



AWaDH

Agriculture and Water
Technology Development Hub

EXPERIMENT – 2

INTERFACING SHT40 SENSOR WITH DEV BOARD/NODE

What will you learn from this module:

Measure Temperature and Humidity using SHT40 sensor and Development Board/Node.

Requirements:

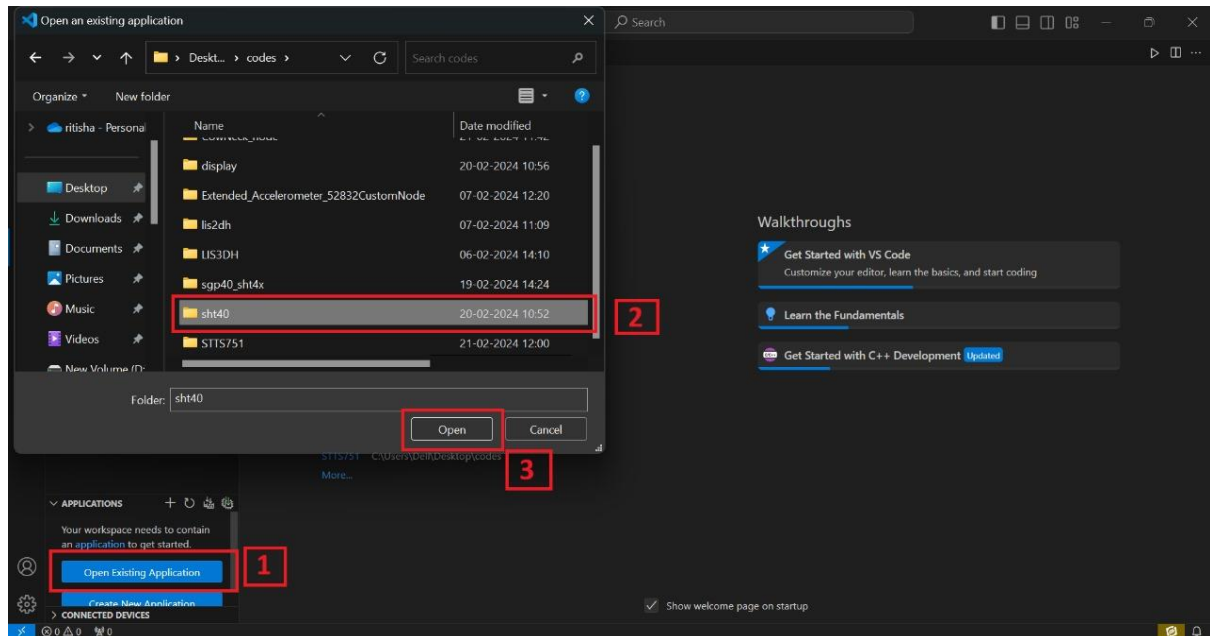
- nRF connect desktop software.
- nRF Command line tools.
- Visual studio code.
- USB cable.
- nRF52832 Development Board/Node.
- SHT40 Sensor.

Prerequisites:

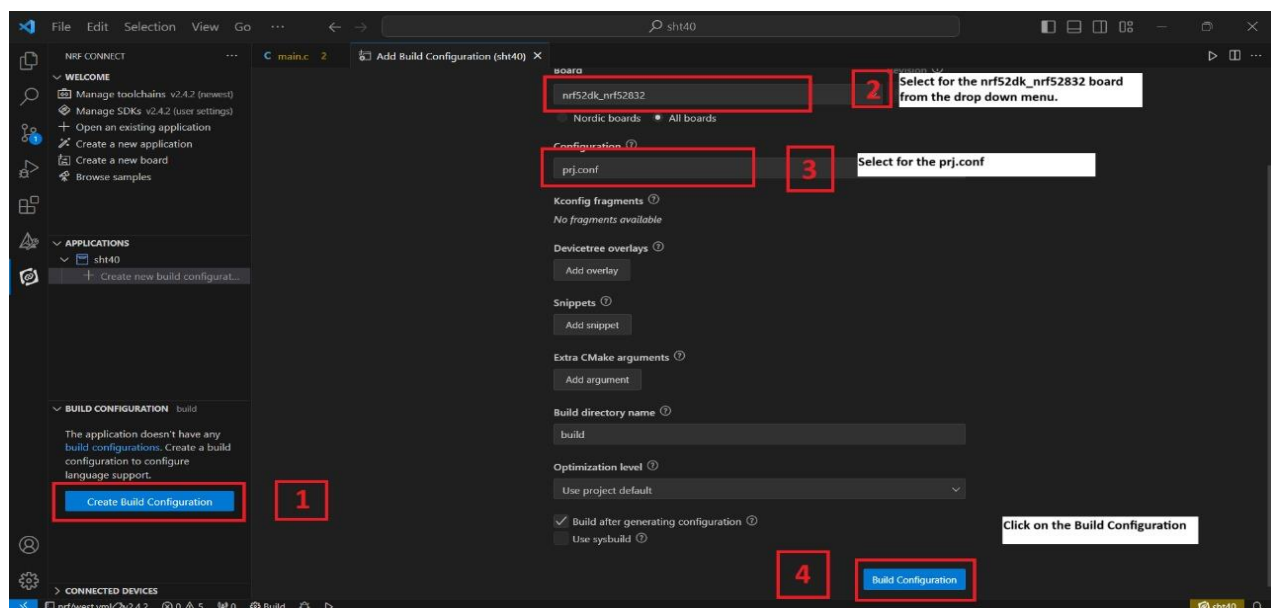
- Basic knowledge of C/C++
- Basic knowledge of communication protocol.
- Basic project setup.

Setup and Configuration:

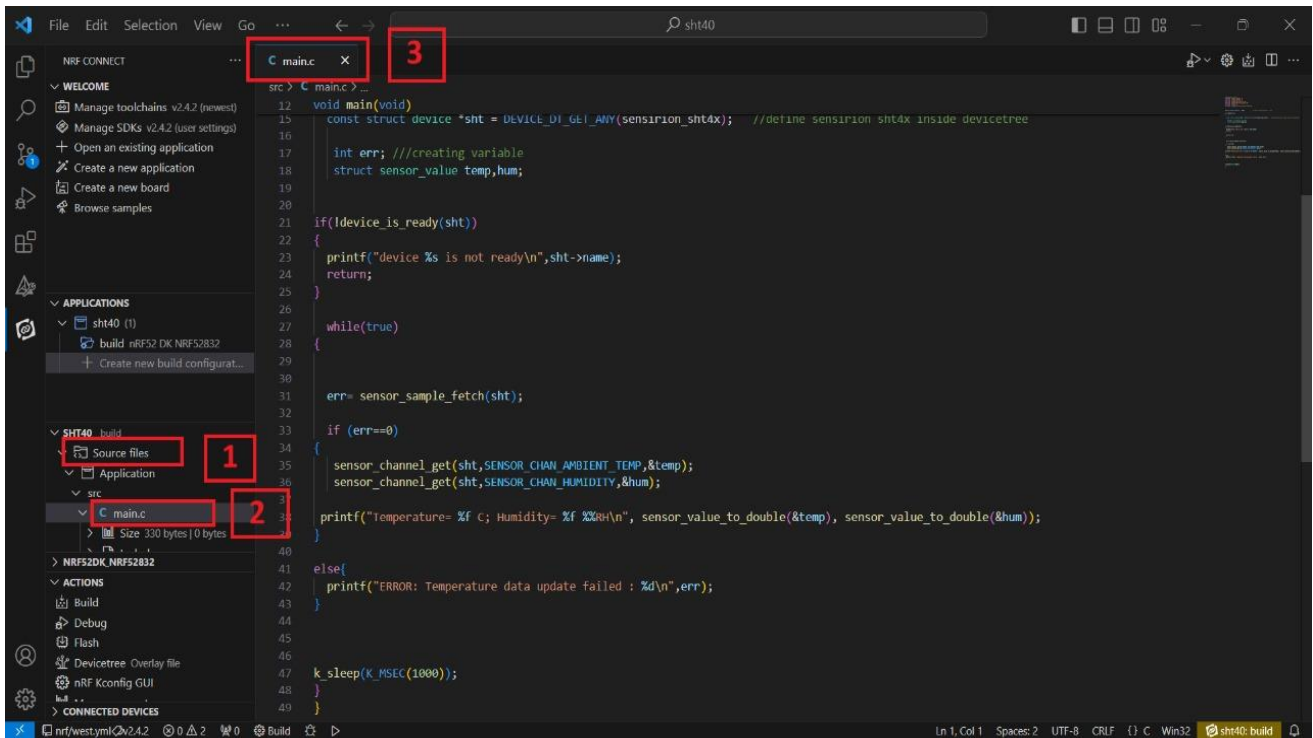
- Open VS Code and click on **Open Existing Application [1]** > click on **sht40 [2]** > **Open [3]** as shown in the picture below.



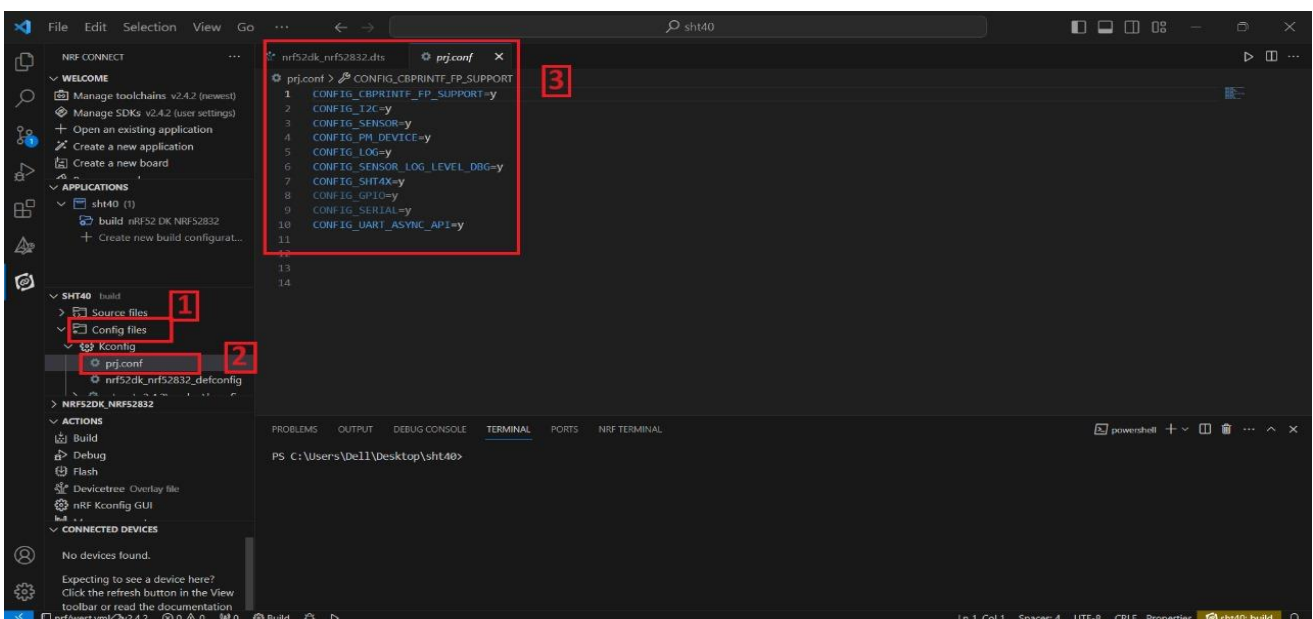
- Click on **Create new build configuration [1]**. Here you can change the board version, if you are using nRF52832, then select **nrf52dk_nrf52832 [2]** or you can change from dropdown menu for another version like nRF52833 etc.
- Click on the Configuration and select **prj.conf [3]** from dropdown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



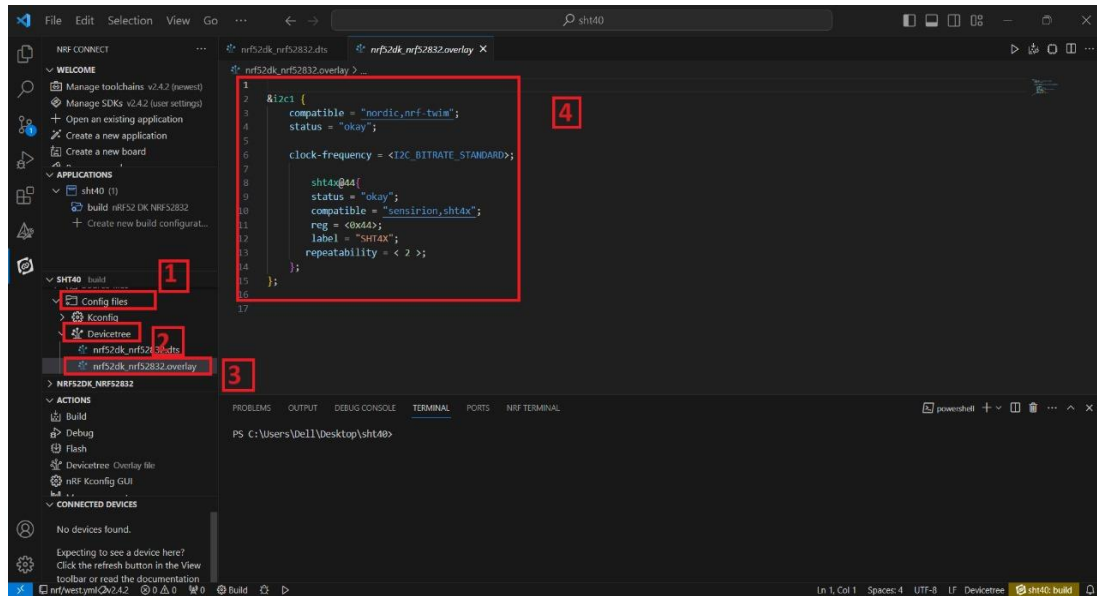
- Go to source file, click **source file [1]** > click on **Application** > click on **src** > click on **main.c [2]**.
- By clicking on **main.c** file and you will see the code on your screen [3].



