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Project Report

Smart Thermostat

Course name: Iot-2

Course code: CSE210

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INTRODUCTION

The Azure SphereMT3620 smart Thermostat was made for a task for our course. The idea at the back of this smart thermostat was to have a agenda that can be configured for each day with any variety of cycles per day. We desired to track how long the furnace ran every day and document the sensor readings. As well, we used a motion detector to automatically activate and off the screen. The motion detector also puts the furnace right into a baseline mode (ignoring the set schedule) if no movement is detected for a fixed time frame. The thermostat can be manually set into a temporary mode or adjusted through the internet web page hosted on a Raspberry Pi 4. The Pi additionally saves the sensor readings to a database through Influxdb and displayed through Grafana. (The furnace at my duplex only has heating and the fan is controlled through it so I only had the option of implementing simply warmness, no fan nor AC) nothing too precise approximately this thermostat apart from the motion detection to be able to mechanically turn the furnace down to a base line temperature till movement is detected once more (this takes place after an adjustable duration, say 1-6 days).

We assume in which this task shines is on the net server aspect. The server not only saves and allows configuration of the schedule, however also affords a prediction of the inside temperature together with how long the furnace might run for. We take inside the local climate for stated day together with the schedule and run it through the model. This calculates what the inner temperature can be as well as when the furnace runs in

the beginning this became no longer too correct as We did not keep in mind how daylight can warmness up the house, once I added the UV index into the version this gave a fairly correct prediction to our surprise. Now the prediction is within 5-20 mins of the actual runtime, the component throwing it a bit off now, depends on how long we are domestic or have visitors over.

