AWaDH
Agriculture and Water
Technology Development Hub

EXPERIMENT – 4

INTERFACING LIS3DH SENSOR WITH DEV BOARD/NODE

What will you learn from this module:

Measure Accelerometer values using LIS3DH and Development Board/Node.

Requirements:

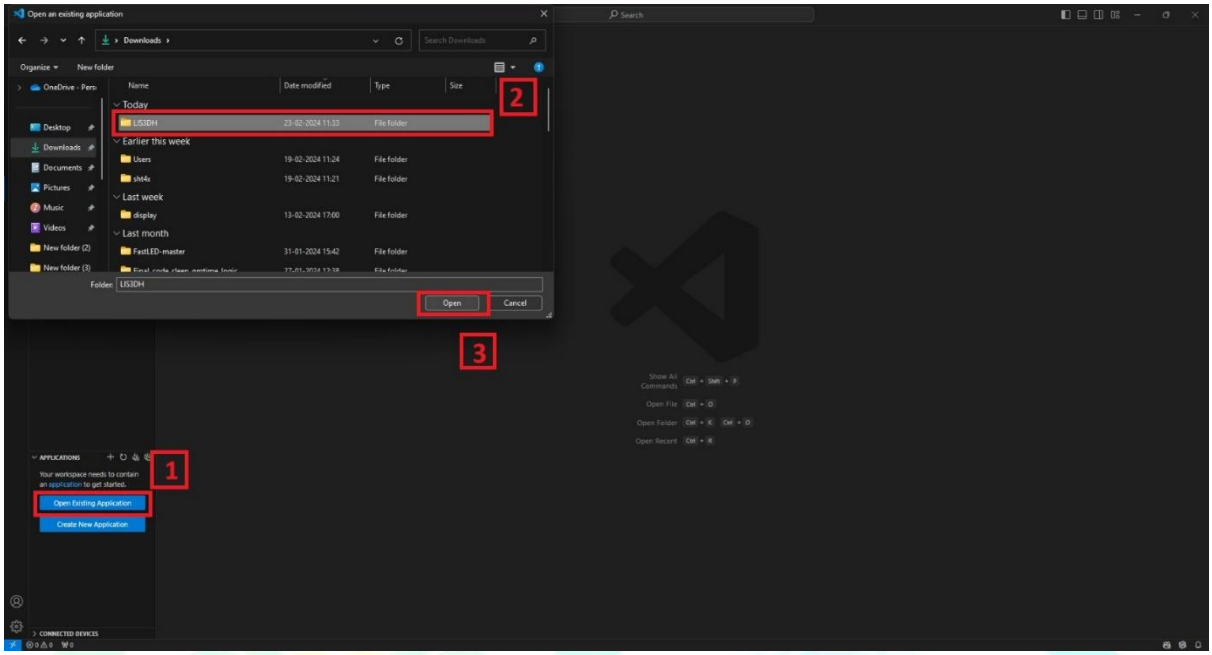
- nRF connect desktop software.
- nRF Command line tools.
- Visual studio code.
- USB cable.
- nRF52832 Development Board/Node.
- LIS3DH Sensor.

Prerequisites:

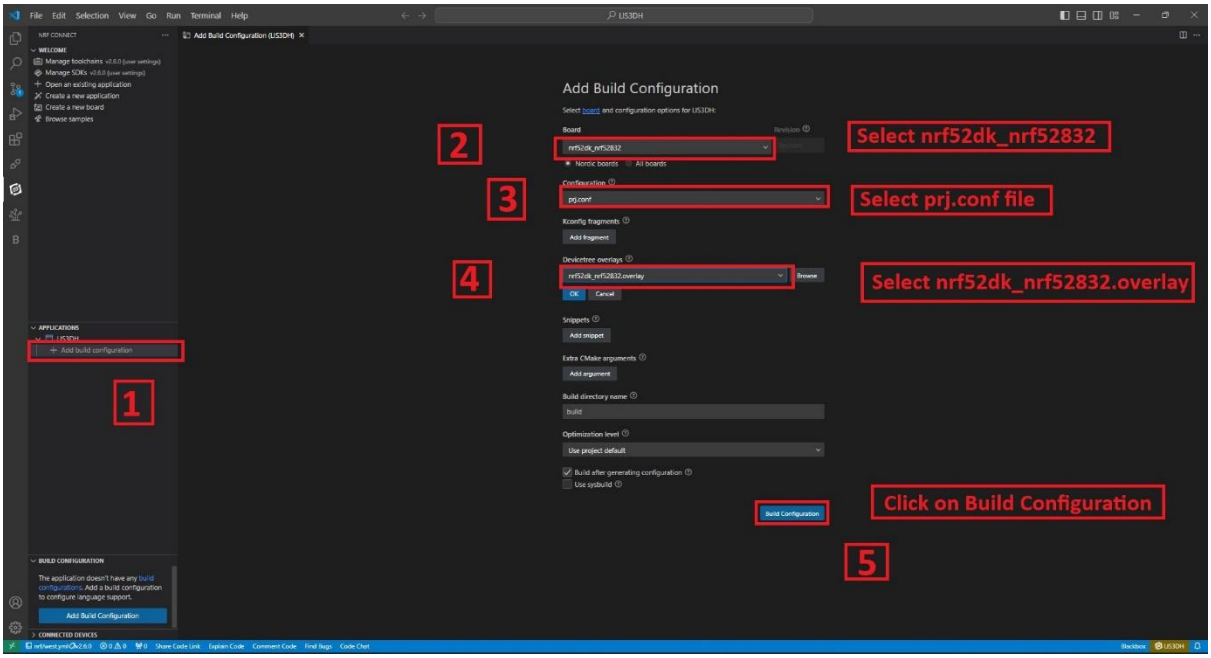
- Basic knowledge of C/C++
- Basic knowledge of communication protocol.
- Basic project setup.