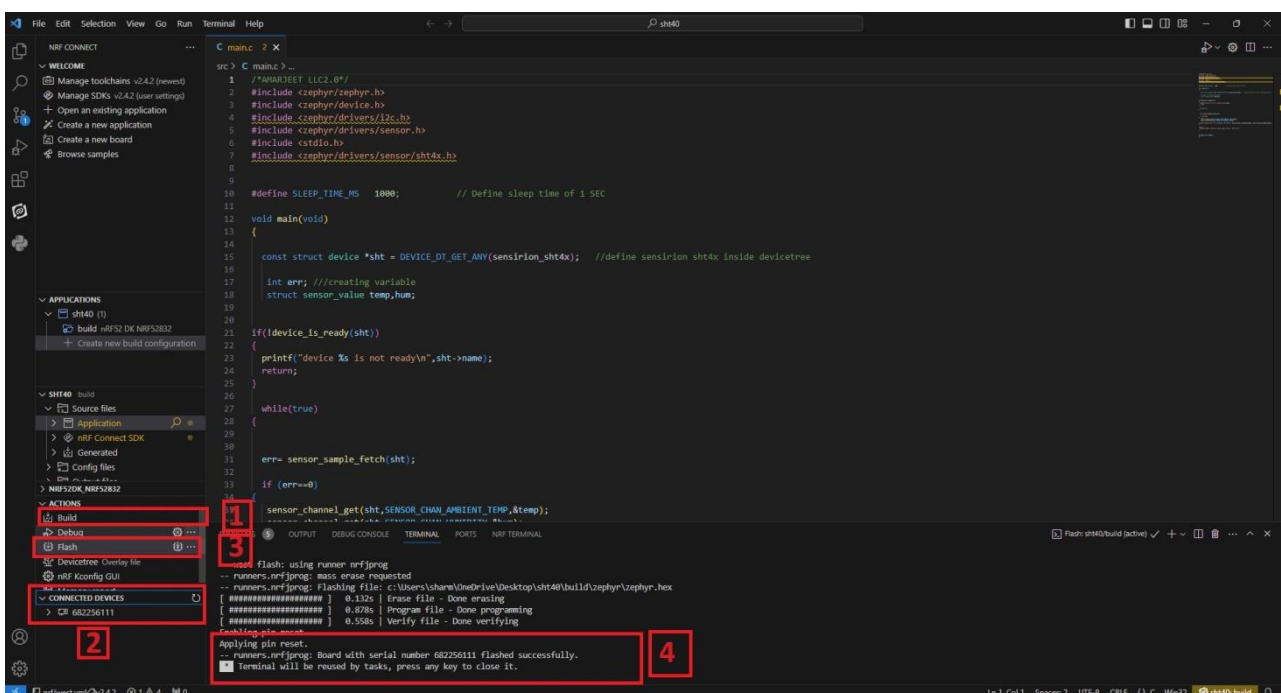
- To configure the prj configuration, click on **Config files [1]** > click on **Kconfig** > click on **prj.conf [2]**.
- The prj configuration will appear on your screen [3] as shown in the picture below.



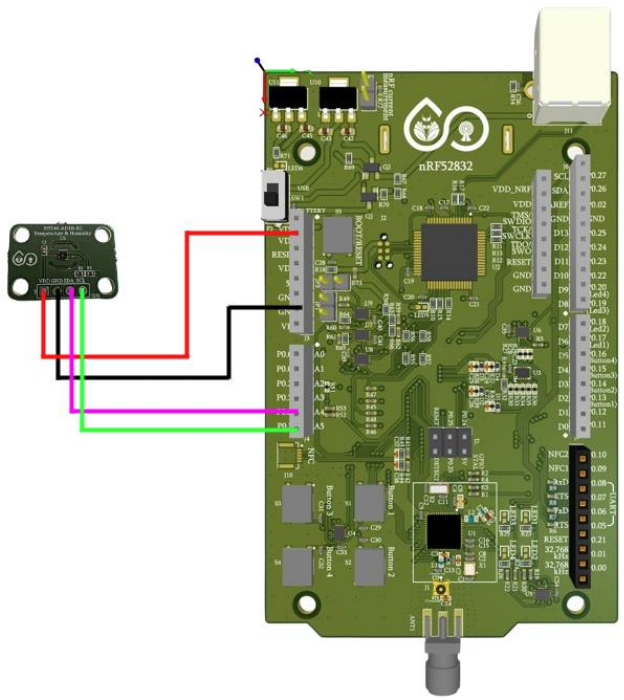
- To configure the i2c protocol, you have to enable it in the **.overlay file**.
- Click on the **Config files [1]** > click on **Kconfig** > click on **Devicetree [2]** > click on **nrf52dk_nrf52832.overlay [3]**.
- The .overlay file will appear on your screen and add the given code to the .overlay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

VDD(3.3V) -> VDD

PO.30 -> SDA

PO.31 -> SCL

GND -> GND

❖ OUTPUT

```

4 #include <zephyr/drivers/
5 #include <zephyr/drivers/
6 #include <stdio.h>
7 #include <zephyr/drivers/
8
9
10 #define SLEEP_TIME_MS 1
11
12 void main(void)
13 {
14
15     const struct device *sht;
16     int err; //creating s
17     struct sensor_value te
18
19     if(!device_is_ready(sht))
20     {
21         printf("device %s is no
22         return;
23     }
24
25     while(true)
26     {
27         err= sensor_sample_fetch
28
29         if (err==0)
30         {
31             sensor_channel_get(sht,SENSOR_CHAN_AMBIENT_TEMP,&temp);
32             sensor_channel_get(sht,SENSOR_CHAN_HUMIDITY,&hum);
33         }
34
35
36
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41
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52
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100

