EXPERIMENT – 11

INTERFACING VCNL4040 (Lux) SENSOR WITH DEV BOARD/NODE

What will you learn from this module:

➢ Interfacing with the help of I2C protocol.
➢ 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.
➢ VCNL4040 Sensor.
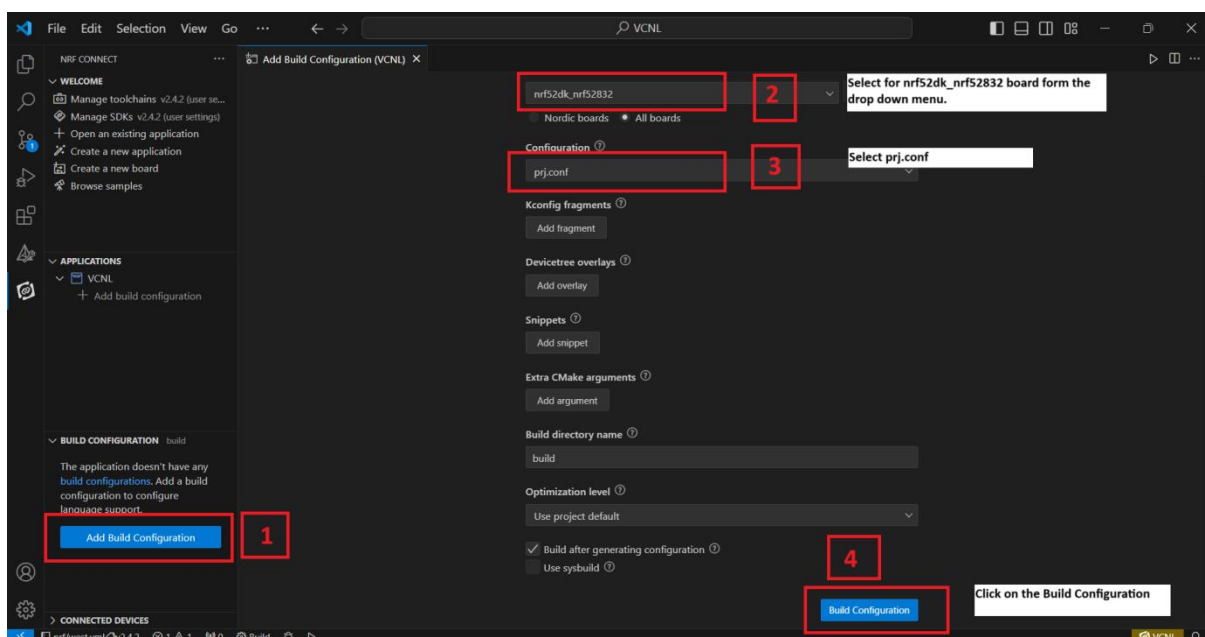➢ TTL Device.

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 **VCNL [2]** > **Open [3]** as shown in the picture below.
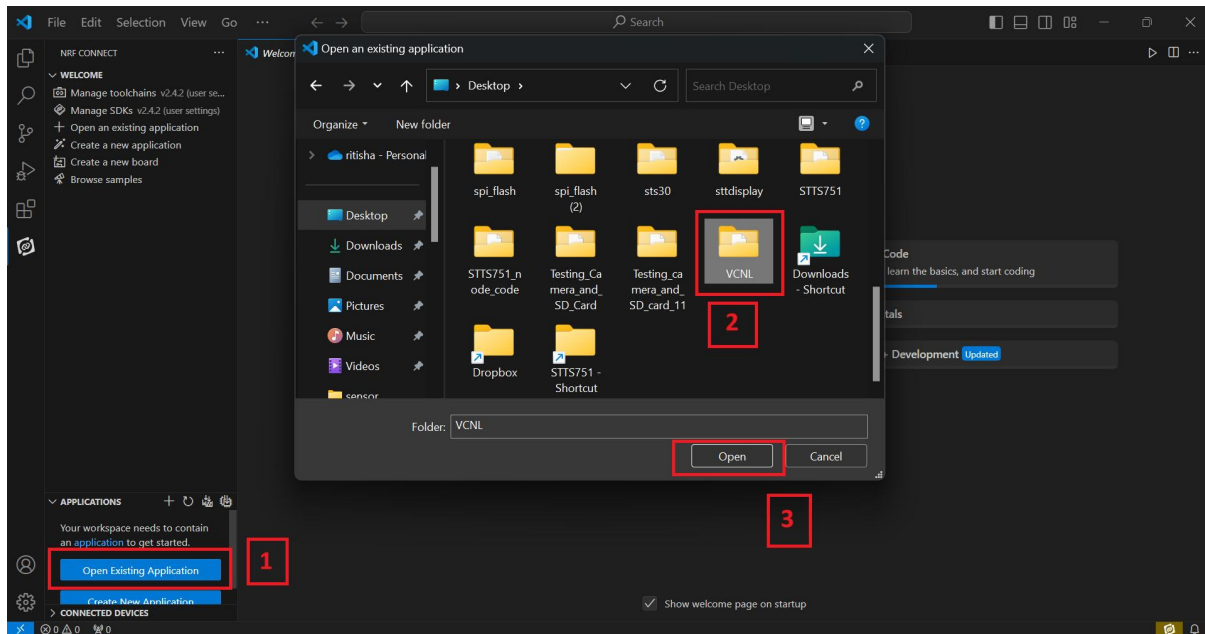

➢ Click on **Create new build configuration [1]**. Here you can change the board version, if you are using nRF52832, then select **nrf52dk_nrf52832 [2]** or you can change from dropdown menu for another version like nRF52833 etc.

➢ Click on the Configuration and select **prj.conf [3]** from dropdown menu and then click on the **Build Configuration [4]** 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]**.
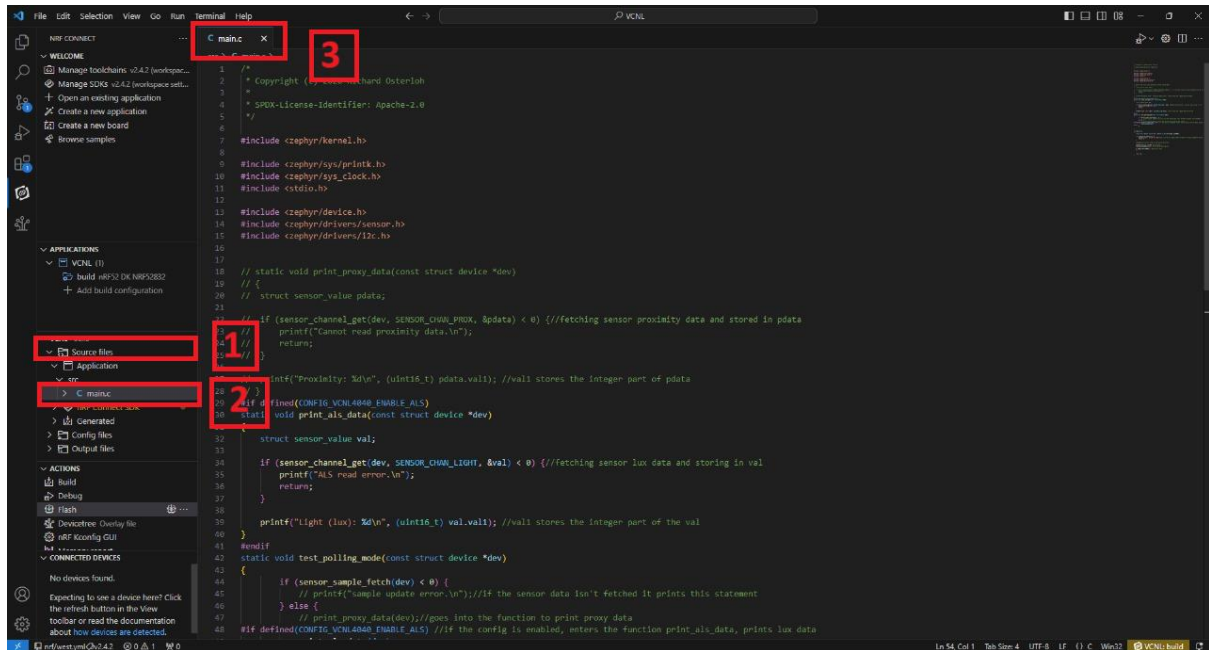