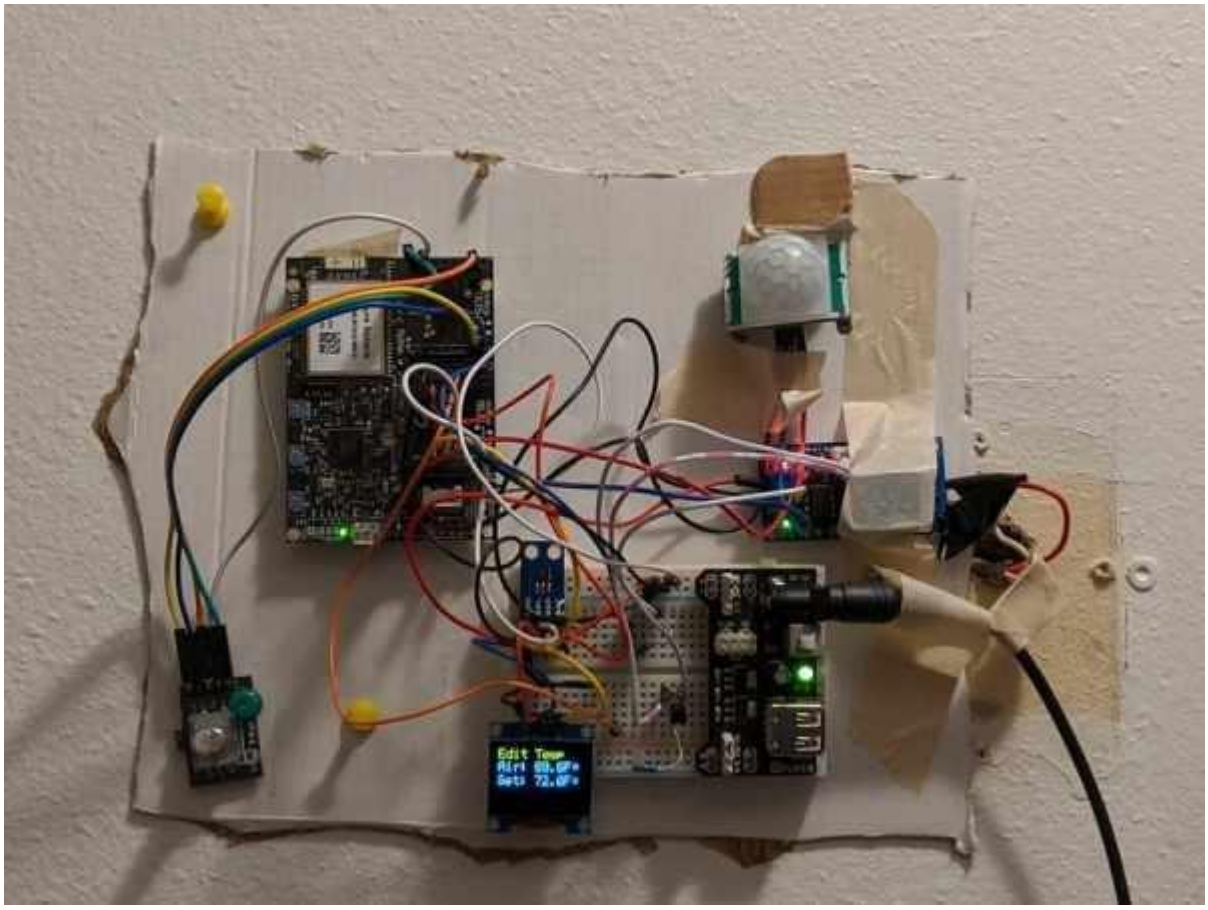
IMPLEMENTATION

A smart thermostat is an advanced thermostat that uses technology to offer more control over the heating and cooling systems in a construction.

- Users can adjust the temperature settings from anywhere with an internet connection, using their smartphones, tablets, or computers.
- Smart thermostats often have built-in sensors which helps the thermostat to make more informed decisions to adjust the temperature.
- They can integrate with other smart home devices and platforms. For example, they can work with voice assistants like Amazon Alexa or Google Assistant, allowing users to control the thermostat using voice commands.
- Some smart thermostats use geofencing technology to detect movements. They can then adjust the temperature accordingly to ensure comfort and energy savings.
- Popular smart thermostat brands include Nest, Ecobee, Honeywell, and others. These devices have gained popularity for their ability to provide greater control, energy savings, and convenience in managing home temperature settings.
- Smart thermostats can extensively reduce energy intake and decrease utility bills by optimizing heating and cooling schedules. They study consumer preferences and adjust temperatures primarily based on occupancy and outside factors, ensuring that energy is no longer wasted.

In summary, using a smart thermostat offers advantages such as energy savings, convenience, customization, and remote control, all while contributing to a more sustainable and comfortable living environment.

HARDWARE AND SOFTWARE REQUIREMENTS

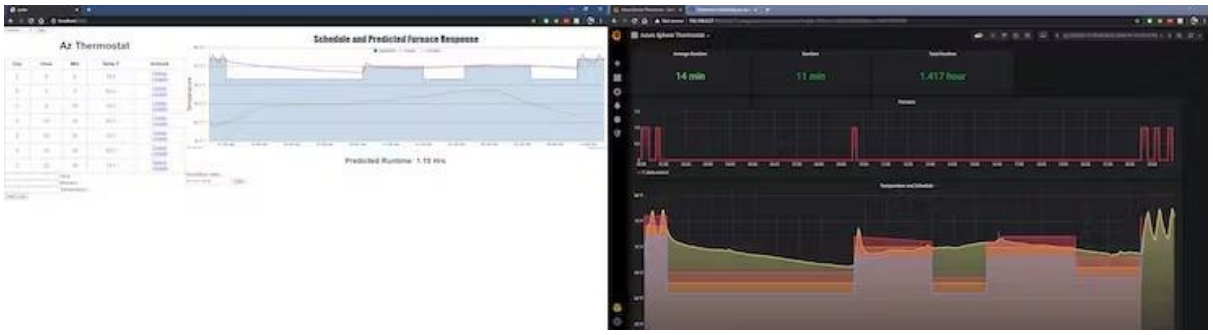


Components:

- Microcontroller: A microcontroller (MCU) serves as the brain of the smart thermostat. Here we have used Raspberry Pi B+
- Azure Sphere MT3620 Starter Kit
- Avnet Azure Sphere MT3620 Starter Kit
- 0.96" OLED 64x128 Display Module
- ElectroPeak 0.96" OLED 64x128 Display Module

- Texas Instruments HDC1080 Digital Humidity Sensor with Temperature Sensor
- PIR Sensor, 7 m
- Rotary Encoder with Push-Button
- Grove - Solid State Relay V2
- Seed Studio Grove - Solid State Relay V2
- Software apps and online services -Microsoft Azure

