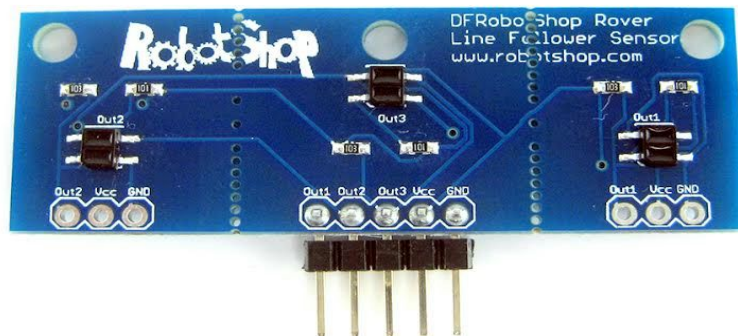# Line Follower Sensor

V1.0 September 2015

This manual is only available in English

Table of contents

I - Overview

The DFRobotShop Rover Line Follower Sensor is intended as a stand-alone product or as an upgrade to any DFRobotShop Rover, allowing the robot to follow a black line on white background. Although directly compatible with the DFRobotShop Rover, it can still be used as a general-purpose line sensor or proximity sensor on any robot. The sensor incorporates three convenient mounting holes so that it can be mounted to other robot chassis. The middle sensor is slightly offset from the other two for more accurate line detection.

If you don't need all the three sensors or want to change the spacing by mounting them individually, the module can be broken apart into three separate stand-alone reflectance sensors along the perforations (simply flex until it breaks apart). A 90 degree five pin 0.1" header is soldered on the board.
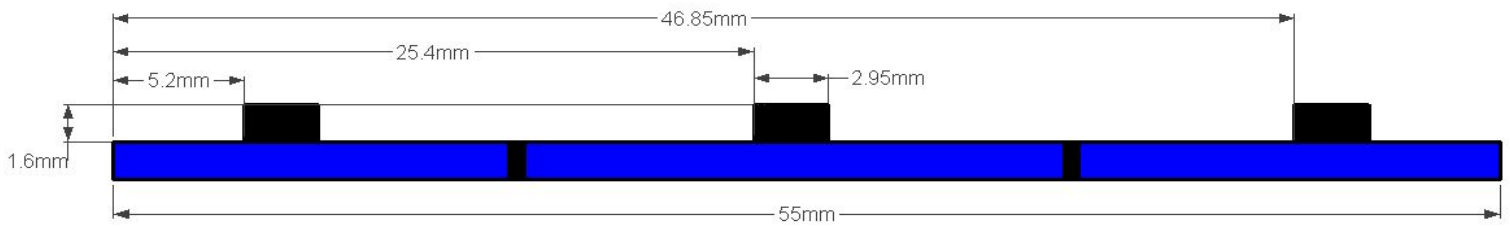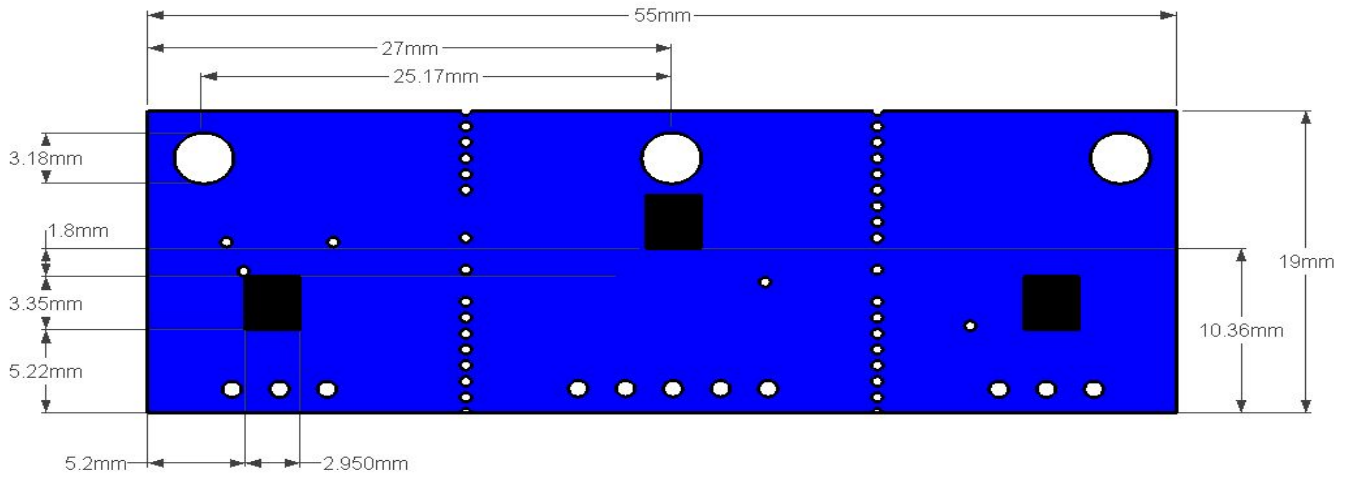
II - Features