- ➢ To configure the prj configuration, click on **Config files [1]** > click on **Kconfig** > click on **prj.conf [2]**.
- ➢ The prj configuration will appear on your screen **[3]** as shown in the picture below.
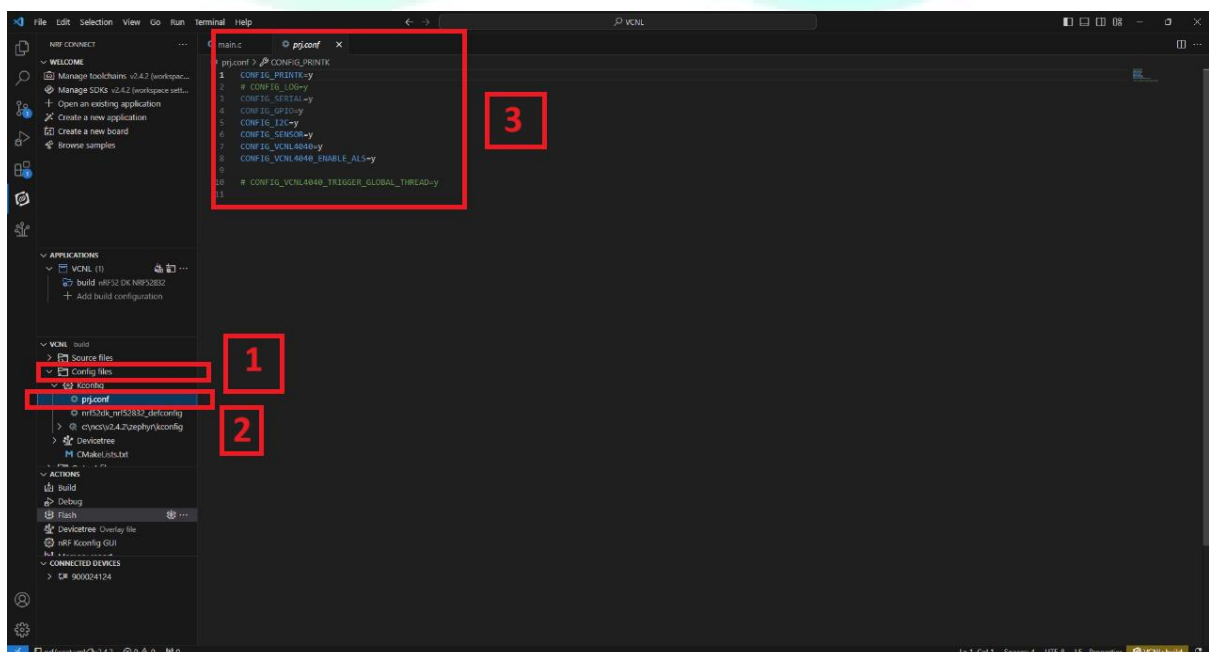
- ➤ To configure the i2c protocol, you have to enable it in the **.overlay file**.
- ➤ Click on the **Config files [1]** > click on **Kconfig** > click on **Devicetree** > click on **nrf52dk_nrf52832.overlay [2]**.
- ➤ The .overlay file will appear on your screen and add the given code to the .overlay file as shown in the picture given below **[3]**.
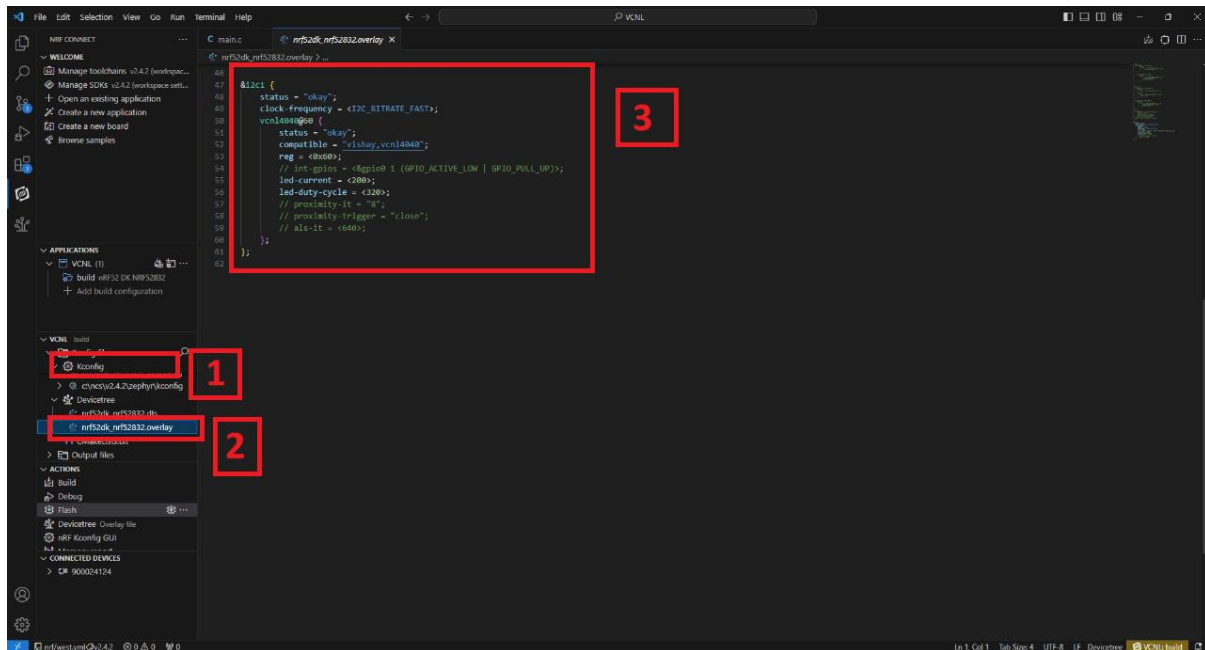
- ➤ Click on **Build [1]** configuration again and check the **CONNECTED DEVICES [2]**.
- ➤ If device id is visible, then **Flash [3]** the code in Dev Kit.
- ➤ If **flashed successfully [4]** message is displayed on serial terminal, then flash process is complete.
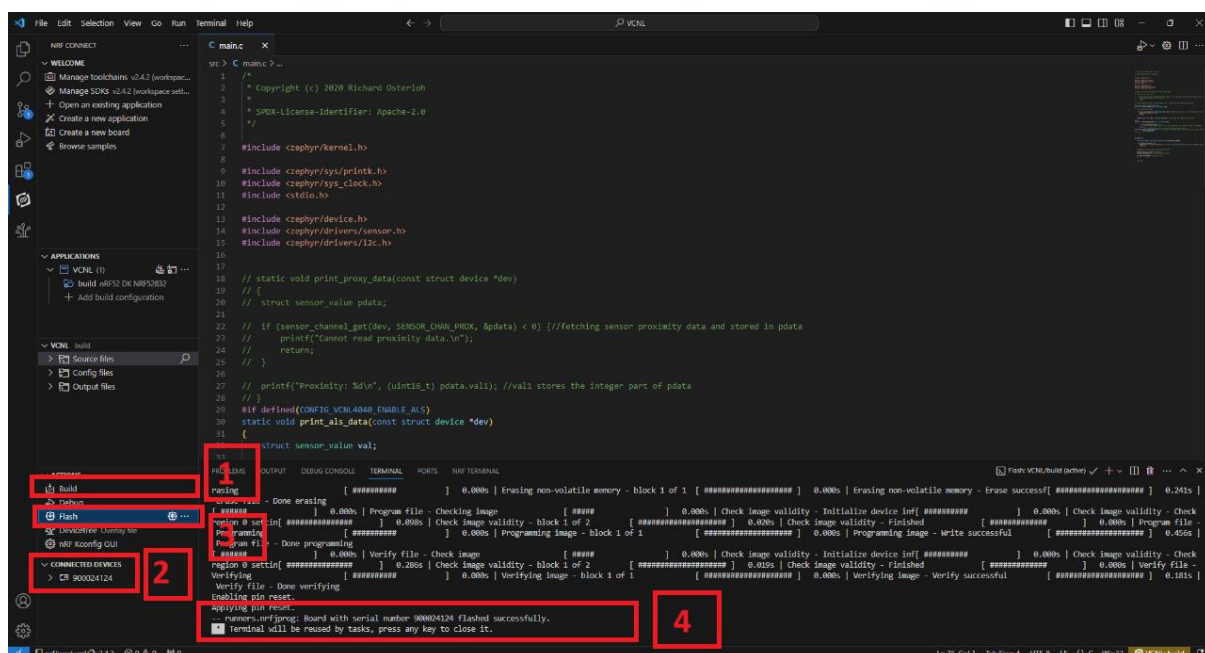
❖ PIN CONFIGURATION
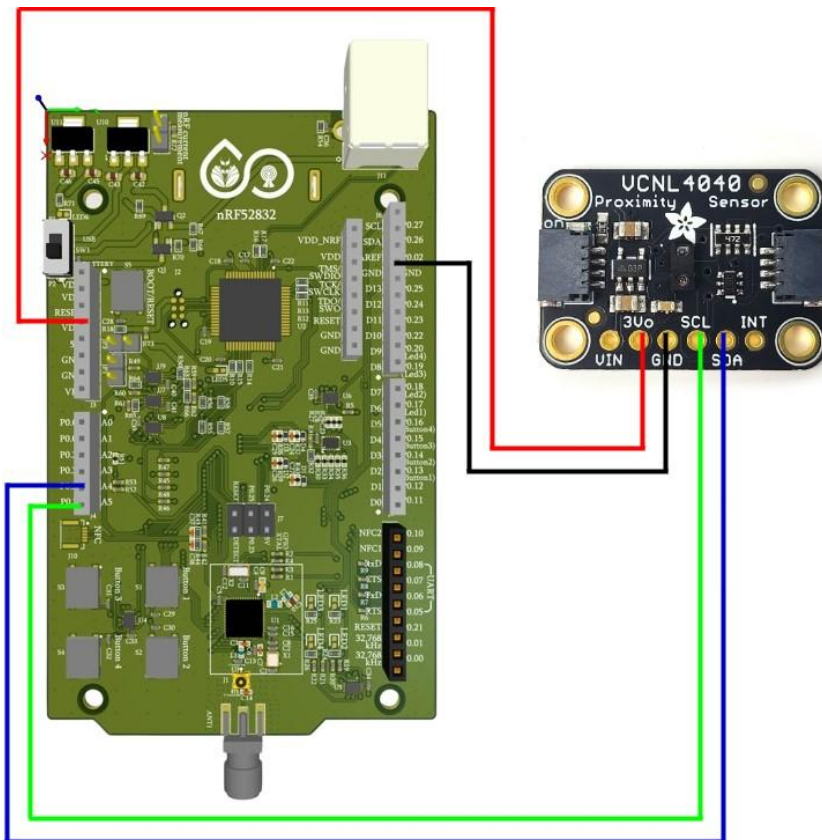
Board Pins -> Sensor Pins

