

## EXPERIMENT

### LTR390(ALS+UV) SENSOR INTERFACING WITH DEV BOARD/NODE

#### What will you learn from this module:

- Interfacing with the help of I2C protocol.
- Ultra violet and Ambient light measurement using LTR390 sensor using nrf dev board/node.
- Configuration of overlay file, device tree and prj file for enabling hardware device.

#### Requirements:

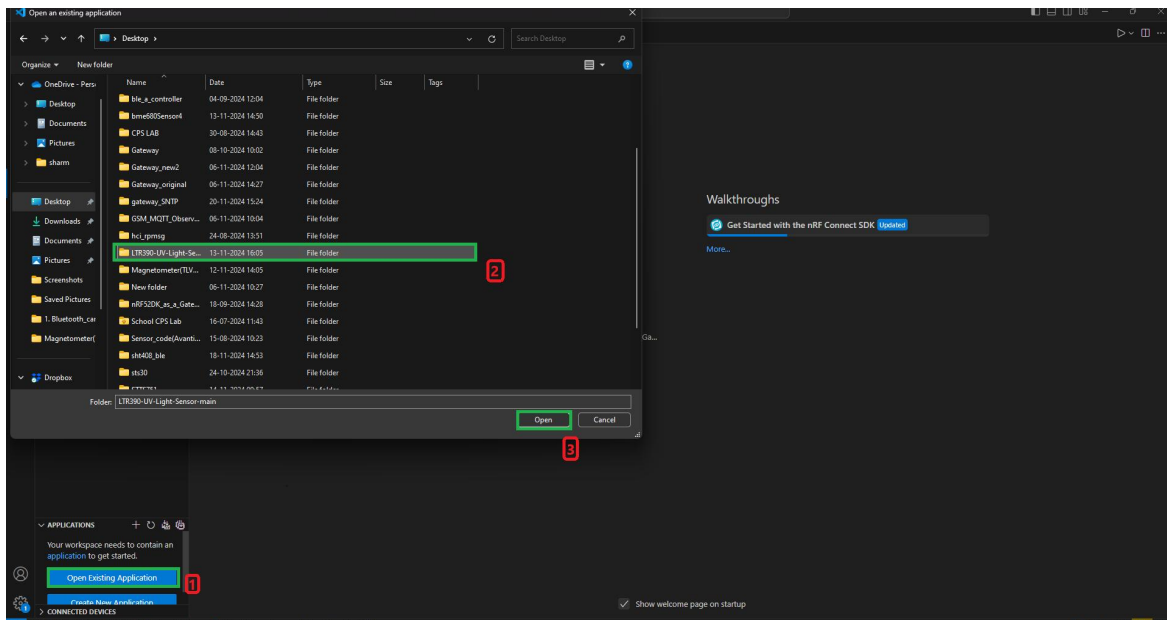
- nRF connect desktop software.
- nRF Command line tools.
- Visual studio code.
- USB cable.
- nRF52832 Development Board/Node.
- LTR390 Sensor.
- TTL Device.

#### Prerequisites:

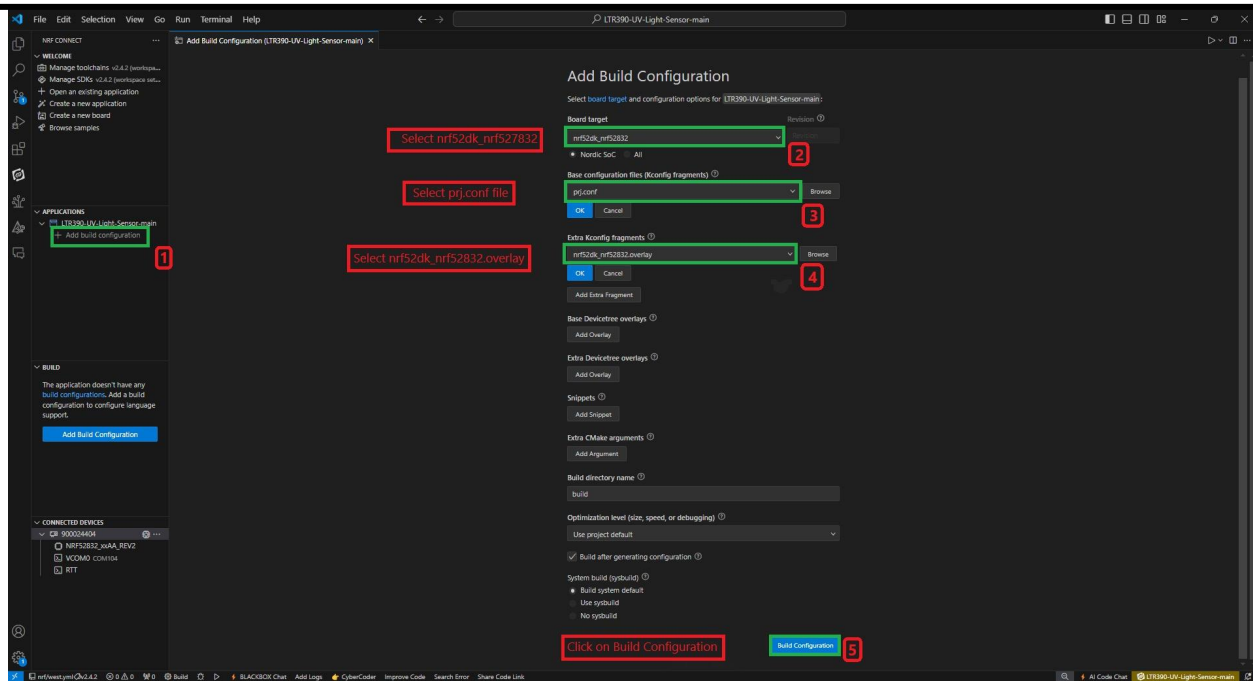
- Basic knowledge of C/C++.
- Basic knowledge of communication protocol.
- Basic project setup.