Setup and Configuration:

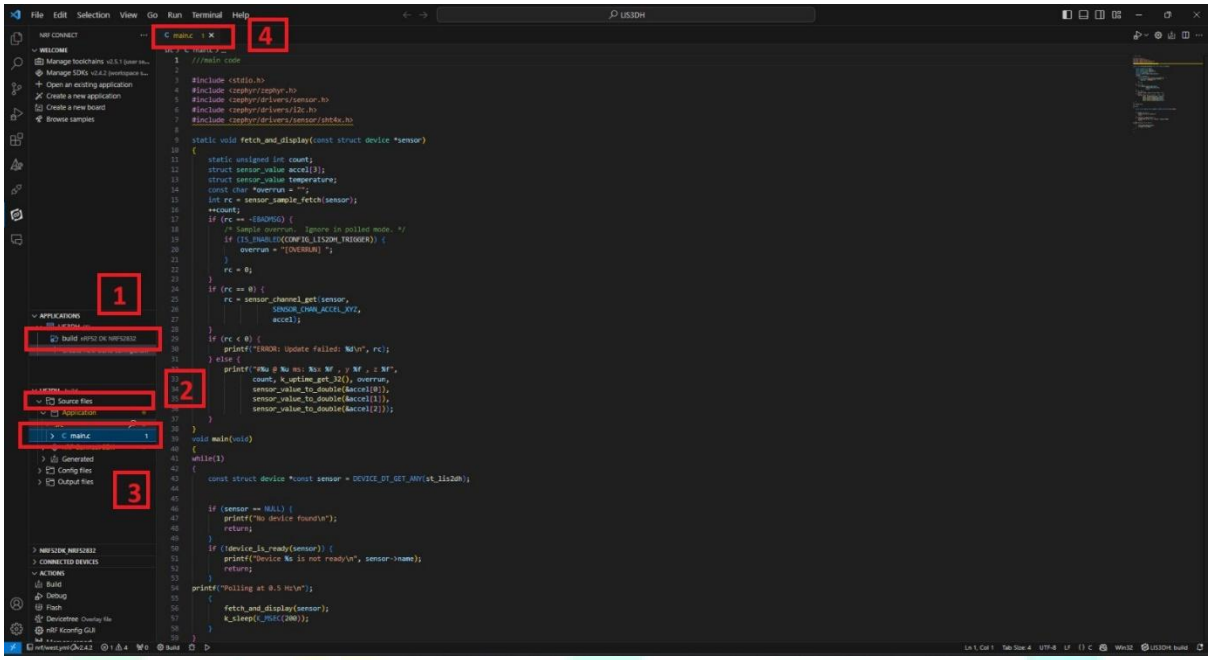
- Open VS Code and click on **Open Existing Application [1]** > click on **LIS3DH [2]** > **Open [3]** as shown in the picture below.



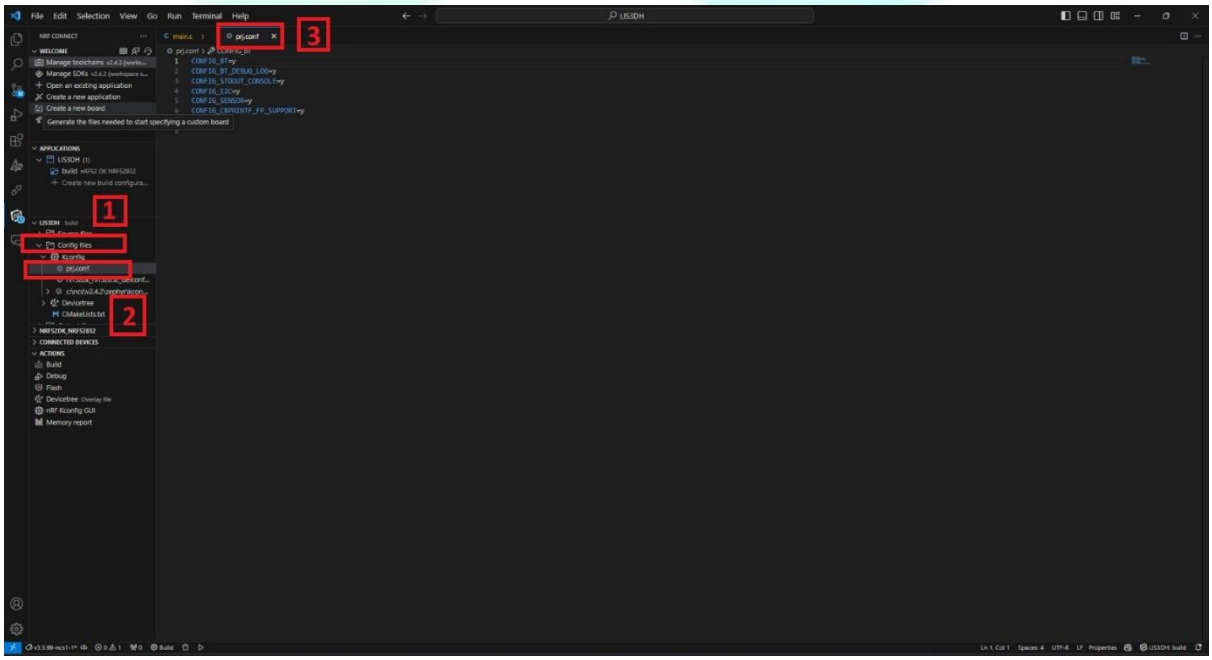
- Click on **Create new build configuration [1]**. Here you can change the board version, if you are using nRF52832, then select **nrf52dk_nrf52832 [2]** or you can change from dropdown menu for another version like nRF52833 etc.
- Click on the Configuration and select **prj.conf [3]** from dropdown menu and then click on the devicetree overlay & select **nrf52dk_nrf52832.overlay [4]**.
- Then click on the **Build Configuration [5]** as shown below in the picture.



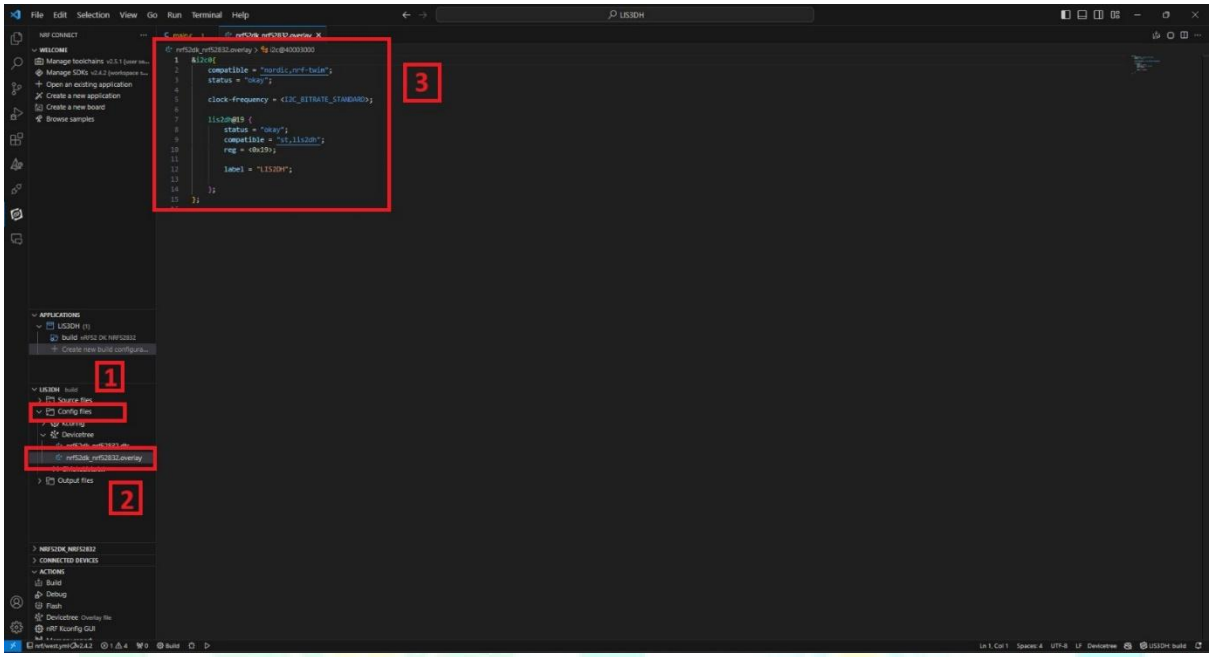
- Go to source file, click **source file [2]** > click on **Application** > click on **src** > click on **main.c [3]**.
- By clicking on **main.c** file and you will see the code on your screen **[4]**.



