For this project, we were tasked with creating a thermostat that could control a heating/cooling system for a home utilizing I2C, GPIO, and UART to support the peripherals and communication protocols. Using UART, we can communicate with the different systems via a Wi-Fi connection and the inter-connected peripherals communicate using the I2C protocol. We utilize the GPIO to control the system with the buttons located on the sides of the board when orienting the USB in the top left corner.

Our system checks the ambient temperature through the use of the onboard temperature sensor, which is checked periodically to determine if the heat should turn off (red LED turns on) by comparing the ambient temperature to the user’s set point. The side buttons are used to adjust the set point temperature of the system; the left-side button is used to decrease the temperature set point, while the right-side button is used to increase the temperature set point.

When comparing different controller board models, we have the TI, Microchip, and Freescale boards to choose from. In regards to peripheral support, all three boards are able to support the required peripherals. With the chips that are used on the boards, all three have sufficient memory but the memory type is an issue with the Freescale board. Freescale uses OTP memory which means we would not be able to reprogram the board if needed. This leaves us with the TI and Microchip boards and where the TI takes the lead is the integrated temperature sensor. I believe using the TI board is the better option due to the already integrated temperature sensor despite the difference in price point; it will be potentially easier to use this board in this use case for this simple fact.