VIETNAM NATIONAL UNIVERSITY, HO CHI MINH CITYHO CHI MINH CITY UNIVERSITY OF TECHNOLOGY

FACULTY OF ELECTRICAL & ELECTRONICS ENGINEERING

TT02 – Semester 232

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Hardware Selection:

Microcontroller: STM32F1

A 32-bit ARM microcontroller from the STM32 series.

Supports necessary peripherals and interfaces for the project requirements.

Peripherals:

Input Devices: Buttons for user interaction.

Display Devices: OLED 0.96 inch 128x64 SSD1306 for visual feedback.

Sensor: To fulfill our motion sensing and orientation tracking requirements, our focus is on calculating roll and pitch angles rather than the yaw angle. Although the MPU6250 could serve as a cost-effective solution for this task, given our current possession of the BNO085 sensor and our tolerance for lower accuracy demands, we have opted to leverage the capabilities of the BNO085 instead of investing in additional hardware. This strategic decision not only optimizes resource allocation but also obviates the necessity of procuring a new sensor, thereby streamlining our operations.

Interfaces: UART, USB, I2C, SPI for communication with other devices.

Power Supply:

Supports AC/DC adapters and a 5V battery for flexible power options.

Microcontroller Selection Criteria:

Required Hardware Interfaces: I2C and UART.

Necessary Interrupts: GPIO and Timer interrupts.

Utilization of Timer 0 and Timer 1 for sensor processing.

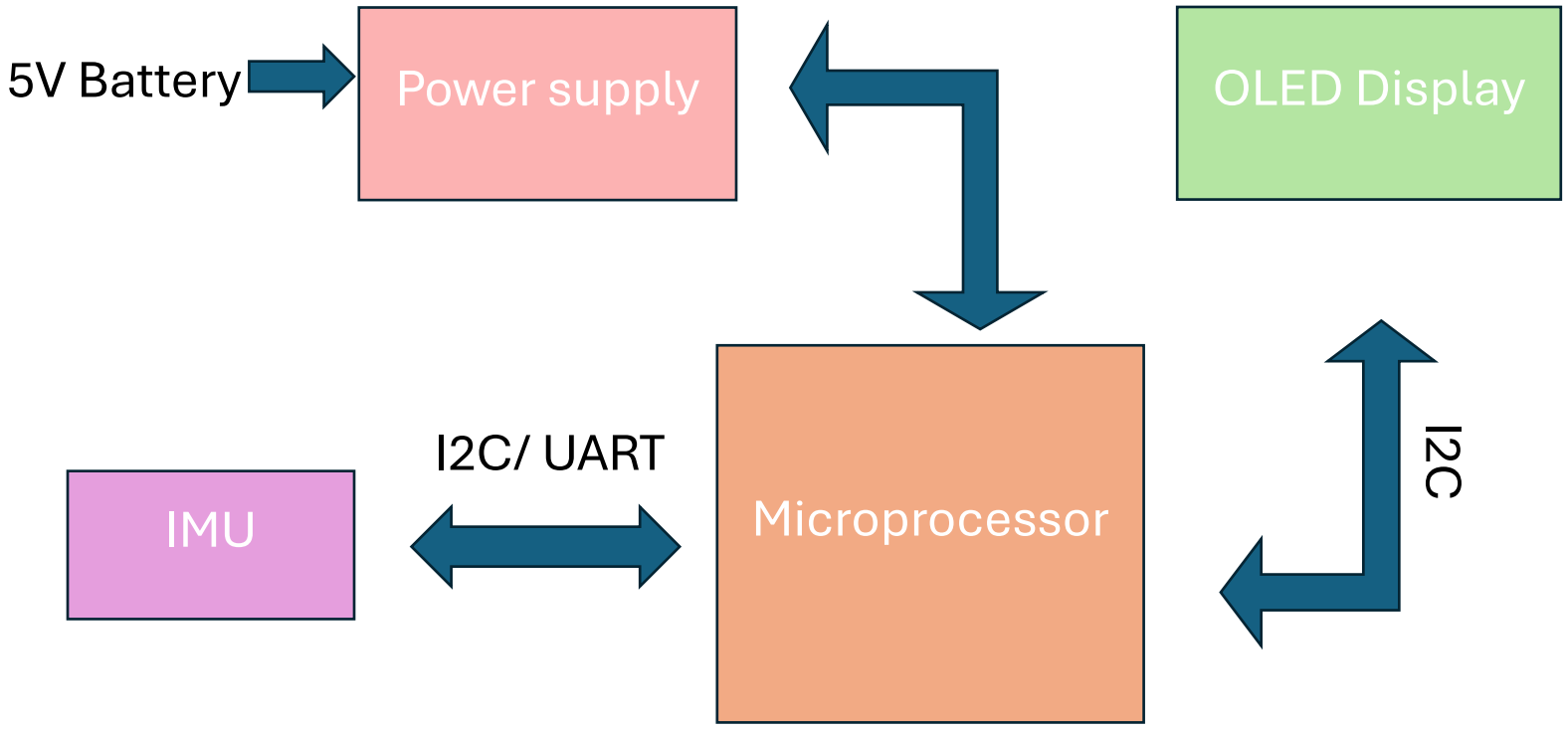
Processing of 32-bit data for BNO085 sensor compatibility.

