# **Peripherals**

In the development of this smart thermostat prototype, we supported the essential peripherals which included I2C, GPIO, and UART. The I2C is used for the inter-connected peripherals to communicate, such as readings from the temperature sensor. The GPIO interrupt was used to control the system with buttons located on either side of the board. The buttons on the side are used to set the temperature. When the set temperature is higher than the temperature from the sensor, the LED light will come on indicating the heat. The LED would turn on via GPIO. UART is used to communicate to the server via Wi-Fi. The TI architecture is able to meet the needs of all the peripherals, providing I2C support for the TMP006 temperature sensor, GPIO control for the LED, GPIO interrupt for the button controls, and UART to communicate with the server via Wi-Fi (*CC3220SF SimpleLink™ Wi-Fi® Single-Chip Wireless MCU Solutions*). Microchip and Freescale are too able support the required peripherals for the smart thermostat protype.

# **Cloud**

All three of the architectures, TI, Microchip, and Freescale (NXP) are able to connect to Wi-Fi for the thermostat to connect to the cloud. The integrated Wi-Fi capabilities on these microcontrollers allow for the thermostat prototype to connect to the Wi-Fi network. Once the device is connected to the Wi-Fi network, the microcontrollers can utilize standard network protocols to facilitate communication over the internet. This allows the microcontrollers to communicate with cloud resources for the thermostat.

# **Flash & Ram**

Taking into consideration Flash and RAM that supports the code, the three architectures would work. However, Freescale (NXP) architecture has limitations due to its use of One-Time-Programmable (OTP) memory. This would limit the reprogramming capabilities. TI and Microchip architecture too offer sufficient memory to support the code requirements. Considering there may be need to later update the code, I do not think the Freescale (NXP) is best suited for this smart thermostat prototype. The TI architecture seems to be the most appropriate architecture choice for this smart thermostat prototype project considering the support for peripherals, cloud connectivity, and memory requirements.

# **References**

*CC3220SF SimpleLinkTM Wi-Fi® Single-Chip Wireless MCU Solutions*. CC3220SF datasheet | TI.com. (n.d.). https://www.ti.com/document-viewer/cc3220sf/datasheet

*Documentation*. NXP Semiconductors. (n.d.). https://www.nxp.com/design/documentation:DOCUMENTATION