## Setup and Configuration:

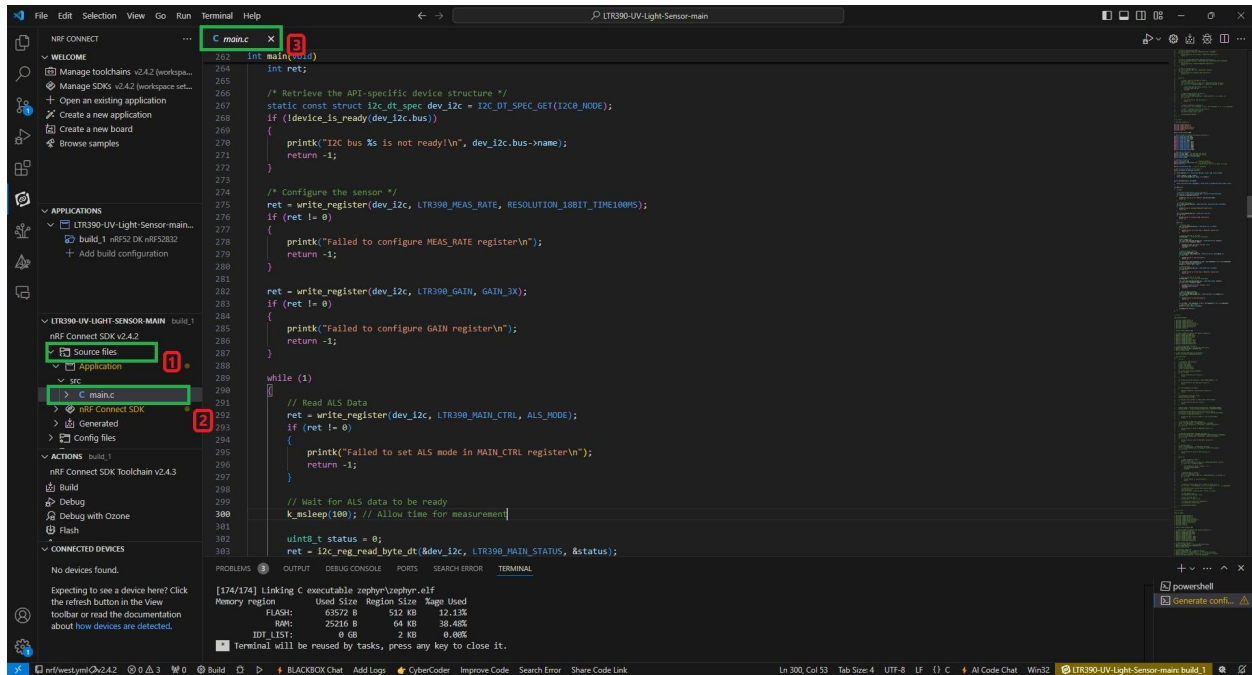
- Open VS Code and click on **Open Existing Application** [1] > click on LTR390 [2] > **Open** [3] as shown in the picture below.



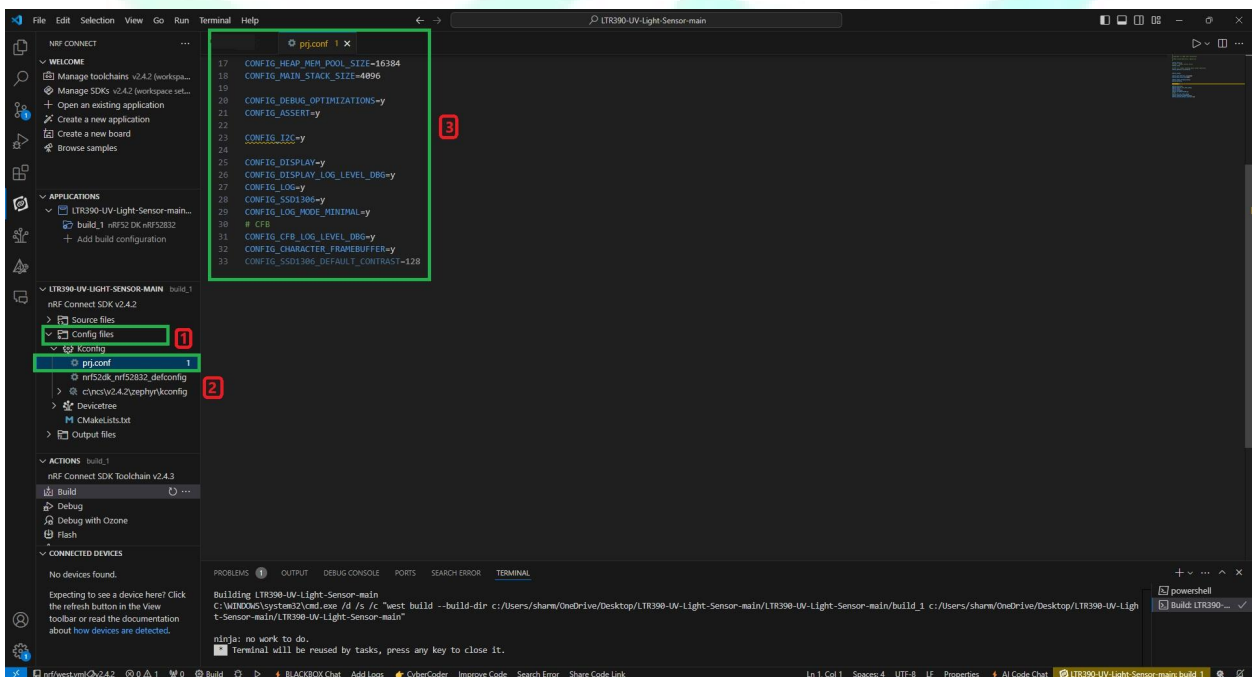
- Click on **Create new build configuration** [1]. Here you can change the board version, if you are using nRF52832, then select **nrf52dk\_nrf52832** [2] or you can change from drop down menu for another version like nRF52833 etc.
- Click on the Configuration and select **prj.conf** [3] from dropdown menu and then click on the device tree overlays and select **nrf52dk\_nrf52832.overlay** [4].
- Then click on the **Build Configuration** [5] as shown below in the picture.