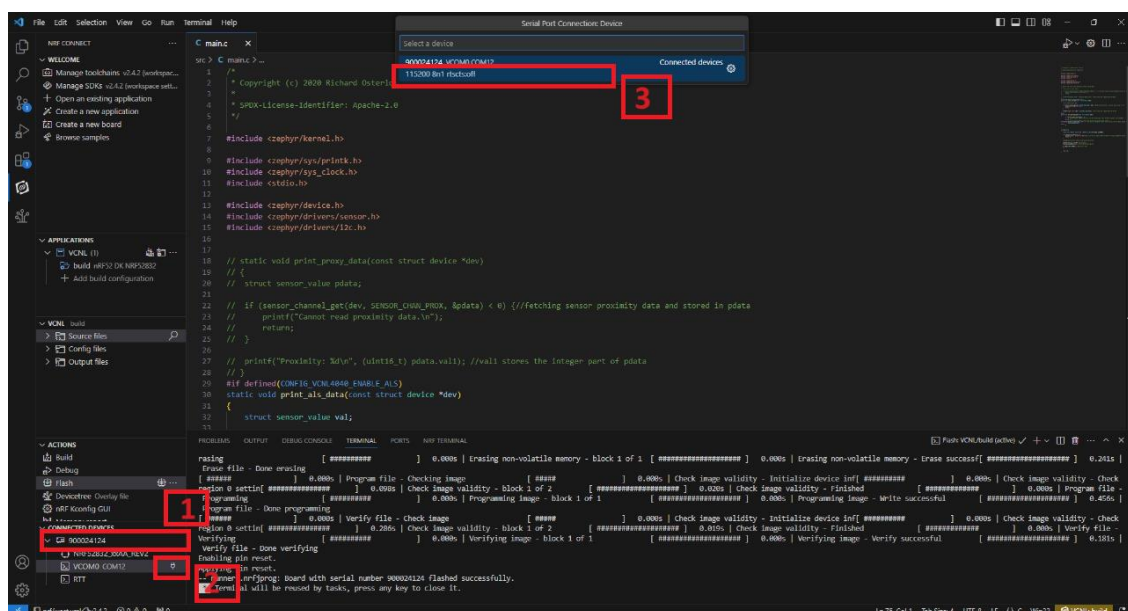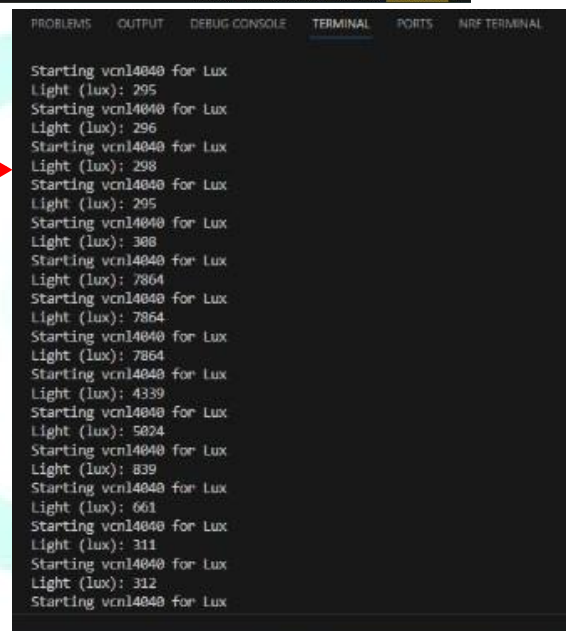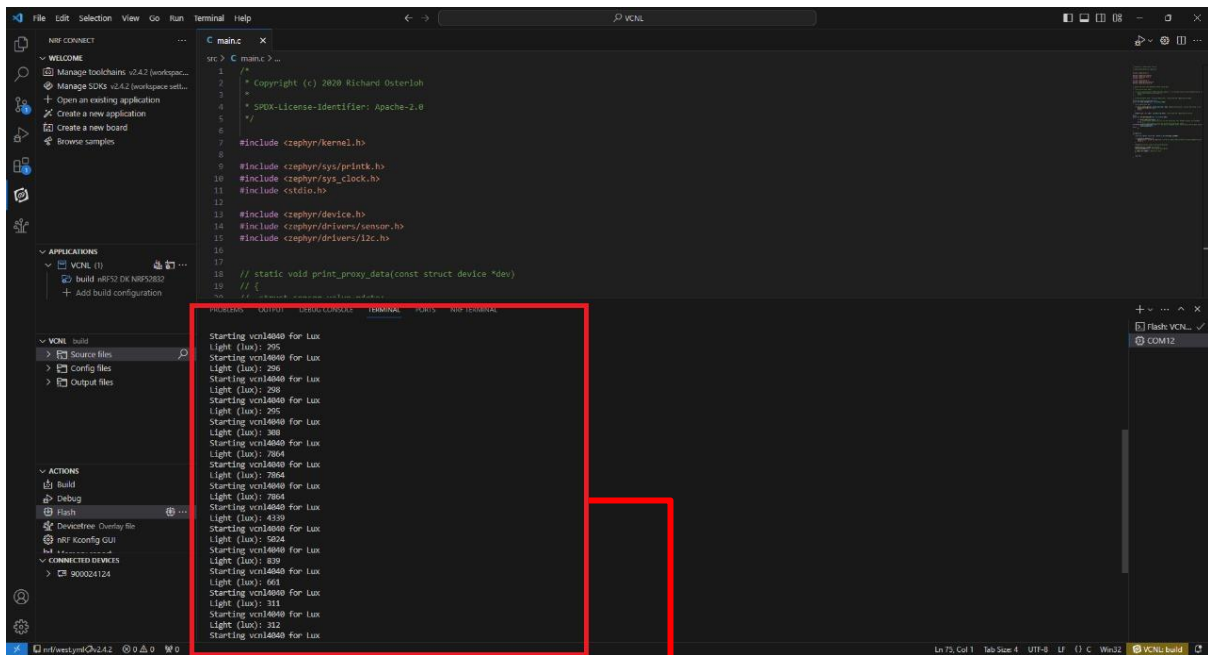**GND -> GND**

