Electronics Phase

Objectives:

To design the main control board for the robotic arm by first drafting its schematic on paper, ensuring all required components and connections are correctly placed, then physically preparing the microcontroller (Bluepill) by soldering its pins. This phase aims to build a clear understanding of the circuit layout, component connection, and safe soldering practices.

Main task:

Subtask 1: Draft your Mainboard schematic diagram on a BLANK paper with a clear labels and components naming. **Mainboard must include:**

1. Two 20-pin header of the bluepill ports.

2. Four 3-pin headers of the Servo motors ports.

3. Four 3-pin header for the potentiometers ports.

4. Two 5-pin headers for the Joysticks ports.

5. One 4-pin header for the UART port.

6. One 2-pin header for the power supply port.

7. One slide switch for the power supply.

8. One LED indicator for the power supply.

9. Three programmable LEDs.

10. Two programmable push buttons with LED indicator.

11. One reset push button with a LED indicator.

Subtask 2: Write a short document about the following:
1. The safety rules to follow in the soldering process.
2. What is the use of soldering paste and sponge.

Subtask 3: Your task is to solder the pins on your bluepill, then using the multimeter, check the following:

- No short circuit between any of the power pins and the ground pins.
- All ground pins are connected together.
- No short circuit between any neighboring pins.
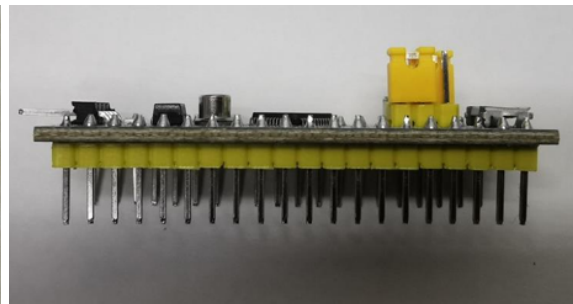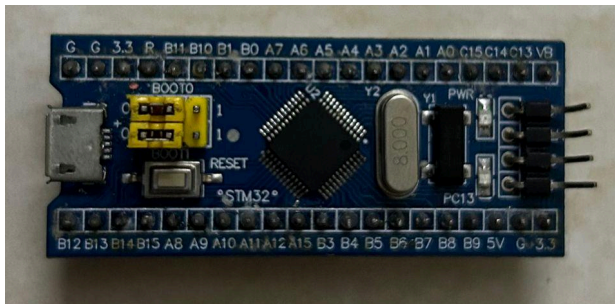
Subtask 4: Using the Female-to-Male jumper wires, cut the Male side of the wire, then solder them to your potentiometers pins, then using the multimeter, check the potentiometers functionality.
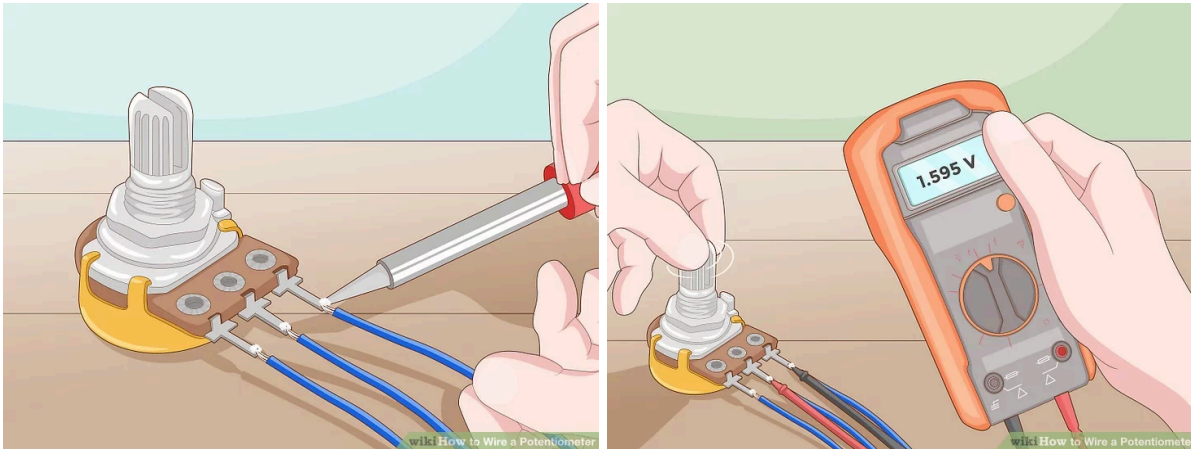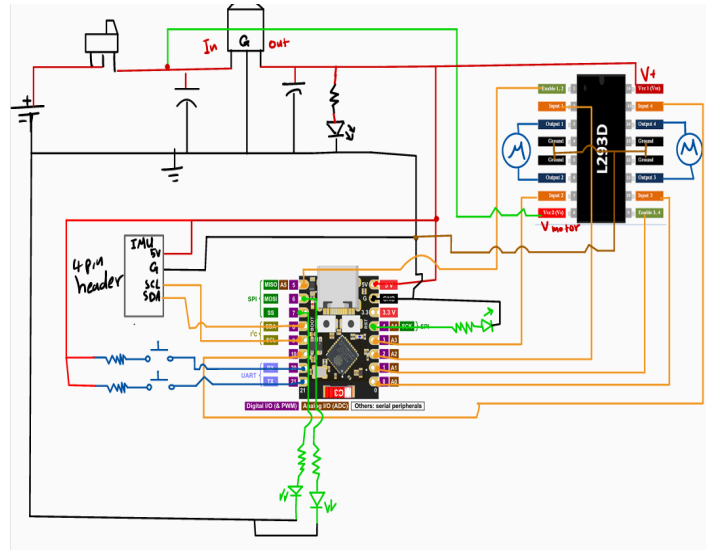

