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Thermostat Report

The main purpose for this report is to compare three similar microcontrollers from three different manufacturers. This is to determine which one of the boards is the most appropriated for a thermostat. The three boards are the one we are using for the project been the SimpleLink from T.I. model CC3220S, the SAM-IOT from Microchip, and the Freescale.

From Freescale I found they have a board model K70 that is a used for smart thermostat applications. The demo kit can connect via ethernet or Wi-Fi. It says that the cloud agent for this demo provides firewall agnostic instant cloud connectivity. It is built for Freescale MQX RTOS v4.0.2 and uses Freescale PEG graphics library for the display. Is a 32-bitARM Cortex M4 MCU. Some of the features are:

32-bit ARM Cortex-M4 core with DSP instructions

120MHz maximum core operating frequency

256 MAPBGA, 17mm x 17mm, 1.0mm pitch package

1.71V – 3.6V operating voltage input range

1 Mbyte of program flash, 128 Kbytes of static RAM

From Microchip I found the model PIC-IoT. It supports Wi-Fi connectivity for smart connectivity. It has a 32KB of SRAM and 256KB of flash memory. It comes with Crypto Authentication for security. It includes a debugger.

*“The PIC-IoT WMx development board combines a powerful PIC24FJ128GA705 16-bit MCU, an ATECC608A CryptoAuthentication™ secure element IC and the fully certified ATWINC1510 Wi-Fi® network controller, which provides the most simple and effective way to connect your embedded application to the Azure IoT Hub via Device Provisioning Service (DPS).”*

From TI CC3220s we know it has an ARM Cortex-M4 processor, support Wi-Fi 2.4ghz. have a lot of security features like Secure boot, Device identity, Secure FW and SW update, Secure storage, Software IP protection, Networking security (WPA3). It ports 256KB of RAM and 1MB flash memory that is optional. Support different peripherals like:

McASP Supports Two I2S Channels

SD, SPI, I2C, UART

8-Bit Synchronous Imager Interface

4-Channel 12-Bit ADCs

4 General-Purpose Timers (GPT) With 16-Bit PWM Mode

Watchdog Timer

Up to 27 GPIO Pins

Debug Interfaces: JTAG, cJTAG, SWD.

Since we been working with TI CC3220S I would say it richer in features and provide the better security of the 3 I found. I didn’t find much about the other peripherals so I have to say the same again, the TI SimpleLink is the one I would choose for a thermostat application. It was a great experience working with the board out of one connectivity issue I had, but it was easily fixed. IoT devices like the thermostat application we created are in our daily life communicating between each other and learning more about them in the class was a new experience that I enjoyed.

Reference

Links:

<https://www.nxp.com/design/development-boards/tower-development-boards/mcu-and-processor-modules/kinetis-modules/kinetis-k70-120-mhz-tower-system-module:TWR-K70F120M>

<https://www.microchip.com/en-us/solutions/internet-of-things>

https://www.ti.com/product/CC3220S#features