Class: CS-350-10870-M01 Emerging Sys Arch & Tech

Assignment: Project Report

Student: Margarita Kiseleva

Date: 06/15/2024

***Report***

1. *Explain how the thermostat supports the peripherals used in the project. Make sure that you have included all the required details from the scenario in your report. You should discuss each of the three outlined hardware architectures, including TI, Microchip, and Freescale.*

This project is built upon using the TI CC3220S peripherals, which are: UARTs, LEDs, temperature sensors, two buttons, and timers. The purpose of the project was to develop a basic thermostat system. Having examined the documentation regarding the launchpad provided by the Texas Instruments website, I noted that:

* The two buttons on each long side of the launchpad can be used as a source of user’s unput. The code configures those buttons to generate interrupts upon being pressed. In this particular project, the two buttons were used to increase and decrease the temperature.
* The LEDs located on the launchpad are used to indicate certain states. In this project, the LEDs were used for the indication of the temperature increment, aka heater.
* The launchpad has a built-in temperature sensor. This sensor is used in tandem with the I2C driver, and it detects the current room temperature.
* It is possible to configure four timers, and all four of them can be configured individually. In this project, the timer was used to schedule tasks.
* The UART driver is used for serial communication. My particular version of UART was UART2. I used it to display the thermostat’s readings to the terminal.
* The microchip has MRF24WG0MA/MB Wi-Fi modules. Those modules, in tandem with their microcontrollers, are used to establish Wi-Fi connectivity.
* Freescale series of microcontrollers provide GUI tools that are used to generate drivers for on-chip peripherals. This series also provides Processor Expert, and they have good peripheral support.

1. *Explain how the thermostat connects to the cloud via Wi-Fi. Discuss all three architectures in your work.*

The connectivity between the thermostat with the cloud is achieved through Wi-Fi. The TI CC3220S launchpad offers built-in Wi-Fi support. This way, the thermostat connects with the microcontroller. The launchpad utilizes the SimpleLink Wi-Fi CC3220 wireless MCU, which sends data to the server after establishing the connection. Additionally, MRF24WG0MA/MB Wi-Fi modules offered by Microchip can be used in tandem with their microcontrollers for Wi-Fi connectivity. Freescale also offers a module called WGM110 which can provide connectivity with Wi-Fi.

1. *Discuss the architecture’s Flash and RAM that supports the code. Include all three architectures in your discussion.*

Both Flash and RAM are essential for storing and executing the code. The program code is stored in the Flash memory while RAM stores the runtime data. There is a variety of Flash and RAM sizes offered by different microcontrollers from Microchip’s PIC and Freescale.