VDD(3.3V) -> $3V_O$
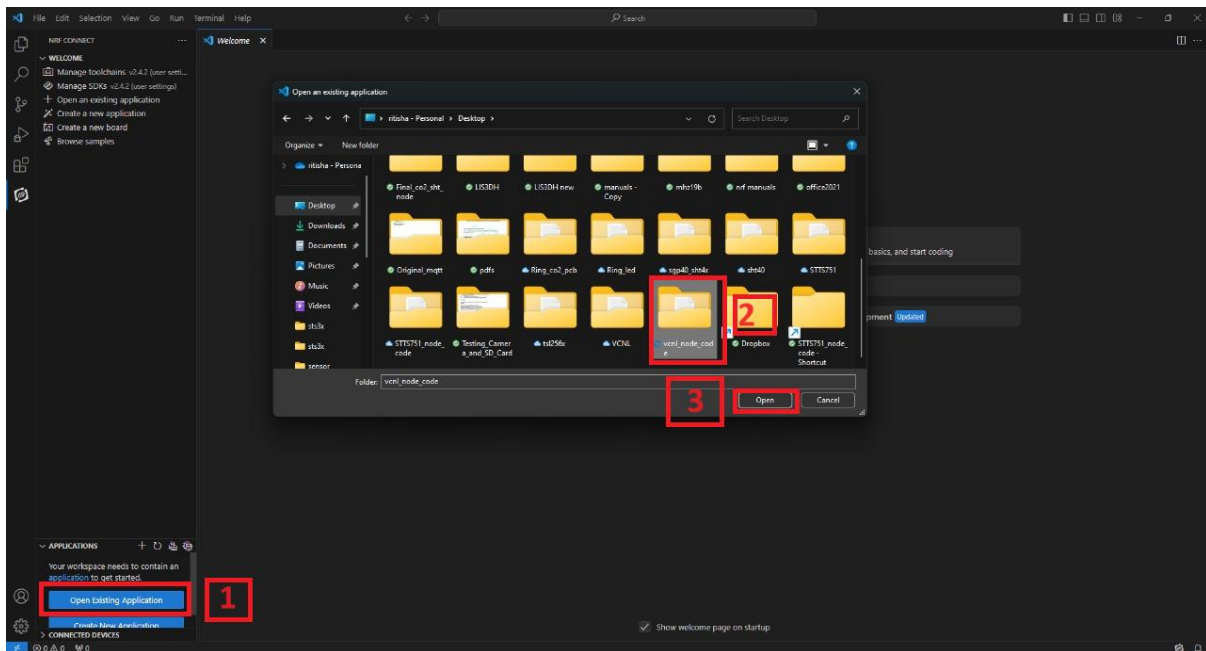
P0.30 -> SDA

P0.31 -> SCL

❖ OUTPUT

> To see the output on the terminal click on the **device ID [1]** -> click on **[2]** -> click on **115200 8n 1 rtsctsoff [3]** as shown below in the picture.
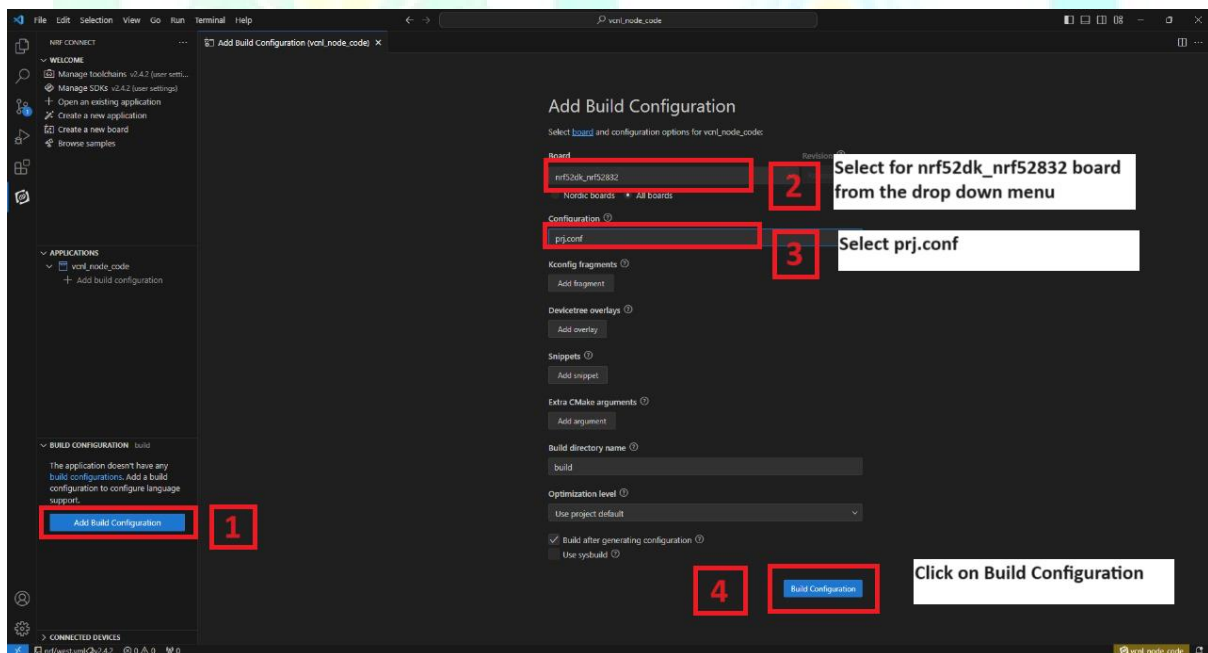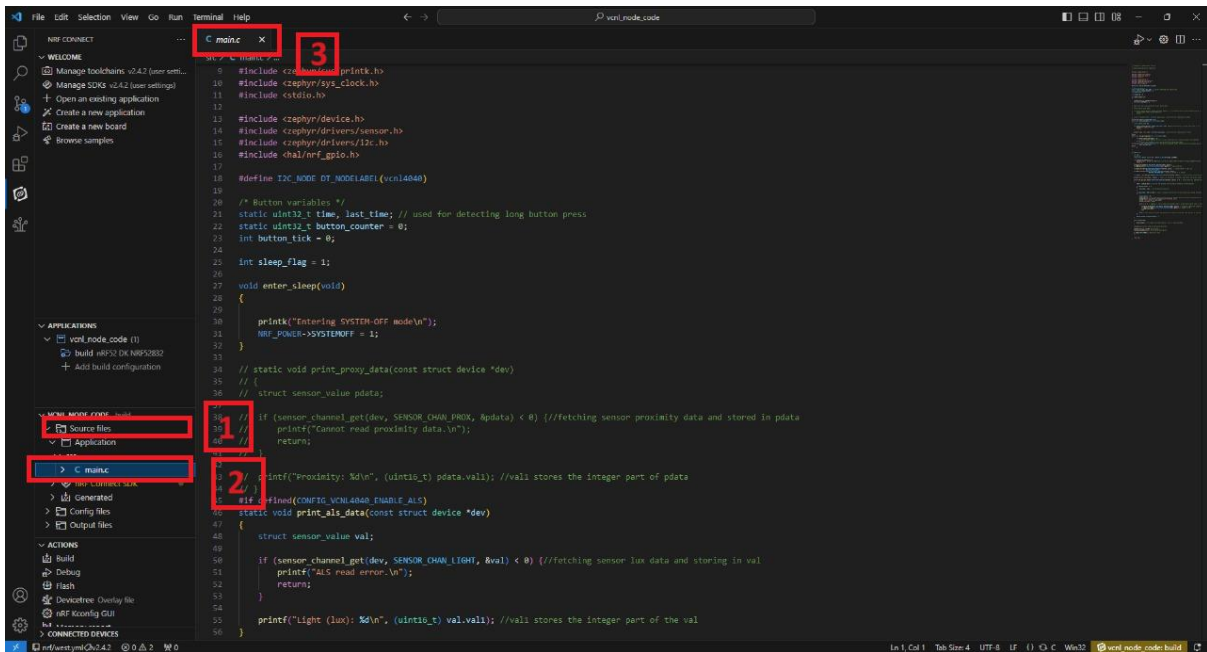
❖ INTERFACING WITH THE HELP OF NODE

➢ Open VS Code and click on **Open Existing Application [1]** > click on **vcnl_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 **Build