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Introduction to Robotics, 2025/26

HOMEWORK 2 – Cº/Fº THERMOMETER

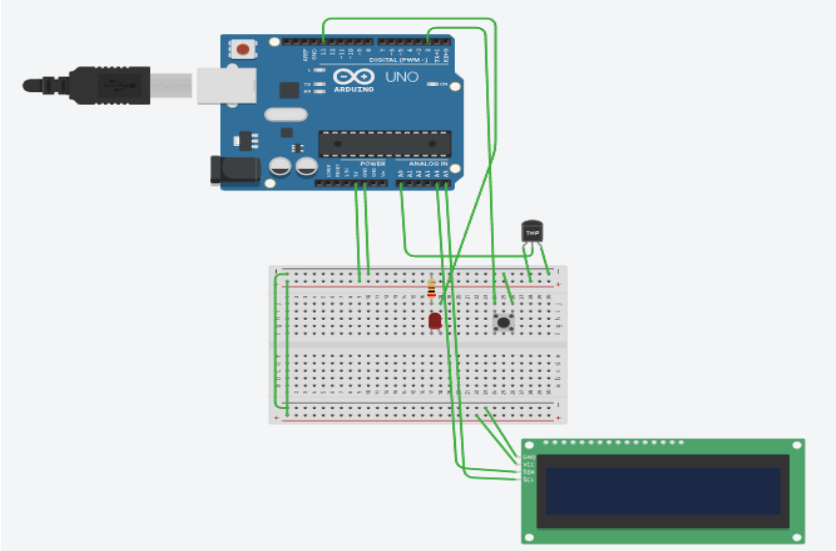
BRIEF NOTE

Design Summary

The project is an embedded temperature display that uses an Arduino Uno, an LM35 temperature sensor and an I2C LCD.

The system reads temperature every 0.5 seconds using a hardware timer interrupt, which is shown by flashing a LED. Meanwhile, user input is handled asynchronously through an external interrupt on a button.

The temperature unit (°C/°F) is stored in EEPROM and restored at startup.



Timing Budget

- Sensor reading and LCD update: ~20 ms

- Timer period: 500 ms

- Button debounce window: 200 ms

- Main loop → idle most of the time → low CPU usage

Test and Accuracy

The temperature readings were off by a difference of around 3°C, which is acceptable for the LM35 sensor.

EEPROM successfully preserved the temperature unit after multiple resets and power cycles.

Known issues

- Occasional ±0.5°C alterations due to ADC noise.

- The LCD may briefly blink when refreshing text.