Hardware Testing Instructions

Note: Before proceeding with reading and following this document, make sure you have gone through:

    1. *Hardware Manual of eYFi-Mega development board*

    2. *Software Manual of eYFi-Mega development board*

    3. *Hookup guide for Line Follower Array*

These documents are provided in the Manuals folder, you can also find them from the **Downloads** page of the website: https://e-yantra.org/products/eyfi-mega and https://e-yantra.org/products/eylfa.

Youtube Link for Introduction of eYFi-Mega Kit: https://youtu.be/001Q-5X3ni0

Youtube Link for Introduction of eY-IDE**:** https://youtu.be/EFfOVVbZE8E

This document contains instructions for interfacing Line Follower Array, VL53L0X Sensor, Motor Driver and N20 motors with eYFi-Mega board and testing them.

Required Hardware with quantity:

1. eYFi-Mega Development Board - [1]

2. Interface Shield - [1]

3. Micro USB cable - [1]

4. Line Follower Array - [1]

5. VL53L0X Sensors - [3]

6. Motor Driver - [1]

7. 6V 600RPM N20 Motors - [2]

8. 2S Li-ion Battery [1]

9. Jumper Wires

10. N20 Wheels

Testing procedure is to be carried out in four stages as listed below:

1)   Testing Battery Monitoring

2)   Testing Line Follower Array

3)   Testing VL53L0X Sensors

4)   Testing Motor Driver and N20 motors

Each Stage consists of 3 sub-tasks:

a)   Hardware Connections

b)   Flashing .bin /.hex file

c)   Monitoring the Output on Serial Terminal (visual observation in case of motors)

Testing Procedure:

1. Testing Battery Monitoring

a) Hardware Connections

Make the connections as shown below in Fig.1, use a SPDT switch to ON/OFF the battery voltage.
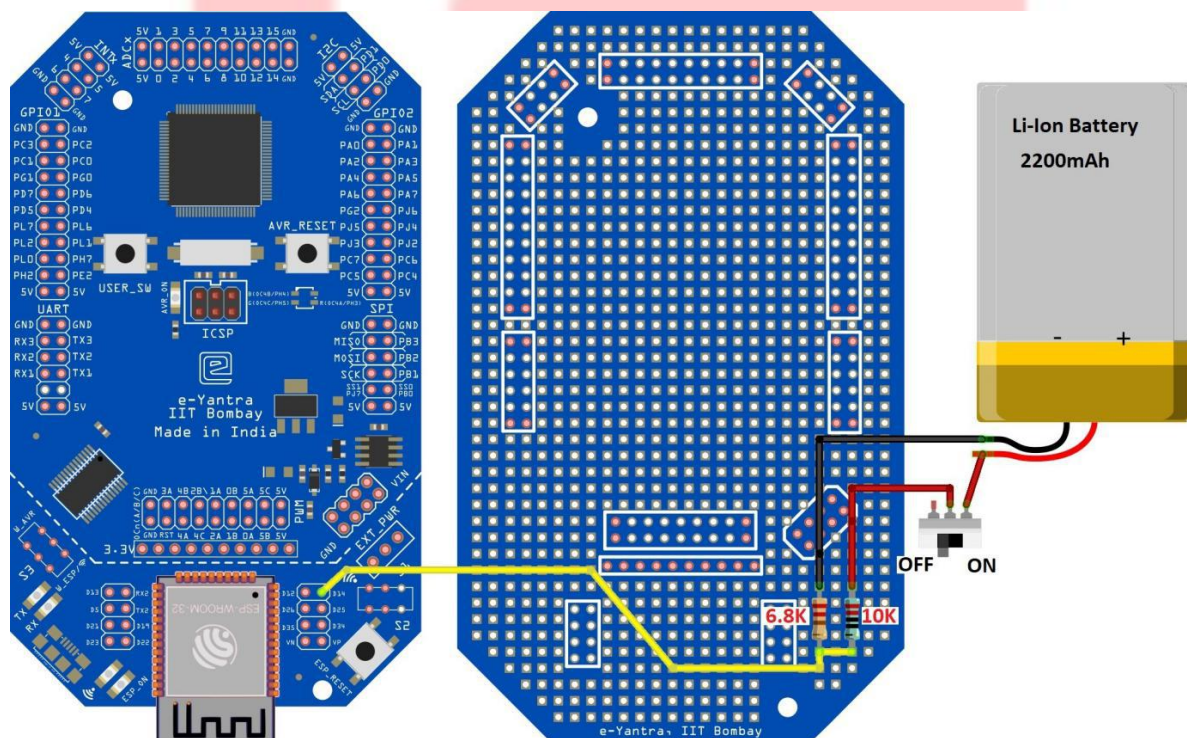

