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*CEE 6110 Assignment #2 Datalogger programming and Data collection*

**Measuring correlation between building interior and exterior temperature to estimate heat leakage**

**Introduction**

Most of the times, a room in a building doesn’t match the thermostat set temperature due to lack of temperature sensors within that room to inform the thermostat controls which usually just has one temperature sensor within it and sits in the living room. As a result, the room temperature may remain uncomfortable and match the external temperature. This assignment looks to see if such a disparity exists between the room temperature and thermostat set temperature and if the room temperature correlates with the external temperature.

**Methods**

Arduino is set up with the temperature sensor in a second floor room of a building in Logan, Utah where the thermostat is set up in the first floor with its sensor. The scan interval is every minute and the record interval every hour. The time support period is 24 hours, spacing and extent ‘x’ and ‘y’ respectively. External weather data is obtained through an API from Dark Sky which provides hourly data going back in time. That is one of the reason for the chosen recording interval every hour.

**Results**

Disparity exists between room and thermostat temperature. