**CS 350 Final Project**

Mohammed Khan

Bachelor of Science in Computer Science, SNHU

CS 350: Emerging System Arch and Tech

Prof. **Bryant Moscon**

February 19, 2025

**CS 350 Final Project**

A thermostat is like a robot that follows simple rules to control the temperature in your house. We can describe how it works using something called a "state machine." This just means the thermostat has different "states" like being "on" or "off" and it switches between these states based on what's happening like if the temperature changing. Imagine the thermostat starting in the "off" state. When the temperature gets too low, it switches to the "heating" state which turns on your heater. Once the room is warm enough, it goes back to the "off" state. You can also manually tell it to turn on or off, which simply overrides the temperature sensor.

Thermostats rely on various types of "brains," such as Raspberry Pi, Microchip, or Freescale, to manage their operations. Each of these processors interfaces with components like temperature sensors and heating/cooling switches in distinct ways. For instance, the Raspberry Pi, it's like a minicomputer that can easily connect to things using simple wires. Microchip uses a special way of talking to its helpers, like the temperature sensor. And freescale has a special layer that helps it work with all its different parts.  
For cloud connectivity, thermostats often connect to Wi-Fi to enable remote control via smartphones or computers. A Raspberry Pi can utilize a Wi-Fi adapter to link to a home network and transmit data to cloud services like AWS. Microchip provides certain microcontrollers with integrated Wi-Fi capabilities which streamlines the connection process.

Each type of "brain" brings unique capabilities to the thermostat's software execution. The Raspberry Pi, for example, supports a full operating system and popular programming languages like Python which simplifies the development of intricate thermostat programs. Microchip delivers dependable and low power temperature sensors. Freescale complements its hardware with tools and support to aid developers in building thermostat software.

This framework helps programmers create state machines in their software which makes it easier to manage the different states and transitions of the thermostat. It provides useful features such as structure, triggers, transitions, event listeners, and persistence.