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Milestone Two Narrative

The artifact I chose for this milestone is the Raspberry Pi thermostat that I first created during CS 405. The project was built with a breadboard circuit, three tactile buttons, two LEDs, and a 16x2 LCD screen connected to a Raspberry Pi. The code uses a state machine to manage the thermostat’s three modes of operation: off, heat, and cool. It drives the LEDs and LCD to give the user feedback on both the current temperature and the system state. I originally wrote it to practice working directly with GPIO, sensors, and displays, but it has continued to be useful as a demonstration of embedded systems design.

I included this artifact in my ePortfolio because it brings together many elements that represent my skills at this stage in the program. It is grounded in low-level device control, but it also requires careful design in software to keep the system reliable and readable. The code showcases my ability to apply state machines in a practical context, to integrate hardware safely through Python libraries, and to build feedback loops that make sense for the user. In Version 2, I improved the software by restructuring it for better error handling, grouping configuration values for easier tuning, and adding safe fallbacks when the sensor or serial port fail. These improvements not only make the program more resilient but also show my growth in thinking about maintainability and long-term use instead of just making the system function once.

In Module One, I planned to meet the outcome tied to software design and engineering by focusing on resilience, clarity, and structure. With Version 2, I have done that by incorporating structured handling of failures, centralizing constants, and making the display and output logic cleaner. I do not need to change my outcome coverage plans; the enhancements line up well with what I set out to accomplish for Category One, while Categories Two and Three will still be addressed in later versions when I move on to algorithms and database storage.

The process of enhancing this artifact has been a reminder that small changes in design can have large impacts on reliability. Adding logging and safe exception handling forced me to think about how fragile the original version was when faced with hardware errors. I also realized that balancing improvement with stability is its own kind of challenge. As a CS student, I know how tempting it is to bolt on new features like smoothing or scheduling right away, but I had to remind myself that each improvement introduces its own risks, especially on a system tied to physical components. The biggest challenge I faced was making sure that my enhancements did not break existing functionality. Keeping the LED logic, button inputs, and LCD behavior consistent while layering on error handling and configuration taught me to be more methodical. It pushed me to approach the work the way I would in a professional setting by making changes incrementally, testing often, and documenting clearly.