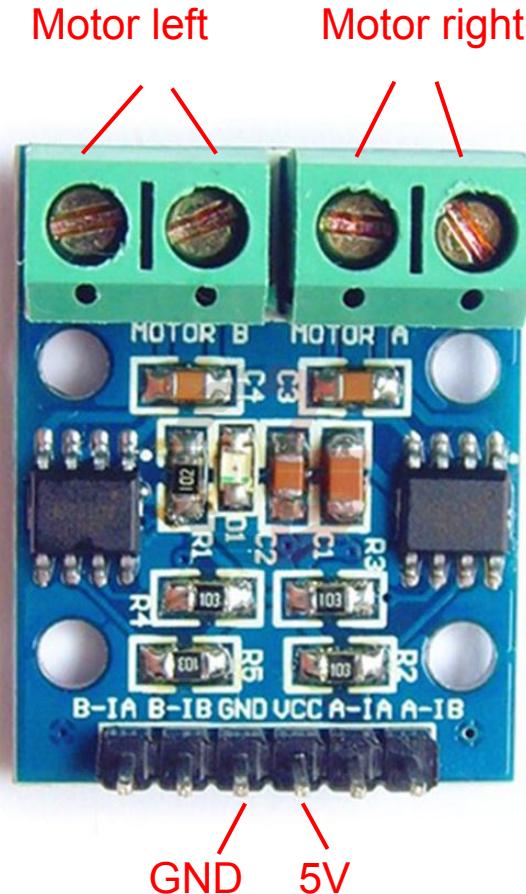


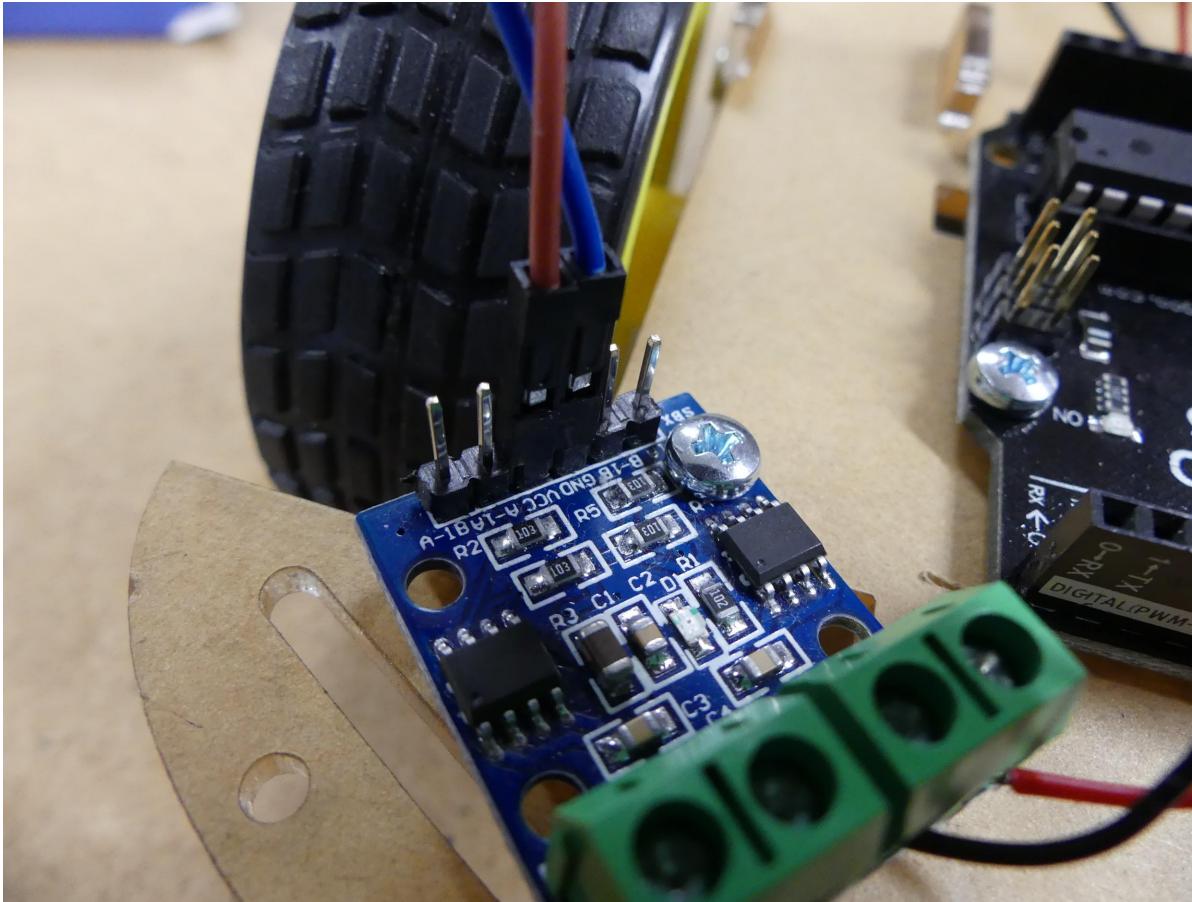
Arduino Pin “5V” (red) and “GND” (black/blue)