- 3 x QRE1113GR miniature reflectance sensors
- Compatible with the DFRobotShop Rover
- Outputs 3 analog voltages
- Five pin right angle 0.1" spaced male header pre-soldered for convenience
- Can be broken into three sections so each individual sensor can be used separately
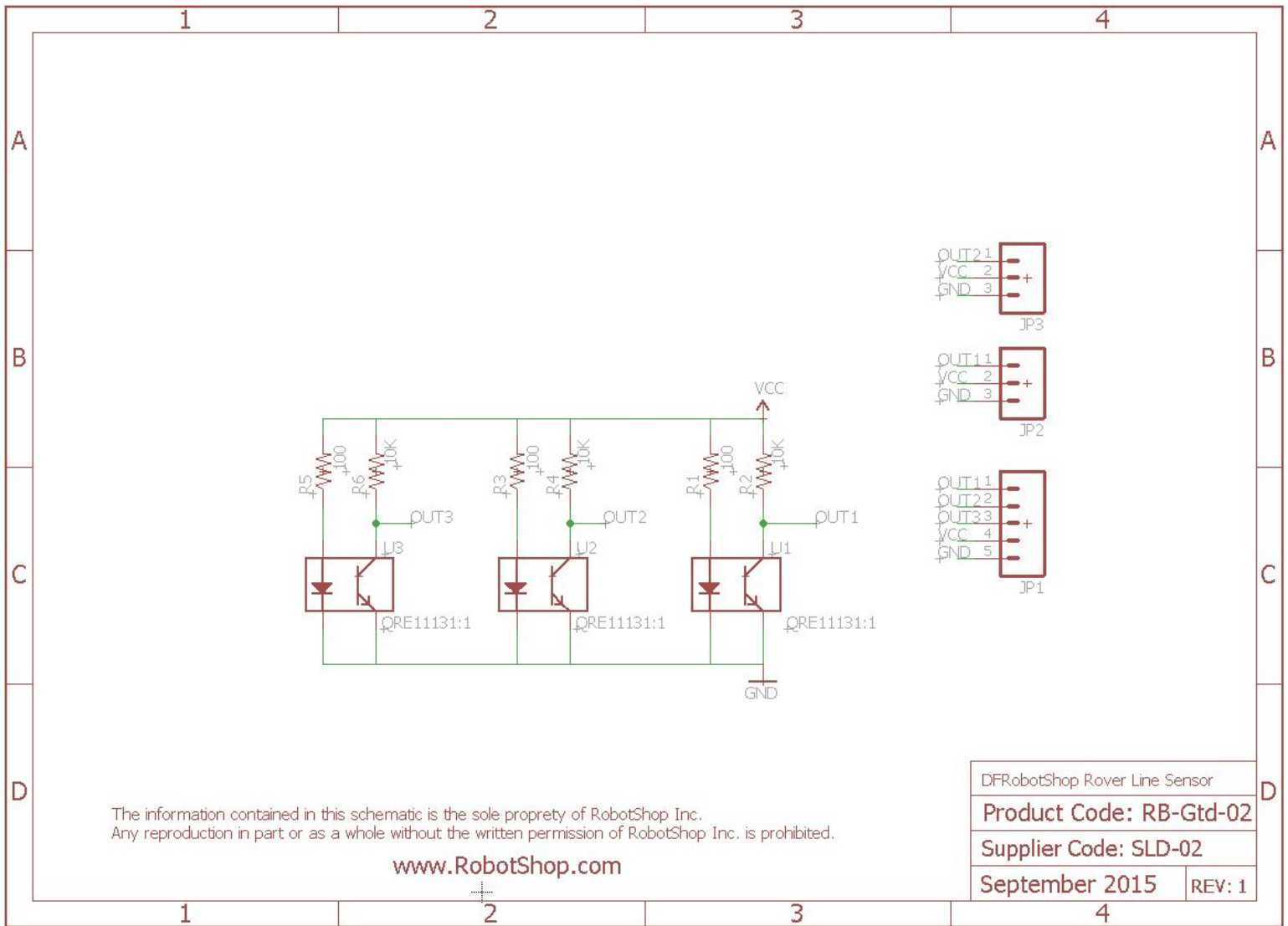
III - Specifications

