



Faculty of Engineering & Technology
Electrical & Computer Engineering Department

ENCS4380

Joystick Controlled Robot

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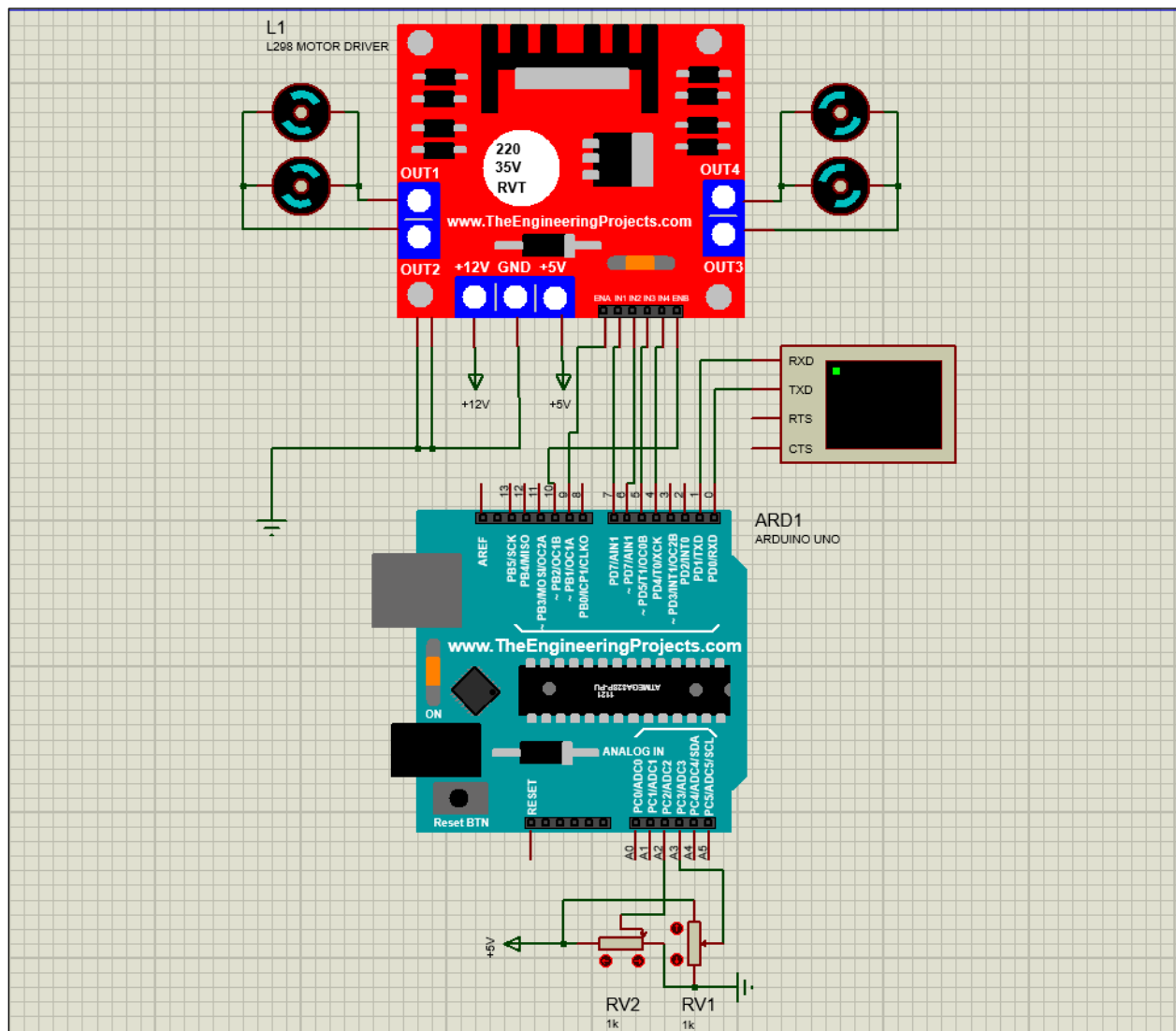
Section : 1

Date : 5/5/2021

Appropriate Hardware

- Arduino UNO
- L298N Motor Driver
- 4 DC Motors
- 2 Potentiometers
- 12V, 5V Battery for L298N

Circuit



We replaced 2 potentiometers instead the joystick to implement a manual joystick.