```

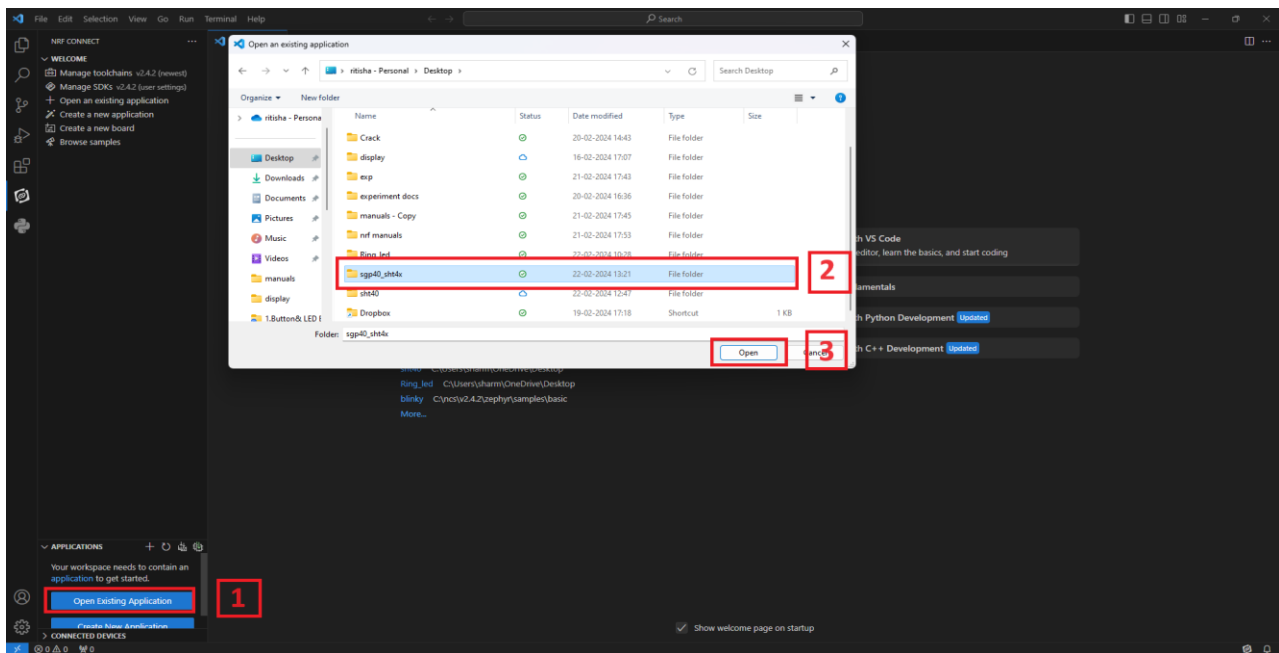
```

Temperature= 25.085450 C; Humidity= 57.300140 %RH
Temperature= 25.058747 C; Humidity= 57.368804 %RH
Temperature= 25.000000 C; Humidity= 57.460357 %RH
Temperature= 24.970626 C; Humidity= 57.506134 %RH
Temperature= 24.933241 C; Humidity= 57.586242 %RH
Temperature= 24.887846 C; Humidity= 57.647277 %RH
Temperature= 24.890516 C; Humidity= 57.755996 %RH
Temperature= 24.847791 C; Humidity= 57.847549 %RH
Temperature= 24.810406 C; Humidity= 57.931472 %RH
Temperature= 24.797055 C; Humidity= 58.028762 %RH
Temperature= 24.773022 C; Humidity= 58.177536 %RH
Temperature= 24.722285 C; Humidity= 58.272903 %RH
Temperature= 24.708934 C; Humidity= 58.387344 %RH

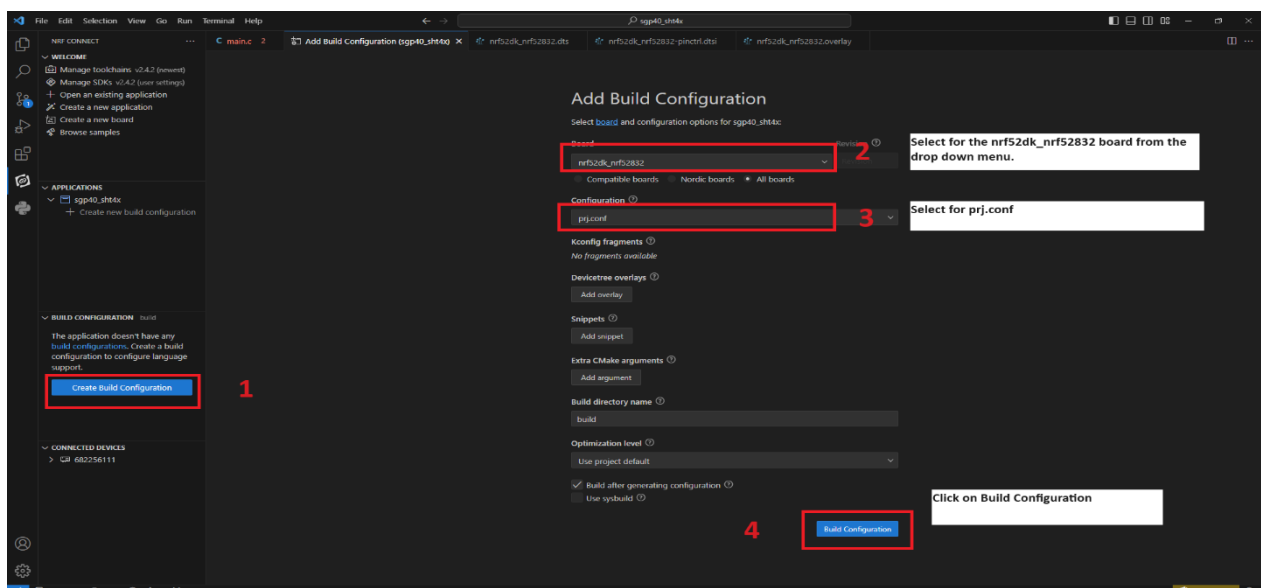
```

WITH THE HELP OF NODE

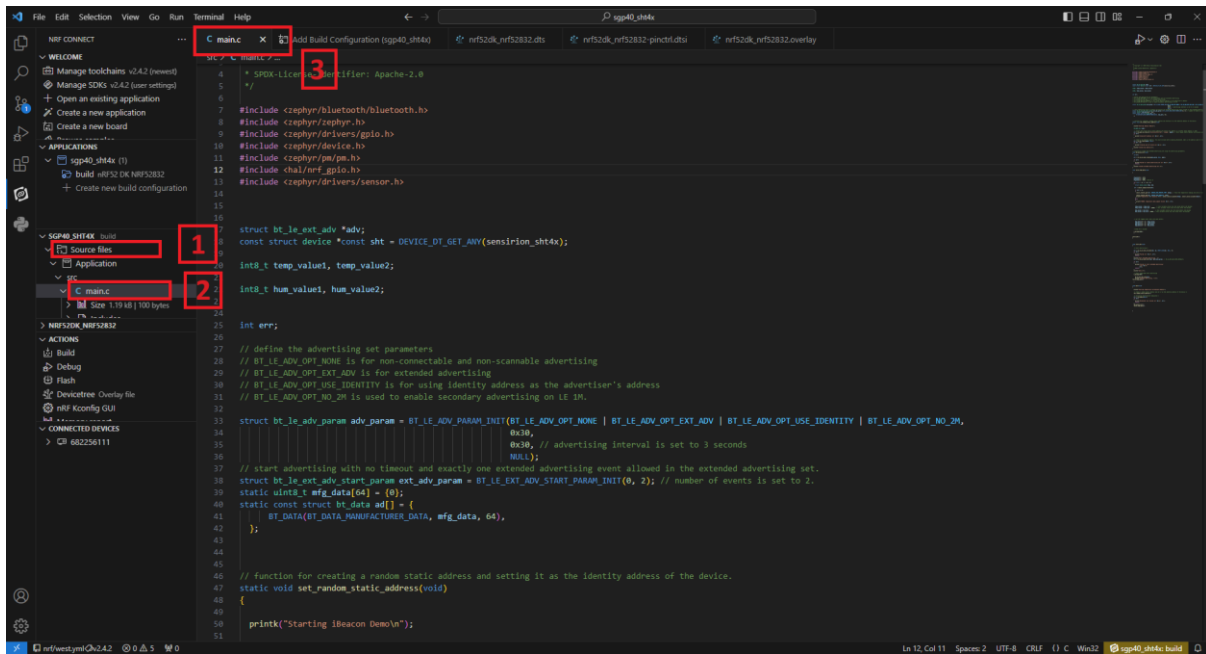
- Open VS Code and click on **Open Existing Application** [1] > click on **sgp40_sht4x** [2] > **Open** [3] as shown in the picture below.



