JAI HOO SATNARYAN.

SIX WEEKS INTERNSHIP AT IIT JAMMU

INTERNSHIP REPORT

4th WEEK

Day 22:

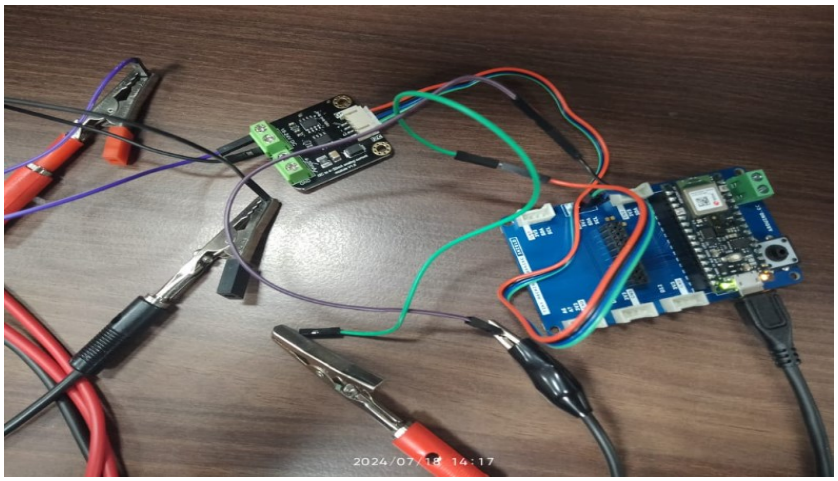
Objective:

To gain a comprehensive understanding of the I2C (Inter-Integrated Circuit) protocol, its operation, applications, and practical integration with the Arduino TinyML kit, as part of the TinyML application project for the edge.

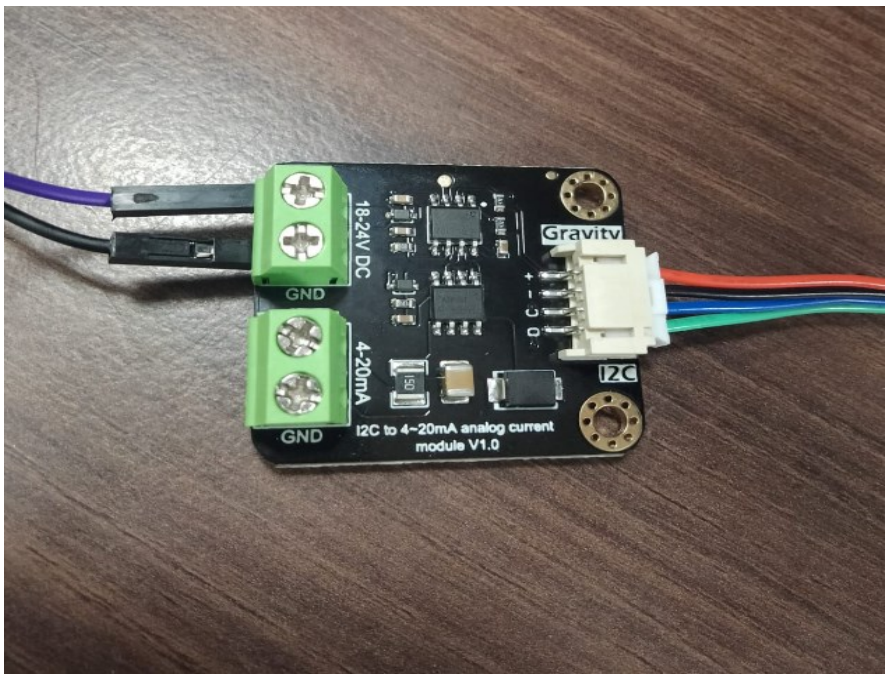
Activities and Progress:

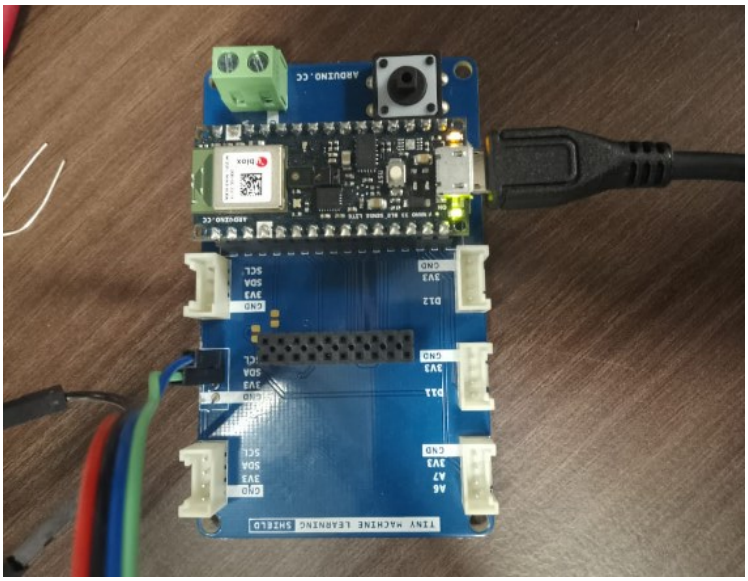
1. **Introduction to I2C Protocol:**
    - The I2C protocol is a crucial communication protocol used for connecting low-speed devices like microcontrollers, sensors, and DAC modules. It facilitates efficient communication using two bidirectional lines: Serial Data Line (SDA) and Serial Clock Line (SCL).
    - **Key Characteristics:**
        - Supports multiple masters and slaves on a single bus.
        - Uses 7-bit or 10-bit addressing to uniquely identify devices.
        - Operates in master-slave mode where the master initiates communication.
2. **In-Depth Study of I2C Operations:**
    - **Start and Stop Conditions:**