Fig. 1: Connections for Testing Battery Monitoring

b) Flashing .bin file

Here, we will be flashing **Batter_Level_Monitoring.bin** file given to you in the Test_Files folder. This **Batter_Level_Monitoring.bin** is supposed to be flashed wirelessly (OTA) using File Server (Refer Software manual Section "**eYFi-Mega OTA Application**" for complete instruction of how to flash .bin file using File Server).

c) Monitoring Output on Wired Serial Monitor

The eY-IDE provided to you has inbuilt Wired Serial Monitor (Refer Software Manual Section "**Button – Wired Serial Monitor**"). Use **Baudrate** of **115200.**

Expected output is shown below (refer Fig. 2).

Note: Output obtained to you will be different as your battery voltage will not be same as ours. If you get output as **Critical Battery voltage** (refer Fig.3) means you need to charge your battery and repeat the test process again.
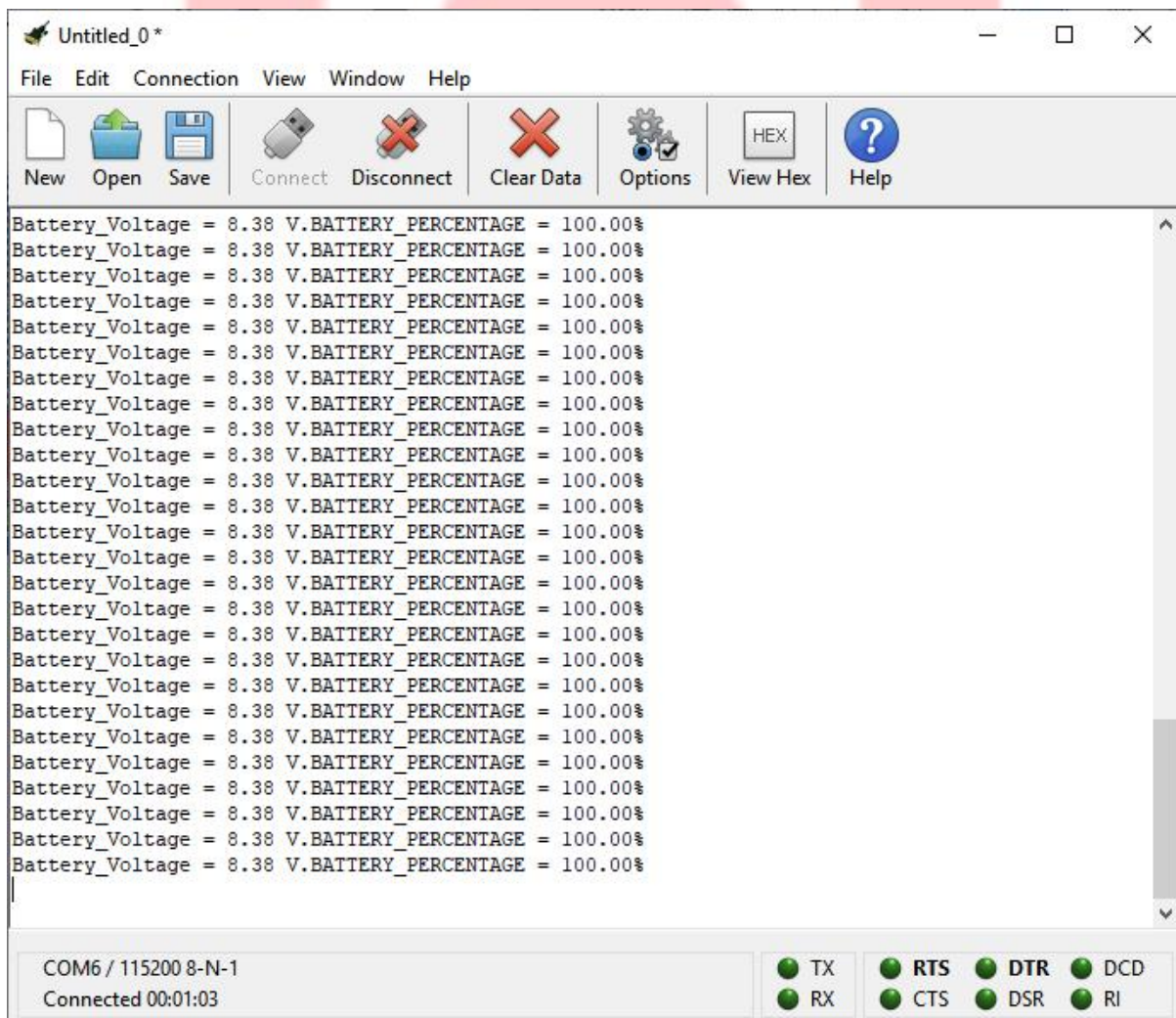