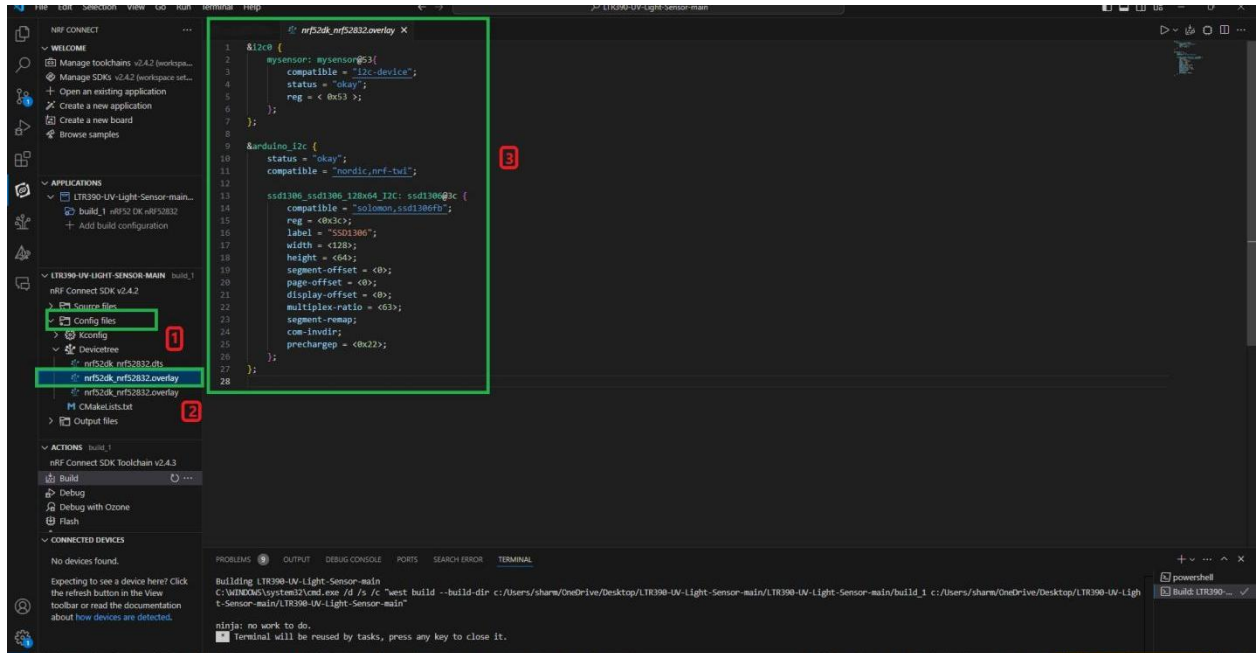
- Go to source file, click **source file [1]** > click on **Application** > click on **src** > click on **main.c [2]**.
- By Clicking on **main.c** file and you will see the code on your screen **[3]**.



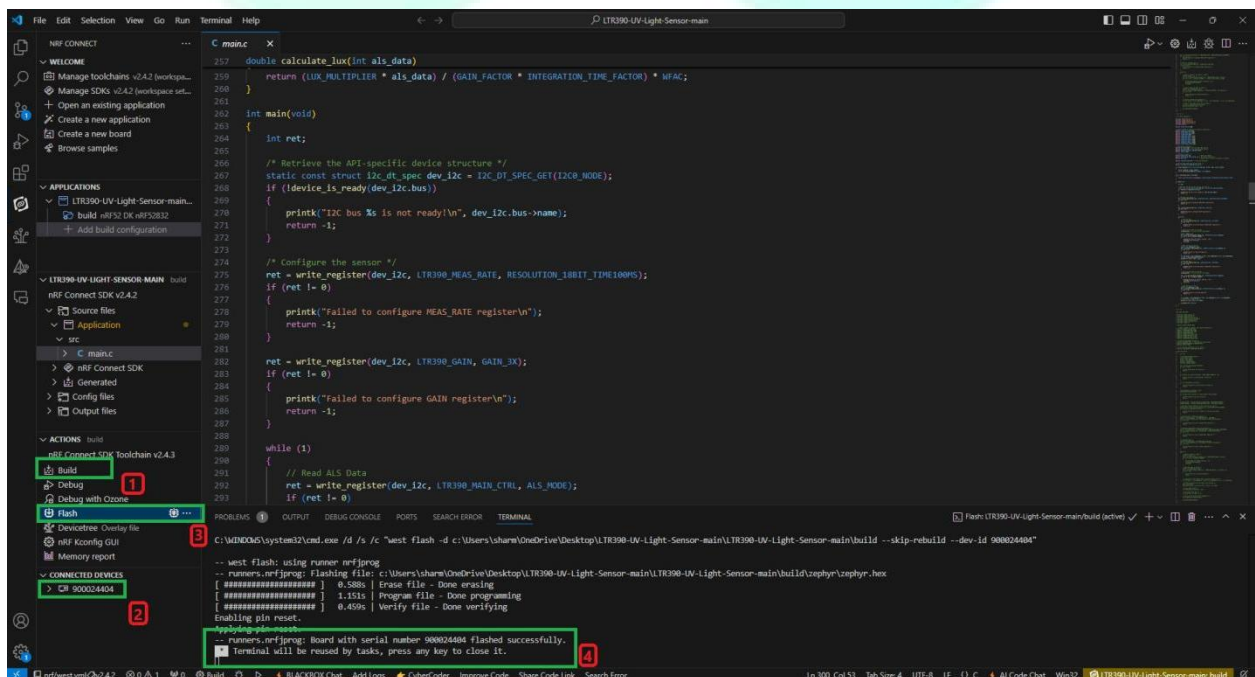
- To configure the prj configuration, click on **Config files [1]** > click on **Kconfig** > click on **prj.conf [2]**.
- The prj configuration will appear on your screen **[3]** as shown in the picture below.



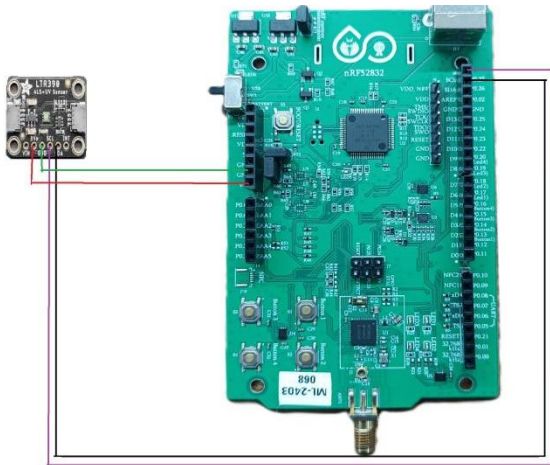
- To configure the i2c protocol, you have to enable it in the **.overlay** file.
- Click on the **Config files [1]** > click on **Kconfig** > click on **Devicetree [2]** > click on **nrf52dk\_nrf52832.overlay [3]**.
- The .overlay file will appear on your screen and add the given code to the .overlay file as shown in the picture given below [4].



- Click on **Build [1]** configuration again and check the **CONNECTED DEVICES [2]**.
- If device id is visible, then **Flash [3]** the code in Dev Kit.
- If **flashed successfully [4]** message is displayed on serial terminal, then flash process is complete.



