



Weeks 2-3 Project Progress

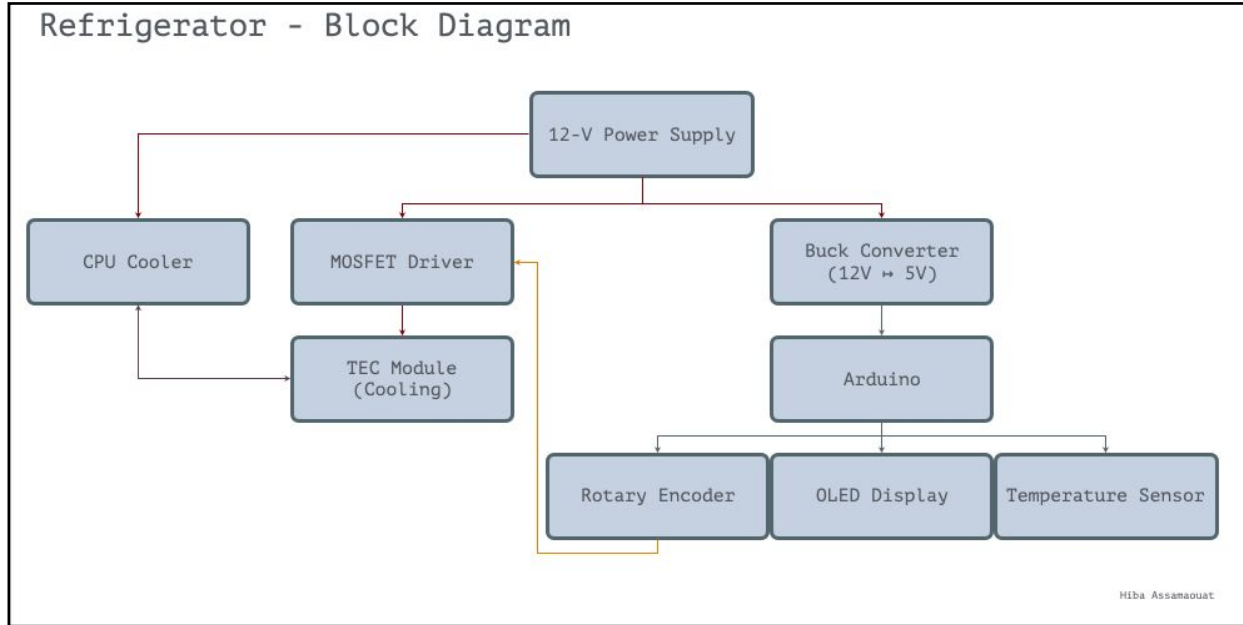
Group 2: Omar, Ahmed, Hiba, Thea, Ibrahim, Kundai, Marine

ENGR-UH 3110 Instrumentation, Sensors, Actuators

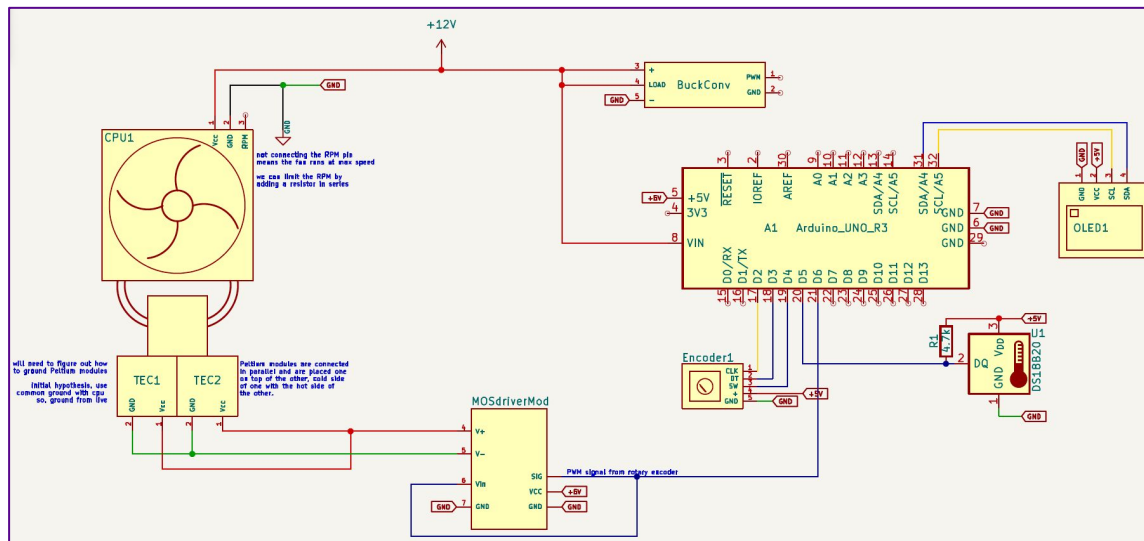
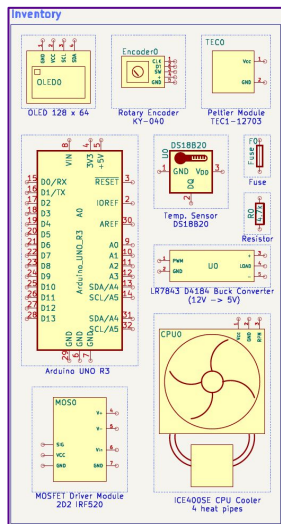
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Block Diagram