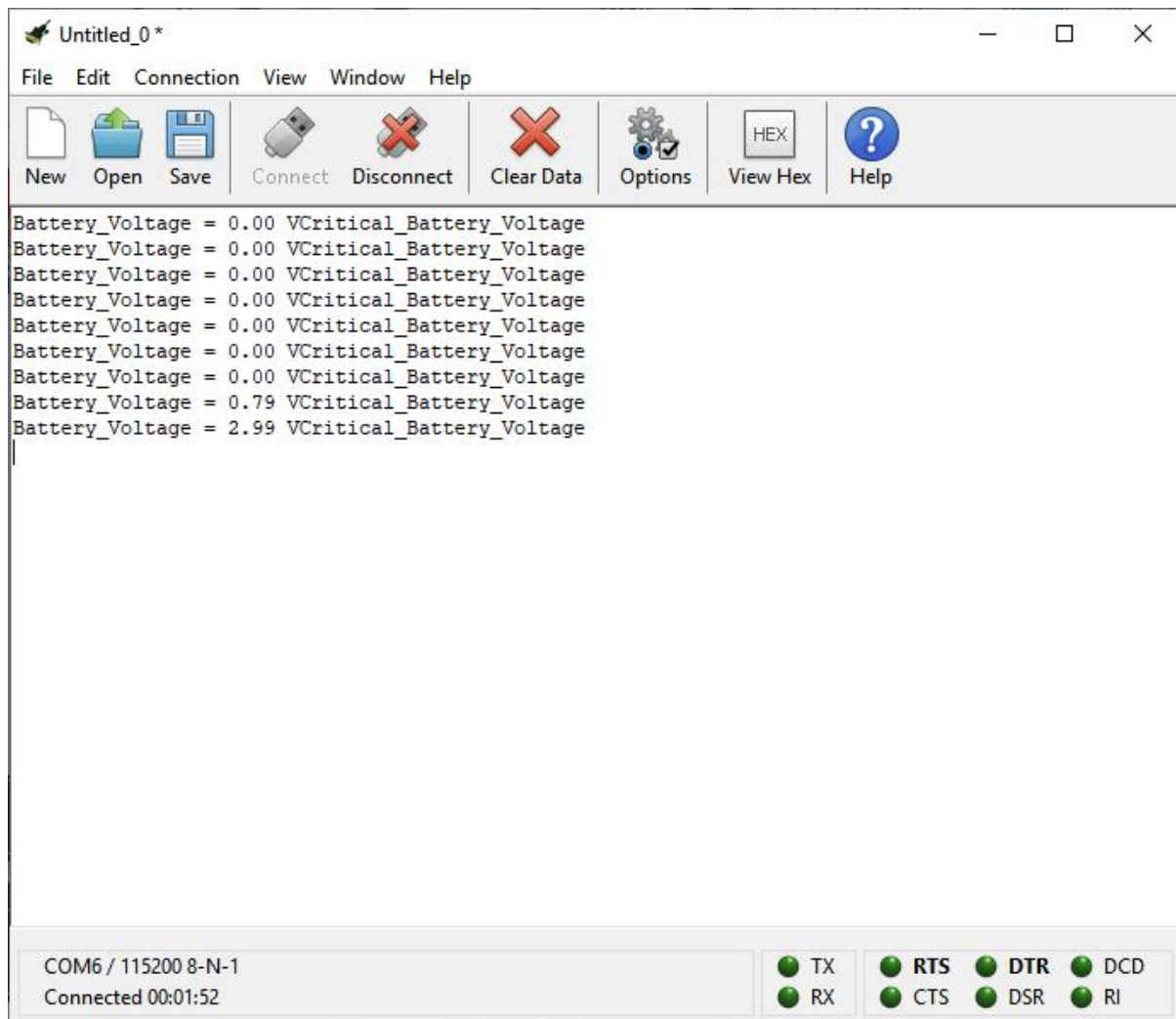Fig. 2: Expected Output (**Reading will vary in your observations)**