- Interface type : 0-5V Analog x3
- Operating voltage : 5V (Nominal)
- Supply current : 75 mA for the entire module
- Sensing range : 3mm (0.125") to ~6mm (0.25")
- Pin definition : Out 1 (Right sensor), Out 2 (Left Sensor), Out 3 (Middle Sensor)
- Optimal sensing distance: 3mm (0.125")
- Optimal line thickness: black electric tape is ideal (≈17mm)

IV - Dimensions

V - Schematic

OUT21
VCC 2
GND 3
JP3

OUT11
VCC 2
GND 3
JP2

OUT11
OUT22
OUT33
VCC 4
GND 5
JP1

VCC

R5 100   R6 10K
R3 100   R4 10K
R1 100   R2 10K

OUT3
OUT2
OUT1

U3
U2
U1

QRE11131:1
QRE11131:1
QRE11131:1

GND

DFRobotShop Rover Line Sensor

Product Code: RB-Gtd-02

Supplier Code: SLD-02

September 2015 | REV: 1

VI - Sample Code for DFRobotShop Rover

```
//*********************************************************************************************************
//                         DFRobotShop Rover Line Sensor Arduino Sample Code
//
// Author : BD
// Creation date: September 1, 2015
// Subject: This Arduino Code intended to use the DFRobotShop Rover Line Sensor with the DFRbotoShop
// Rover to follow a black line on a white background
//*********************************************************************************************************


int rsensor = 2; // Left Sensor on Analog Pin 2
int lsensor = 1; // Right Sensor on Analog Pin 1
int msensor = 0; // Middle Sensor on Analog Pin 0

int E1 = 6; //M1 Speed Control
int E2 = 5; //M2 Speed Control
int M1 = 8; //M1 Direction Control
int M2 = 7; //M2 Direction Control

const int whitelevl = 600; // reading level is white if <600
const int blacklevl = 850; // reading level is black if >850


void setup() {
 Serial.begin(9600);
}

void loop() {
  // Case 1: Left sensor and right sensors are reading white and middle sensor is reading black. Drive forward!

 if (readQD(lsensor) < whitelevl && readQD(msensor)> blacklevl && readQD(rsensor) < whitelevl)
 {
 goforward();
 }

  // Case 2 : Left sensor and middle sensor are reading white and right sensor is reading black. Turn right!

 else if (readQD(lsensor) < whitelevl && readQD(msensor)< whitelevl && readQD(rsensor) > blacklevl)
 {
 while(true)
 {
 turnright();
 if ((readQD(lsensor) < whitelevl && readQD(msensor)> blacklevl && readQD(rsensor) < whitelevl)  ||
(readQD(lsensor)> blacklevl && readQD(msensor)> blacklevl && readQD(rsensor) < whitelevl))
{break;} // Break if Left sensor and right sensor are reading white and middle sensor is reading black
 }
 }

  // Case 3 : Left sensor is reading white, middle sensor and right sensor are reading black. Turn right!