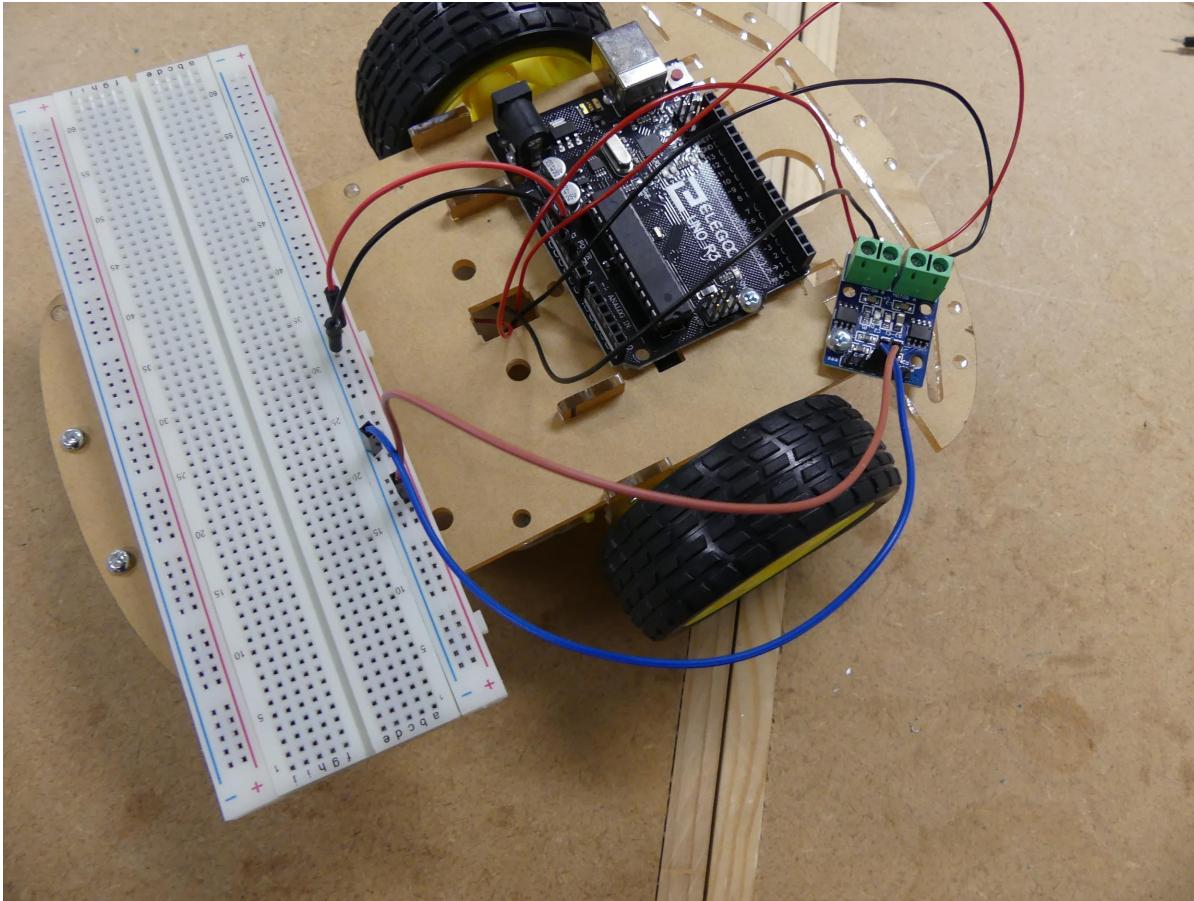




Connection

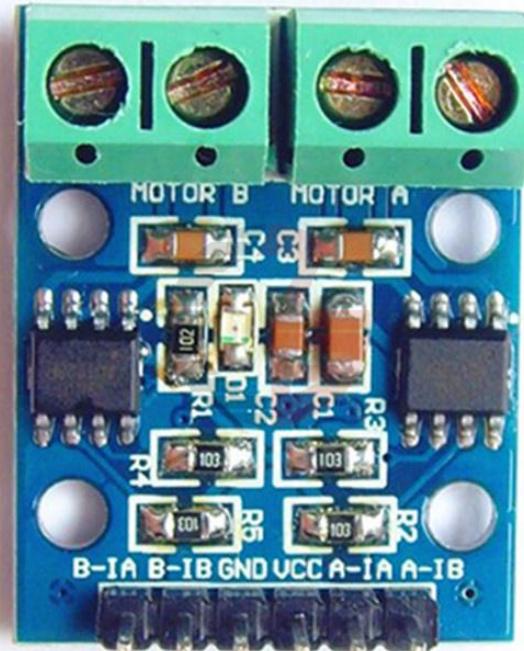






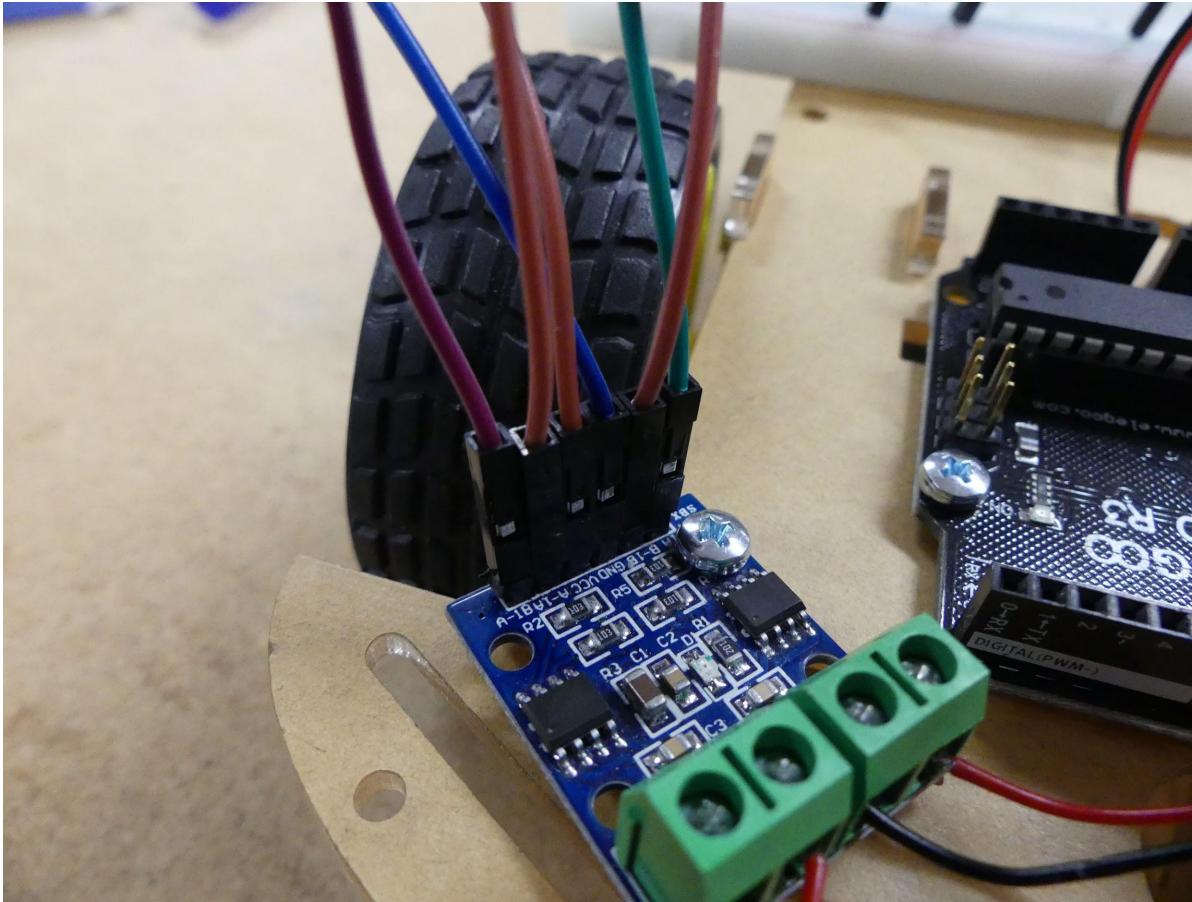


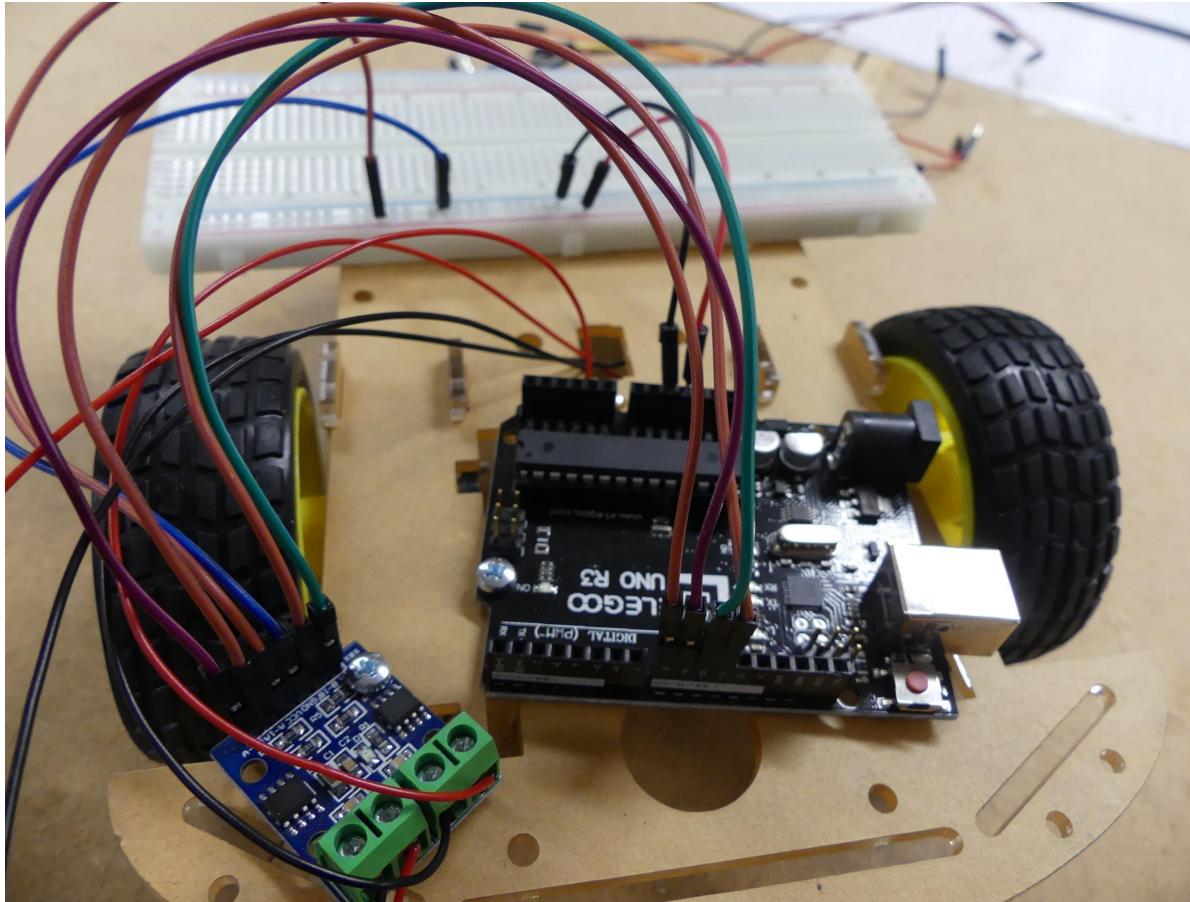
Connection

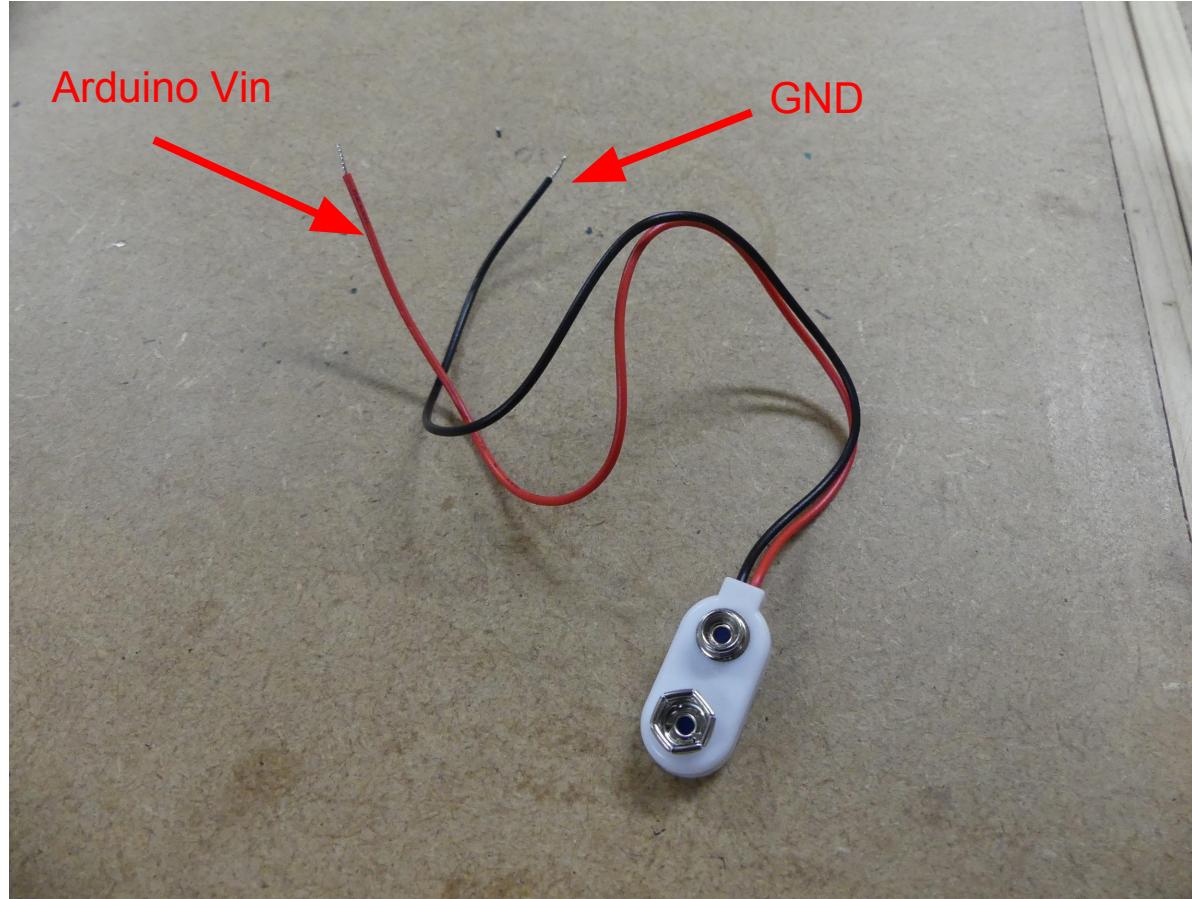


Connect to Arduino: Pin 10 Pin 11

Pin 8 Pin 9









Motor Software



Download our template

tinyurl.com/line-follower-motor



Arduino Program structure

```
/* This is a comment */

void setup() {
    /* Code runs once at startup */
}

void loop() {
    /* Code here runs repeatedly */
}
```



Template - Pin Initialisation

```