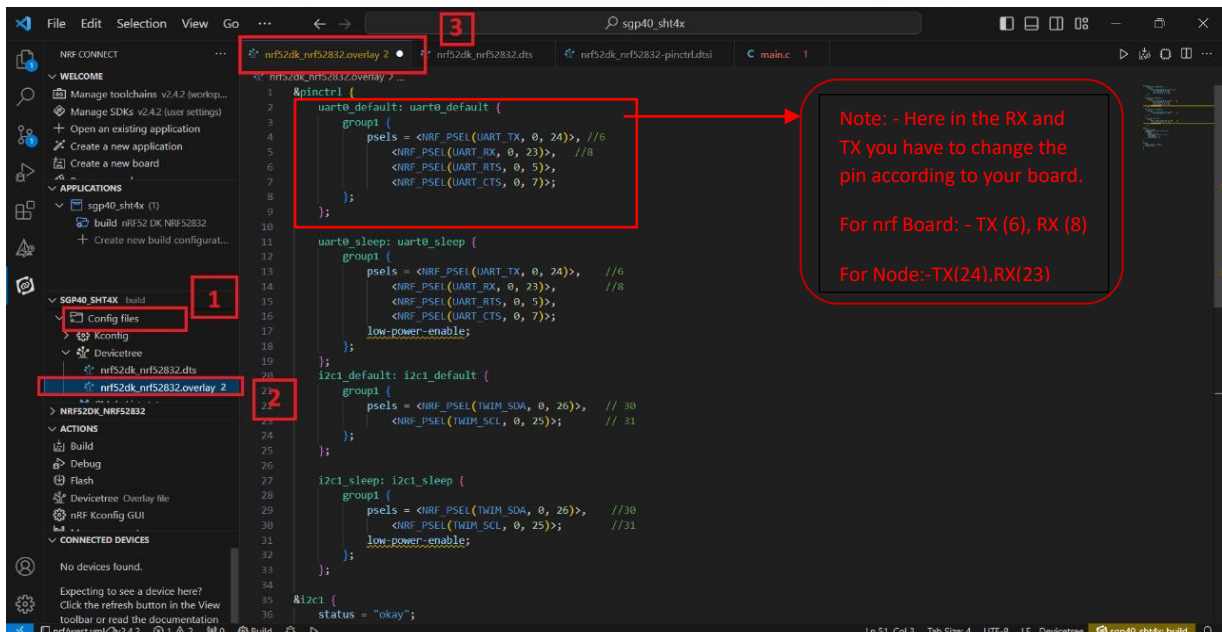
- Click on **Create new build configuration** [1]. Here you can change the board version, if you are using nRF52832, then select **nrf52dk_nrf52832** [2] or you can change from dropdown menu for another version like nRF52833 etc.
- Click on the Configuration and select **prj.conf** [3] from dropdown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



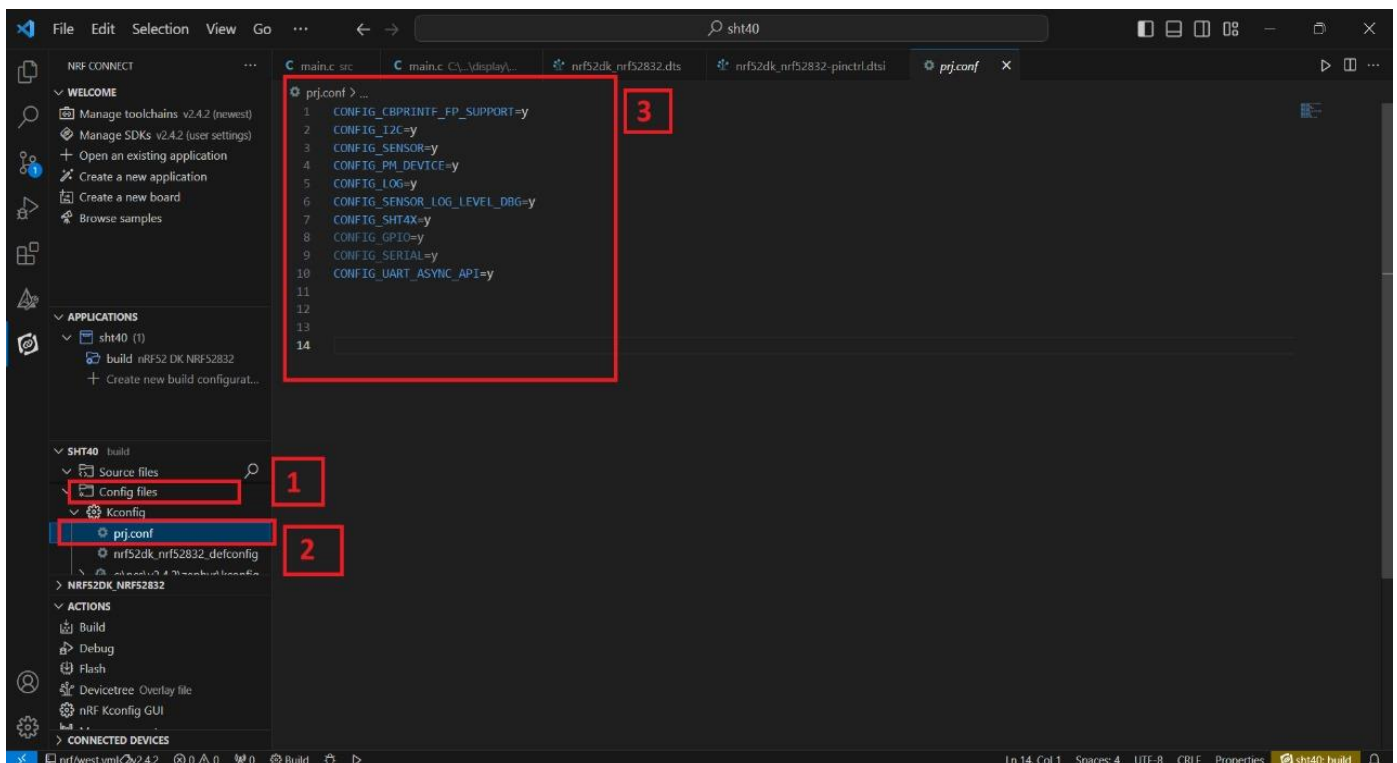
- Go to source file, click **source file [1]** > click on **Application** > click on **src** > click on **main.c [2]**.
- By clicking on **main.c** file and you will see the code on your screen [3].



