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As the thermostat project moves forward, the next capability to integrate is wireless communications over wi-fi. At this stage, considerations for hardware need to begin. SysTec has requested that potential options from three companies, Raspberry pi, Microchip, and Freescale, now part of NXP, be evaluated for fitness. The recommendations are required to be able to handle the current peripherals, access wifi and run the code effectively. The preliminary candidates I have chosen are the Pico 2 W from Raspberry Pi, the WFI32E01PE from Microchip Technologies, and the RW610 from NXP.

Each of the candidate controllers was selected for their ability to manage the temperature sensor, LEDs, buttons, and 16x2 screen used in the breadboard prototype. Each candidate has at least the requisite number of GPIO pins to accommodate these peripherals, with only a single surmountable exception. Each of the candidates is able to accommodate the lower 3.3 volt peripherals natively, but lack the 5 volt pin of the larger Raspberry Pi 4 in the prototype, and will require a solution, such as a level shifter, to safely interact with the 16x2 screen.

All three candidates have Wifi capabilities built into the package, however they have different wifi standard generations. The Pico 2 W and WFI32E01PE both operate on the Wifi 4, IEEE 802.11n standard. The RW610 carries the later IEEE 802.11ax, or Wifi 6, standard. The older generation standards of the Pico 2 W and WFI32E01PE are not projected to be an issue given the demands of the project, and each will be able to connect to a cloud server as specified by the project requirements.

The final consideration is the code itself. The code itself will require about 17 kb of flash memory to accommodate as it currently is, and more room is preferred for future updates. The WFI32E01PE provides a modest 1mb of on chip flash memory and the Pico 2 W a generous 4 mb, meaning they easily support storage of the code and future updates. The RW610 does not have on chip flash, and so will require an off chip solution. Calculating RAM needs is more difficult, but each of the three candidates should be able to accommodate the code’s needs. The WFI32E01PE provides only 256 kb of RAM, making it the least of the three. The Pico 2 W comes with 520 kb, and the the RW610 includes a considerable 1.2 mb, making them more likely to support all future updates to the code. The final consideration is thread, of which the code uses two. The WFI32E01PE and RW610 support only a single actual thread, so they will need to implement a pseudo-multithread solution. The Pico 2 W features dual cores and true dual-thread processing.