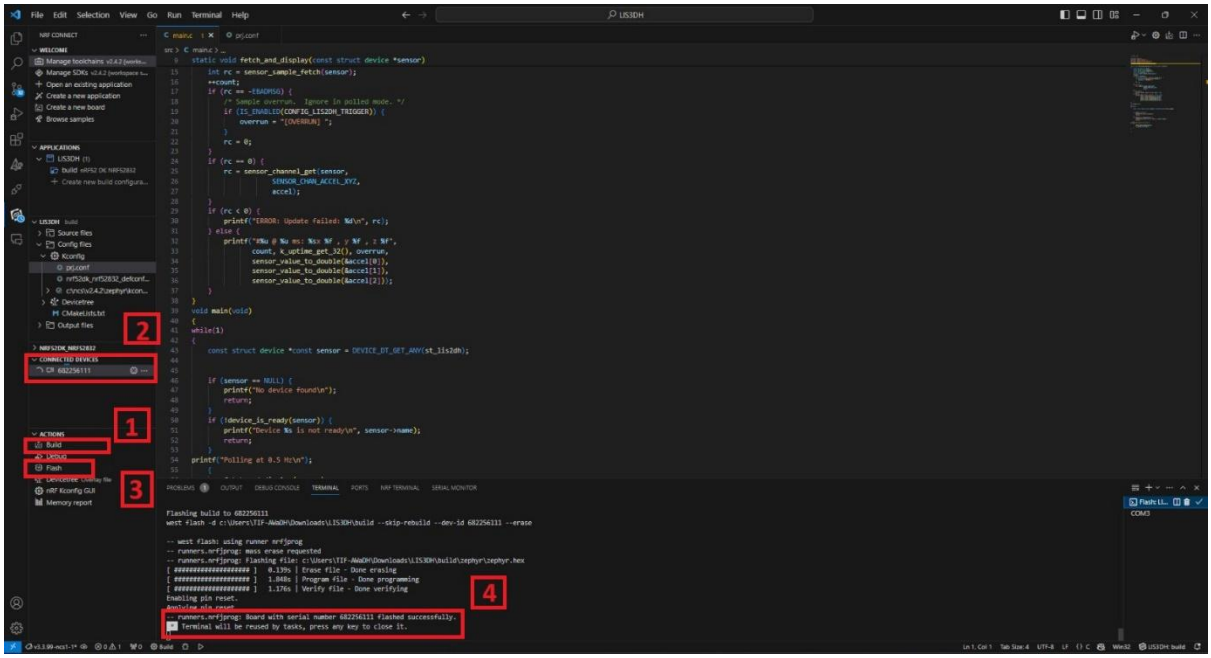
- To configure the prj configuration, click on **Config files [1]** > click on **Kconfig** > click on **prj.conf [2]**.
- The prj configuration will appear on your screen **[3]** as shown in the picture below.



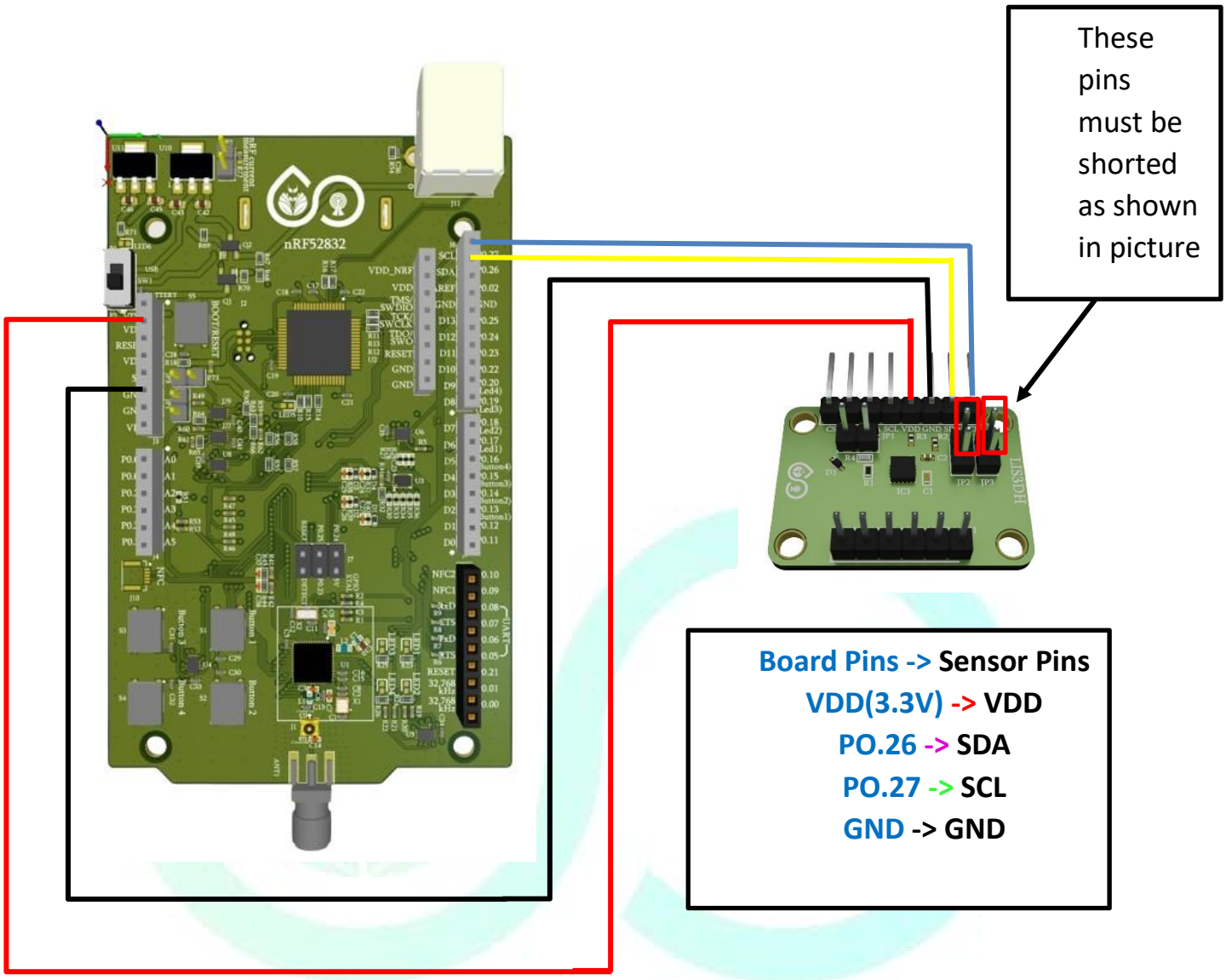
- To configure the i2c protocol, you have to enable it in the **.overlay file**.
- Click on the **Config files [1]** > click on **Kconfig** > click on **Devicetree [2]** > click on **nrf52dk_nrf52832.overlay [3]**.
- The overlay file will appear on your screen and add the given code to the .overlay file as shown in the picture given below **[4]**.