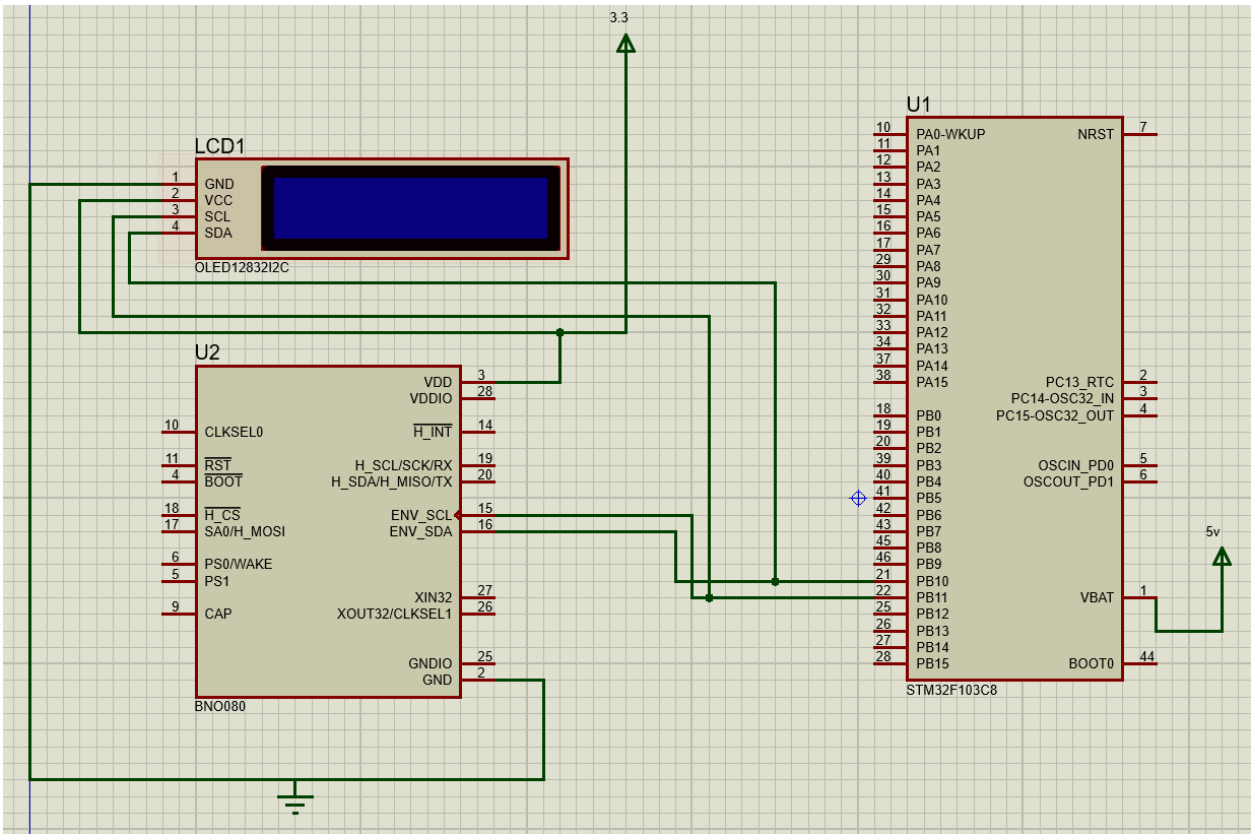
Availability of libraries supporting the selected architecture.

Essential requirement for low-power features suitable for battery-powered and mobile applications.

Cost-effective solution leveraging existing resources.

Compilers and Tools: Support for C compiler and Python for efficient development.


5V Battery
Power supply
OLED Display
I2C/ UART
IMU
Microprocessor
I2C



In the STM32F1 setup, we've opted for a 5V power supply for VBAT. Additionally, we've designated PB10 as SCL/Tx and PB11 as SDA/Rx for our I2C interface.

For the BN085 sensor, we've connected VDD to 3.3V and GND to ground. To utilize the I2C communication protocol, we've linked ENV_SCL to PB11 and ENV_SDA to PB10.

Similarly, for the OLED display (SSD1306), we've adhered to a 3.3V VDD and grounded GND. To enable I2C functionality, we've wired SCL to PB11 and SDA to PB10.

This configuration ensures compatibility and seamless communication between the STM32F1 microcontroller, BN085 sensor, and OLED display.