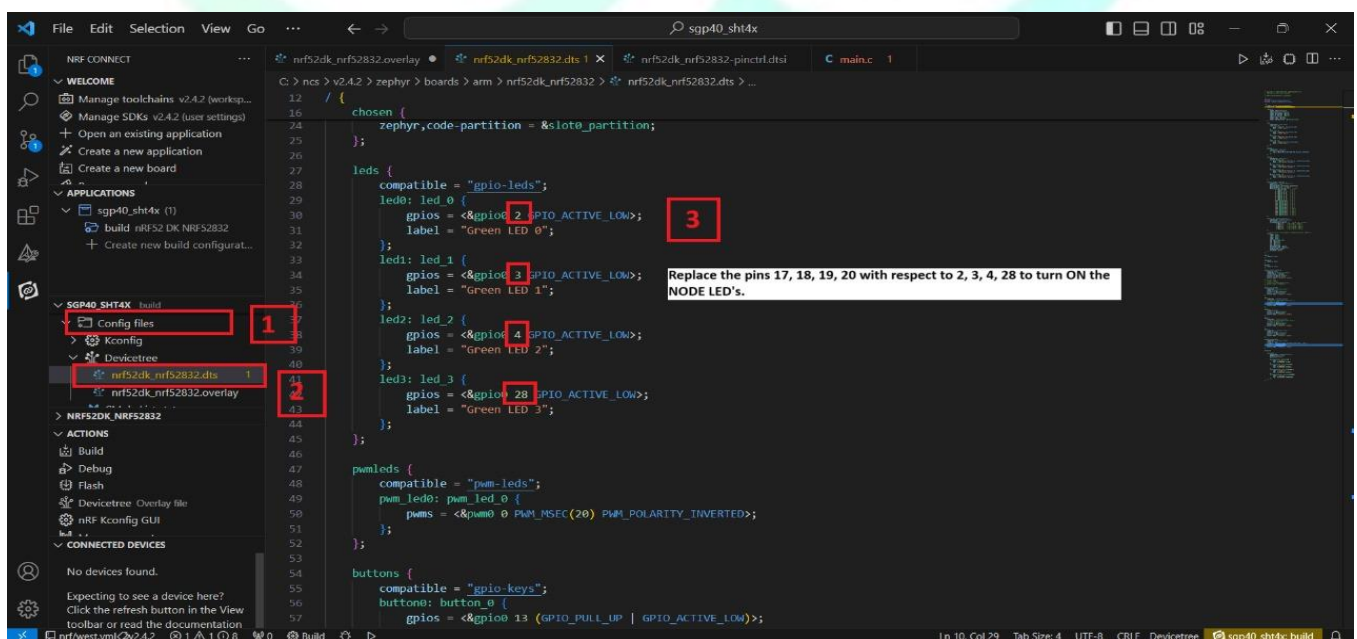
- To configure the i2c & UART protocols, you have to enable it in the **overlay file**.
- Click on the **Config files[1]** > click on **Kconfig** > click on **Devicetree** > click on **nrf52dk_nrf52832.overlay [2]**.
- The overlay file will appear on your screen and add the given code to the **overlay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



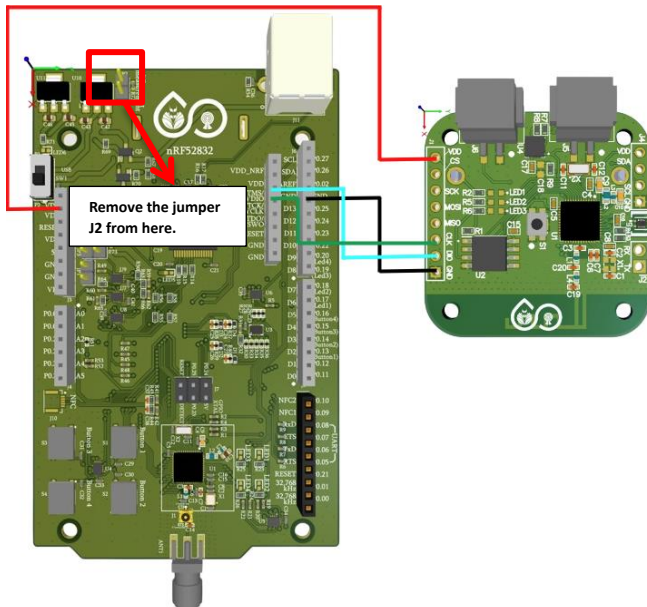
- You need to enable sensor in prj file for communication as shown below.
- Click on **Config files [1]** > then click on **Kconfig files** > click on **prj.conf [2]**



- You need to enable sensor in prj 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

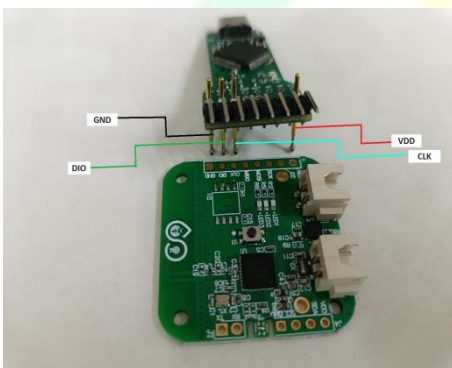
VDD(3.3V) -> VDD

GND -> GND

CLK -> CLK

DIO -> DIO

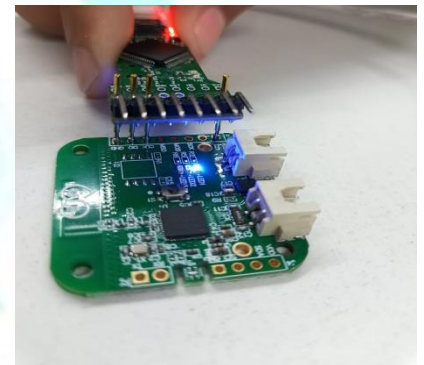
- There is another way of flashing the code with the help of Node Programmer as shown in the picture below.



- NODE without connection.

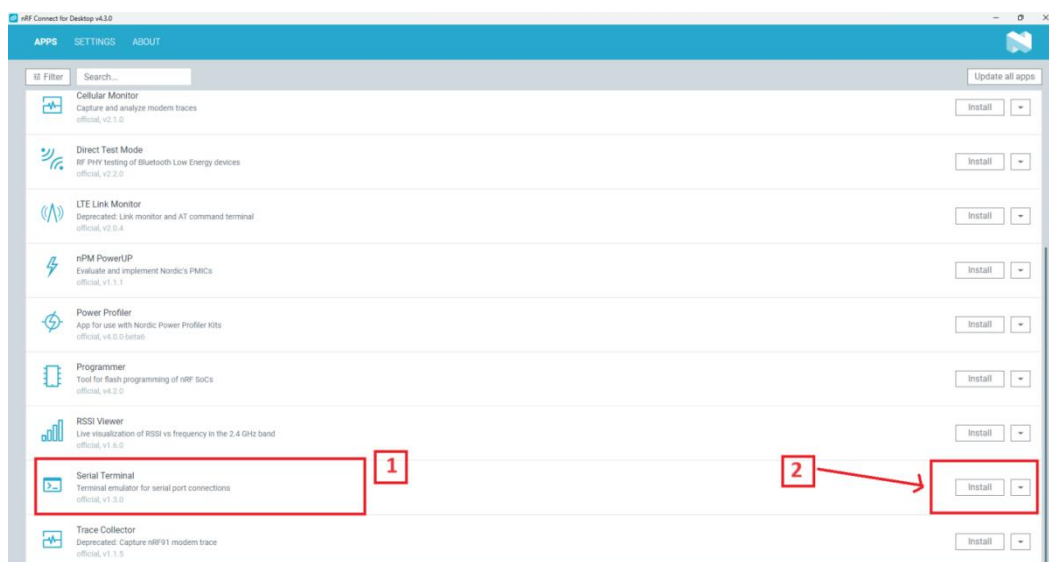


- NODE with connection.