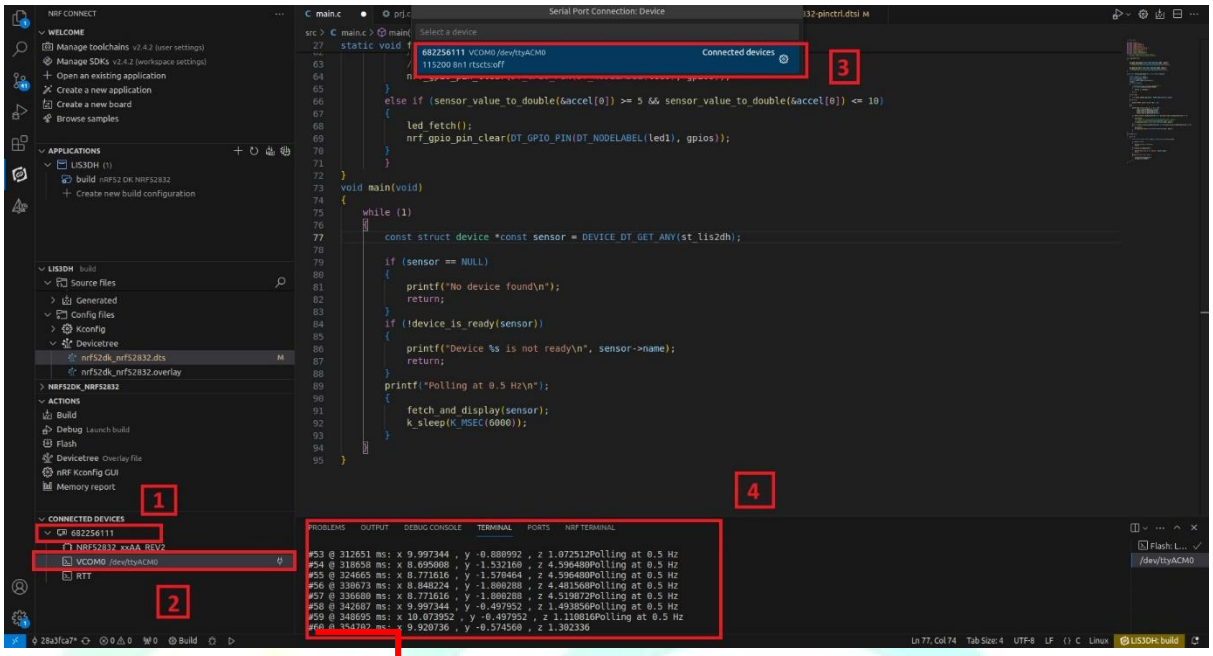
- Click on **Build [1]** configuration again and check the **CONNECTED DEVICES [2]**.
- If device id is visible, then **Flash [3]** the code in Dev Kit.
- If **flashed successfully [4]** message is displayed on serial terminal, then flash process is complete.



❖ PIN CONFIGURATION



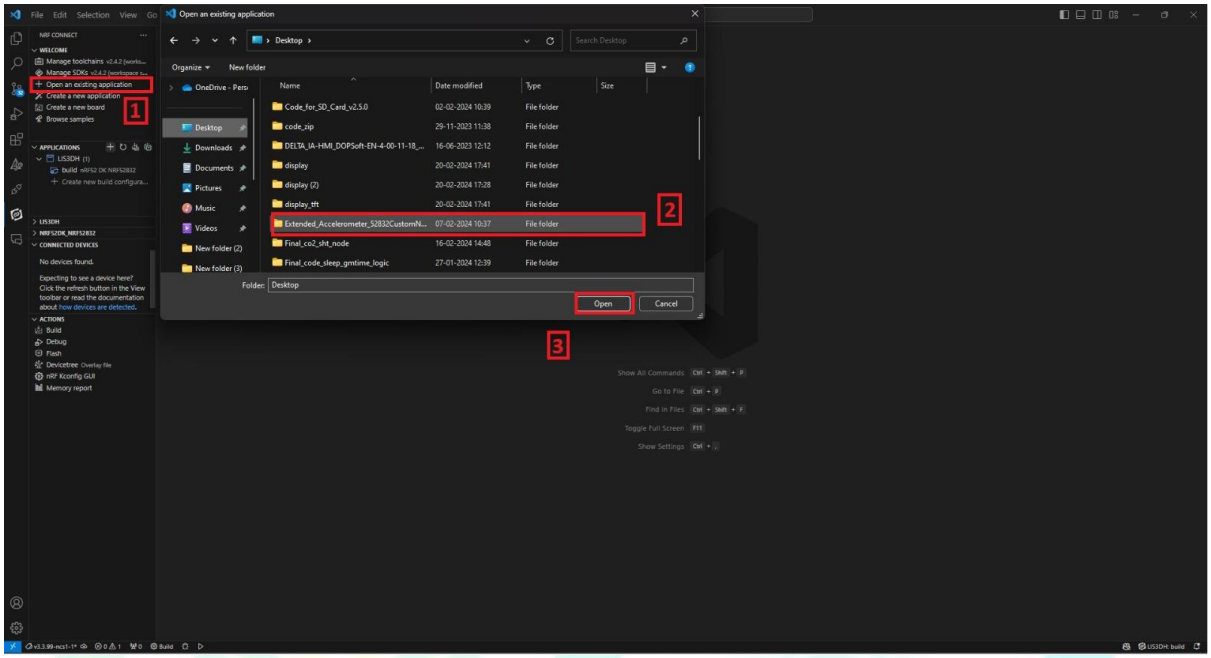
❖ OUTPUT


1
2
3
4
Connected devices
682256111 VCOM0 /dev/ttyACM0
115200 8n1 rtscts:off
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
NRF TERMINAL
#53 @ 312651 ms: x 9.997344 , y -0.880992 , z 1.072512Polling at 0.5 Hz
#54 @ 318658 ms: x 8.695008 , y -1.532160 , z 4.596480Polling at 0.5 Hz
#55 @ 324665 ms: x 8.771616 , y -1.570464 , z 4.596480Polling at 0.5 Hz
#56 @ 330673 ms: x 8.848224 , y -1.800288 , z 4.481568Polling at 0.5 Hz
#57 @ 336680 ms: x 8.771616 , y -1.800288 , z 4.519872Polling at 0.5 Hz
#58 @ 342687 ms: x 9.997344 , y -0.497952 , z 1.493856Polling at 0.5 Hz
#59 @ 348695 ms: x 10.073952 , y -0.497952 , z 1.110816Polling at 0.5 Hz
#60 @ 354702 ms: x 9.920736 , y -0.574560 , z 1.302336

