UI and Network Integration for SMARTair HVAC Vent Controller

Sponsored by Hatchtank

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Abstract

The SMARTair HVAC vent controller system is a comfort-driven air conditioning system dedicated to lowering energy consumption costs. The vent aperture control system can automatically adjust the airflow in specific rooms. This level of air conditioning is conveniently manipulated through a room's user interface (present in each room). The master wall mount can adjust the vent control in any room and alter the system-wide HVAC controls through communication with Google Nest Thermostat. Our team worked alongside the Dampener/Networking team, the Sensor/Lighting team, and Texas A&M's team

Problem/Need

According to the U.S. Energy Information Administration, air conditioning usage accounted for 27% of total home energy consumption in the Southeast United States in 2015. Yan et al. Demonstrates the usefulness of smart vents they showed using computational fluid dynamics simulations that a smart register can reduce energy consumption by 30% compared to traditional air conditioners.

Design Concept

Our team designed and developed a user interface capable of controlling the lighting of a room as well as the air flowing through the HVAC system granting users more control. Our team created a LoRa network with the capability to send commands to a light controller and vent controller. Our UI also communicates with a Google Nest via Wi-Fi to receive the current thermostat level and set target temperatures.
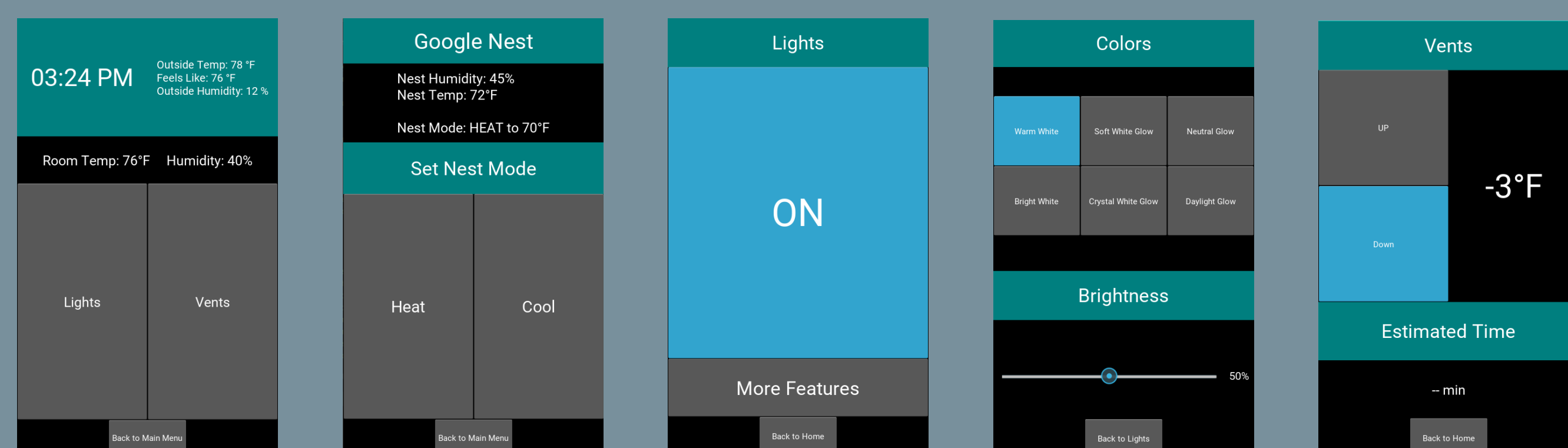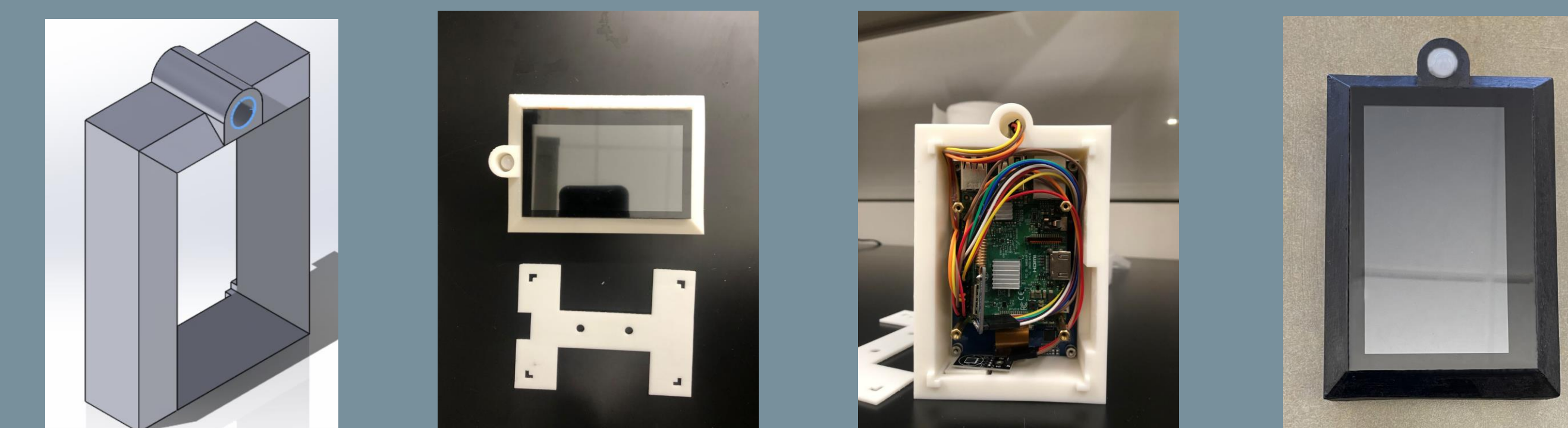
Functional Block Diagram
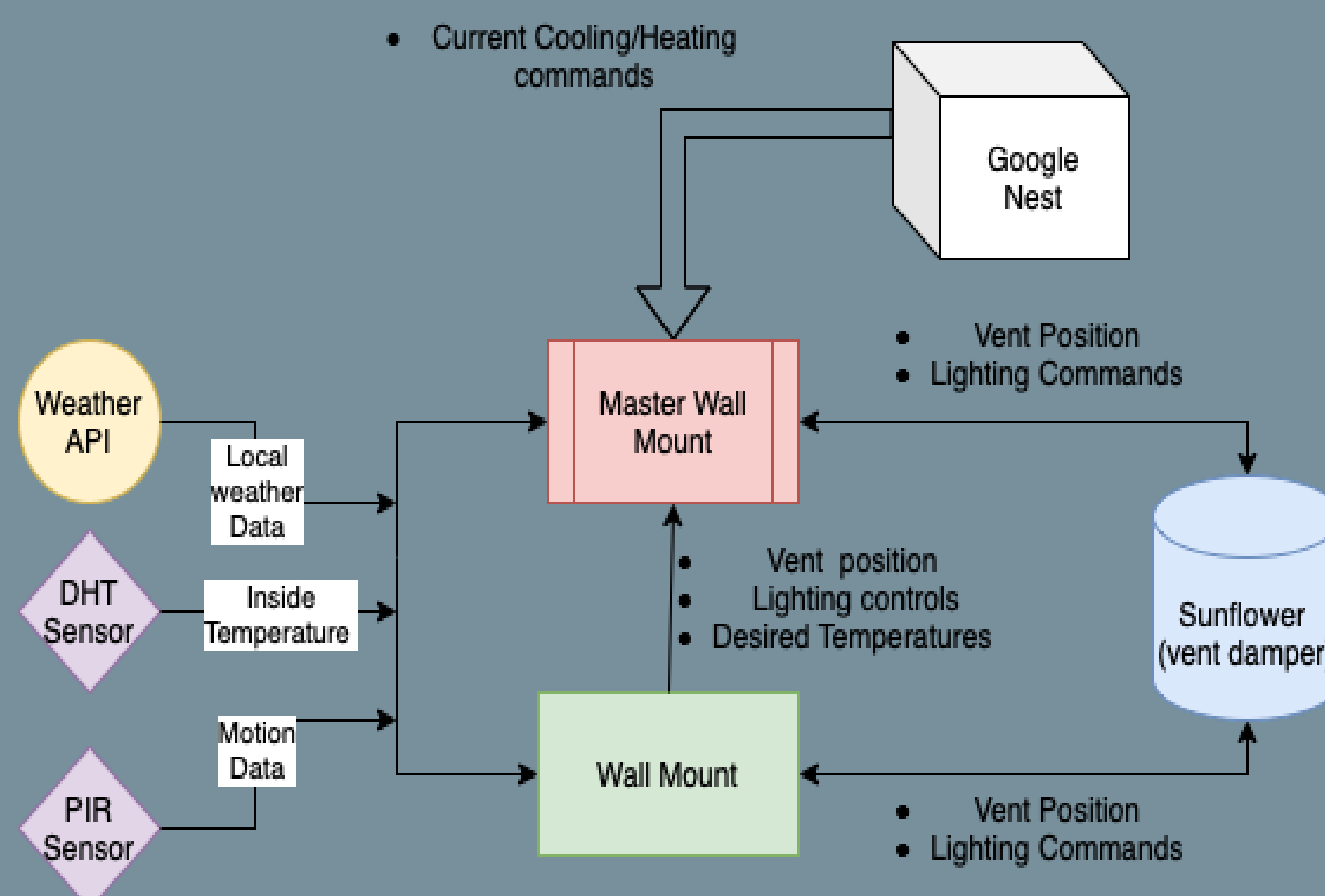
Software Flow Diagram
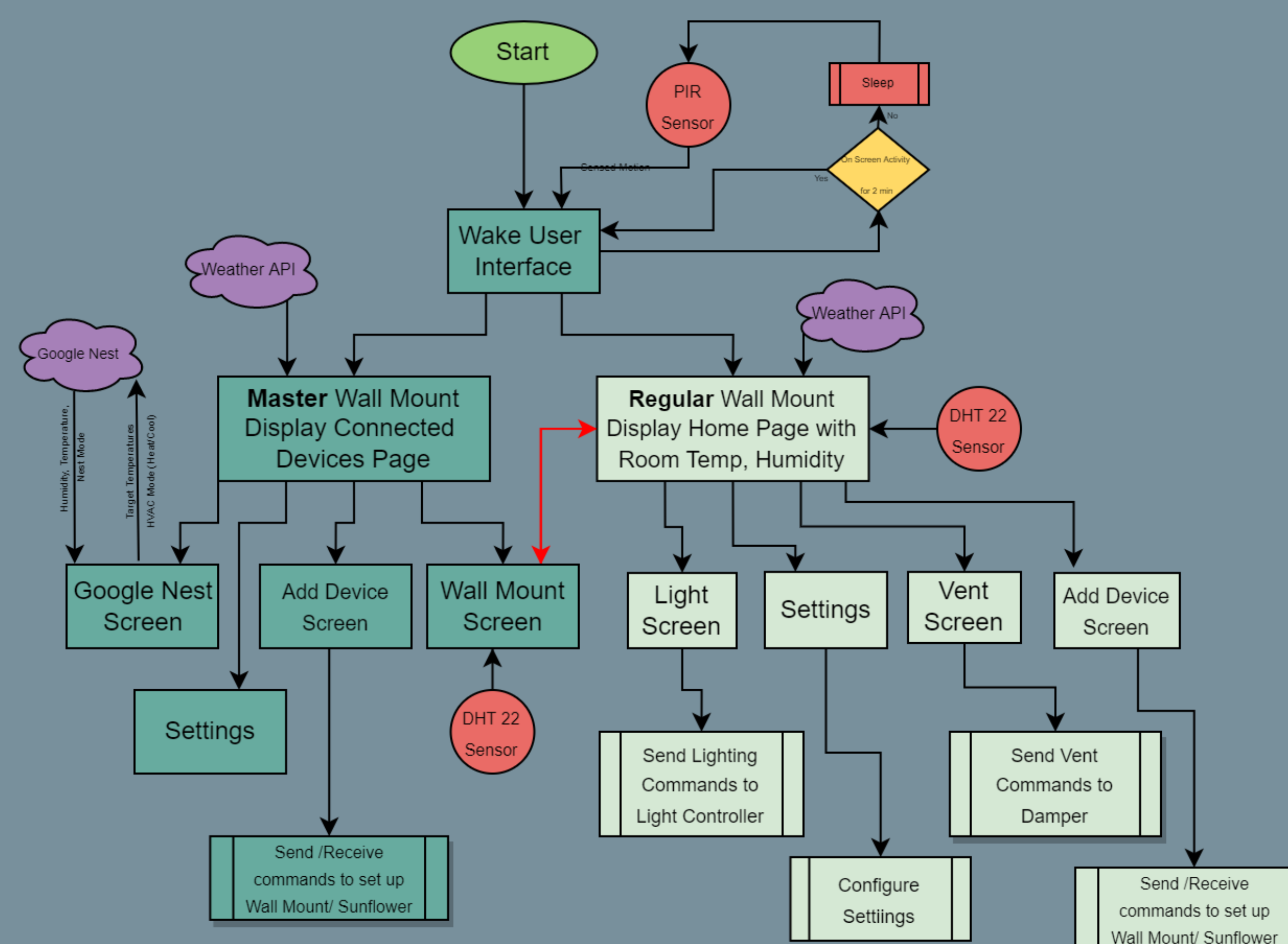
Components

- 4.3" Capacitive Touch Screen
- Raspberry PI
- DHT22 Sensor
- PIR Sensor
- RFM95W LoRa Transceiver

Conclusion

The implementation of the SMARTair vent Controller with IoT Integration project will be very beneficial for residents and the environment. By reducing the wasted energy used by the HVAC system, this will cut the cost of heating and cooling, while also providing superior comfort.

Acknowledgements

Team #5

Norris Redhi
Role: Project Manager

Enrique Navarrete
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Michael Squire
Role: Lead on Documentation