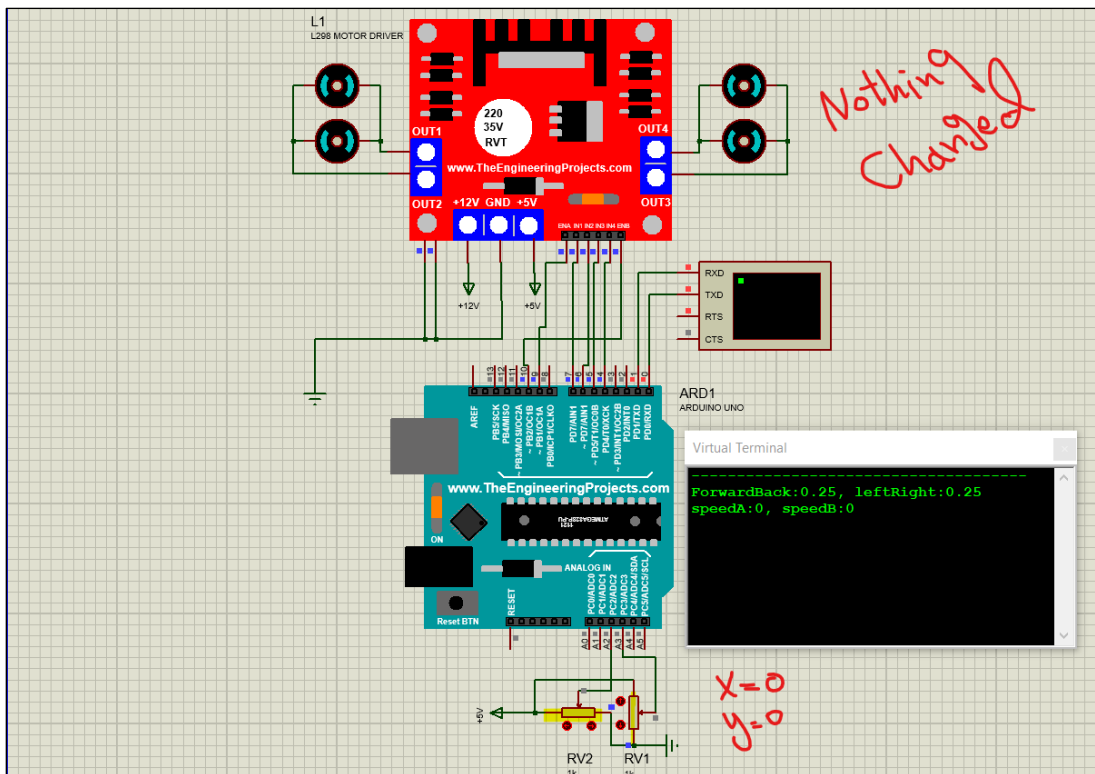
Arduino Code

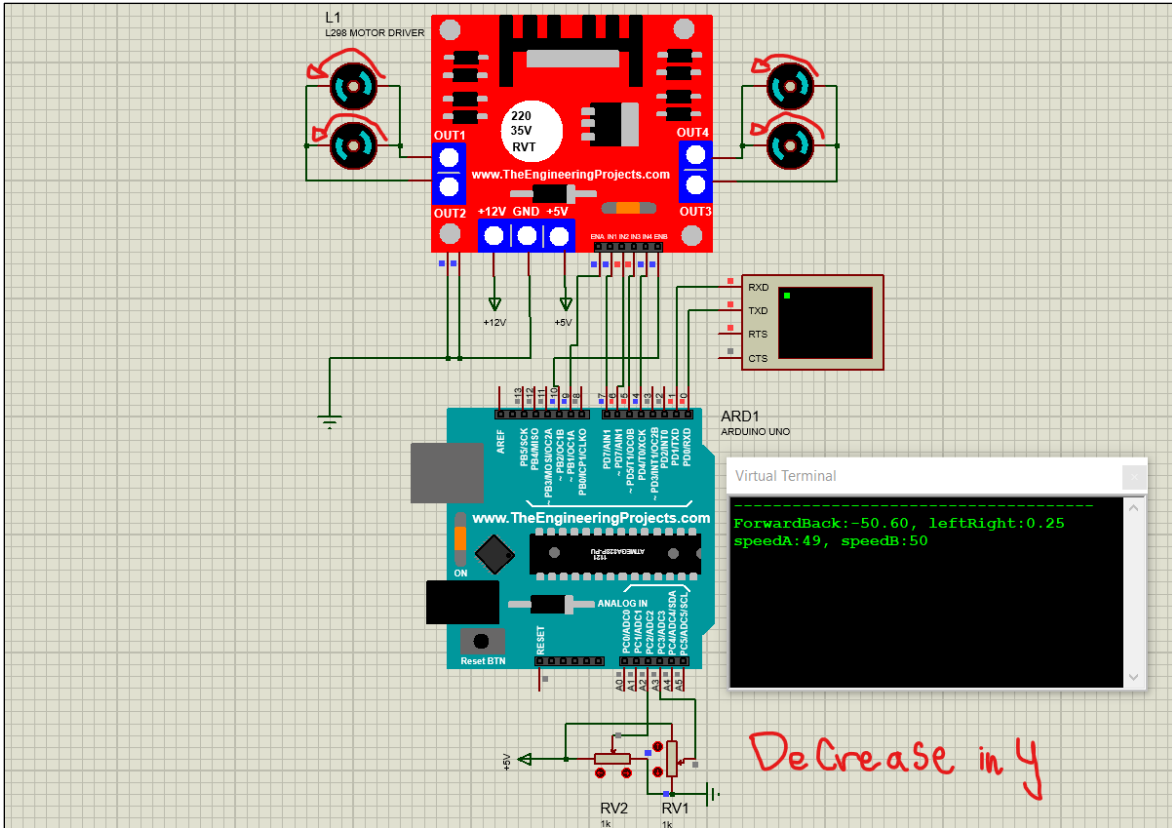
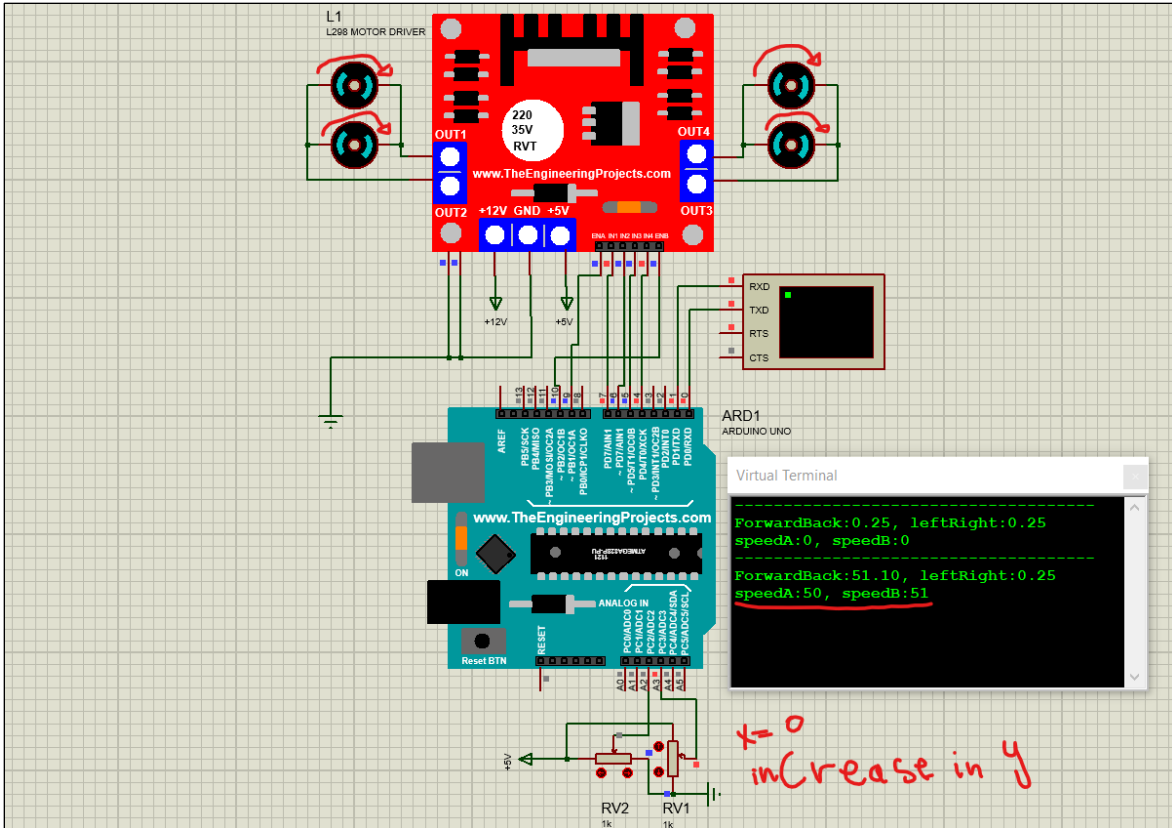
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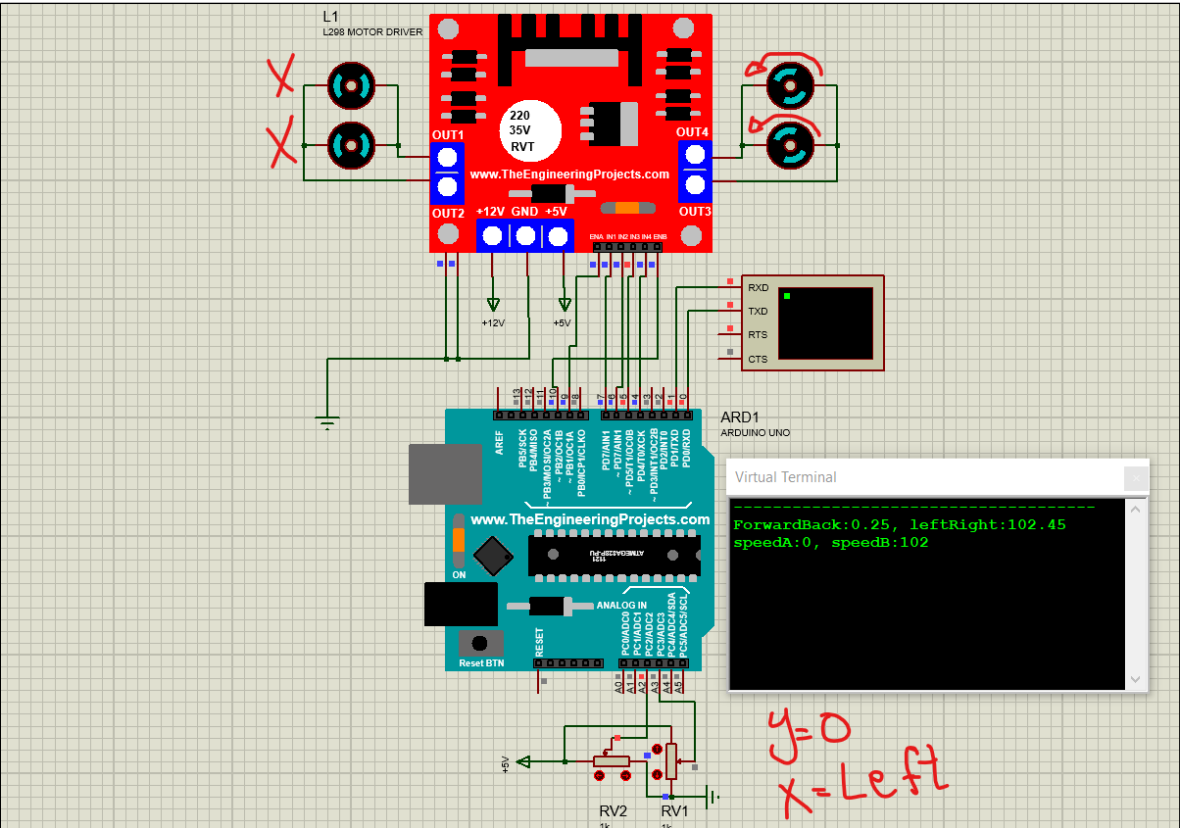
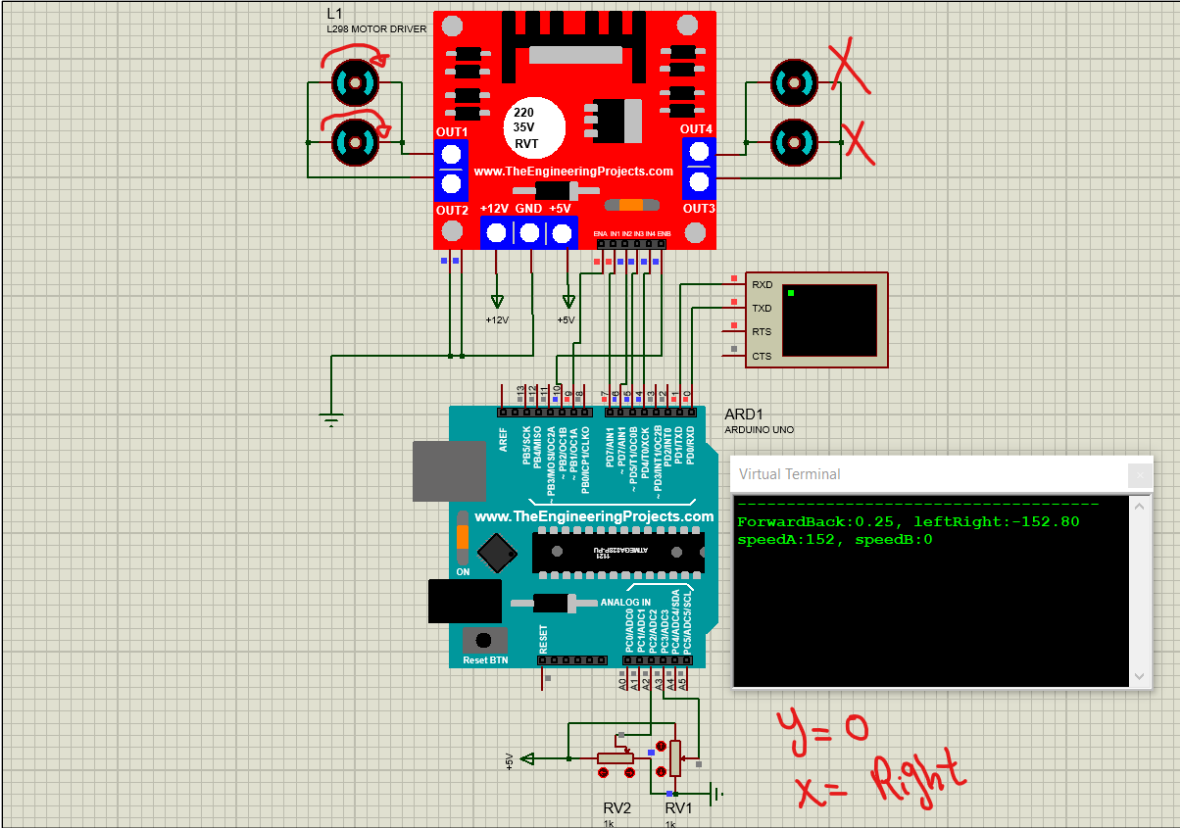
1 // Group#7
2 // Define Pins and Variables
3 float ForwardBack;
4 float leftRight;
5 int speedA;
6 int speedB;
7
8 int INA1 = 7;
9 int INA2 = 6;
10 int INB1 = 4;
11 int INB2 = 5;
12
13 int ENA = 9;
14 int ENB = 10;
15
16 void setup () {
17 // Detect the output and input pins
18 pinMode(A2, INPUT);
19 pinMode(A3, INPUT);
20
21 pinMode(INA1, OUTPUT);
22 pinMode(INA2, OUTPUT);
23 pinMode(INB1, OUTPUT);