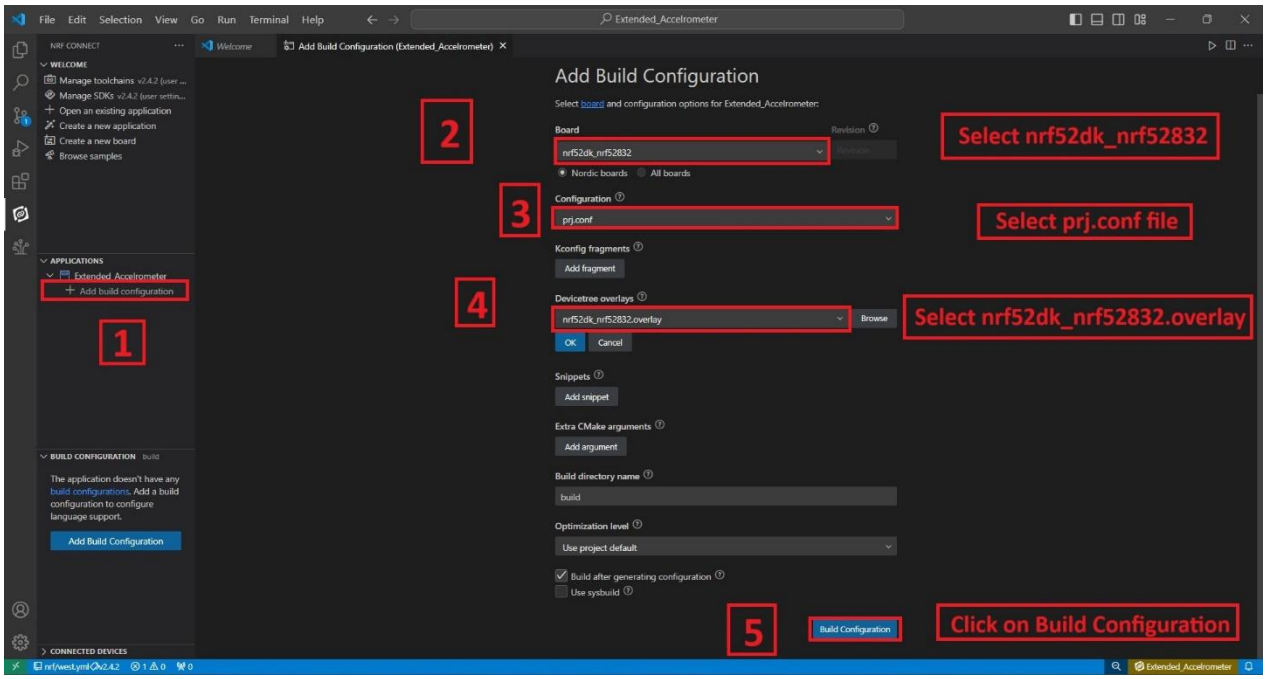

PROBLEMS 8
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
NRF TERMINAL
Polling at 0.5 Hz
#22 @ 4733 ms: x 6.856416 , y 4.864608 , z -5.094432Polling at 0.5 Hz
#23 @ 4941 ms: x 6.894720 , y 4.749696 , z -5.017824Polling at 0.5 Hz
#24 @ 5148 ms: x 6.933024 , y 4.864608 , z -5.056128Polling at 0.5 Hz
#25 @ 5355 ms: x 6.894720 , y 4.826304 , z -4.979520Polling at 0.5 Hz
#26 @ 5562 ms: x 6.933024 , y 4.826304 , z -5.132736Polling at 0.5 Hz
#27 @ 5770 ms: x 6.933024 , y 4.788000 , z -5.094432Polling at 0.5 Hz
#28 @ 5977 ms: x 6.894720 , y 4.864608 , z -4.979520Polling at 0.5 Hz
#29 @ 6184 ms: x 6.856416 , y 4.864608 , z -5.094432Polling at 0.5 Hz
#30 @ 6391 ms: x 6.856416 , y 4.864608 , z -5.132736Polling at 0.5 Hz

WITH THE HELP OF NODE

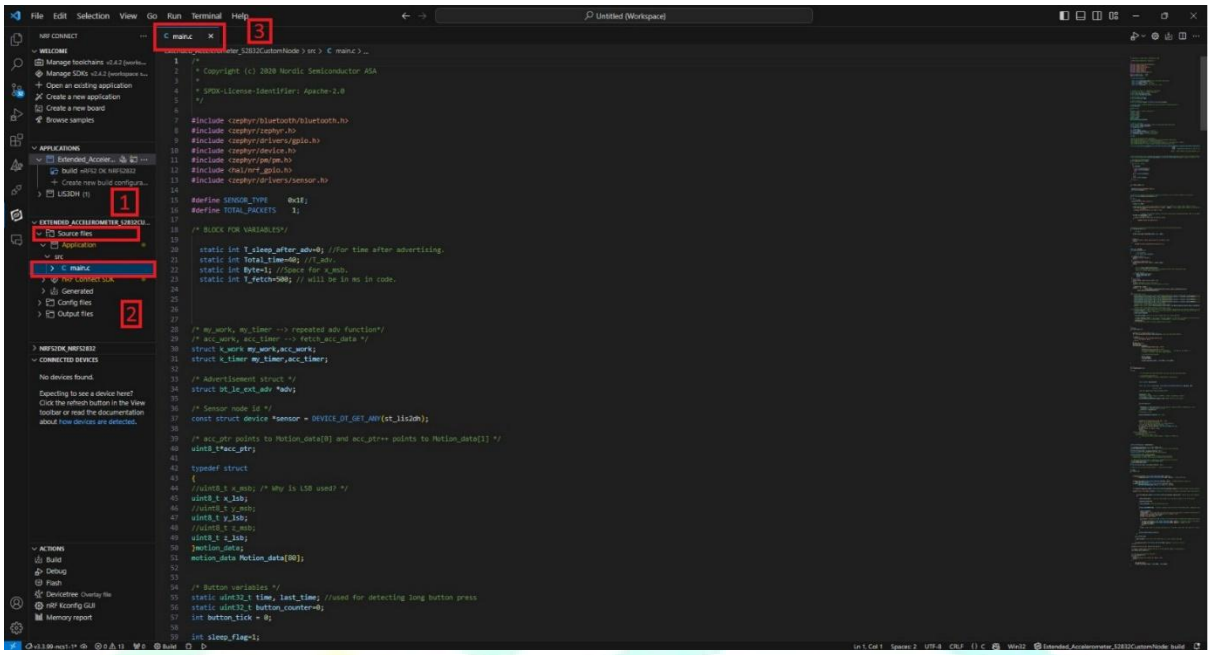
- Open VS Code and click on **Open Existing Application [1]** > click on **Extended_Accelrometer.. [2]** > **Open [3]** as shown in the picture below.