Configuration [4]** 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 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.
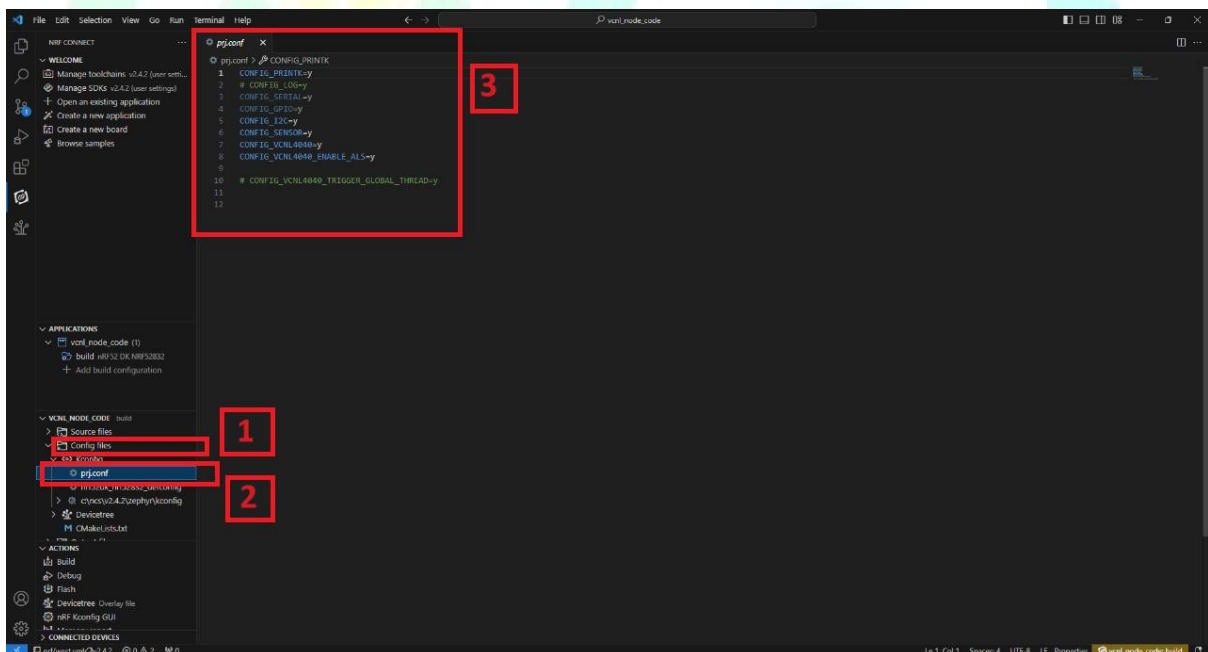

> ➢ To configure the i2c & uart protocol, you have to enable it in the **.overlay file**.
> ➢ Click on the **Config files [1]** > click on **Kconfig** > click on **Devicetree** > click on **nrf52dk_nrf52832.overlay [2]**.
> ➢ The .overlay file will appear on your screen and add the given code to the .overlay file as shown in the picture given below **[3]**.

