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CS 350 Emerging Systems Architecture and Technology

**Project One Report**

The task scheduler created works with the checkButtonPeriod, checkTempPeriod, and heatSensorPeriod variables to read sates after a given timeframe and behave accordingly. In detail, the checkButtonPeriod checks for button flags every 200ms to see if the any of the buttons have been pressed. If they have been, it will either increase or decrease the setpoint, turning the heat on or off. The checkTempPeriod task reads the current temperature of the room. If it is less than the setpoint, it will turn the heat on, or else it will turn it off. In both instances, though heat is its own variable, it is represented by the red LED being on or off.

The thermostat supports the peripherals used in the project because it cannot function properly without the I2C, UART, and GPIO peripherals. The temperature sensor is connected to the I2C bus. The LEDs and push buttons are considered as GPIOs. The UART supports a USB COM port and is ultimately used as a transmitter through the USB to the PC. Texas Instruments, Microchip Technologies, and Freescale Semiconductor (now known as NXP Semiconductor) all create microcontrollers. The one used for this project is the TI CCS3220S. Of each of their lineups, many of their microcontrollers allow for additional peripherals, and some include accelerometers, temperature sensors, and wi-fi features.

The thermostat connects to the cloud because the microcontroller features wi-fi capabilities. It does not require external power for wi-fi to be used. Microchip Technologies and Freescale/NXP also offer options to connect wi-fi on some of their microcontrollers, like Microchip’s WFI32E development board, or NXP’s RDMW320-R0 Starter Kit.

Flash and RAM apply generally across the board of all three architectures. The flash retains data even if there is no power supply involved because it is a non-volatile memory form. This data is held until it needs to be executed. The RAM is like short term memory, where it executes the data it has held, but it is volatile so it will “forget” or lose that data once there is no power. These principles apply for TI, NXP, and Microchip. In this instance, our TI board offers 256KB of RAM.

**Sources:**

Texas Instruments Incorporated. (2017, February). *CC3220 SimpleLinkTM Wi-Fi® LaunchPadTM Development Kit Hardware*. www.ti.com. https://www.ti.com/lit/ug/swru463c/swru463c.pdf?ts=1708798268742