## ❖ PIN CONFIGURATION



### Board Pins -> Sensor Pins

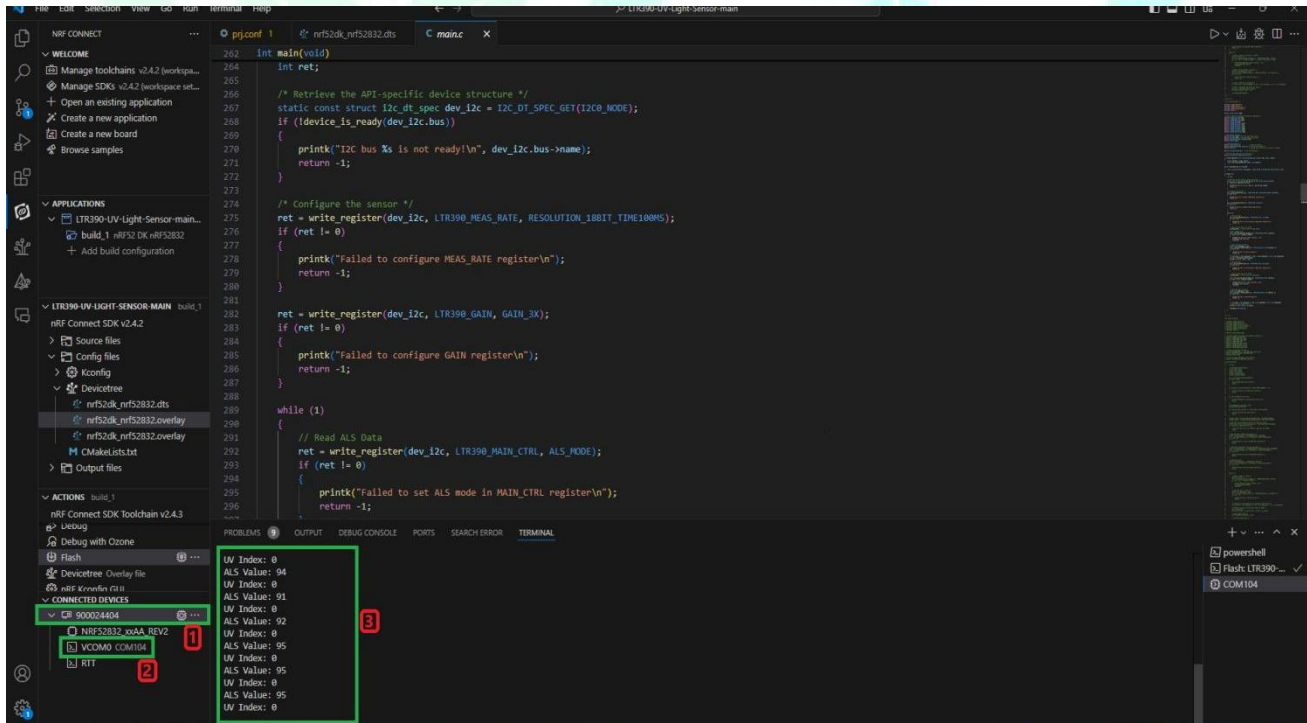
GND -> GND

VDD(3.3V) -> VDD

PO.26 -> SDA

PO.27 -> SCL

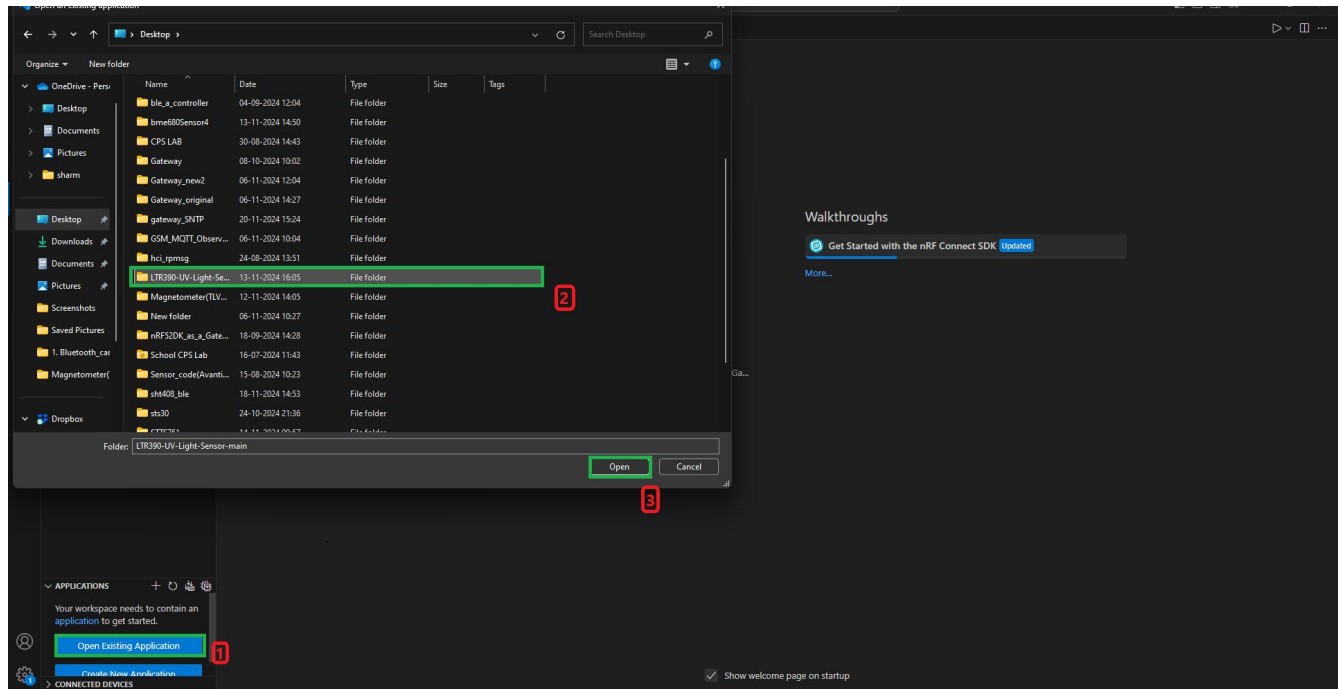
## ❖ OUTPUT



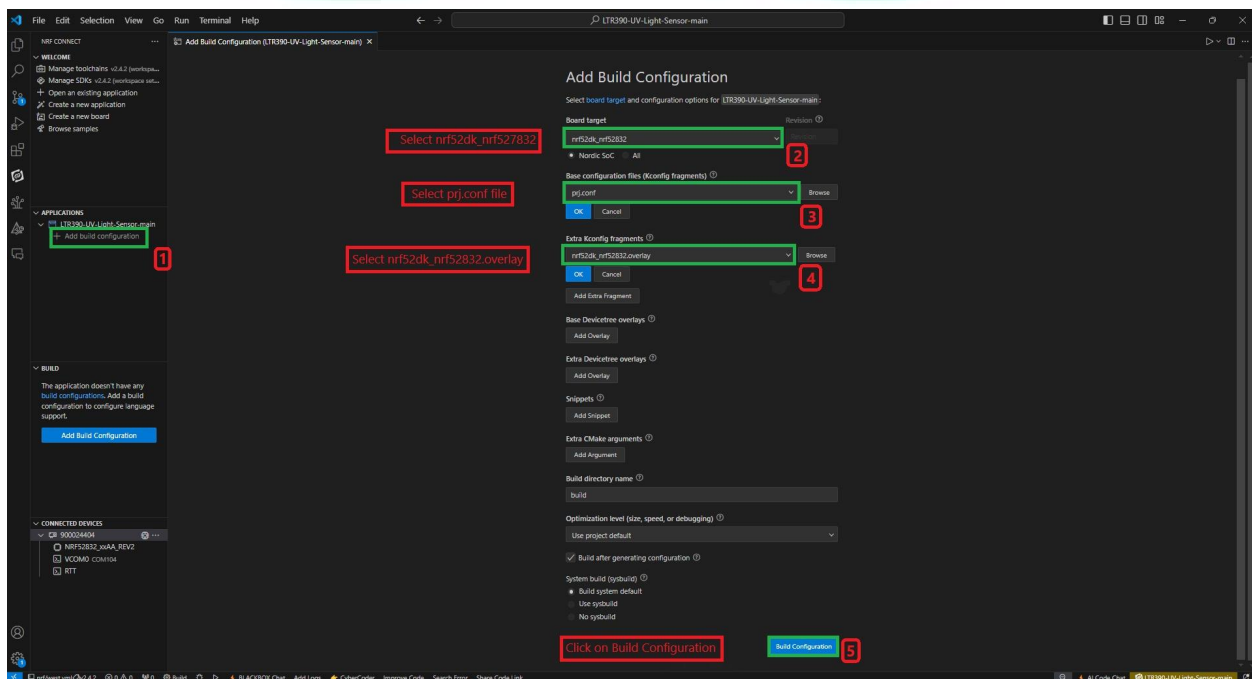