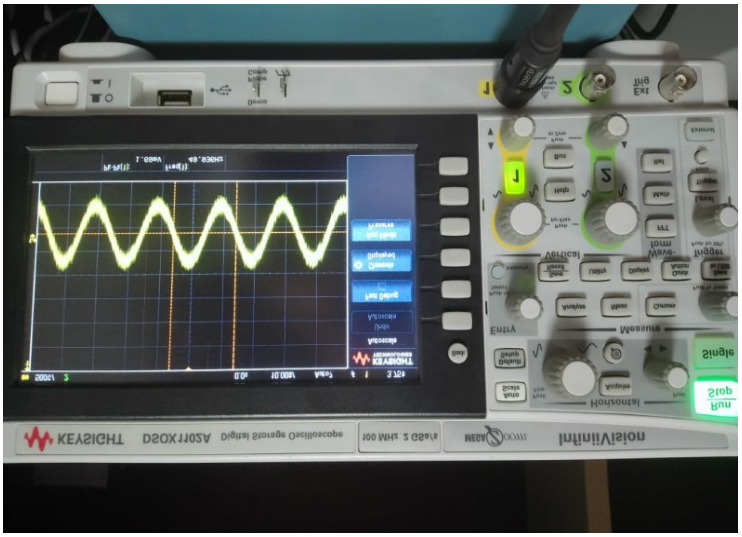
        - A start condition is indicated by a high-to-low transition on the SDA line while SCL is high. It signals the beginning of communication.
        - A stop condition is indicated by a low-to-high transition on the SDA line while SCL is high. It signals the end of communication.
    - **Addressing Mechanism:**
        - Devices on the I2C bus are identified by unique addresses. In 7-bit addressing, the address consists of 7 bits followed by a read/write bit.
        - The master sends the address of the target slave device after the start condition.
    - **Data Transfer Process:**
        - Data transfer occurs in bytes. Each byte is followed by an acknowledgment (ACK) bit from the receiver.
        - The master generates the clock pulses, while the data is transferred on the rising edge of the clock signal.
    - **Clock Stretching:**
        - Slaves can hold the clock line low to force the master into a wait state until the slave is ready to proceed. This ensures proper synchronization.
3. **Practical Implementation with Arduino TinyML Kit:**
    - **Setup and Configuration:**
        - Utilized the Arduino Nano 33 BLE Sense for I2C communication. Connected the SDA and SCL pins to corresponding pins on the sensor module.
        - Configured the I2C address of the sensor and initialized the communication in the Arduino IDE.

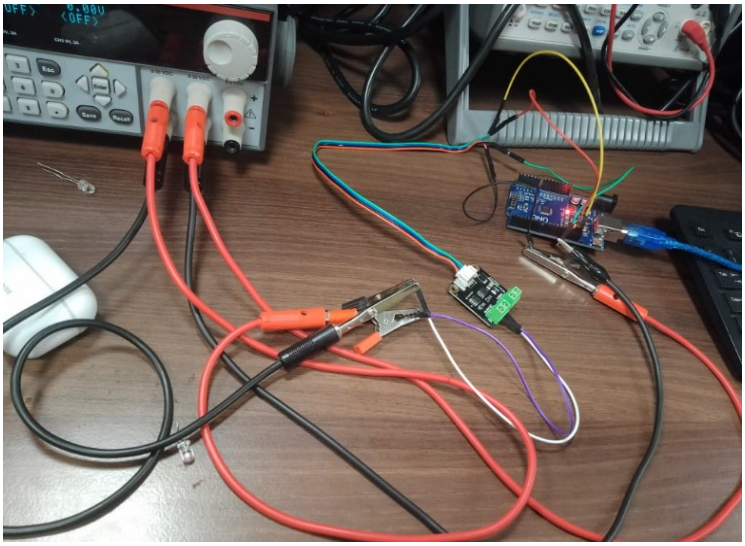



KEITHLEY
2231A-30-3 TRIPLE CHANNEL DC POWER SUPPLY
0.00V
〈OFF〉
0.00V
〈OFF〉
0.00V
〈OFF〉
CH1 30V, 3A
CH2 30V, 3A
CH3 5V, 3A
SELECT
CH1
CH2
CH3
POWER
V-Set
I-Set
OUTPUT
Menu
On/Off
LOCAL
Esc
Enter
Save
Recall
0-30 VDC
0-30 VDC
0-5 VDC
2024/07/18 14:16


18-24V DC
GND
4-20mA
GND
Gravity
I2C
I2C to 4~20mA analog current
module V1.0


ARDUINO.CC
TINY MACHINE LEARNING SHIELD


KEYSIGHT
DSOX1102A
Digital Storage Oscilloscope



Day 23:

Research

Continued research on generating sine waves using the Arduino Nano 33 BLE Sense Lite with the DAC DFR0972 and visualizing them on an oscilloscope.

Day 24

Holiday Break

No work was conducted on 17th July (Wednesday) as Muharam Holiday.

Day 25:

Research

Continued research on generating sine waves using the Arduino Nano 33 BLE Sense Lite with the DAC DFR0972 and visualizing them on an oscilloscope.

Day 26:

Research

Continued research on generating sine waves using the Arduino Nano 33 BLE Sense Lite with the DAC DFR0972 and visualizing them on an oscilloscope.

Day 27 and Day 28

Weekend Break

No work was conducted on Day 27 (Saturday) and Day 28 (Sunday). These days were designated as non-working days, allowing for rest and relaxation.