## Peripherals and System Design

1. I2C (TMP006 Temperature Sensor): The system reads the room temperature every 500 ms, ensuring real-time monitoring.
2. GPIO (Buttons and LED):
   * Buttons: One button increases the set-point, and another decreases it.
   * LED: The LED turns on when the room temperature is below the set-point, indicating the heating system is active.
3. UART: UART simulates data transmission, sending the temperature, set-point, and heater status as if to a server.

### Task Scheduler

A task scheduler driven by a hardware timer manages the system:

* Temperature Reading: Every 500 ms, the temperature is read.
* Set-Point Adjustment: Buttons adjust the set-point based on user input.
* Heater Control: The LED toggles based on whether the current temperature is above or below the set-point.
* UART Output: Every second, the system sends current data over UART to simulate server communication.

### Hardware Architecture Comparison

To connect the thermostat to the cloud via Wi-Fi, we analyzed three hardware architectures:

1. TI CC3220x:
   * Wi-Fi: Integrated.
   * Memory: 1MB Flash, 256KB RAM (sufficient for expansion).
   * Recommendation: Best suited for cloud integration and compatibility with peripherals.
2. Microchip PIC32:
   * Wi-Fi: Requires an external module.
   * Memory: Up to 512KB Flash, 128KB RAM.
   * Recommendation: Not ideal due to limited memory and external Wi-Fi requirement.
3. Freescale/NXP i.MX:
   * Wi-Fi: Integrated, but excessive for this project.
   * Memory: High capacity (overkill).
   * Recommendation: Too complex and power-hungry for this use case.