 else if (readQD(lsensor) < whitelevl && readQD(msensor)> blacklevl && readQD(rsensor) > blacklevl)
```

```
  {
   while(true)
   {
   turnright();
   if ((readQD(lsensor) < whitelevl && readQD(msensor)> blacklevl && readQD(rsensor) < whitelevl)  ||
(readQD(lsensor)> blacklevl && readQD(msensor)> blacklevl && readQD(rsensor) < whitelevl))
{break;}  // Break if Left sensor and right sensor are reading white and middle sensor is reading black
   }
    }

    // Case 4 :  Left sensor is reading black, middle sensor and right sensor are reading white. Turn left!
    else if (readQD(lsensor) > blacklevl && readQD(msensor)< whitelevl && readQD(rsensor) < whitelevl)
   {
   while(true)
   {
   turnleft();
   if ((readQD(lsensor) < whitelevl && readQD(msensor)> blacklevl && readQD(rsensor) < whitelevl) ||
(readQD(lsensor)< whitelevl && readQD(msensor)> blacklevl && readQD(rsensor) > blacklevl))
{break;}  // Break if Left sensor and right sensor are reading white and middle sensor is reading black
   }
    }

    // Case 5 : Left sensor and middle sensor are reading black and right sensor is reading white. Turn left!
    else if (readQD(lsensor) > blacklevl && readQD(msensor)> blacklevl && readQD(rsensor) < whitelevl)
   {
   while(true)
   {
   turnleft();
   if ((readQD(lsensor) < whitelevl && readQD(msensor)> blacklevl && readQD(rsensor) < whitelevl ) ||
(readQD(lsensor)< whitelevl && readQD(msensor)> blacklevl && readQD(rsensor) > blacklevl))
{break;} // Break if Left sensor and right sensor are reading white and middle sensor is reading black
   }
    }

    else
    {
   goforward();  // If there is no line, the rover will go forward
     }
}



////////////// Go Forward Routine ///////////////////
void goforward(){
 analogWrite (E1,210);
 digitalWrite(M1,LOW);
 analogWrite (E2,210);
 digitalWrite(M2,LOW);
 }
/////////////////////////////////////////////////

////////////// Turn Right Routine ///////////////////
 void turnright(){
 analogWrite (E1,210);
 digitalWrite(M1,LOW);
 analogWrite (E2,210);
```
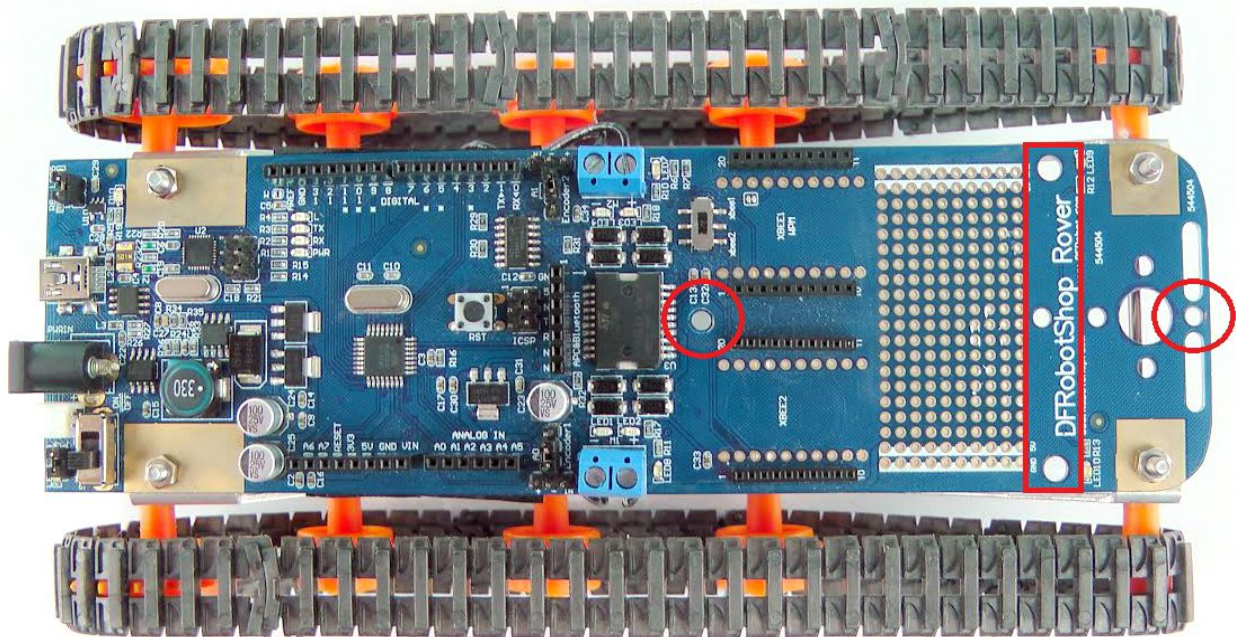
```
  digitalWrite(M2,HIGH);
 }
/////////////////////////////////////////////////

///////////// Turn Left Routine ///////////////////
 void turnleft(){
 analogWrite (E1,210);
 digitalWrite(M1,HIGH);
 analogWrite (E2,210
 );
 digitalWrite(M2,LOW);
 }
/////////////////////////////////////////////////

//////////////////// Read Sensor Routine //////////
int readQD(int x){
 int val = analogRead(x);
 return val;
}
/////////////////////////////////////////////////
```
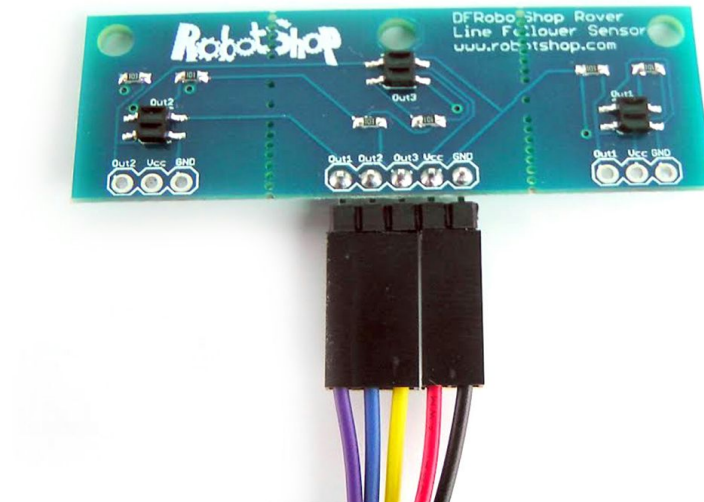
VII - Installation On DFRobotShop Rover