Change the SDA & SCL pin no. to 26 and 25 respectively.
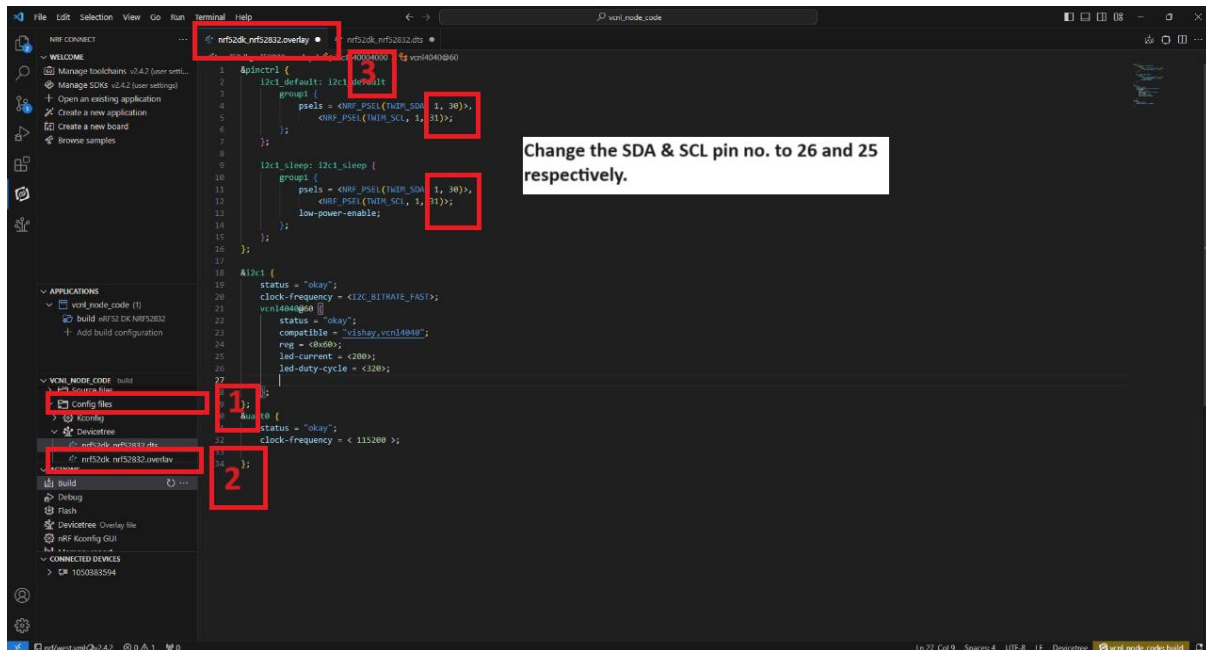
> You need to enable sensor in **dts** file for communication as shown below.
> Click on **Config files [1]** > then click on **Devicetree** > click on **nrf52dk_nrf52832.dts** [2]
> The **dts file** will appear on your screen and add the details in your **dts file** as shown in the picture given below **[3]**.

Replace 17, 18, 19 & 20 with 2, 3, 4 & 28 respectively.
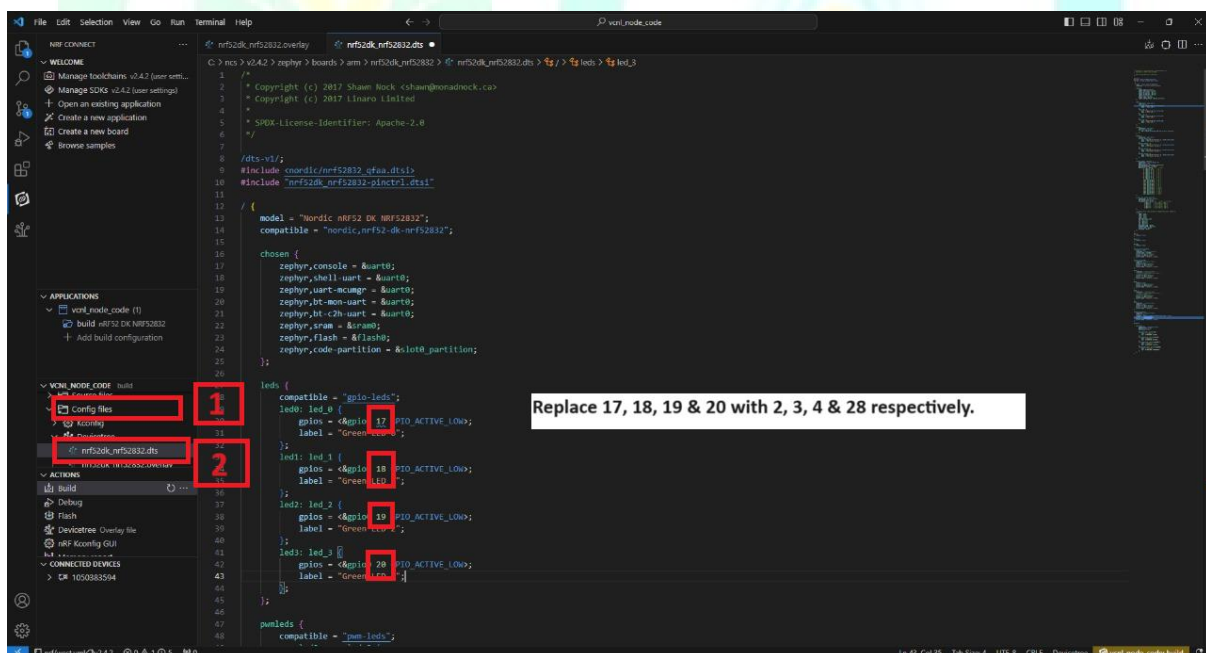
> For Node programing remove the jumper **J2** from the development board.
> Now flash the code with the help of nRF52832 development board as shown below in the figure.
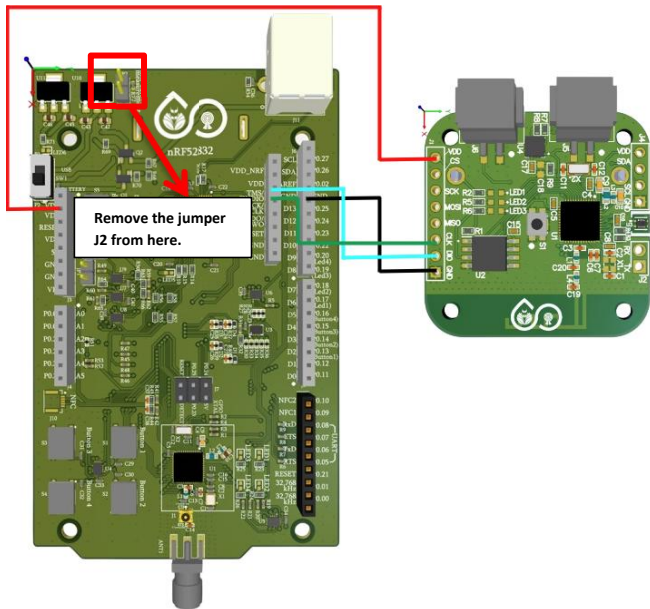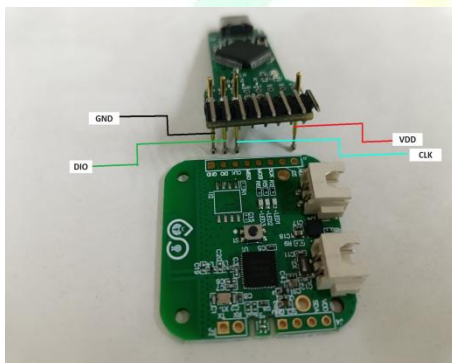
Board Pins -> NODE Pins