24 pinMode(INB2, OUTPUT);
25
26 pinMode(ENA, OUTPUT);
27 pinMode(ENB, OUTPUT);
28
29 // To show the Serial Monitor Results
30 Serial.begin(9600);
31 }
32
33 void loop() {
34 // Read the voltages on the potentiometers
35 // and make the range = [-255, 255]
36 leftRight = ((analogRead(A2) * 5 / 1023.0) - 2.5) * 102;
37 ForwardBack = ((analogRead(A3) * 5 / 1023.0) - 2.5) * 102;
38
39 // Show some data on the virtual terminal
40 Serial.println("-----");
41 Serial.print("ForwardBack:");
42 Serial.print(ForwardBack);
43 Serial.print(", leftRight:");
44 Serial.println(leftRight);
45
46
47 if (int(ForwardBack) > 0) {
48 // Make the DC motors rotate in the sa
49 digitalWrite(INA1, HIGH);
50 digitalWrite(INA2, LOW);
51 digitalWrite(INB1, HIGH);
52 digitalWrite(INB2, LOW);
53 } else if (int(ForwardBack) < 0) {
54 // Make the DC motors rotate in the sa
55 digitalWrite(INA1, LOW);
56 digitalWrite(INA2, HIGH);
57 digitalWrite(INB1, LOW);
58 digitalWrite(INB2, HIGH);
59 }
60
61 speedA = abs(ForwardBack);
62 speedB = abs(ForwardBack);
63
64 // Considering the 'leftRight' variable
65 speedA = speedA - leftRight;
66 speedB = speedB + leftRight;
67
68 // Detect the direction of DC Motor when
69 if (int(ForwardBack) == 0)
70 if (speedA > speedB) {
71 digitalWrite(INA1, HIGH);
72 digitalWrite(INA2, LOW);
73
74 } else {
75 digitalWrite(INB1, LOW);
76 digitalWrite(INB2, HIGH);
77 }
78
79 // The following 'IF' conditions are to ensure that the speeds are limited in
80 if (speedA > 255)
81 speedA = 255;
82 if (speedA < 0)
83 speedA = 0;
84 if (speedB > 255)
85 speedB = 255;
86 if (speedB < 0)
87 speedB = 0;
88
89 // Show the speeds on the virtual terminal
90 Serial.print("speedA:");
91 Serial.print(speedA);
92 Serial.print(", speedB:");
93 Serial.println(speedB);
94
95 // Call a method that sends the speed of each DC motor to L298N Motor Driver
96 setSpeed();
97
98 // Little delay just to see the data in the terminal
99 delay(2000);
100 }
101
102 void setSpeed() {
103 analogWrite(ENA, abs(speedA));
104 analogWrite(ENB, abs(speedB));
105 }

