Liu, Kevin

17 February 2025

Professor Timothy Alexander

CS-350-16652-M01

Raspberry Pi, Microchip, and Freescale are three hardware architectures that are being considered for the next phase of smart thermostat. To see which hardware is most suitable for the thermostat we need to compare their peripheral support, Wi-Fi connectivity, and Flash RAM requirements.

For peripheral support, all three hardware meet project needs. Raspberry Pi offers GPIO, which contains general-purpose peripheral design. Microchip microcontrollers provide good peripheral support with I2C making them suitable for embedded applications. Freescale microcontrollers deliver UART, which are specifically designed for embedded systems. For Wi-Fi connectivity, Raspberry Pi and Freescale offers integrated Wi-Fi capabilities. These capabilities simplify the design and reduce development time. In contrast, Microchip requires an external Wi-Fi module, which increases design complexity and cost. When considering Flash and RAM requirements, Freescale is the best. It offers up to 4 MB of Flash and 1 MB of RAM, providing memory for the application code and cloud connectivity. Raspberry Pi offers 1 GB or more of RAM and expandable storage via a microSD card, provides excessive resources that may not be necessary for a thermostat. While Microchip only offers up to 2 MB of Flash and 512 KB of RAM, which may be limiting for more advanced features or extensive cloud connectivity.

Raspberry Pi offers robust resources, but at the same time it requires high power consumption, making it unideal for a dedicated thermostat. While Micro Chips are cost efficient, it lacks Wi-Fi capabilities which constrain future scalability. Finally, Freescale strikes the right balance between performance, functionality, and efficiency, making it the best choice for SysTec's smart thermostat.