**Project Reflection**

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The project is a working prototype for a smart thermostat system. There are three buttons on the circuit board: the first cycles between states (off, heating, cooling), the second raises the target temperature set point by one degree, and the third button lowers the target temperature set point by one degree. When the state is set to “off,” no LEDs are lit up and the display will show the current date, time, and temperature set point. The display will update with each button press, showing which state is currently active and the temperature set point as it changes. If the system is in heating mode and the current temperature is below the set point, the red LED will pulse. Once the temperature is met, it will become solid. If the system is in cooling mode and the current temperature is above the set point, the blue LED will pulse, and become solid once the set point is reached.

To determine the best hardware to use for the deployment of this project, the functionality should be evaluated and the architecture that meets requirements while still remaining cost-effective should be chosen. Three have been evaluated here: the Raspberry Pi 3 Model B (BCM2837), Microchip’s PIC32MZ-W1 wireless microcontroller, and Freescale’s i.MX RT1060.

The Raspberry Pi 3 Model B uses a 40-pin GPIO header with USB support and a 2.4GHz single-band 802.11n Wi-Fi adapter built into the board. It has 1 GB memory and uses a programmable microSD for storage, allowing for customizable flash sizes to meet the requirements of the project. The ARM cores run at 1.2GHz.

Microchip’s PIC32MZ-W1 wireless microcontroller supports up to 60 GPIOs and can handle advanced peripherals, such as a touch input peripheral. It uses a single-band 2.4GHz 802.11 bgn wireless radio built into the chip. It supports only up to 2 MB embedded flash and has 640 KB of RAM. It is a low-power device that meets all of the minimum requirements for the project.

Finally, Freescale’s i.MX RT1060 has 1MB of RAM, and has a very low-latency response time. It has low-power mode options to conserve energy and supports on-chip Wi-Fi and Bluetooth connectivity.

For the project, Microchip’s PIC32MZ-W1 wireless microcontroller is recommended. It has enough on-board flash and RAM to handle all of the processes and programs necessary to operate the smart thermostat without being overqualified. The wireless module is built into the chip, so there is no need for external adapters for connectivity. Additionally, the GPIO support can allow for additional features and modifications to the thermostat as necessary, such as a touch interface for setting temperature, while still supporting the other peripherals necessary.

**References**

*I.MX RT1060*. (n.d.). Retrieved April 19, 2025, from <https://www.nxp.com/products/i.MX-RT1060>

*PIC32MZ W1 Family of Microcontrollers*. (n.d.). Retrieved April 19, 2025, from <https://www.microchip.com/en-us/products/microcontrollers-and-microprocessors/32-bit-mcus/pic32-32-bit-mcus/pic32mz-w1>

*Raspberry Pi hardware—Raspberry Pi Documentation*. (n.d.). Retrieved April 19, 2025, from <https://www.raspberrypi.com/documentation/computers/raspberry-pi.html>