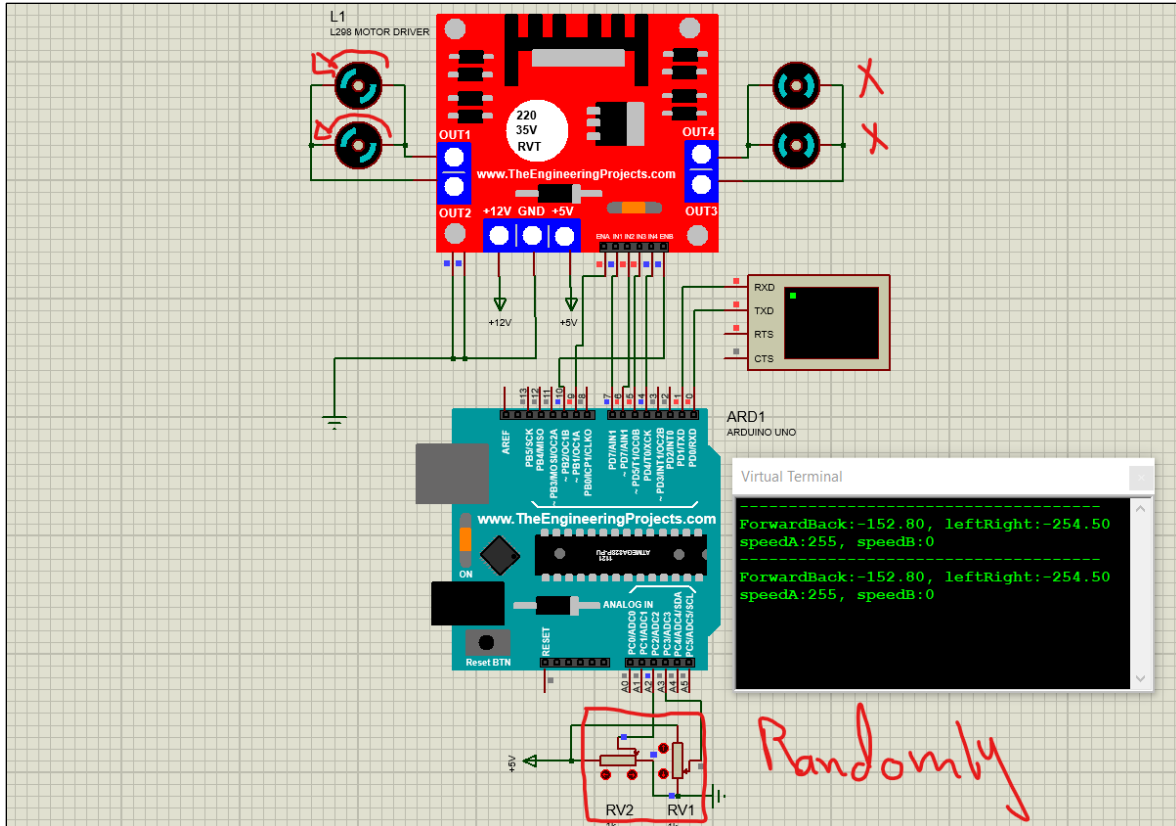
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Simulations