We suggest mounting the sensor on one of the locations below outlines in red:


Pinout:
- Out1 : Right Sensor analog output to Analog pin 2 on Arduino
- Out2 : Left Sensor analog output to Analog pin 1 on Arduino
- Out3 : Middle Sensor analog output to Analog pin 0 on Arduino
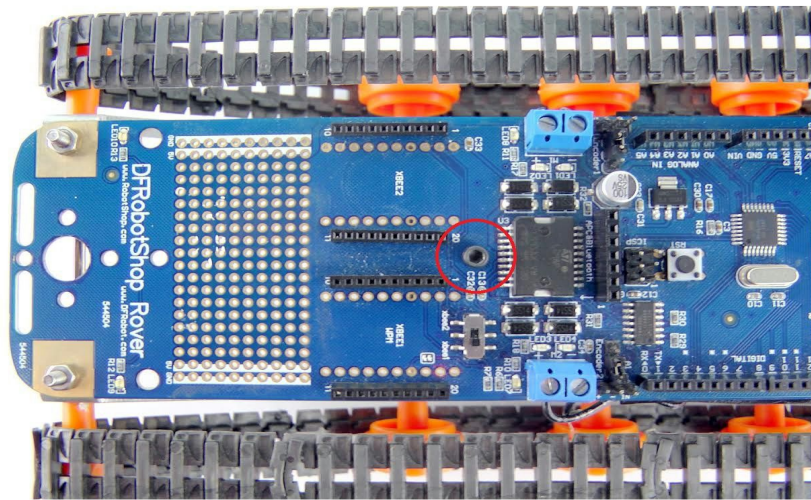- VCC : +5V
- GND : Ground