Fig. 3: Critical Battery Voltage

Youtube Link for Testing Battery Monitoring: https://youtu.be/Qh0Oo3tJi8A

2. Testing Line Follower Array

a) Hardware Connections

Make the connections as shown (refer **Fig. 4 & Table 1**).

Table 1: Tabular Representation of Connections

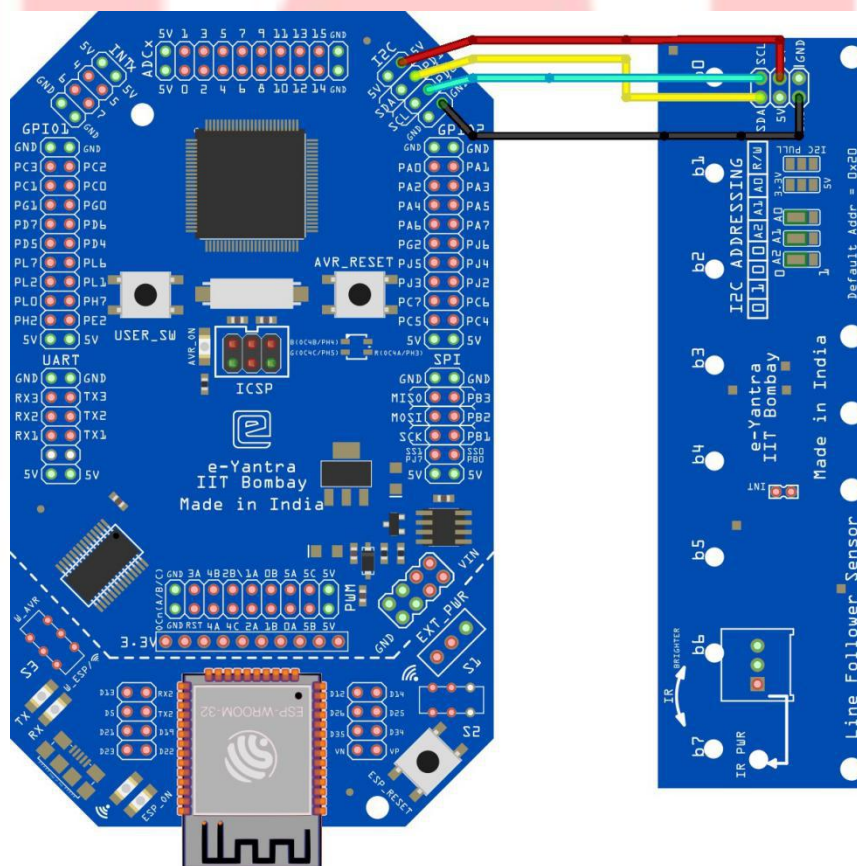| Signal/Description	Line Follower array	eYFi-Mega
Power	5V	5V
Ground	GND	GND
I2C Data	SDA	SDA/PD1
I2C Clock	SCL	SCL/PD0

Fig. 4: Connection Diagram for Testing Line Follower Array

f) Flashing .hex File

Here, we will be flashing **LFA_MCP23017.hex** file given to you in the Test_Files folder. This **LFA_MCP23017.hex** is supposed to be flashed wirelessly (OTA) using File Server (Refer Software manual Section "**eYFi-Mega OTA Application**" for complete instruction of how to flash .hex file using File Server).