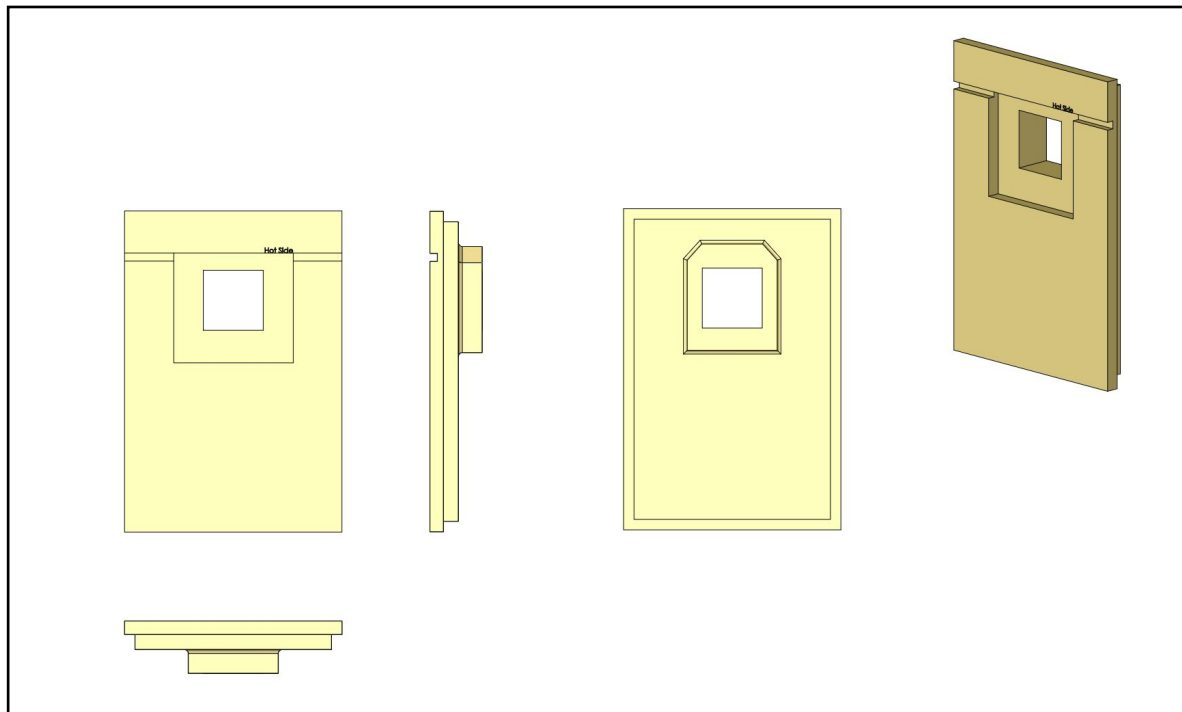
Circuit Schematics

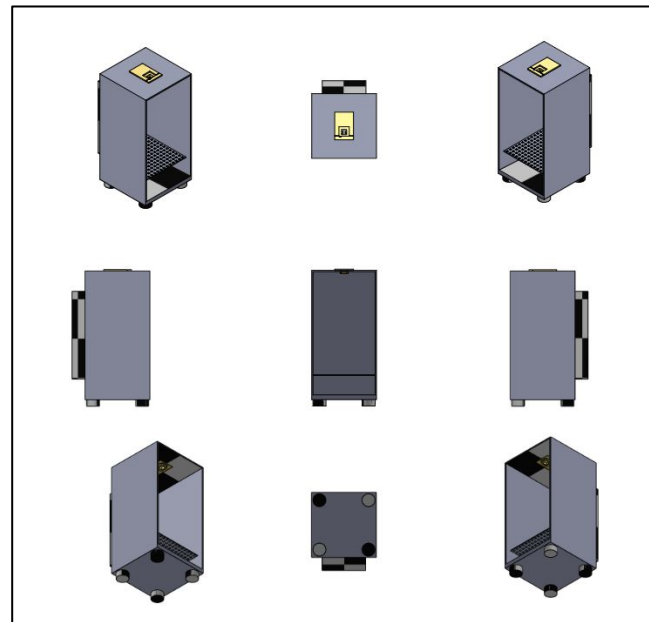
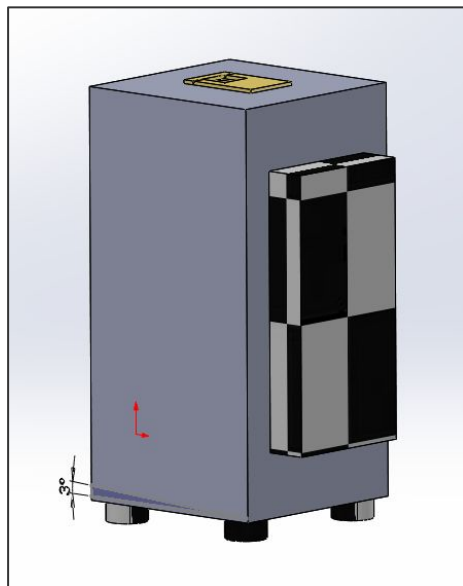
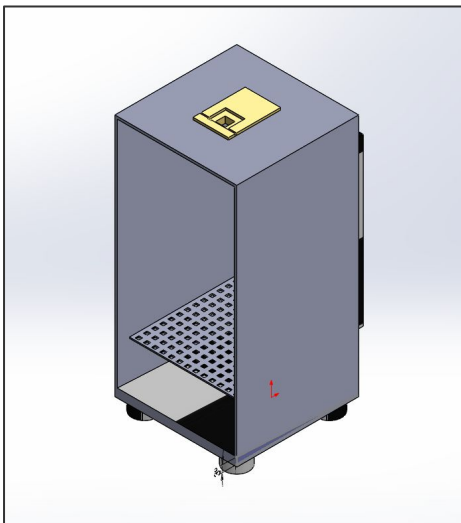


Mechanical Layout & Design

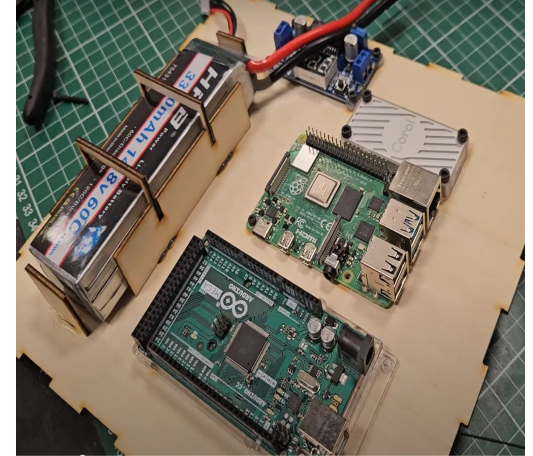
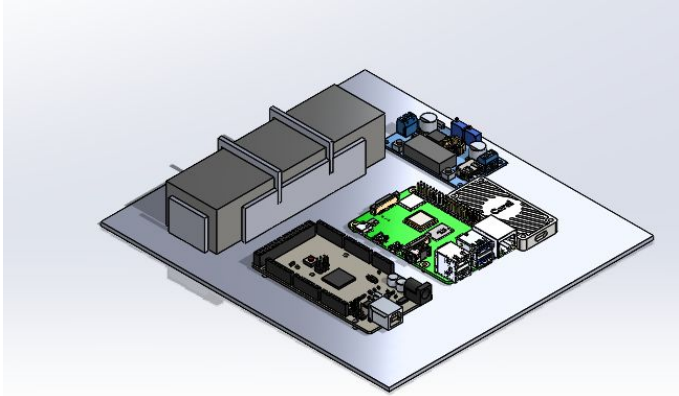
As part of the mechanical design for this system, we will be fabricating brackets that secure the thermoelectric cooler (TEC) modules to both the cooler box and the heatsink assembly.

Mechanical Layout & Design





Enclosure box for components



Additional Components

To maintain electric protection and stability, using a **fuse** (5A–10A, inline holder, in case the fuse blocks cannot fit within the circuit) is to be included in the 12V power input to protect against overcurrent and short circuits.

If unavailable, a software-based current limiter can be implemented in the Arduino code.