## INTERFACING WITH THE HELP OF NODE

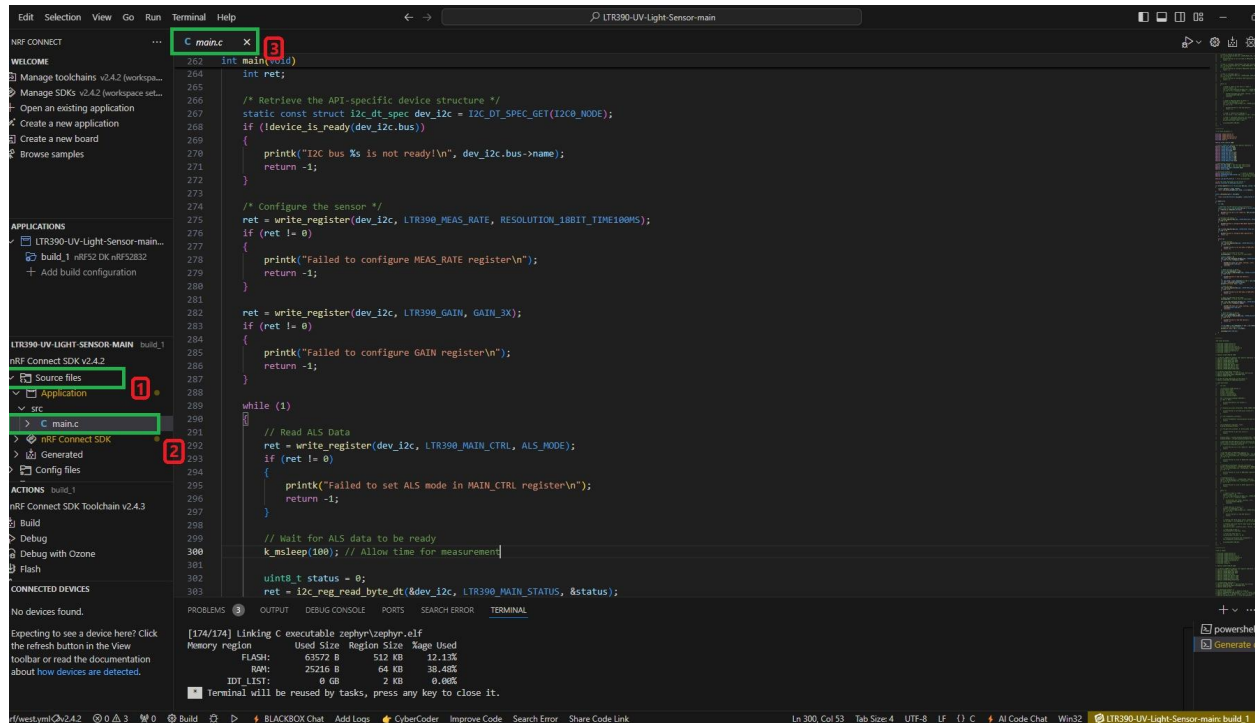
- Open VS Code and click on **Open Existing Application** [1] > click on LTR390\_node\_code [2] > **Open** [3] as shown in the picture below.