g) Monitoring Output on Serial Terminal

The eY-IDE provided to you has inbuilt Wired Serial Monitor (Refer Software Manual Section "**Button - Wired Serial Monitor**"). Use **Baudrate** of **115200.**

Expected Output is shown below (refer Fig.5)

Note: To Understand the Output (LFA_READING) of Line Follower Array Refer the Hookup guide of Line follower array (Provided in the Manual folder, you can also find this from the link: https://e-yantra.org/products.)
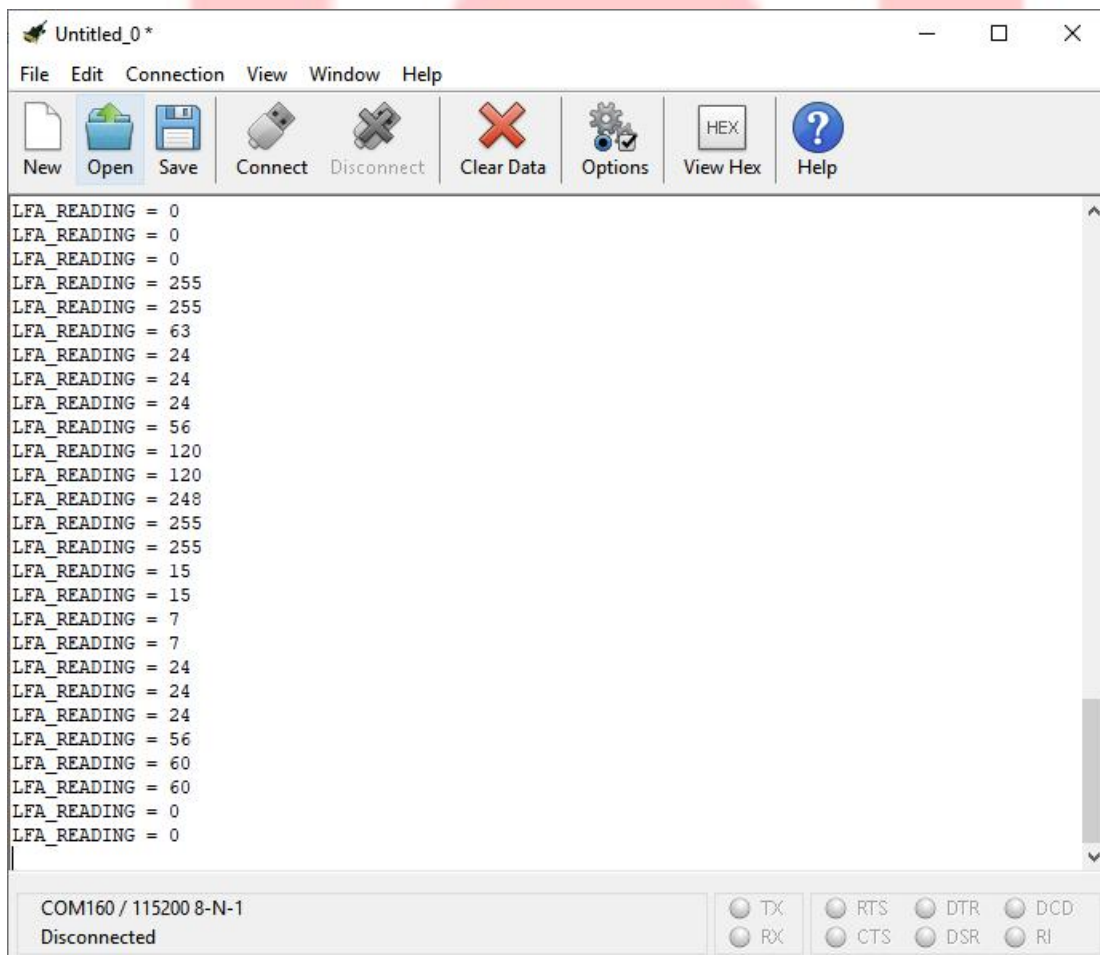

Fig. 5: Line Follower Array Readings

Youtube Link for Testing Line Follower Array: https://youtu.be/ulM1gkf5Hu0

3. Testing VL53L0X Sensors

a) Hardware Connections

Total 3 (Three) VL53L0X Sensors have to be tested. To do so, we will be testing 2 (Two) VL53L0X Sensors at a time. First, connect any of the two sensors and proceed with the testing. Once the testing is completed, replace any one of the tested sensor with one which needs to be tested (the third one).