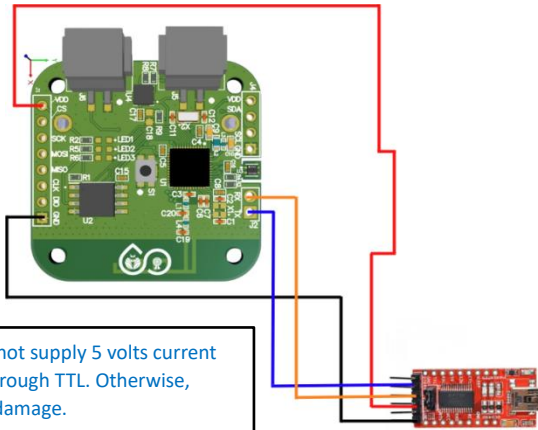


- NODE after program.

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



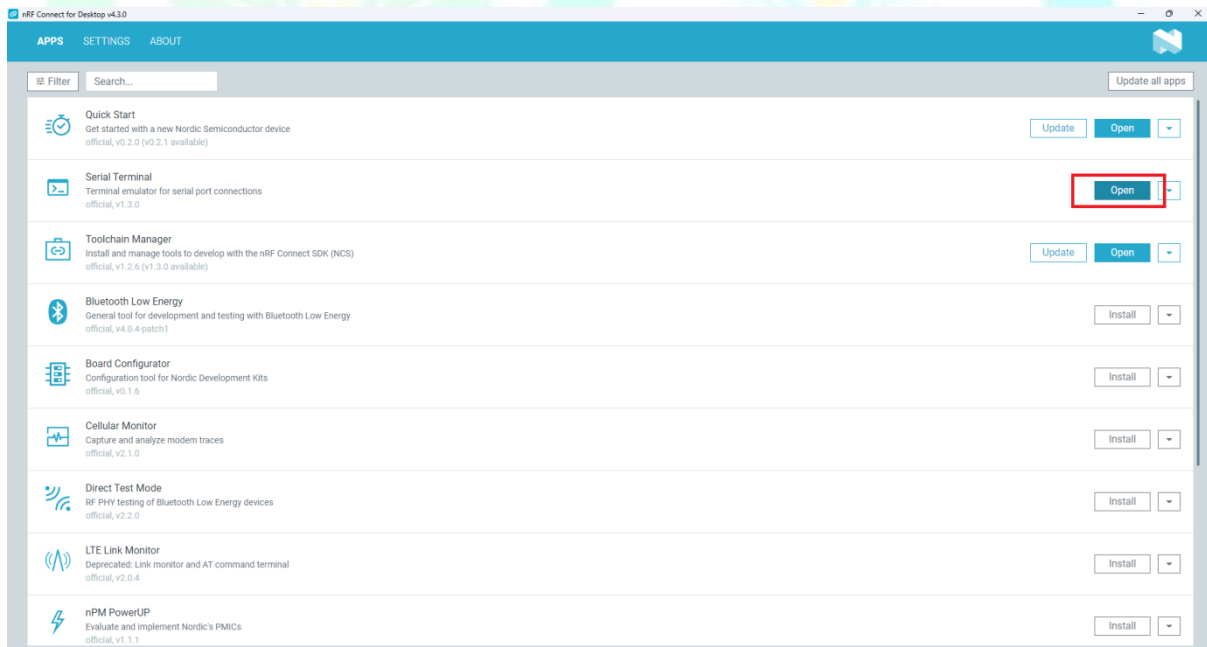
- Connect the **TTL Device** for UART communication so that the data must appear on the serial terminal.
- Connect the **TTL Device** as shown below in the picture.



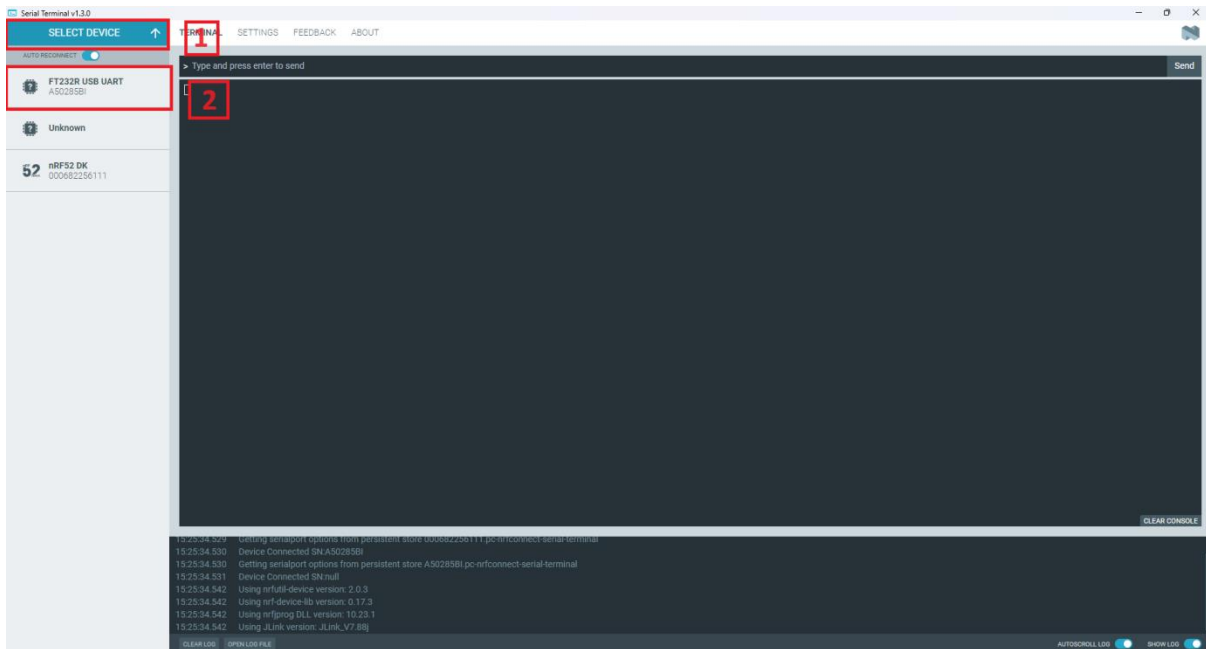
Note: - Do not supply 5 volts current to board through TTL. Otherwise, board will damage.