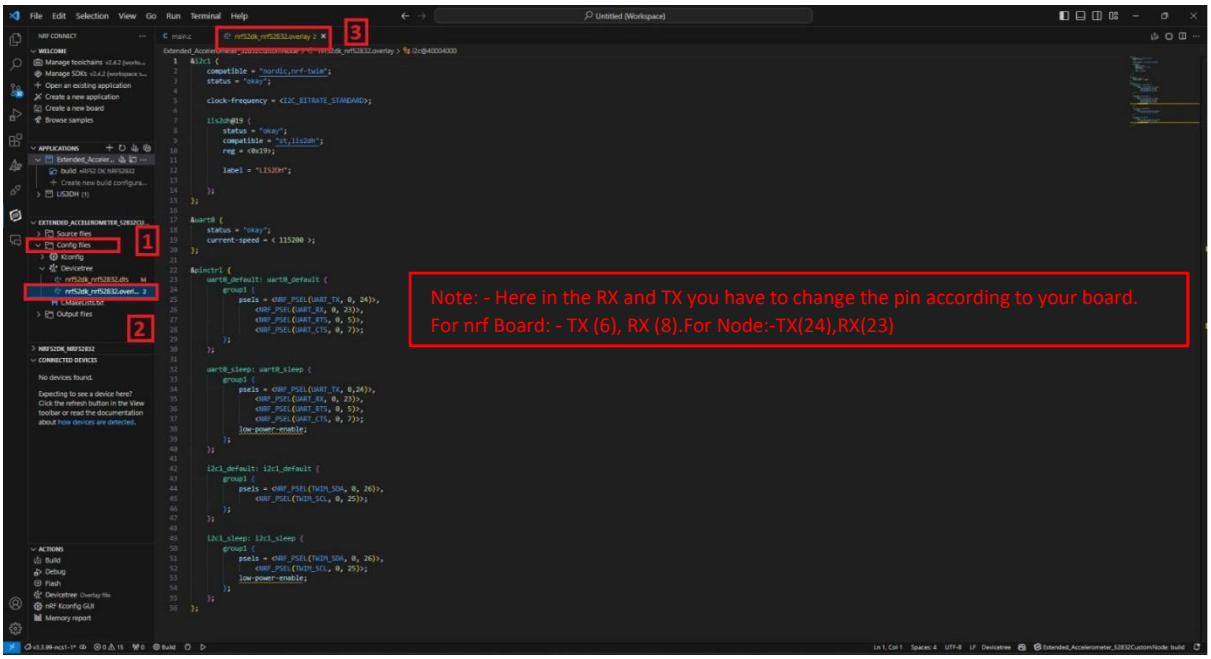
- Click on **Create new build configuration [1]**. Here you can change the board version, if you are using nRF52832, then select **nrf52dk_nrf52832 [2]** or you can change from dropdown menu for another version like nRF52833 etc.
- Click on the Configuration and select **prj.conf [3]** from dropdown menu and then click on the devicetree overlay & select **nrf52dk_nrf52832.overlay [4]**.
- Then click on the **Build Configuration [5]** as shown below in the picture.



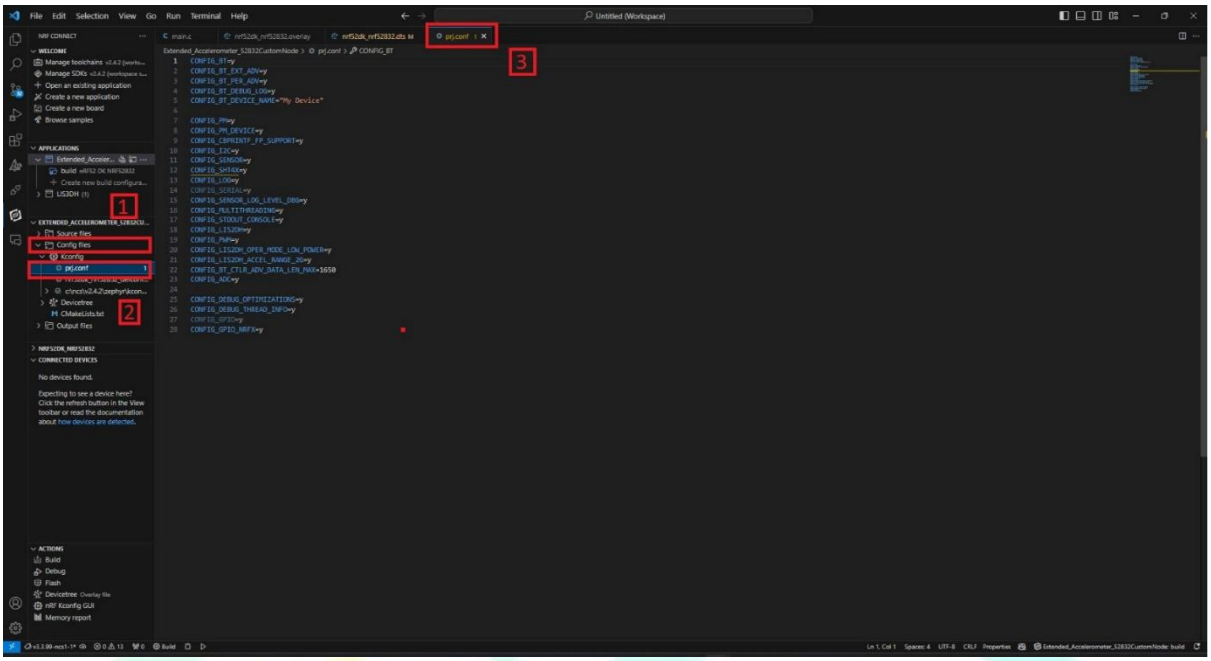
- Go to source file, click **Source file [1]** > click on **Application** > click on **src** > click on **main.c [2]**.
- By clicking on **main.c** file and you will see the code on your screen **[3]**.