Make the connections as shown (refer Table 2, Table 3 and Fig. 6).

Table 2: Connections for 1st VL53L0X

Signal/Description	VL53L0X	eYFi-Mega
Power	VIN	5V
Ground	GND	GND
I2C Clock	SCL	SCL/PD0
I2C Data	SDA	SDA/PD1
XSHUT	X	PA1

Table 3: Connections for 2nd VL53L0X

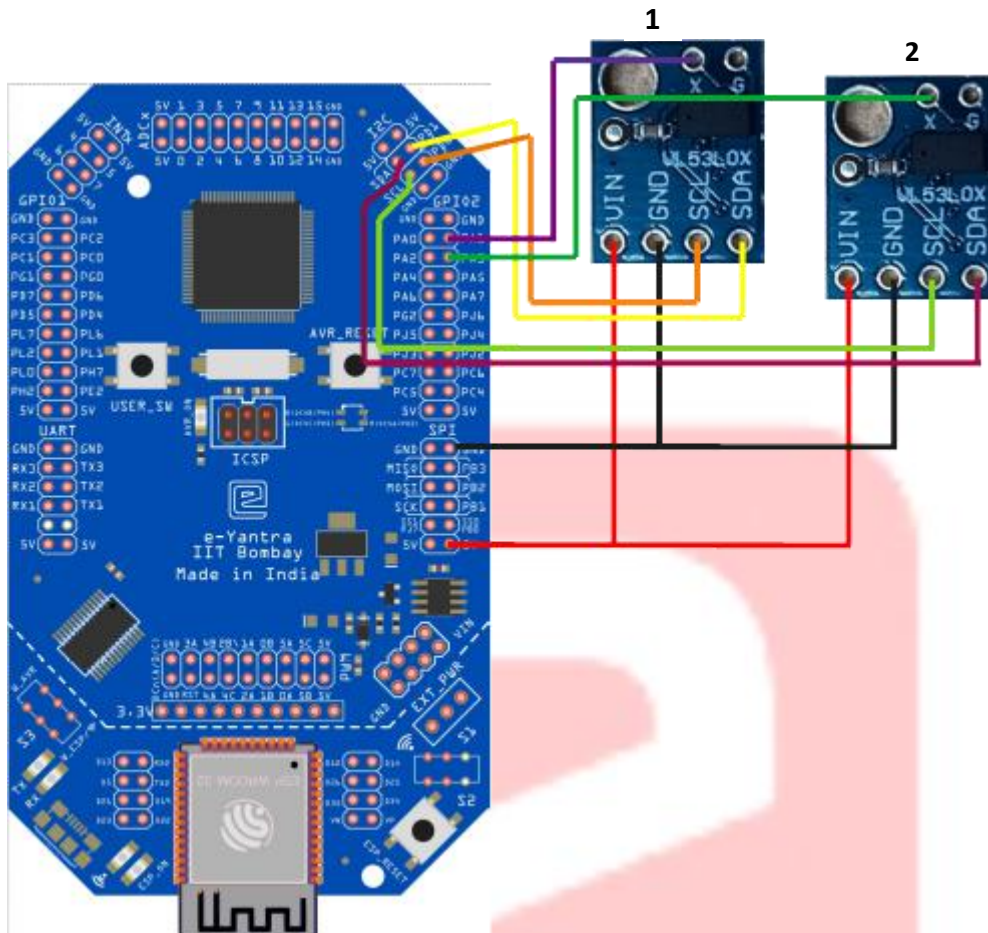| Signal/Description	VL53L0X	eYFi-Mega
Power	VIN	5V
Ground	GND	GND
I2C Clock	SCL	SCL/PD0
I2C Data	SDA	SDA/PD1
XSHUT	X	PA3

Fig. 6: Connections for Testing Multiple VL53L0X Sensors

b) Flashing .hex File

Here, we will be flashing **VL53L0X_Multiple.hex** file given to you in Test_Files folder. This **VL53L0X_Multiple.hex** is supposed to be flashed wirelessly (OTA) using File Server (Refer Software Manual Section "**eYFi-Mega OTA Application"** for complete instruction of how to flash .hex file using File Server).

c) Monitoring Output on Serial Terminal

The eY-IDE provided to you has inbuilt Wired Serial Monitor (Refer Software Manual Section "**Button - Wired Serial Monitor"**). Use **Baudrate** of **115200**

Expected Output is shown below (refer Fig.7).