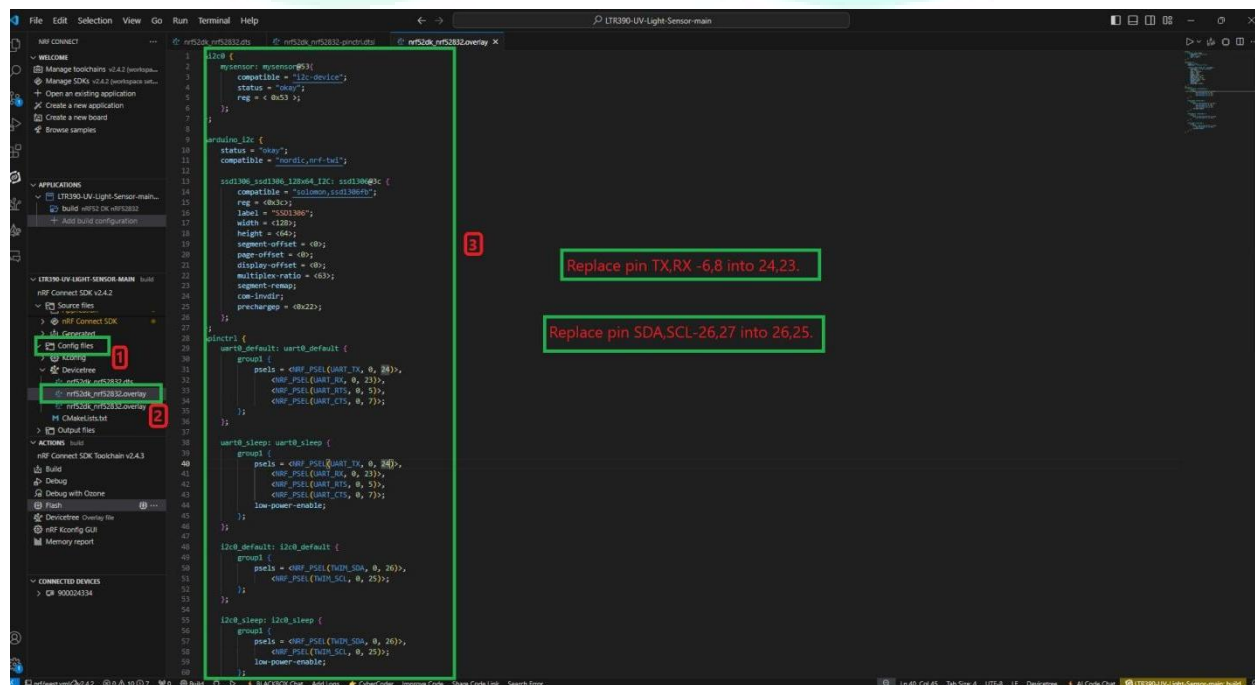
- Click on **Create new build configuration** [1]. Here you can change the board version, if you are using nRF52832, then select **nrf52dk\_nrf52832** [2] or you can change from dropdown menu for another version like nRF52833 etc.
- Click on the Configuration and select **prj.conf** [3] from dropdown menu and then click on the device tree overlays and select **nrf52dk\_nrf52832.overlay**[4].
- Then click on the **Build Configuration** [5] as shown below in the picture.



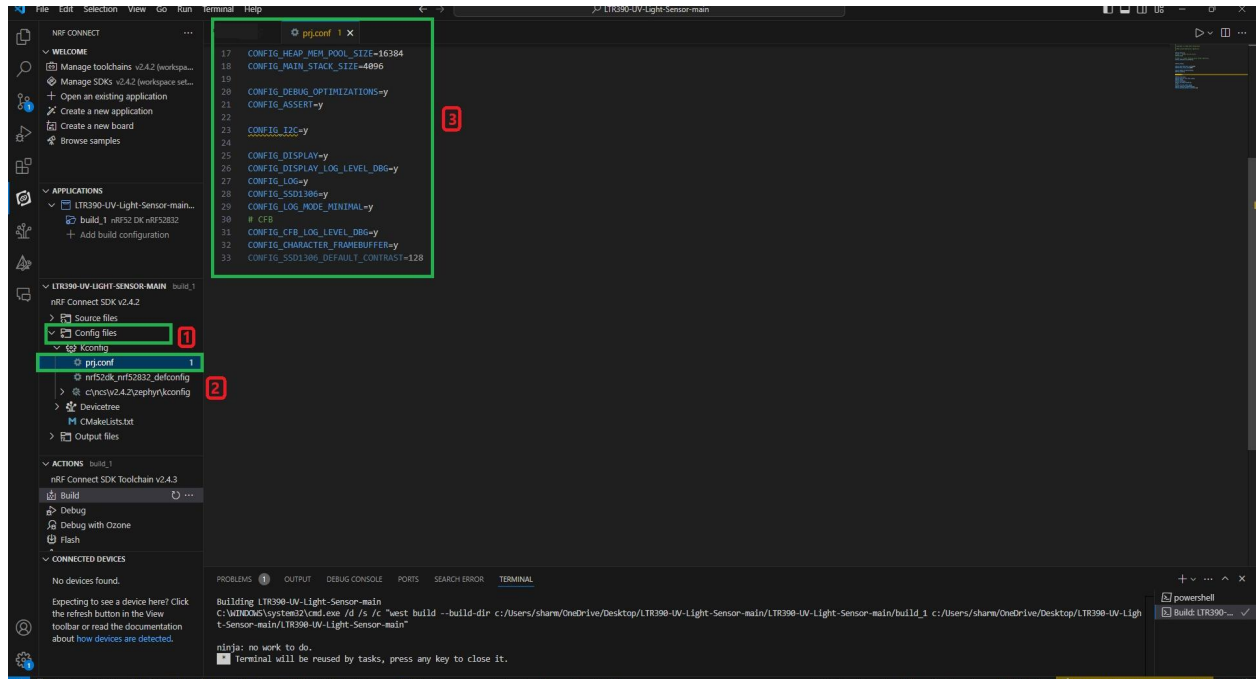
- Go to source file, click **source file [1]** > click on **Application** > click on **src** > click on **main.c [2]**.
- By clicking on **main.c** file and you will see the code on your screen.



- To configure the i2c & UART protocols, you have to enable it in the **overlay file**.
- Click on the **Config files[1]** > click on **Kconfig** > click on **Devicetree** > click on **nrf52dk\_nrf52832.overlay [2]**.
- The overlay file will appear on your screen and add the given code to the **overlay file** as shown in the picture given below [3].

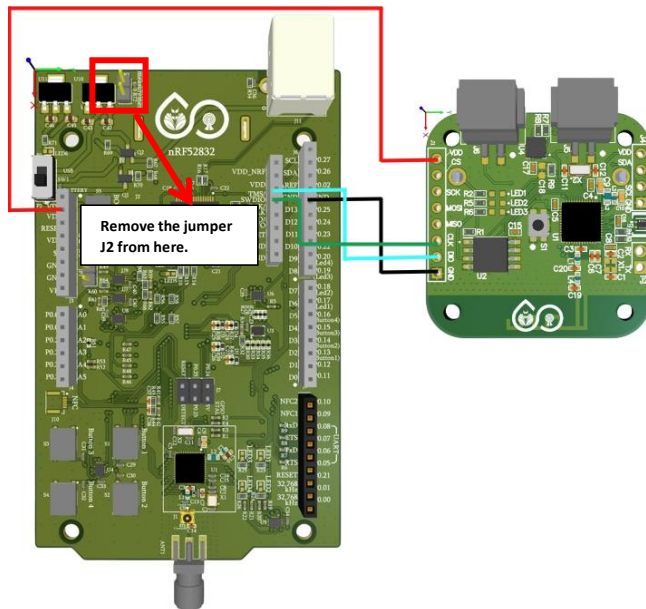


- You need to enable sensor in prj file for communication as shown below.
- Click on **Config files [1]** > then click on **Kconfig files** > click on **prj.conf [2]**.
- The **prj.conf** will appear on the screen [3] as shown below in the picture.