VDD(3.3V) -> VDD

GND -> GND

CLK -> CLK
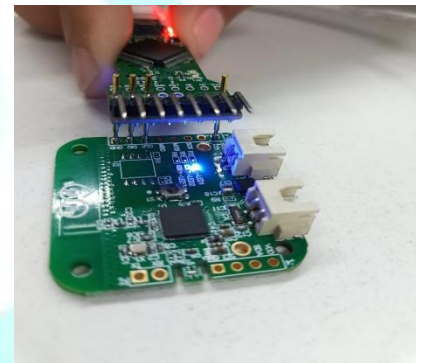
DIO -> DIO

Remove the jumper J2 from here.

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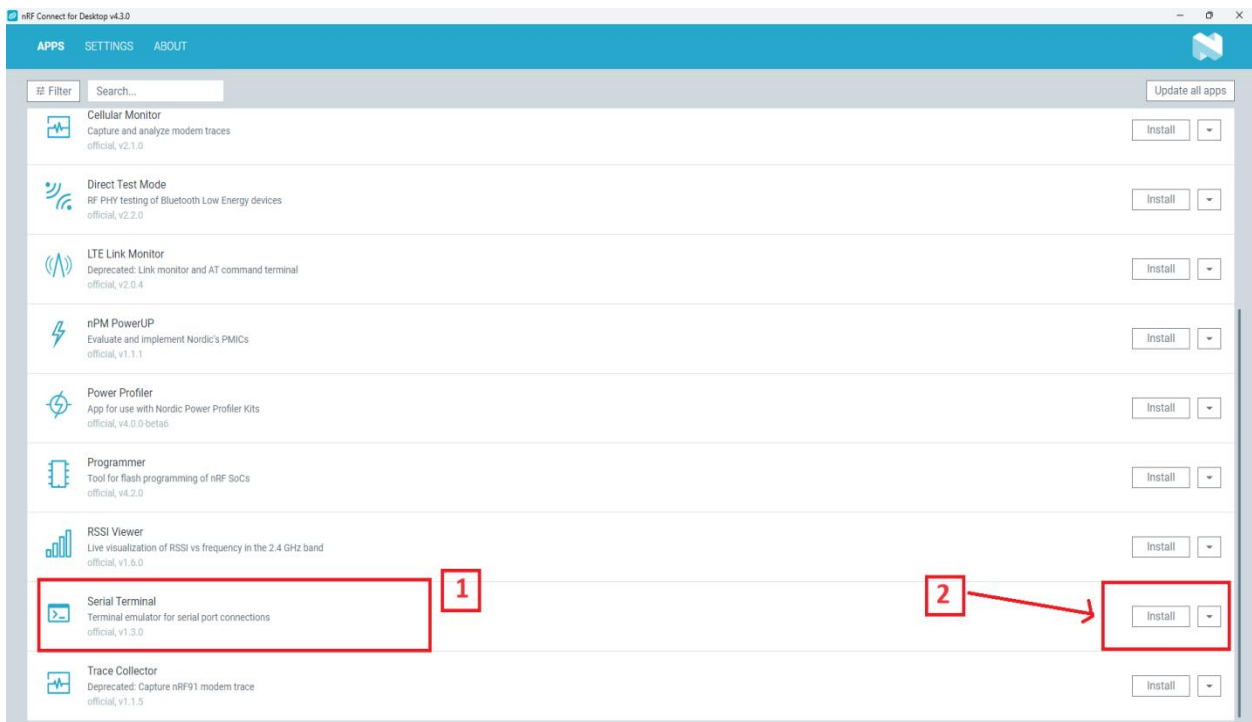

➢ NODE without connection.
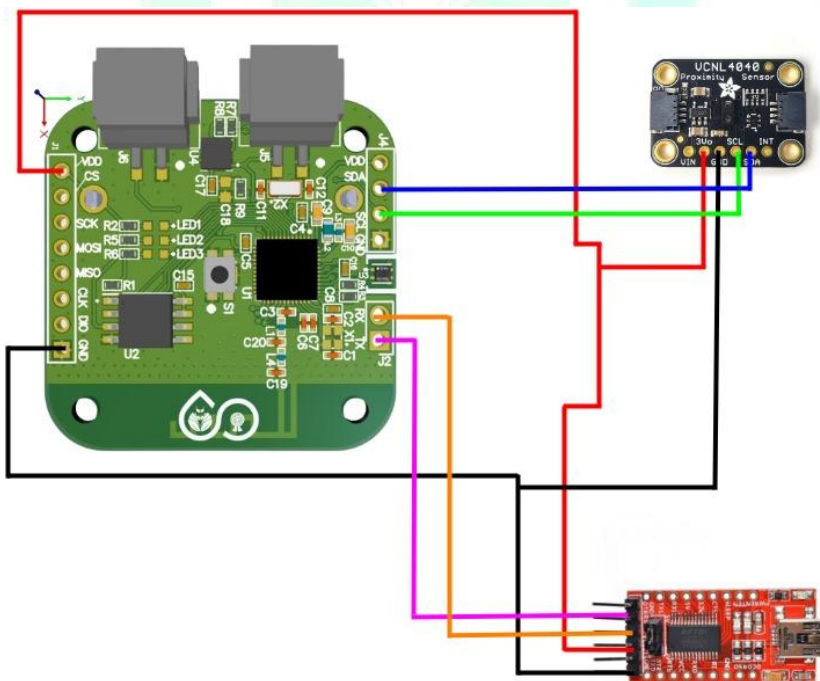

➢ NODE with connection.