const int motorLeftA = 10;
const int motorLeftB = 11;
const int motorRightA = 9;
const int motorRightB = 8;

void motorInit() {
    pinMode(motorLeftA, OUTPUT);
    pinMode(motorLeftB, OUTPUT);
    pinMode(motorRightA, OUTPUT);
    pinMode(motorRightB, OUTPUT);
}
```



Template - Motor Helper Routines

```
void motorLeftSetSpeed(int speed) {  
    if (dirLeft == FORWARD) {  
        analogWrite(motorLeftA, speed);  
        digitalWrite(motorLeftB, LOW);  
    }  
}
```



Template - Motor Helper Routines

```
void motorLeftSetSpeed(int speed) {  
    if (dirLeft == FORWARD) {  
        analogWrite(motorLeftA, speed);  
        digitalWrite(motorLeftB, LOW);  
    } else {  
        analogWrite(motorLeftA, 255 - speed);  
        digitalWrite(motorLeftB, HIGH);  
    }  
}
```



Add Your Code - Run the Car

- Run the Motors
- Stop after a few seconds

Function 'delay(ms)' to pause the Arduino



Add Your Code - Run the Car

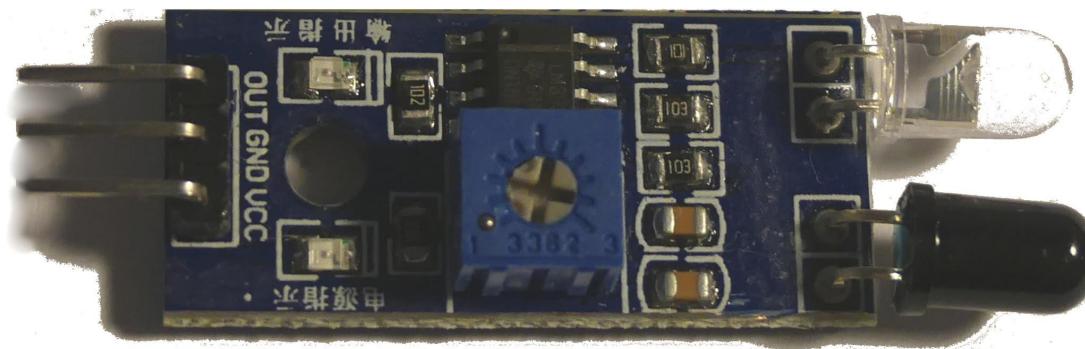
```
void setup() {  
    motorLeftSetSpeed(140);  
    motorRightSetSpeed(150);  
  
    delay(2000);  
  
    motorLeftSetSpeed(0);  
    motorRightSetSpeed(0);  
}
```