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

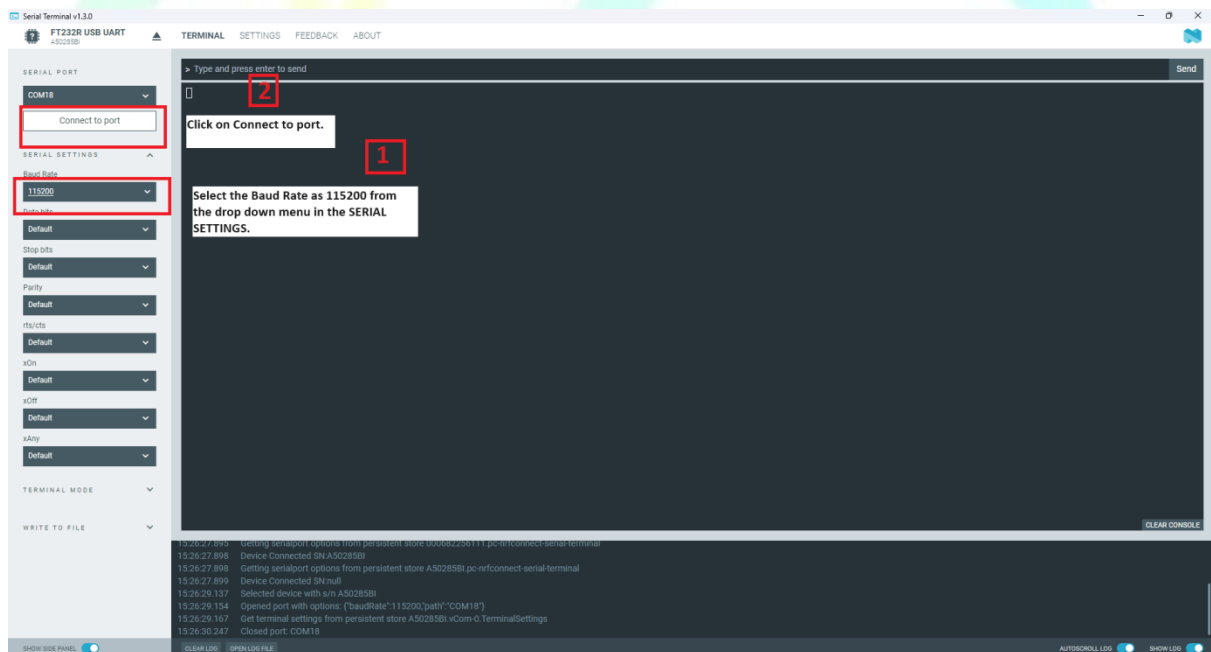
- Click on **Open** as shown below in the picture.



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

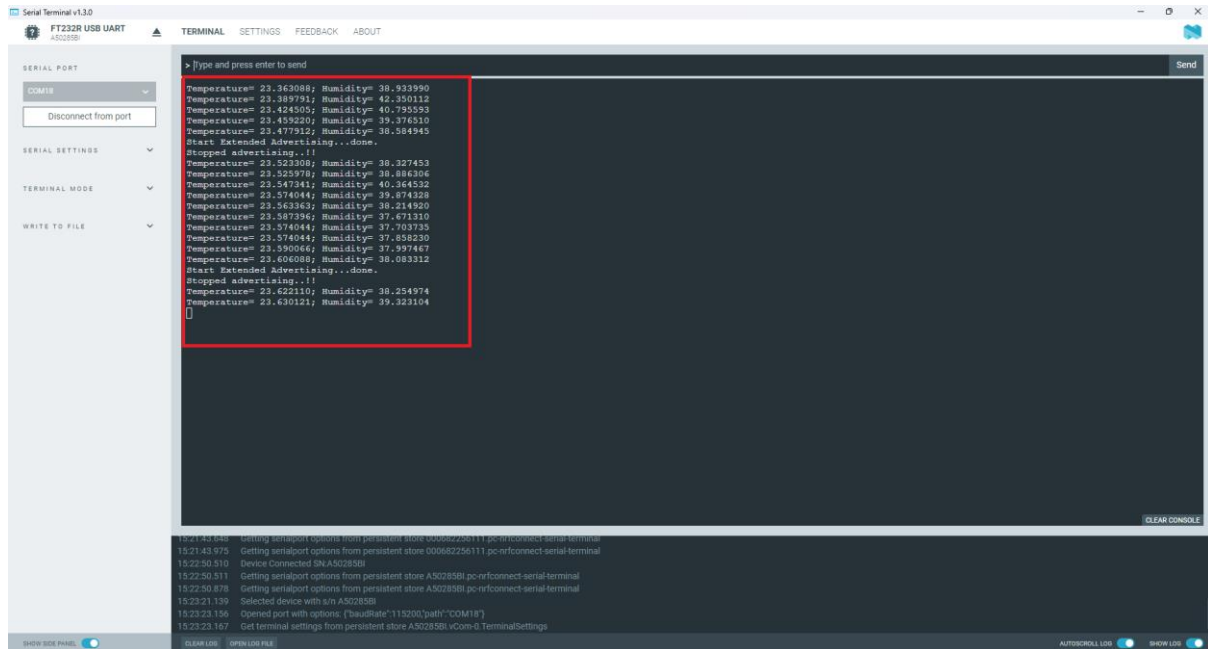


- Click on **SERIAL SETTINGS** > click on **Baud Rate** [1] > click on **Connect to port** [2] as shown below in the picture.



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

❖ OUTPUT



The screenshot displays the Serial Terminal v1.3.0 interface. The left sidebar contains a 'SERIAL PORT' section with a dropdown menu set to 'COM18' and a 'Disconnect from port' button. Below this are sections for 'SERIAL SETTINGS', 'TERMINAL MODE', and 'WRITE TO FILE'. The main terminal window shows a prompt '> Type and press enter to send' at the top. Below the prompt, a red rectangular box highlights a block of sensor data output. This data consists of multiple lines of 'Temperature= [value]; Humidity= [value]' pairs, followed by 'Start Extended Advertising...done' and 'Stopped advertising...!!' messages. The data is repeated twice. At the bottom of the terminal window, a 'CLEAR CONSOLE' button is visible. Below the terminal window, a log area shows a series of timestamps and messages related to the serial port connection and device selection. At the very bottom of the application window, there are three buttons: 'SHOW SIDE PANEL', 'AUTOREWIND LOG', and 'SHOW LOG'.

```
> Type and press enter to send

Temperature= 23.363088; Humidity= 38.933990
Temperature= 23.389791; Humidity= 42.350112
Temperature= 23.454505; Humidity= 40.750553
Temperature= 23.459220; Humidity= 39.376510
Temperature= 23.477912; Humidity= 38.584945
Start Extended Advertising...done
Stopped advertising...!!
Temperature= 23.523309; Humidity= 38.327453
Temperature= 23.535979; Humidity= 39.886306
Temperature= 23.547341; Humidity= 40.364532
Temperature= 23.574044; Humidity= 39.874328
Temperature= 23.563363; Humidity= 38.214920
Temperature= 23.587396; Humidity= 37.671310
Temperature= 23.574044; Humidity= 37.703735
Temperature= 23.574044; Humidity= 37.438230
Temperature= 23.590066; Humidity= 37.597467
Temperature= 23.406088; Humidity= 38.083312
Start Extended Advertising...done
Stopped advertising...!!
Temperature= 23.622110; Humidity= 38.254974
Temperature= 23.430121; Humidity= 39.323104

```

15:41:43.040 Getting serialport options from persistent store 0006c2de111 pc-rfconnect-serial-terminal
15:21:43.975 Getting serialport options from persistent store 0006c2256111 pc-rfconnect-serial-terminal
15:22:50.810 Device Connected: 0XA50285B1
15:22:50.811 Getting serialport options from persistent store A50285B1 pc-rfconnect-serial-terminal
15:22:50.878 Getting serialport options from persistent store A50285B1 pc-rfconnect-serial-terminal
15:23:21.139 Selected device with s/n A50285B1
15:23:23.136 Opened port with options: {"baudRate": 115200, "parity": "COM18"}
15:23:23.167 Get terminal settings from persistent store A50285B1 vConn-0 TerminalSettings

CLEAR LOG SHOW LOG