Note: Sensor values are in **mm**. Depending on the obstacle, values may vary.
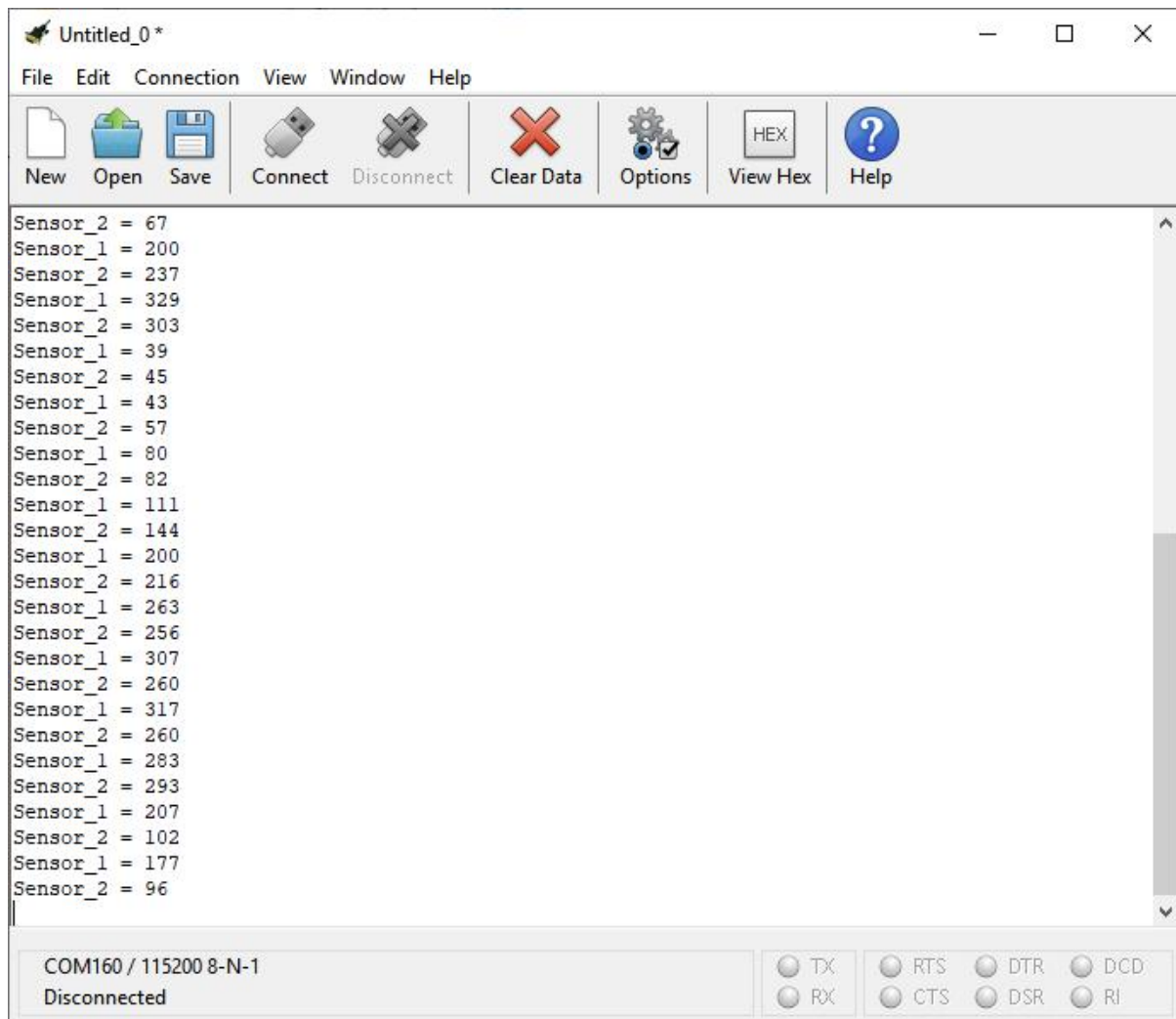
Fig.7: Reading of VL53L0X Sensor in mm

Youtube Link for Testing VL53L0X Sensors: https://youtu.be/_Sl6AwveuMY

4. Testing Motor Driver and N20 Motors

a) Hardware Connections

Make the connections as shown in below (refer Table 4 and Fig. 8). Solder wire to the Motor using Soldering iron. Also, connect wheel to the motor so that movement of motor can be observed easily.