Code as a Text

```
// Group#7
// Define Pins and Variables
float ForwardBack;
float leftRight;
int speedA;
int speedB;

int INA1 = 7;
int INA2 = 6;
int INB1 = 4;
int INB2 = 5;

int ENA = 9;
int ENB = 10;

void setup () {
  // Detect the output and input pins
  pinMode(A2, INPUT);
  pinMode(A3, INPUT);

  pinMode(INA1, OUTPUT);
  pinMode(INA2, OUTPUT);
  pinMode(INB1, OUTPUT);
  pinMode(INB2, OUTPUT);

  pinMode(ENA, OUTPUT);
  pinMode(ENB, OUTPUT);

  // To show the Serial Monitor Results
  Serial.begin(9600);
}

void loop() {
```

```

// Read the voltages on the potentiometers
// and make the range = [-255, 255]
leftRight = ((analogRead(A2) * 5 / 1023.0) - 2.5) * 102;
ForwardBack = ((analogRead(A3) * 5 / 1023.0) - 2.5) * 102;

// Show some data on the virtual terminal
Serial.println("-----");
Serial.print("ForwardBack:");
Serial.print(ForwardBack);
Serial.print(", leftRight:");
Serial.println(leftRight);

if (int(ForwardBack) > 0) {
  // Make the DC motors rotate in the same direction and forward
  digitalWrite(INA1, HIGH);
  digitalWrite(INA2, LOW);
  digitalWrite(INB1, HIGH);
  digitalWrite(INB2, LOW);
} else if (int(ForwardBack) < 0) {
  // Make the DC motors rotate in the same direction and reverse
  digitalWrite(INA1, LOW);
  digitalWrite(INA2, HIGH);
  digitalWrite(INB1, LOW);
  digitalWrite(INB2, HIGH);
}

speedA = abs(ForwardBack);
speedB = abs(ForwardBack);

// Considering the 'leftRight' variable is the deviation between the speed of motors
speedA = speedA - leftRight;
speedB = speedB + leftRight;

// Detect the direction of DC Motor when there speed=0
if (int(ForwardBack) == 0)
  if (speedA > speedB) {
    digitalWrite(INA1, HIGH);
    digitalWrite(INA2, LOW);

  } else {
    digitalWrite(INB1, LOW);
    digitalWrite(INB2, HIGH);
  }

// The following 'IF' conditions are to ensure that the speeds are limited in our specific range
if (speedA > 255)
  speedA = 255;
if (speedA < 0)
  speedA = 0;
if (speedB > 255)
  speedB = 255;
if (speedB < 0)
  speedB = 0;

// Show the speeds on the virtual terminal
Serial.print("speedA:");
Serial.print(speedA);
Serial.print(", speedB:");
Serial.println(speedB);

// Call a method that sends the speed of each DC motor to L298N Motor Driver
setSpeed();

// Little delay just to see the data in the terminal
delay(2000);
}

void setSpeed() {
  analogWrite(ENA, abs(speedA));
  analogWrite(ENB, abs(speedB));
}

```