

## **EE / CprE / SE 492 Weekly Report**

October 17 - Oct 30

sddec25-08

Smart Home Control Unit for Energy Optimization

Faculty Advisor / Client: Md Maruf Ahamed

### **Team Members:**

- Alexander Ryan
- Mitchell Jensen
- Arie Kraayenbrink
- Gamage Binula Karunaratne
- Erik Schmidt

### **Summary of Work:**

During this period, the team focused on testing and troubleshooting the light dimmer circuit and advancing both the hardware and software components of the Smart Home Control Unit. Dimmer circuit testing was unsuccessful, resulting in a burnt-out IC chip. The team investigated potential causes, identified corrective actions, and ordered replacement chips for retesting. In parallel, software development progressed with setup of the Home Assistant integration and the React-based UI. The sensor PCB design was finalized and prepared for printing.

### **Work Period Accomplishments:**

- Tested the dimmer circuit; initial tests led to IC failure, prompting further analysis and reordering of parts.
- Conducted LTSpice simulations to better understand the dimmer circuit and ensure proper interfacing with the ESP32 microcontroller.
- Continued development of the system's software pipeline, integrating Home Assistant with the React UI for device monitoring and control.
- Finalized the design of the sensor PCB and prepared to coordinate with ETG for manufacturing.
- Began design and layout work for the UI, including a floor plan mockup and power-saving calculation features.

- Progressed HVAC control hardware integration and setup within the Home Assistant environment.

**Plans for Coming Week + Action Items:**

- Alexander Ryan- Add floor plan to “mock out” house display for UI, cost-saving calculation if time
- Mitchell Jensen - Continue testing dimmer circuit/ implement fixes once chips arrive
- Arie Kraayenbrink- Continue working on the HVAC hardware and integrating it into Home Assistant.
- Gamage Binula Karunaratne- Continue testing the dimmer circuit. Run simulations on the dimmer/ESP32 connection.
- Erik Schmidt- Talk to ETG about PCB printing for finalized sensor design.

**Pending Issues:**

- Alexander Ryan- No issues
- Mitchell Jensen- Dimmer Module chip failure. New chip order with backup pending arrival
- Arie Kraayenbrink- No issues
- Gamage Binula Karunaratne- No issues
- Erik Schmidt- No issues

**Individual Contributions:**

Team Member	Contribution	Weekly Hours	Total Hours
Mitchell Jensen	Continued testing of the dimmer module. Determined potential reasons for failure and solutions to test once hardware arrives.	6	16.5
Arie Kraayenbrink	Ordered parts. Assisted in testing the light dimmer. Continued work on the HVAC control.	5	23
Binula Karunaratne	Continued testing the dimmer with the team. Did research and worked on running a SPICE simulation to determine how to connect the dimmer to the ESP32.	7	16.5

Erik Schmidt	Continued and finalized design for sensor PCB. Talked to team and advisor about PCB printing during weekly meeting. Will discuss printing options with ETG early next week.	5	16.5
Alexander Ryan	Set up a pipeline for deployment to the HA UI React app. Implemented React infrastructure and setup for local development. Created a git repo for local development. Pushed new 'skeleton' for UI look and ideation on potential new features (Cost/Power saver calculation, floor plan view, etc.). Demo'd to the advisor and working through feedback and advice.	6	20.5