Additional Components

To optimize heat transfer between the TEC modules and the heatsink, **thermal paste or thermal pads** are applied to ensure efficient thermal conductivity.

If unavailable, CPU/GPU thermal grease can be used as an alternative.

Additional Components

To regulate heat dissipation, a **PWM fan control system** is implemented using the existing MOSFET module, allowing dynamic fan speed adjustment based on system temperature.

If unavailable, the fan can be directly connected to 12V for continuous full-speed operation or controlled with a resistor-based voltage divider for reduced speed

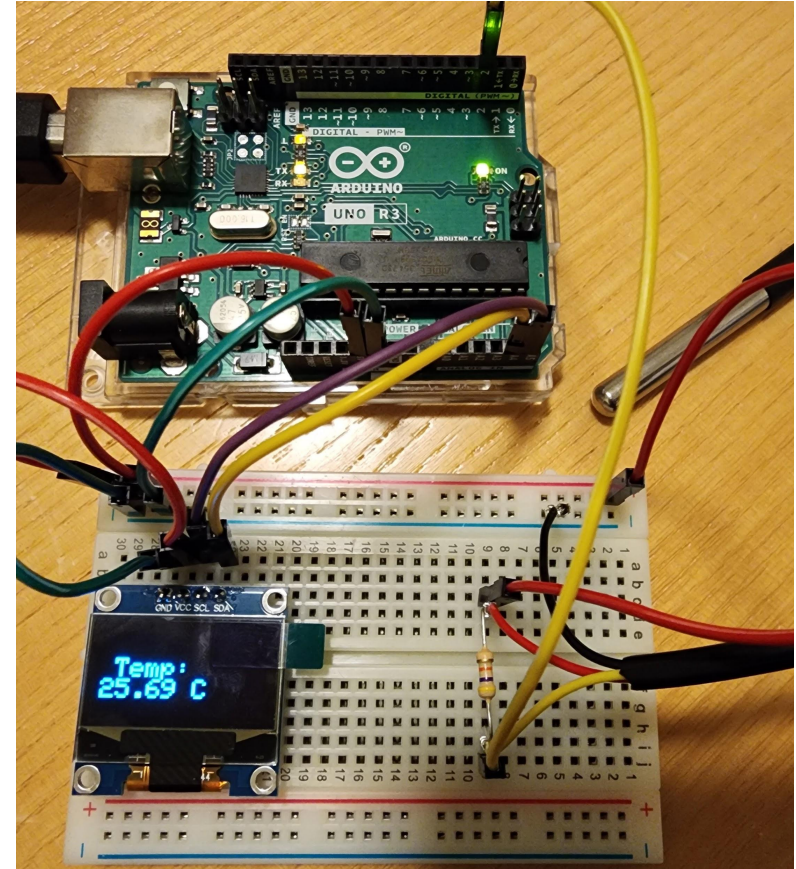
Additional Components


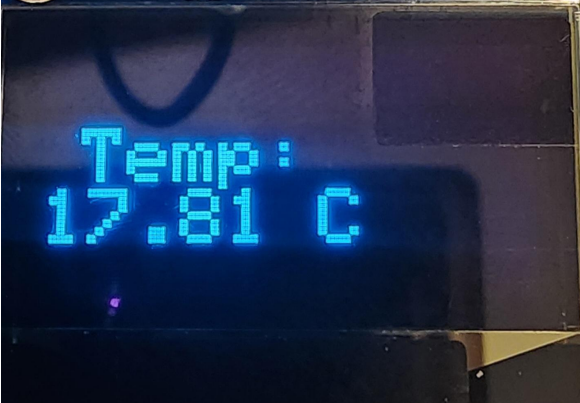
To prevent overheating, a **10k NTC thermistor** and **relay module** are integrated to cut TEC power when excessive heat is detected.

If the relay module is unavailable, a software-based shutdown using the digital temperature sensor can be implemented to disable TEC operation at critical temperatures

Arduino Set-Up

- A 4.7 k Ω resistor pulls the DS18B20 sensor's data line to 5V for OneWire communication.
- The circuit measures room temperature and displays it on an OLED screen.



System	
Boiling Water	 A digital thermometer with a blue LCD screen displaying "Temp: 86.00 C". The device is black with a gold-colored top edge. The background is dark.
Cold Tap Water	 A digital thermometer with a blue LCD screen displaying "Temp: 17.81 C". The device is black with a gold-colored top edge. The background is dark.

Fun Part

Chilly McFrosty is a reaction-based game that tests response time against an average F1 driver. Using an OLED display, LED system, and push button, players must react to a visual cue. A fast response wins; otherwise, it's "Tough Luck."