Sensors

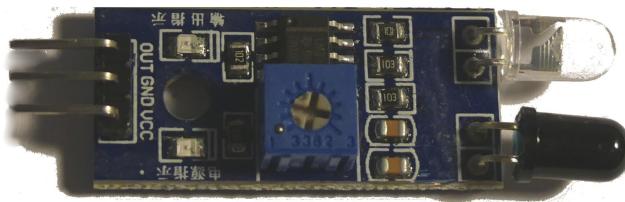


IR Sensors - Assembling

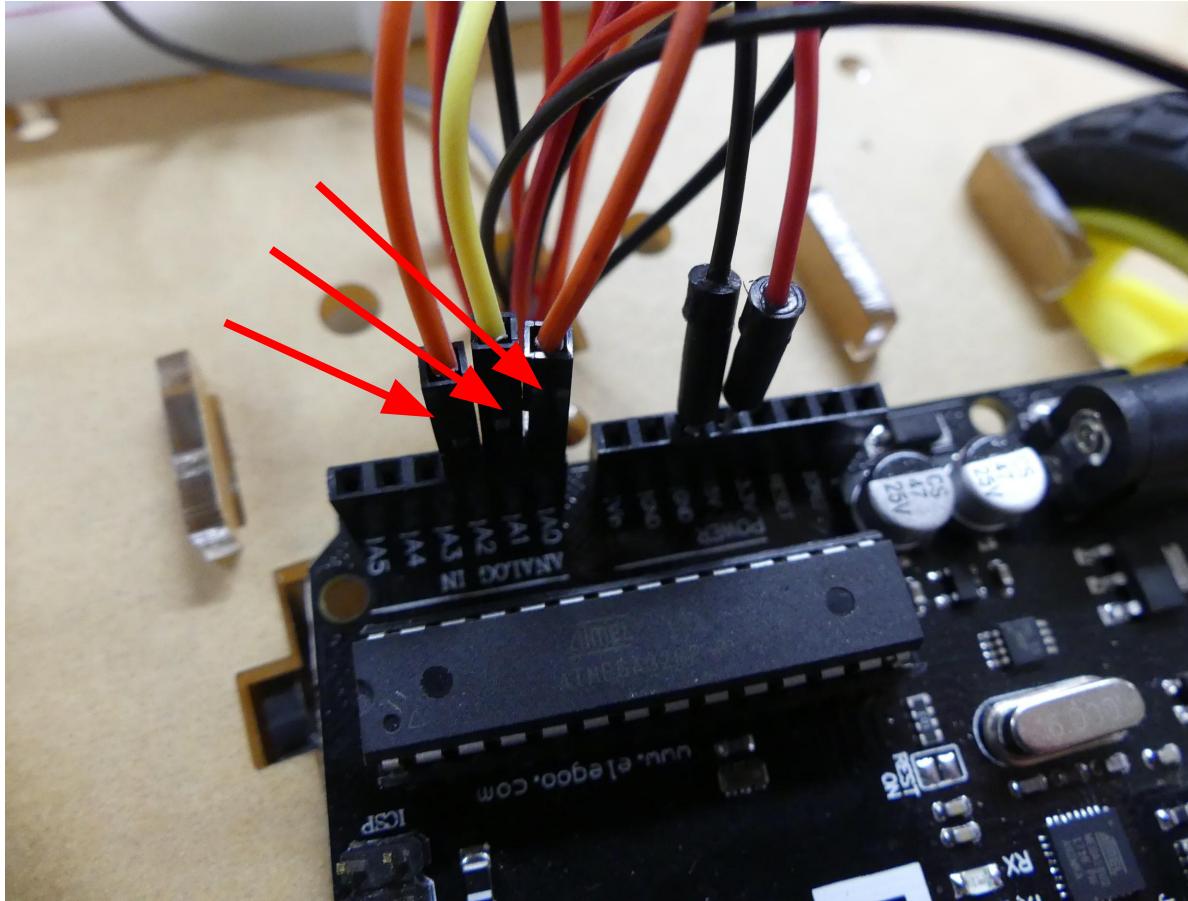




Connection to Arduino

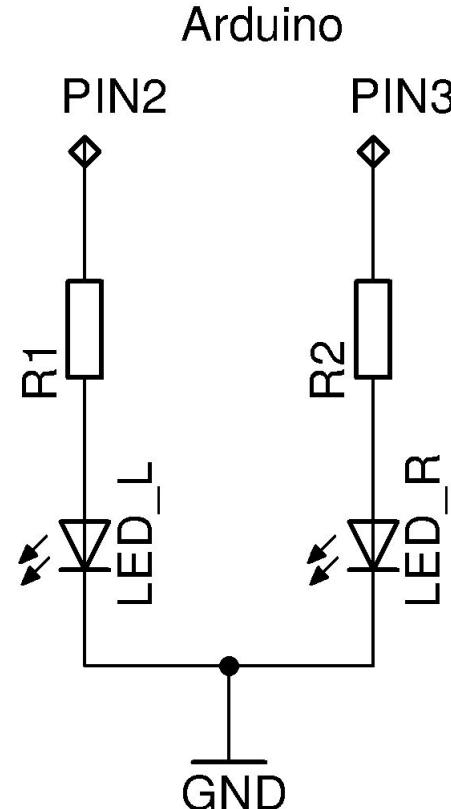


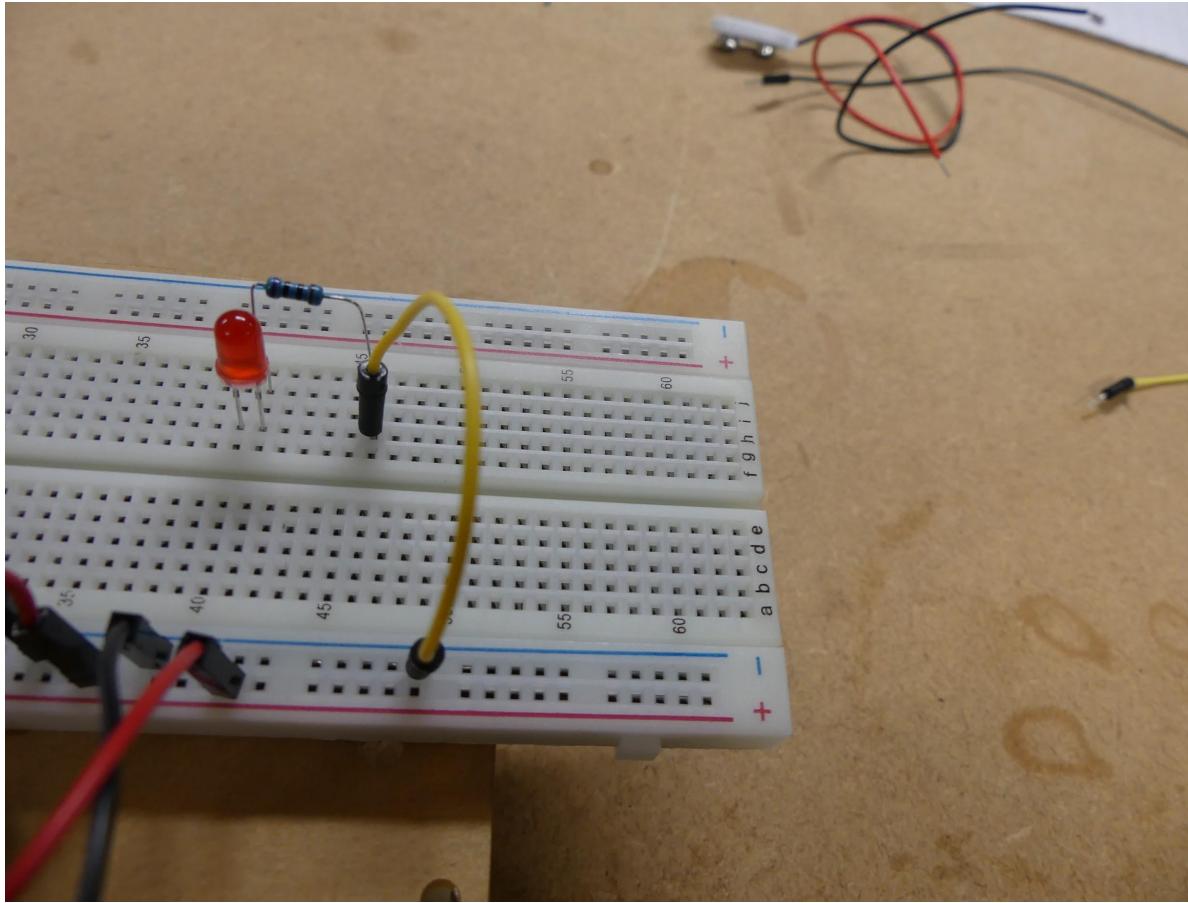
All GND	GND (Breadboard)
All Vcc	+5V (Breadboard)
Sensor Left Out	Arduino Pin A0
Sensor Center Out	Arduino Pin A1
Sensor Right Out	Arduino Pin A2

