Justin Chevalier

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This report is focused on analyzing three microcontrollers who have some similarities but also have a few differences. I’m analyzing these boards to make a recommendation on what is the best microcontroller to use in designing the thermostat application. The three boards that will be evaluated are the SimpleLink CC3220s made by Texas Instruments, the Freedom Development Platform for the Kinetis MCUs from NXP, and the SAM-IOT manufactured by Microchip.

Texas Instrument’s SimpleLink CC3220s features 256 KB of RAM available for use and comes with optional 1 MB of serial flash which would be enough to support our thermostat application. The SimpleLink CC3220s also contains all of the needed peripherals to successfully implement into the thermostat application. This includes the SD, the UART, the SPI and I2C. SimpleLink CC3220s contains four General Purpose Timers(GPT) with a 16 bit PWM mode and can utilized up to 27 GPIO pins. It also has various Wi-Fi modes that are needed to accurately implement the thermostat application as well as enhanced security features such as asymmetric keys and unique device identity just to name a few. The Wi-Fi modes include access points that can support up to four stations and this microcontroller is very affordable at a cost of about 6 dollars which is a bargain when you consider all of the features that accommodate the microcontroller.

The Freedom Development Board from NXP feature 256 KB of flash memory with 32KB of SRAM memory which retains data bits in its memory as long as power is being supplied. Unlike dynamic RAM (DRAM), which must be continuously refreshed, SRAM does not have this requirement, resulting in better performance and lower power usage. The Freedom Development Board doesn’t feature Wi-Fi support that will be needed to complete our thermostat application. It uses a full speed USB port with micro A/B connector to support device functionality. The Freedom Development Board has the peripherals that are needed to produce the thermostat application. This would include the SPI driver, the UART, the I2C, the GPIO and the PWM. The I2C sensor will be utilized for our temperature sensor for the thermostat application. These board are also affordable with an average price at around 18 dollars is very much a value item according to the price range.

The SAM-IOT Development Board from Microchip has 256 KB of flash memory as well as 32 KB of SRAM that available to use on our thermostat application. It’s Wi-Fi module consist of a single band 2.4 GHz b/g/n IOT network controller as well as a pre certified module. It has the ability to connect to the Google cloud IoT platform and also feature an ATECC608A CryptoAuthentication™ secure element IC to securely connect to the cloud via Wi-Fi. The board features a MCP9808 Temperature sensor which can be utilized gauge a room temperature and is a vital piece of hardware we need to implement our thermostat application. It’s built in debugger has Auto-ID for board identification in Microchip MPLAB X. It also spotlight the peripherals such as the UART, the PWM and GPIO just to name a few. The SAM-IOT Development Board from Microchip is a little more expensive than its two counterparts at 45.99 the price is almost double the other but for all of its sophistication it could be money well spent.

Based on my evaluation of the three boards which are all qualified to implement our thermostat application my recommendation will be to go with Texas Instruments SimpleLink CC3220s board. The board is one of the cheaper boards but gives you the best wifi capabilities with the SAM-IOT right there with the SimpleLink CC3220s. While the memory size isn’t as vast as the other two it posses the crucial peripherals that are needed to successfully design the thermostat application.

**Resources**

Texas Instruments(n.d.) [www.ti.com/product/CC3220S?keyMatch=CC3220S&tisearch=search-everything&usecase=GPN#pps](http://www.ti.com/product/CC3220S?keyMatch=CC3220S&tisearch=search-everything&usecase=GPN#pps)

NXP. (n.d). Freedom Development Platform| MCUXpelresso SDK API Reference Manual <https://mcuxpresso.nxp.com/api_doc/dev/329/arch.html>

SAM-IOT WG DEVELOPMENT BOARD https://www.microchip.com/en-us/development-tool/EV75S95A#document-table