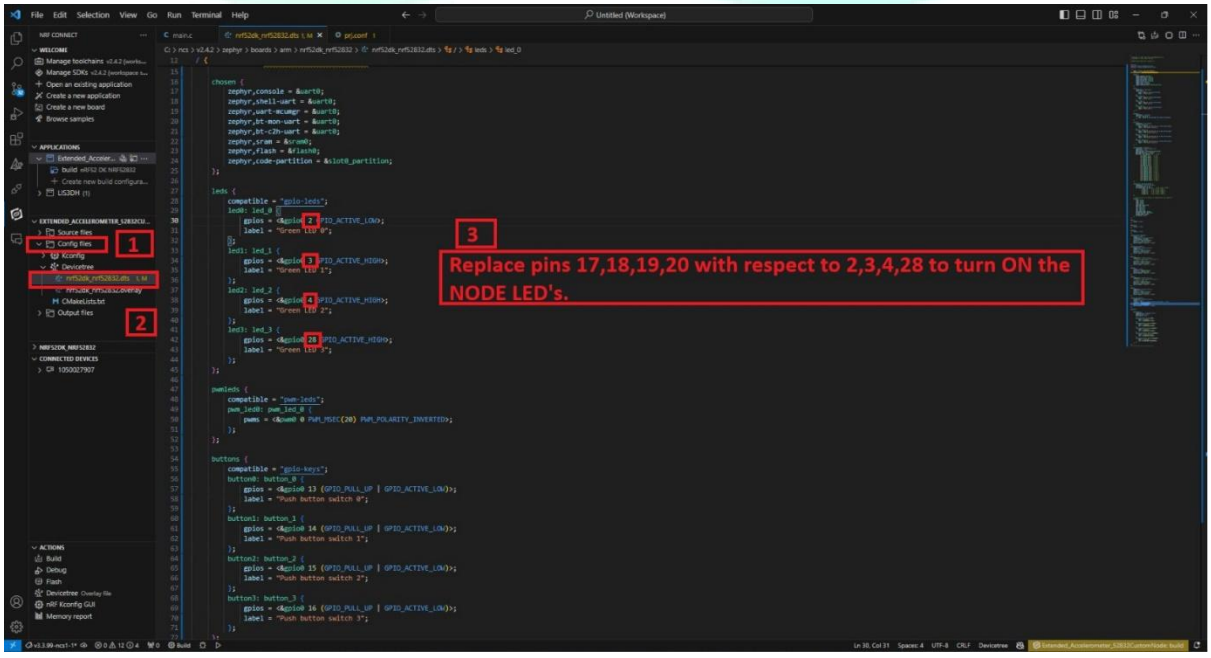
- To configure the i2c & UART protocols, you have to enable it in the **overlay file**.
- Click on the **Config files[1]** > click on **Kconfig** > click on **Devicetree** > click on **nrf52dk_nrf52832.overlay [2]**.
- The overlay file will appear on your screen and add the given code to the **overlay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



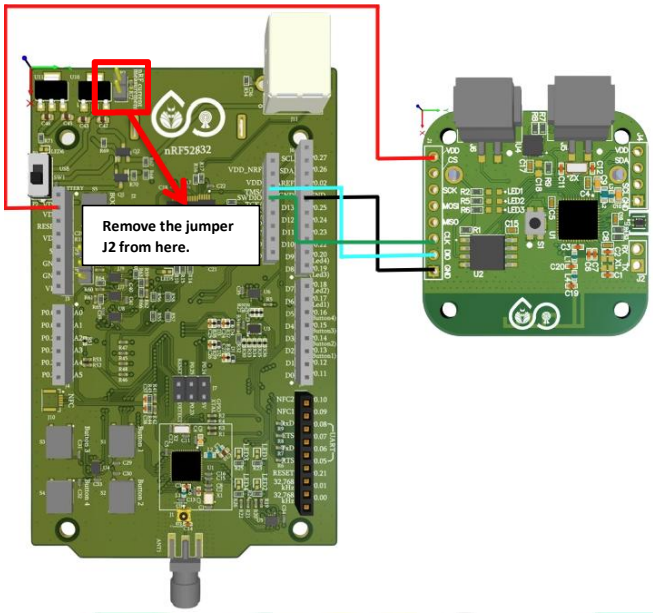
- You need to enable sensor in prj file for communication as shown below.
- Click on **Config files [1]** > then click on **Kconfig files** > click on **prj.conf** [2]



- 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]**.



- 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

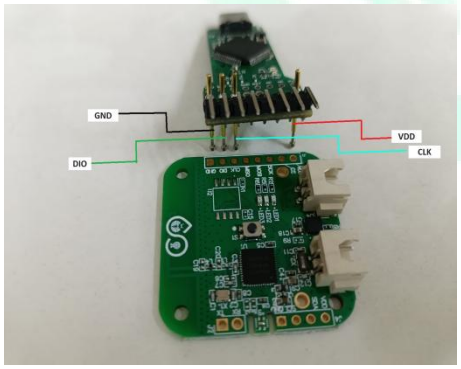
VDD(3.3V) -> VDD

GND -> GND

CLK -> CLK

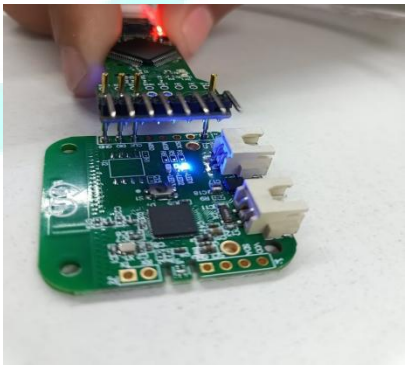
DIO -> DIO

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



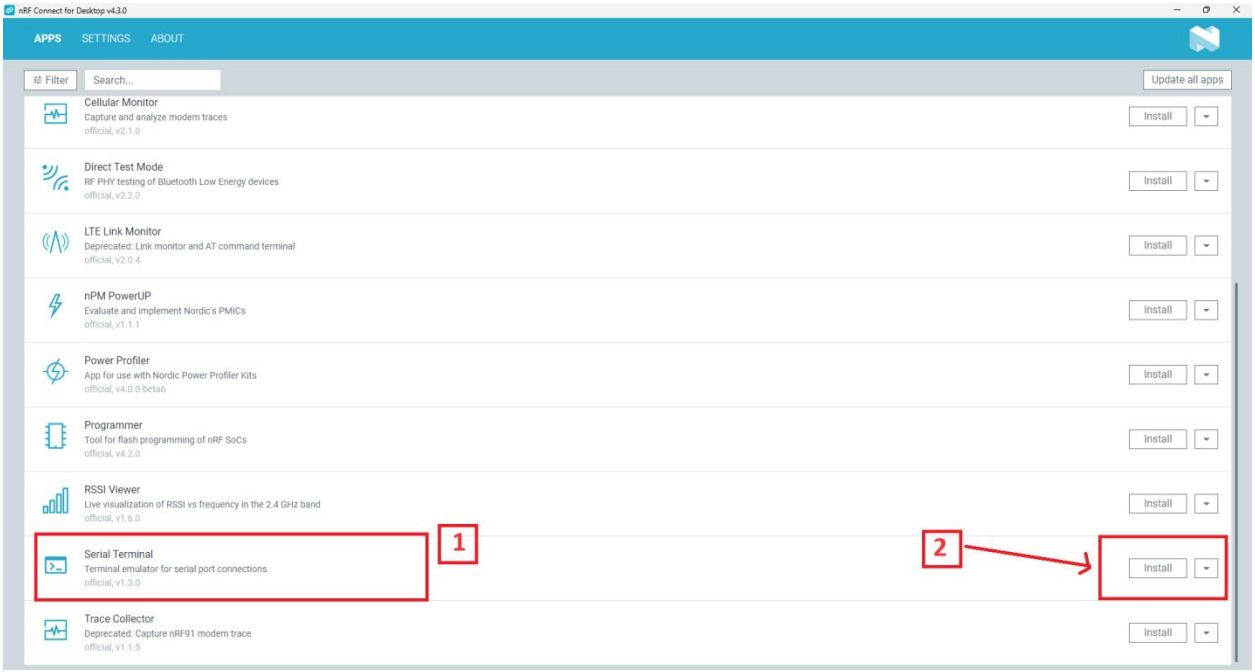
- NODE without connection.