Optional Task:

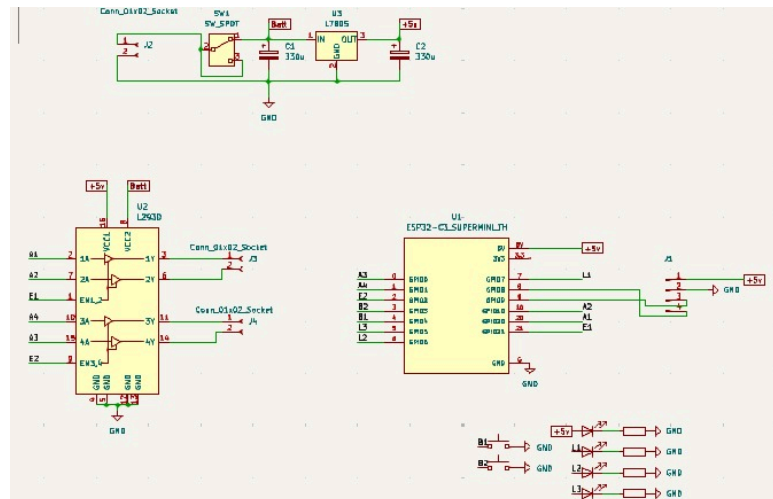Draft your schematic diagram again using a PCB CAD software from your choice (e.g. KiCAD, EasyEDA, Altium).

Hints:

- Example of the Mainboard schematic diagram (*don't use as reference*):

- Example of the Mainboard schematic diagram using PCB CAD softwares (*don't use as reference*):

- Tips on soldering:
    - https://youtube.com/shorts/-aooeUUE2Qc?si=IPKa-GFPOExbqdFm
    - https://youtu.be/OWNAjwhwzro?si=kk43qTy44GT0Ec9L

Caution (read carefully) ⚠️ :

- Always handle the soldering gun with care. Use the gun holder when not in use, and switch it off immediately after finishing.
- The gun's holder can slide and fall, so be careful while using it, use the gun on a fixed flat surface.
- Avoid inhaling solder smoke — it contains harmful fumes. Wear a mask or ensure proper ventilation while soldering.
- Take extra care when soldering the STM32 (Bluepill) pins to avoid damaging or overheating its components, especially if you have only one STM32.

Submission:

- Complete all subtasks of the main task and the optional task and submit them in one PDF file.
- Add your draft of the schematic for subtask 1 and the optional task (if done) to the PDF file.
- Add the short document of subtask 2 to the PDF file.
- Add pictures of the result of subtask 3 and subtask 4 to the PDF file.
- Name the PDF files with task2_groupx_your_name, (replace x with your group number).
- This task should be submitted before 14th Aug 10:00pm (Malaysia time), 05:00pm (Saudi time).
- Your mentor must approve your task answer file before submission.
- Submit the PDF file to the Google form will be announced later.