OUTPUT



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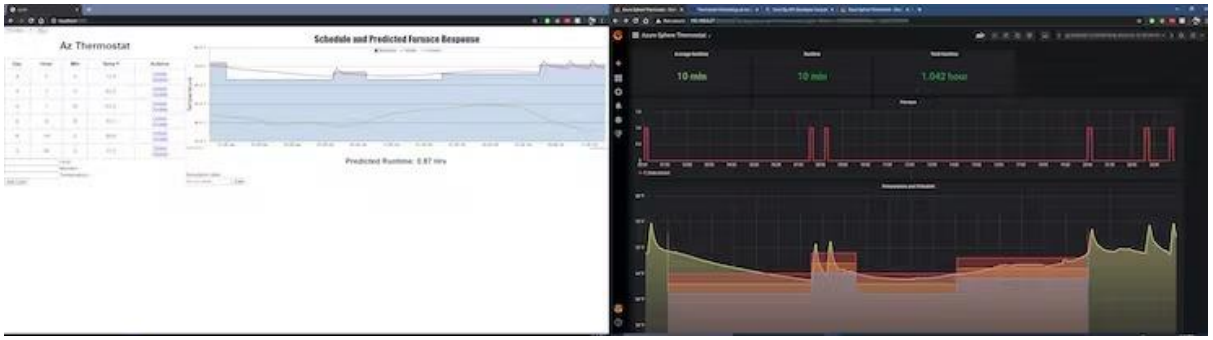

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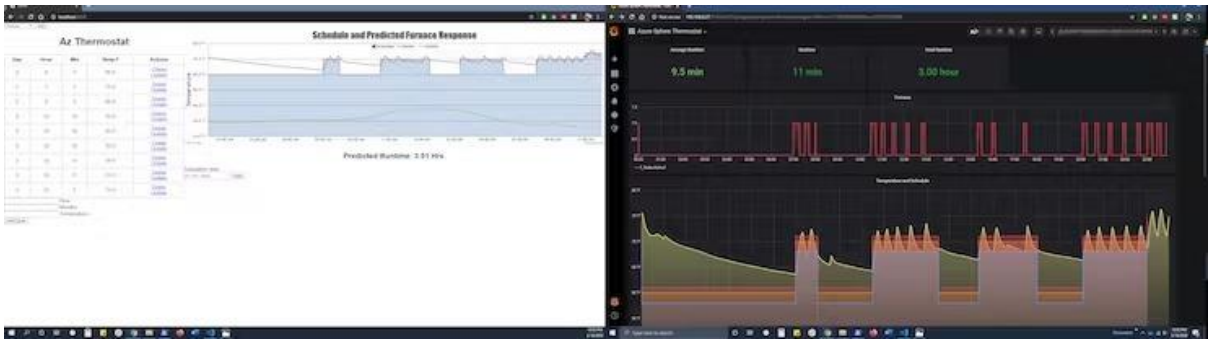

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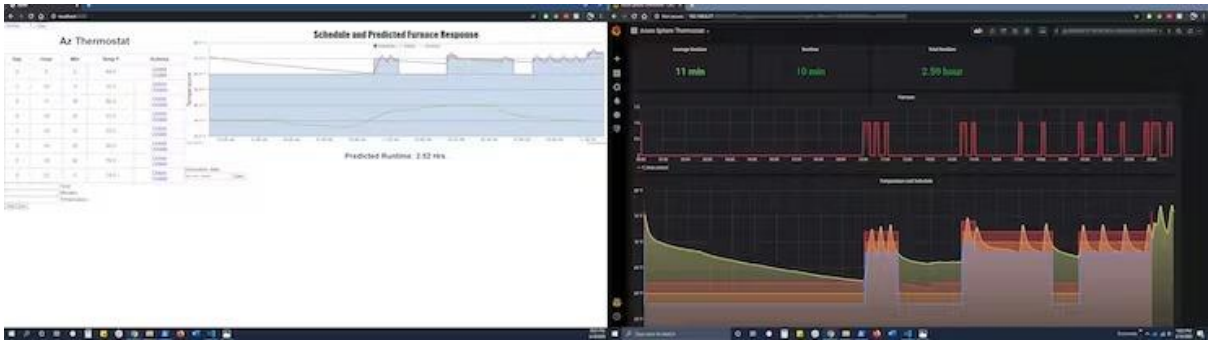

September 29,2023

CONCLUSION

In conclusion, smart thermostats represent a significant advancement in HVAC (Heating, Ventilation, and Air Conditioning) technology, offering various advantages to both residential and commercial users. These devices have the potential to revolutionize the way we control and manage indoor climate.

As the demand for energy-efficient and connected homes continues to grow, smart thermostats have emerged as a valuable tool for improving comfort, saving money, and contributing to a more sustainable future. With ongoing innovation, these devices are likely to play an even more prominent role in modern living, making them an appealing choice for homeowners and businesses alike.

REFERENCES

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