Table 4: Tabular Representation of Motor Driver Connection

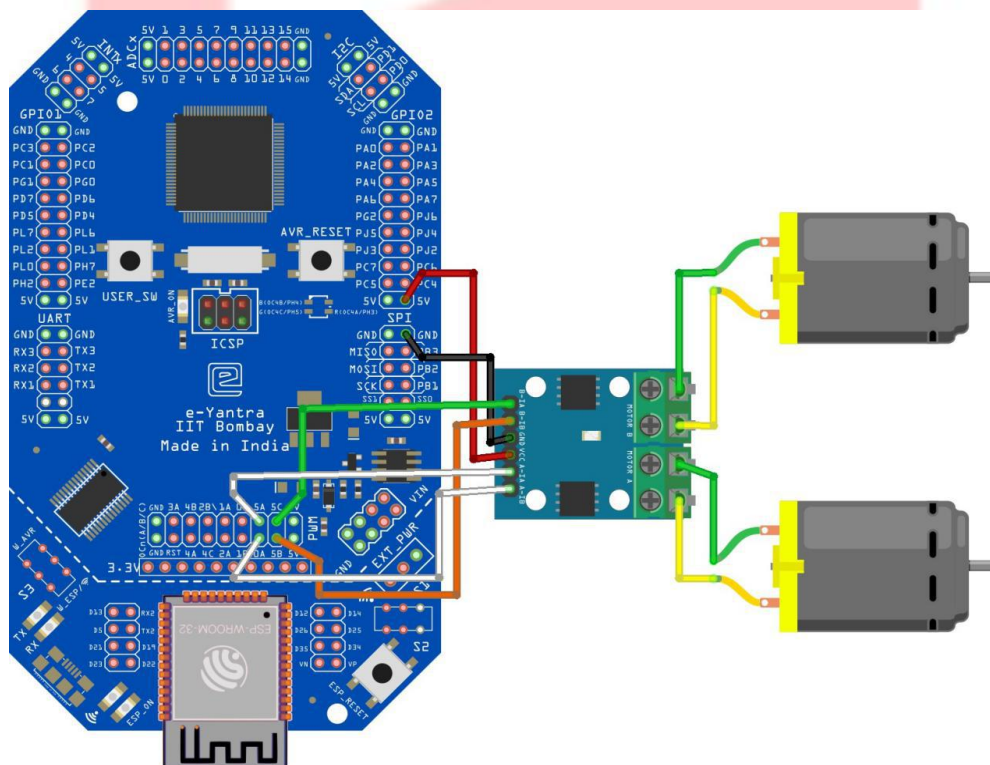| Signal/Description	Motor_Driver_L9110s	eYFi-Mega
Motor B Input A	B-1A	OC5C
Motor B Input B	B-1B	OC5B
Ground	GND	GND
Power	5V	5V
Motor A Input A	A-1A	OC5A
Motor A Input B	A-1B	OC0A

Fig. 8: Connection Diagram for Testing Motor Driver and N20 Motors

b) Flashing .hex File

Here, we will be flashing **Motor_Driver_L9110s.hex** file given to you in Test_Files folder. This **Motor_Driver_L9110s.hex** is supposed to be flashed wirelessly (OTA) using file Server (Refer Software manual Section "**eYFi-Mega OTA Application**" for complete instruction of how to flash .hex file using file server).

c) Motoring Output

Both the motors will start rotating in one direction at a constant speed, this verifies that both motor driver and N20 motors are working fine.

YouTube Link for Testing Motor Driver and N20 Motors: https://youtu.be/JS7uNKCETZY

Playlist Link for all the Videos:
https://www.youtube.com/playlist?list=PLK0jpMYIBd6DEwOS6iy4A3Gk-MmiLeA3y