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CS-350 : Emerging Sys Arch & Tech

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**Project 1**

To develop a functional thermostat prototype, the microcontroller must meet specific requirements to ensure its compatibility and functionality. These include supporting I2C for temperature sensor reading, GPIO for LED control, GPIO interrupt for button input, and UART2 for data transmission simulation to a server. Additionally, the microcontroller must be Wi-Fi capable and possess sufficient RAM and Flash memory to accommodate the necessary code.

The TI microcontroller stands out as a suitable choice, as it fulfills all peripheral requirements and offers Wi-Fi connectivity, facilitating communication with cloud servers. With 256KB of RAM, it provides adequate memory for the prototype's code. Microchip's WFI32 series microcontroller development boards also present a viable option. These boards integrate LEDs, user-configurable buttons, an onboard temperature sensor, and Wi-Fi connectivity, enabling cloud resource access. Supporting GPIO, I2C, UART2, and meeting RAM requirements, these microcontrollers offer comprehensive support for the prototype.

NXP (formerly Freescale) microcontrollers present challenges. While NXP microcontrollers are available, none were found to meet all prototype requirements. Some products lacked essential features such as buttons or LEDs, while others missed the temperature sensor or Wi-Fi connectivity. All three microcontroller architectures provide software facilitating Wi-Fi network connection, utilizing standard protocols like TCP/IP for internet communication. The intended target for this communication is cloud resources necessary for the thermostat prototype's operation.

Regarding memory, Flash serves as code storage, while RAM holds executing code and associated variables. All three microcontroller architectures support these functionalities, ensuring efficient execution of the thermostat prototype's code.