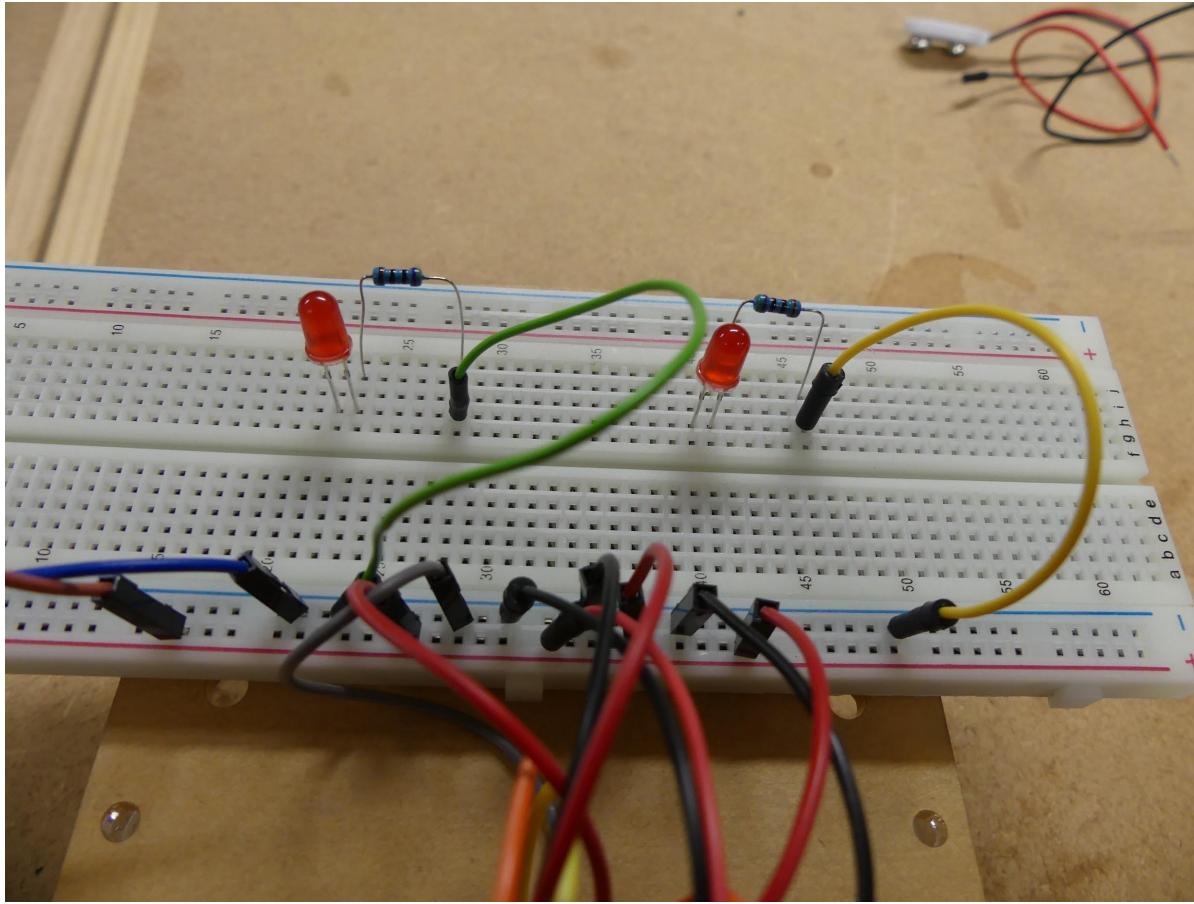


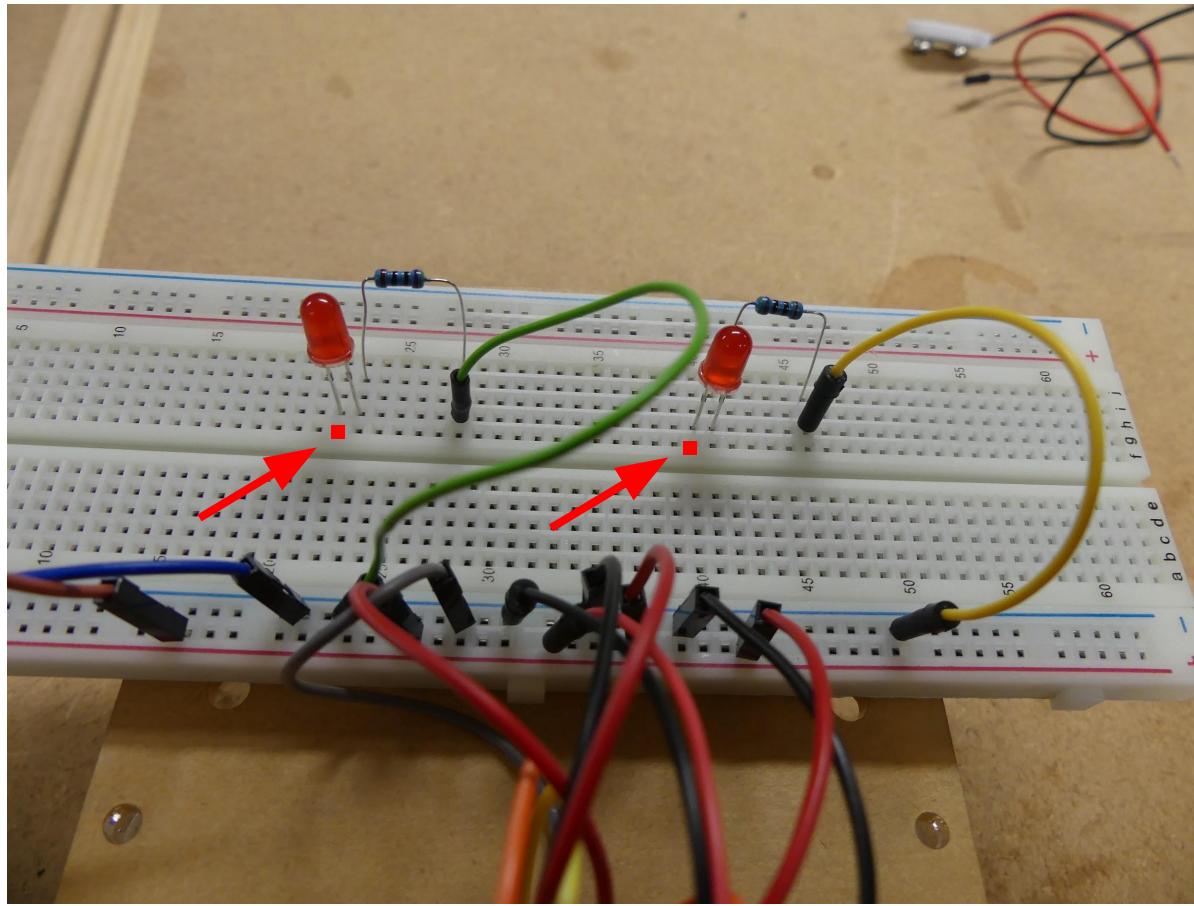


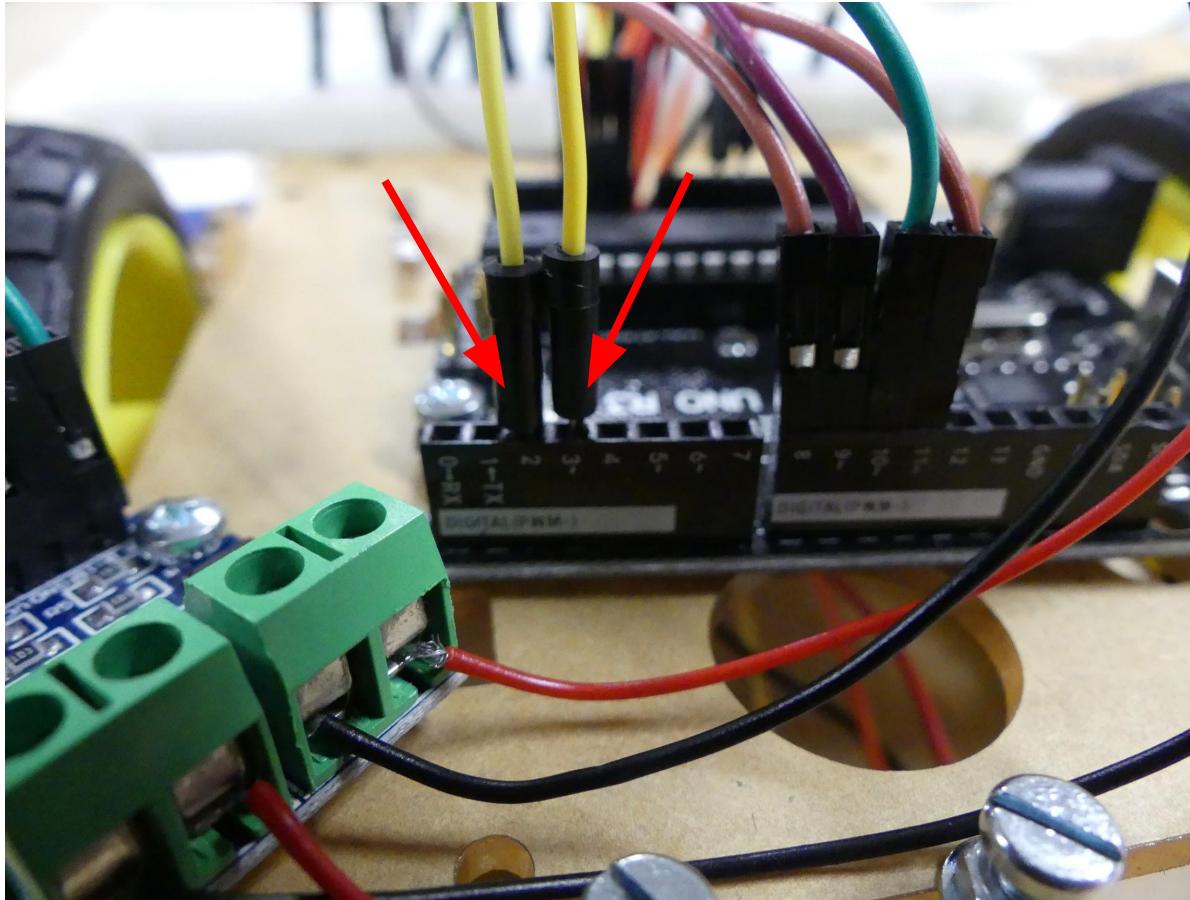
Checking the Sensors













Sensor Software



Checking the Sensors

```
const int sensorLeft  = A0;  
const int sensorCenter = A1;  
const int sensorRight = A2;
```

```
const int ledLeft    = 2;  
const int ledCenter  = 13;  
const int ledRight   = 3;
```