There are many possible ways to mount the DFRobotShop Rover Line Sensor. Here is an example :
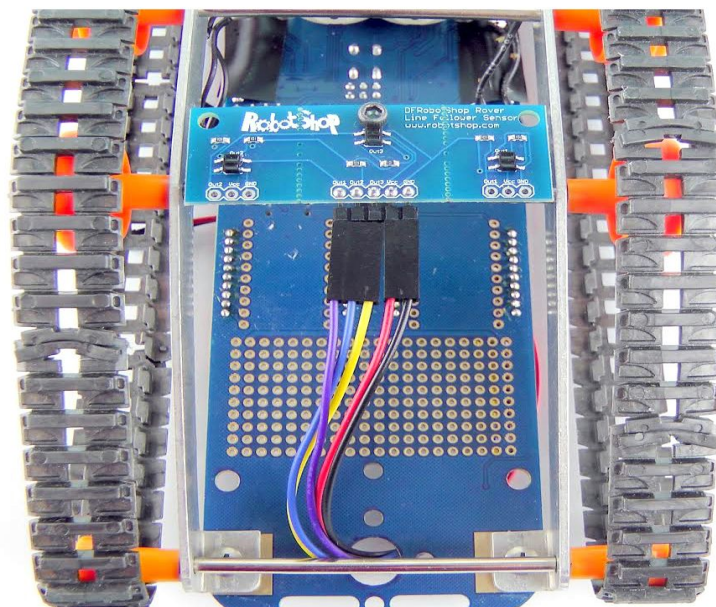
1) Insert the 1/4" x 4-40 Screw in the middle mounting hole and screw on one end of a F/F 1" x 1/4" Standoff :
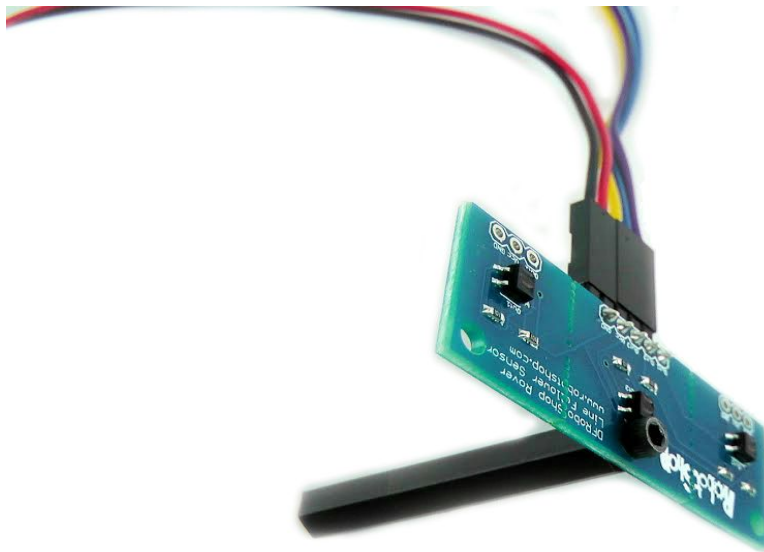
2) Insert another 1/4" x 4-40 Screw on the DFRobotShop Rover :

3) Screw on the other end of the F/F 1" x 1/4" Standoff with the DFRobotShop Rover Line Sensor to the 1/4" x 4-40 Screw on the rover (The wires can be passed through the hole in front of the rover) :

4) Insert 2 pin headers to the power wires (Red and Black) and 3 pin headers to the output wires (Yellow, Blue and Purple). Plug the wires as mentioned in the Pinout Section :
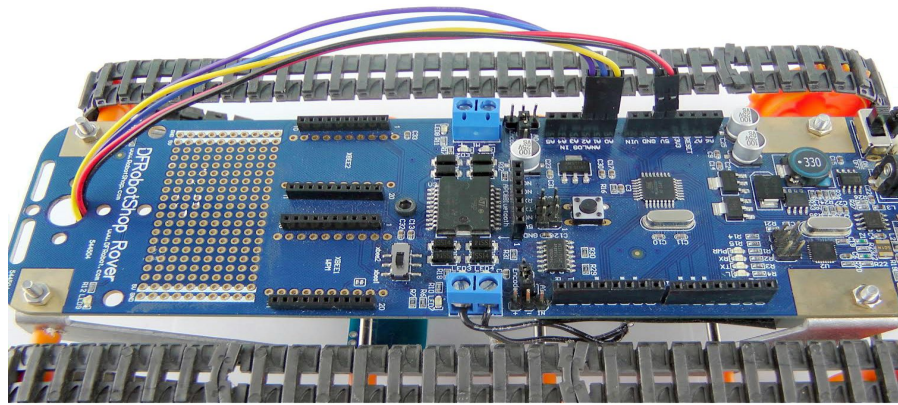
VIII - Questions/Troubleshooting

For questions or troubleshooting, please contact us through our [Forum](#) or submit a ticket via our [Support Center](#).