- For Node programming remove the jumper **J2** from the development board.
- Now flash the code with the help of nRF52832 development board as shown below in the figure.



Board Pins -> NODE Pins

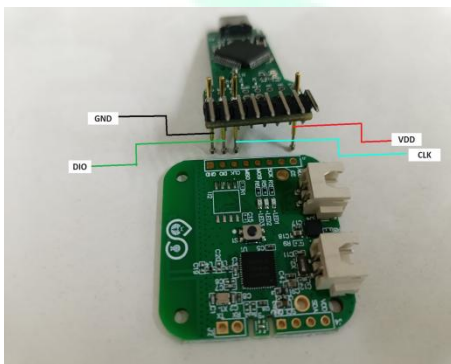
VDD(3.3V) -> VDD

GND -> GND

CLK -> CLK

DIO -> DIO

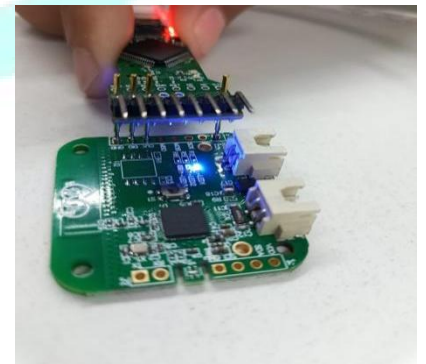
- There is another way of flashing the code with the help of Node Programmer as shown in the picture below.



- NODE without connection.

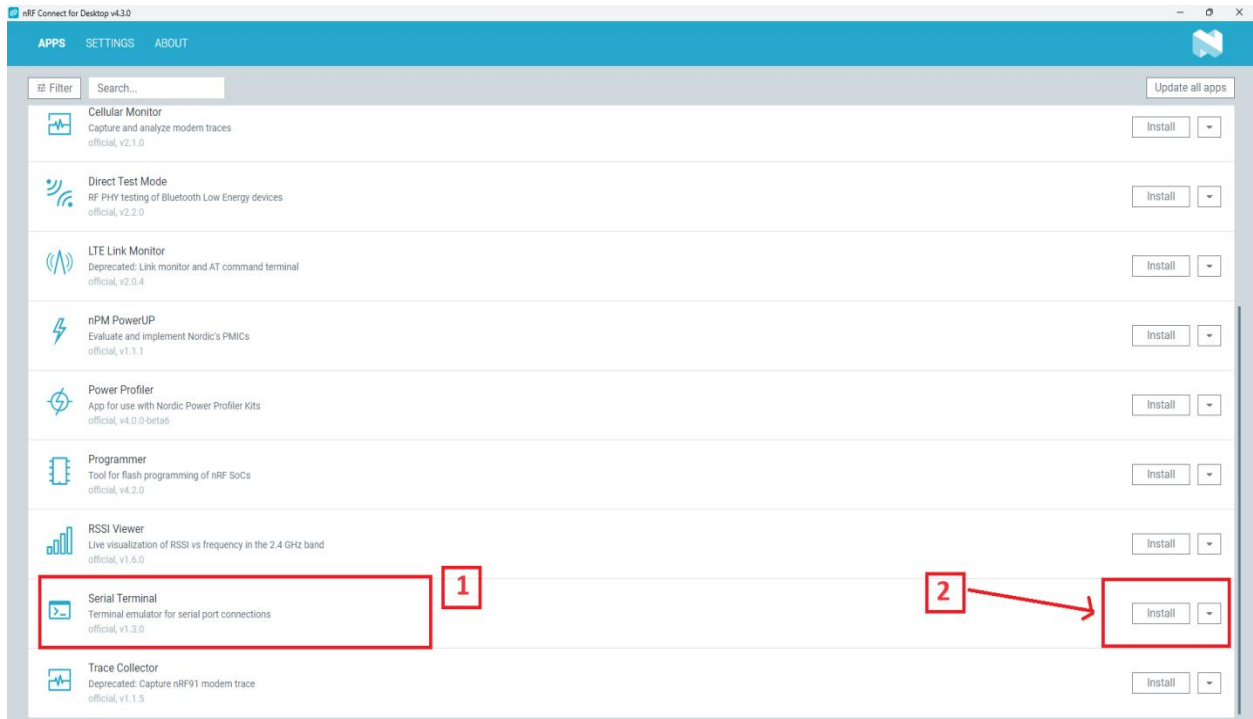


- NODE with connection.

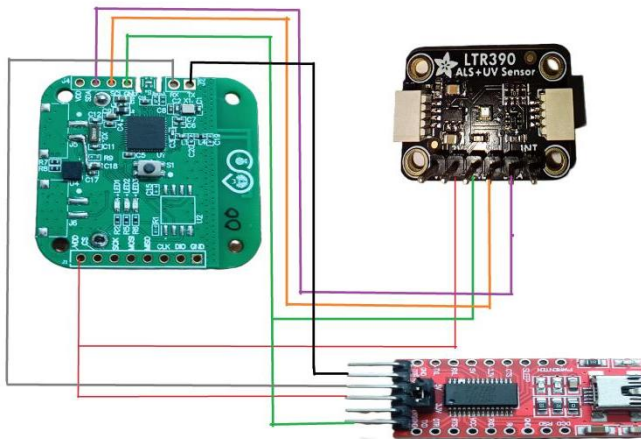


- NODE after program.

- Firstly, you have to **Install [2]** the nRF **Serial Terminal [1]** in nRF Connect for Desktop application as shown below.



- Connect the **TTL Device** for UART communication so that the data must appear on the serial terminal.
- Connect the **TTL Device** as shown below in the picture.



