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CS 350

Thermostat LAB

SysTec wants to enter the smart thermostat market, which is expected to grow to $9 billion by 2026. My job is to help build a prototype thermostat that meets SysTec’s needs. The first step is making sure the thermostat can do basic functions, and the next step is getting it to send data over Wi-Fi to SysTec’s cloud-based system.

The thermostat needs to work with different components, including temperature sensors, lights (LEDs), buttons, and a small screen (LCD). The Raspberry Pi is a flexible option because it has the necessary connections to support all these parts. Microchip’s ATSAM and PIC32MZ series also work well with these components. Freescale’s i.MX series offers similar support and is often used in industrial settings. All three options can handle the required sensors and controls, so they are all viable choices.

Wi-Fi is essential because the thermostat needs to send data to the cloud. Some Raspberry Pi models, like Raspberry Pi 4 and Raspberry Pi Zero W, have built-in Wi-Fi, making them easy to set up. Microchip’s ATSAMW25 also has Wi-Fi built in, which removes the need for extra parts. Freescale’s i.MX series has models that can support Wi-Fi, but they often require additional setup. Having a reliable Wi-Fi connection means the thermostat can send temperature readings and system updates to SysTec’s servers so users can monitor and adjust settings remotely.

The hardware also needs enough memory to run the software smoothly. Raspberry Pi has different memory options, going up to 8GB of RAM with an SD card for storage, but it uses a lot of power, which may not be ideal for a thermostat. Microchip’s ATSAMW25 has 2MB of Flash storage and 512KB of RAM, which is enough for this type of project. Freescale’s i.MX series has more memory, from 512MB to 2GB, and plenty of storage, but it is more complex to work with.

The next step will be writing the software to connect the thermostat to SysTec’s cloud using a protocol like MQTT or HTTP, testing Wi-Fi performance, and finalizing the design. Choosing the Microchip ATSAMW25 ensures SysTec will have an efficient and cost-effective smart thermostat ready for the market. I recommend using the Microchip ATSAMW25. It supports all the necessary components, has built-in Wi-Fi, and provides enough memory to run the thermostat’s software without wasting energy. The Raspberry Pi is a great development tool, but it is more powerful, and it’s not needed.