➢ 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(3.3V) -> VDD
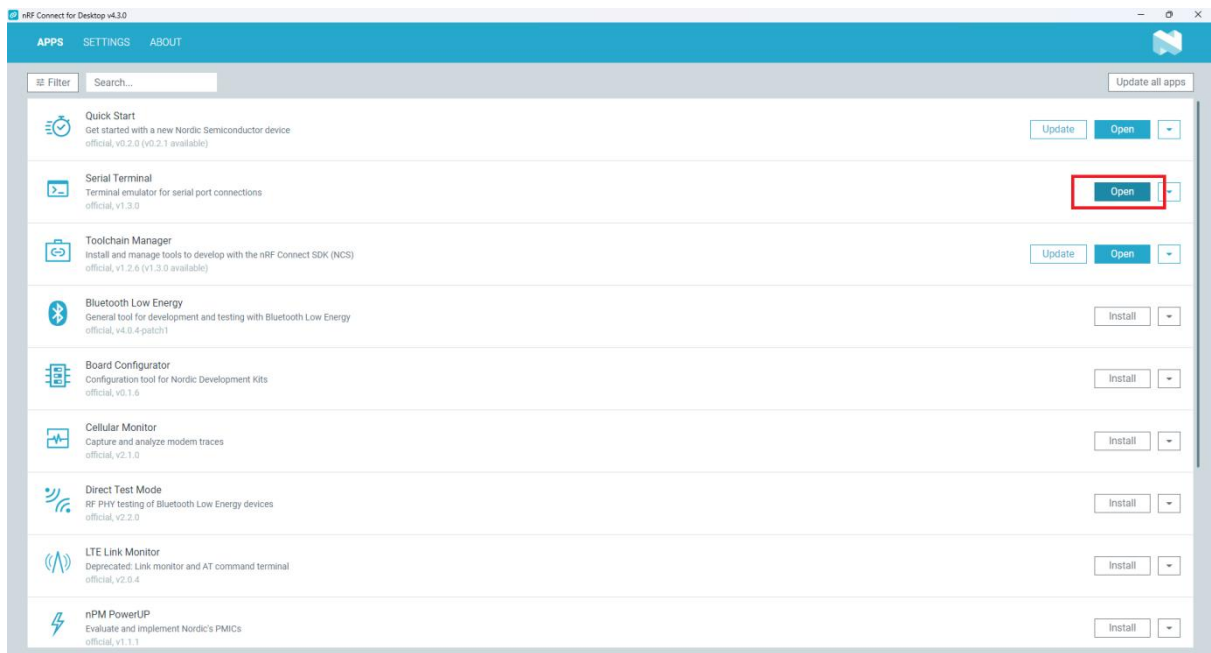**GND -> GND**
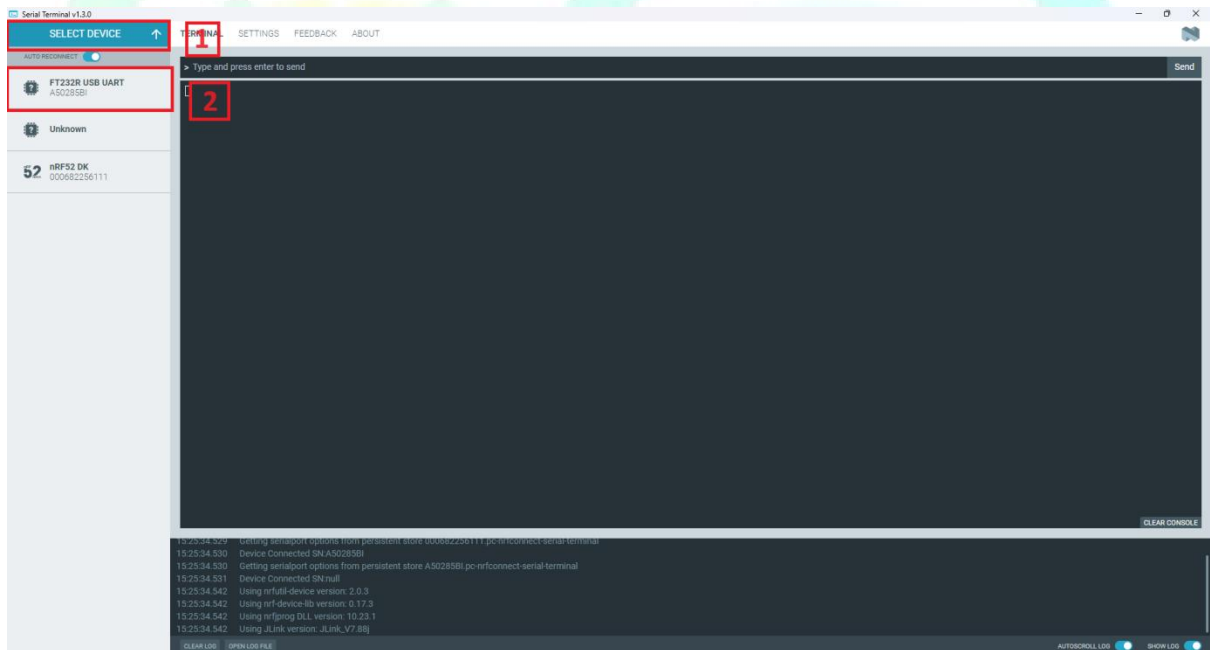
Node Pins -> Sensor Pins
SDA -> SDA
SCL -> SCL
VDD(3.3V) -> 3V$_O$
GND -> GND
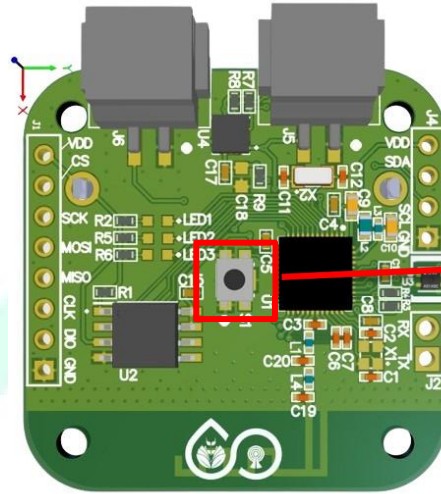
> ➢ Click on **Open** as shown below in the picture.

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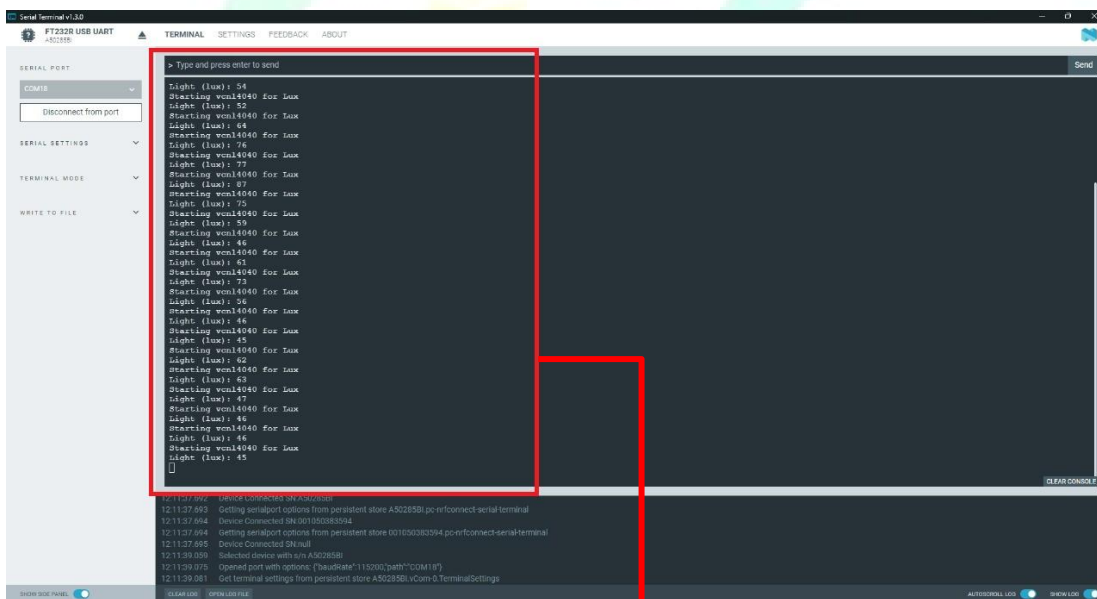

> Now the output will appear on your screen as shown below.

❖ OUTPUT

> ➢ Press the reset button for 5 seconds and the output will appear on the serial terminal.

Press this button for 5 seconds.