Checking the Sensors

```
const int sensorLeft    = A0;
const int sensorCenter = A1;
const int sensorRight   = A2;

const int ledLeft      = 2;
const int ledCenter    = 13;
const int ledRight     = 3;

void setup() {
    // ...
    pinMode(sensorLeft, INPUT);
    pinMode(sensorCenter, INPUT);
    pinMode(sensorRight, INPUT);

    pinMode(ledLeft, OUTPUT);
    pinMode(ledCenter, OUTPUT);
    pinMode(ledRight, OUTPUT);
}
```



Checking the Sensors

```
void loop() {
    int valLeft = digitalRead(sensorLeft);
    int valCenter = digitalRead(sensorCenter);
    int valRight = digitalRead(sensorRight);

    digitalWrite(sensorLeft, valLeft);
    digitalWrite(sensorCenter, valCenter);
    digitalWrite(sensorRight, valRight);
}
```



Download our template

tinyurl.com/line-follower-sensor



Line Following



Easy Line Follow Algorithm

```
if (Left sensor is detecting line) {
    Move to the right;
}

else if (Right sensor is detecting line) {
    Move to the left;
}

else if (Middle sensor is detecting line) {
    Move straight;
}

else { // No sensor is detecting line
    Keep going as before;
}
```



Easy Line Follow Algorithm

```
if (Left sensor is detecting line) {  
    Move to the right;  
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else if (Middle sensor is detecting line) {  
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```



Easy Line Follow Algorithm

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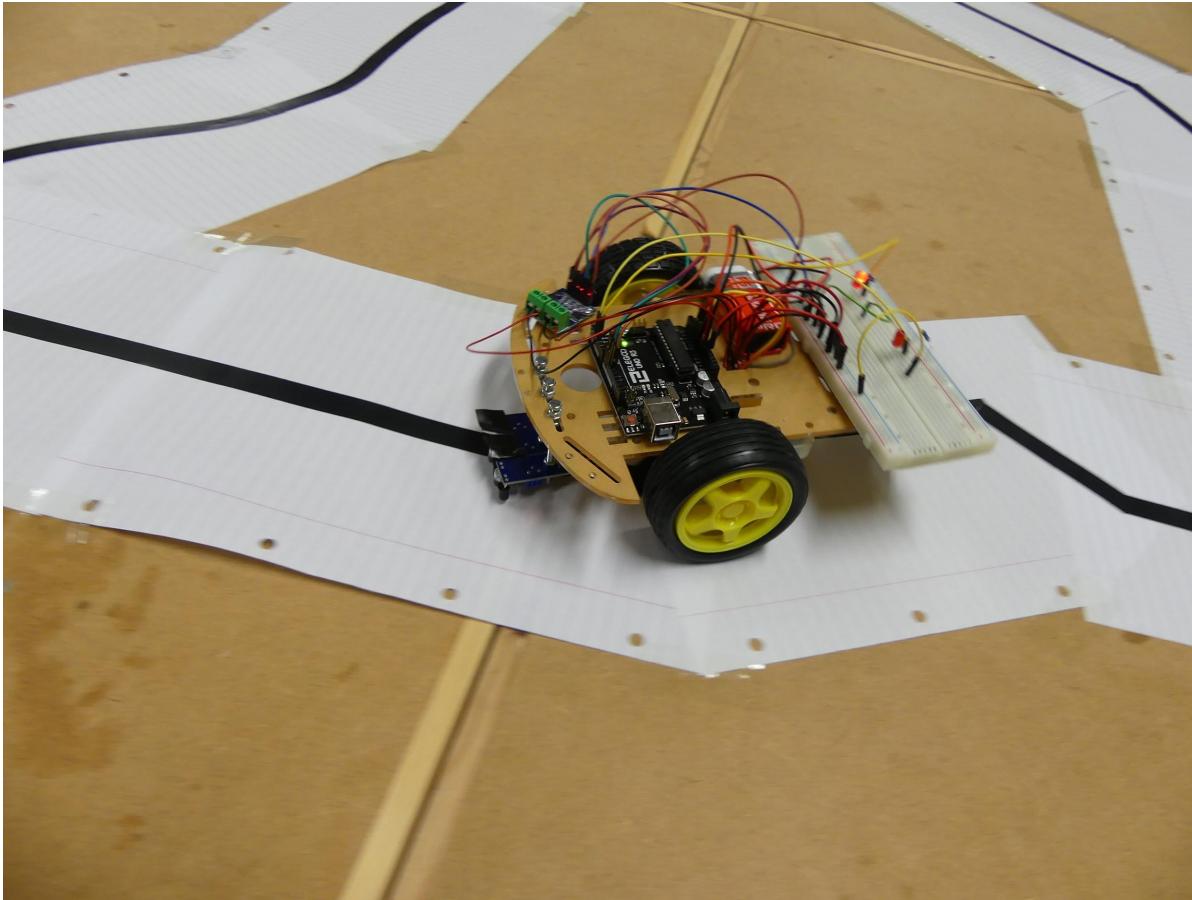
Easy Line Follow Algorithm

```
if (valCenter == HIGH) {  
    motorLeftSetSpeed(200);  
    motorRightSetSpeed(200);  
} else if (valRight == HIGH) {  
    motorLeftSetSpeed(180);  
    motorRightSetSpeed(0);  
} else if (valLeft == HIGH) {  
    motorLeftSetSpeed(0);  
    motorRightSetSpeed(180);  
}
```



Download our template

tinyurl.com/line-follower-final





Back to the Hack...