#### Node Pins -> TTL Pins

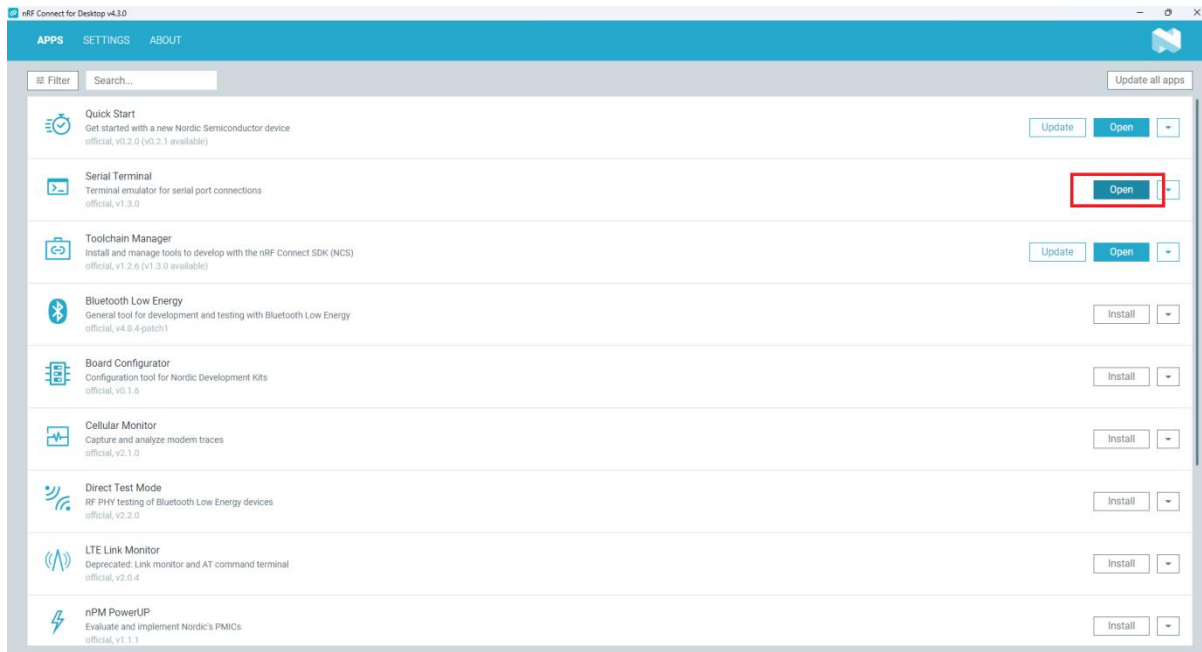
**Tx** -> **Rx**  
**Rx** -> **Tx**  
**VDD** -> **VDD**  
**GND** -> **GND**

#### Node Pins -> Sensor Pins

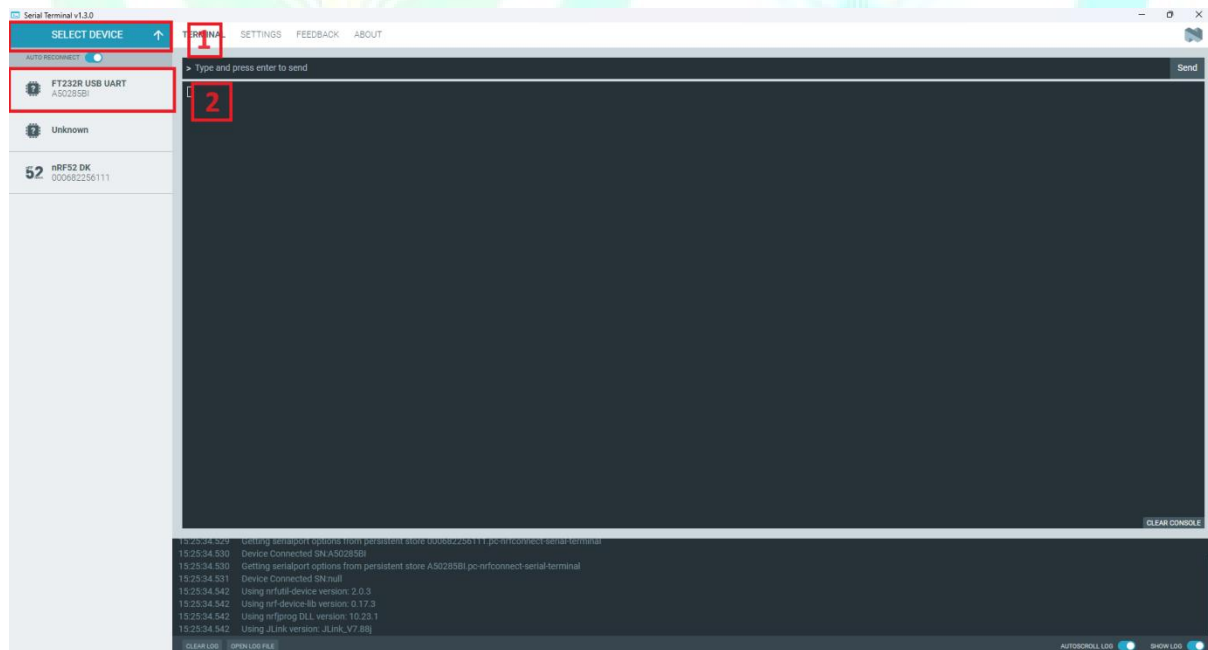
**SDA** -> **SDA**  
**SCL** -> **SCL**  
**VDD** -> **VDD(3Vo)**  
**GND** -> **GND**

**Note:** - Do not supply 5 volts current to board through TTL. Otherwise, board will damage.

- Click on **Open** as shown below in the picture.



➤ Click on **Select Device** [1] > click on **FT232R USB UART** [2] as shown below in the picture.



➤ Now the output will appear on your screen as shown below.

## ❖ OUTPUT

```
> Type and press Enter to send
UV Index: 0
ALS Value: 72
UV Index: 0
ALS Value: 62
UV Index: 0
ALS Value: 54
UV Index: 0
ALS Value: 58
UV Index: 0
ALS Value: 66
UV Index: 0
ALS Value: 68
UV Index: 0
ALS Value: 68
UV Index: 0
ALS Value: 68
UV Index: 0
ALS Value: 67
UV Index: 0
ALS Value: 67
UV Index: 0
ALS Value: 67
UV Index: 0
ALS Value: 64
UV Index: 0
ALS Value: 55
UV Index: 0
ALS Value: 57
UV Index: 0
ALS Value: 59
UV Index: 0
ALS Value: 58
UV Index: 0
ALS Value: 44
UV Index: 0
ALS Value: 45
UV Index: 0
ALS Value: 44
```

15:39:32.889 Selected device with the serial number AS0285BI  
15:39:32.894 Getting serial port options from the persistent store for AS0285BI pc-rtfconnect-serial-terminal  
15:39:36.102 Opened port with options: {"baudRate":9600,"path":"COM6"}  
15:39:36.136 Get terminal settings from the persistent store for AS0285BI vCom-0.TerminaSettings  
15:40:24.716 Closed port: COM6  
15:40:31.752 Opened port with options: {"baudRate":115200,"path":"COM6"}  
15:40:31.759 Get terminal settings from the persistent store for AS0285BI vCom-0.TerminaSettings