Project Summary

CS – 350

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October 15, 2023

The peripherals used in this project to create the thermostat are the GPIO, UART, Timer, and I2C peripherals. The peripherals work with the different types of input and output that are necessary for the thermostat to function. GPIO is used for button input, and in this case, it allows the user to increase or decrease the temperature which the thermostat is set to. The Timer peripheral is implemented to make sure that all necessary tasks are executed at the proper times within the program. UART outputs the state of system to the terminal to simulate a connection with the cloud, and the I2C peripheral is implemented to read information from the temperature sensor located on the TI board so the system can interpret the information.

Based on research into the TI, Microchip, and Freescale hardware architectures, I found the following to be very informative. “Microchip Technology Inc.'s PIC18F87J90 8-bit direct LCD-drive microcontroller features 64-128 KB Flash and 4 KB RAM. It is said to be the industry's first 8-bit MCU to include a real-time clock and calendar (RTCC) and charge time measurement unit (CTMU) peripheral for capacitive touch sensing or precise time measurement. The new family of devices is pin-compatible with Microchip's PIC18F85J90 devices, providing a migration path across the company's entire LCD-drive MCU family. With its extended memory range and integrated peripheral set, the PIC18F87J90 is targeted at display applications using capacitive- or inductive-touch user interfaces.” (*Freescale, Microchip, TI Roll Out Microcontrollers*, 2017)

“Freescale Semiconductor's MPC8569E PowerQUICC III communications' processor is a high-performance, low-power device based on 45-nm silicon-on-insulator technology. Aimed at advanced wireless and wire line communications equipment, it supports a wide range of wireless protocols and delivers up to 1.3-GHz performance within a sub-10-W power envelope. The device's integrated design allows for a single-chip solution, consolidating network processing and control processing functions. It's designed to address ever-increasing performance and protocol support requirements, as well as demand for low-cost operation for broadband access equipment, such as 3G/WiMAX/LTE base stations, RNCs, gateways and ATM/TDM/IP equipment.” (*Freescale, Microchip, TI Roll Out Microcontrollers*, 2017)

“Texas Instruments' 32-bit TMS320F2802x/F2803x microcontrollers are targeted at delivering real-time control for cost-sensitive applications. Starting at less than $2 apiece in volume, the new "Piccolo" microcontrollers, as they're known, feature architectural advancements and enhanced peripherals in package sizes starting at 38 pins. Its real-time performance makes the device a candidate for industrial, consumer and automotive applications, such as solar power micro-inverters, LED lighting, white goods appliances, power line communications and hybrid automotive batteries.” (*Freescale, Microchip, TI Roll Out Microcontrollers*, 2017)

The TI board used in this project is the CS3220S-LAUNCHXL. It supports the necessary peripherals for the project and supports all the technical and physical requirements needed for the project. The TI board has the necessary onboard temperature sensor and has 256 KB of RAM and 1 MB of executable flash memory, which is enough to handle the code for the project. I believe it would be a great fit for further development and for connecting the thermostat to the cloud since it has a great many features for Wi-Fi connectivity and the security required for the creation of an IoT device like a smart thermostat.

**References:**

*Freescale, Microchip, TI Roll out Microcontrollers*. (2017, May 22). designnews.com. https://www.designnews.com/freescale-microchip-ti-roll-out-microcontrollers-0