- NODE with connection.

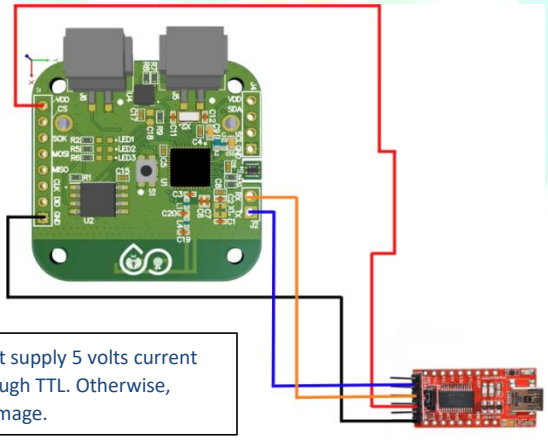


- NODE after program.

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



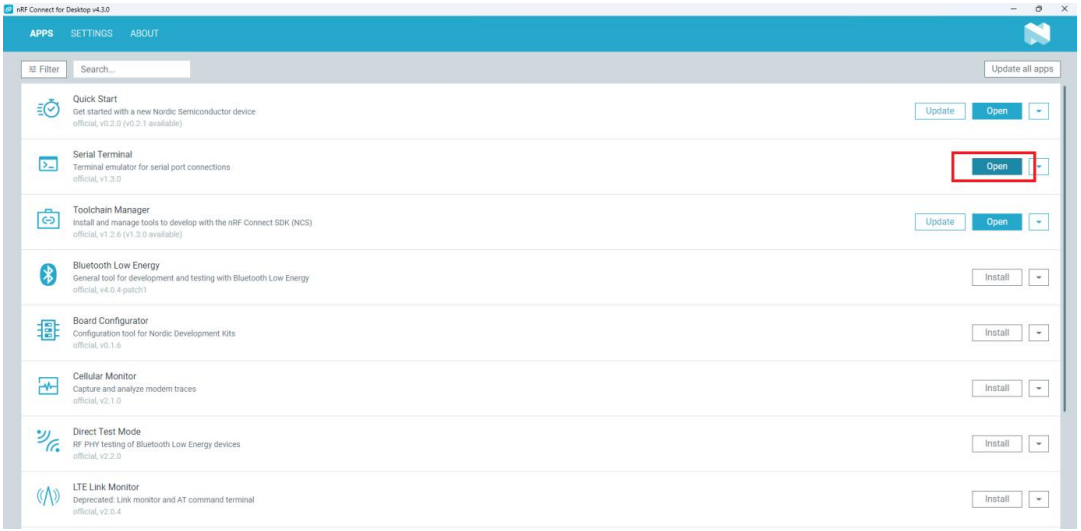
- Connect the **TTL Device** for UART communication so that the data must appear on the serial terminal.
- Connect the **TTL Device** as shown below in the picture.



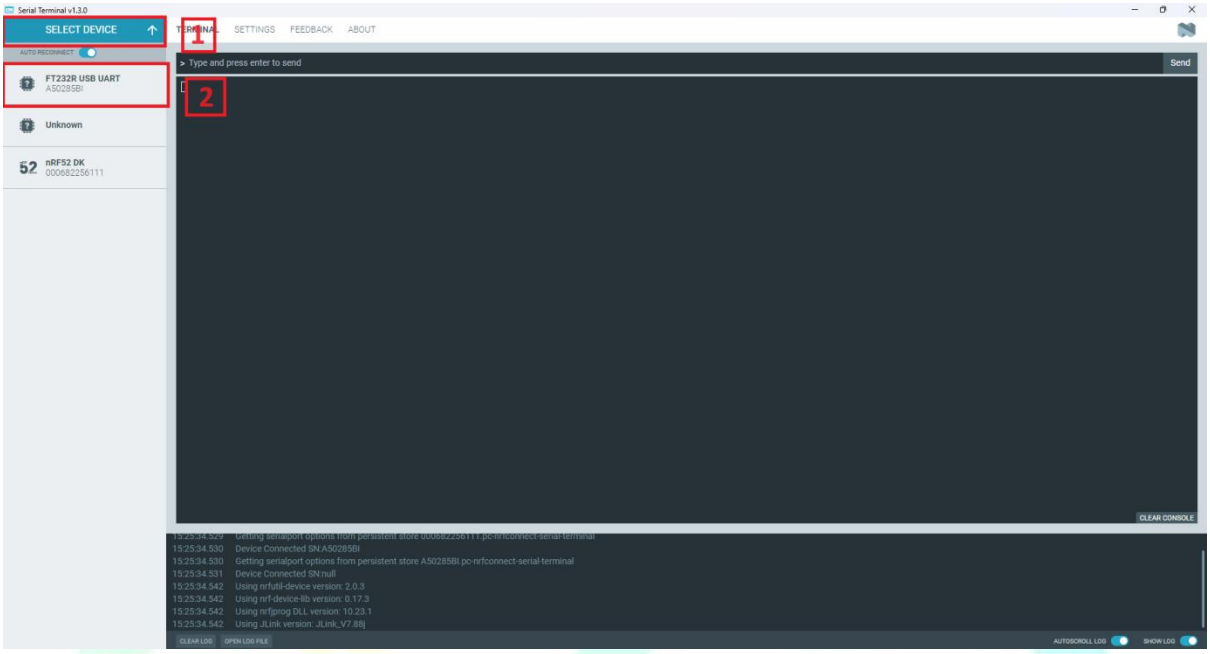
Note: - Do not supply 5 volts current to board through TTL. Otherwise, board will damage.

Node Pins -> TTL Pins
Tx -> Rx
Rx -> Tx
VDD(3.3V) -> VDD
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