**Southern New Hampshire University CS 350Module Six Project six**

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**Overview**

The project thus proposes a complete and optimized system integration of a digital temperature and humidity monitoring system using a Raspberry Pi, AHT20 sensor, LCD 16x2, and a push-button interface within the system. The developed system is designed to efficiently accomplish and meet five specific functional requirements in real-time.

**System Functionality**

The layout schematically divides the screen into two rows, the first of which displays the current date and time incessantly by means of the Python datetime module. Moisture and temperature data are being dynamically displayed in the second row. Temperature is shown in either Celsius or Fahrenheit, whereas humidity is in percentage. The AHT20 readings are interfaced over the I2C protocol using the adafruit\_ahtx0 library.

State machine architecture using the state machine library is implemented to manage the transition between Celsius and Fahrenheit modes. Switching scales is by a push-button connected to GPIO pin 24. This setup ensures a modular and maintainable codebase in which the state logic is separated from hardware interfacing. Real-time display updates are handled in a separate thread so that the updates are not blocking the main execution loop.

**Hardware and Software Integration**

The label of the library as such in such a way as it was connected via GPIO to the Cassandra board; custom GPIO tagging was developed in order to make it work properly. Under our control, the cleanup routines were so designed as owing to the color forces of the danger in the various moments of life. Using the gpiozero library in Python allows us to assure some reliability in the INPs of the button for managing purposes.

**Results and Observations**

It worked really well. The real-time display of temperature and humidity was coupled with a functioning button that toggled between Celsius and Fahrenheit. The LCD presented the time and the sensor data in the correct format, which was evidence enough to clarify that all indices were fulfilled by the project.

**Conclusion**

The project demonstrates a complete and thorough understanding of embedded systems, sensor integration, state machine design, and user interaction using Raspberry Pi. The solution is efficient and maintainable and meets all the requisite functional specifications.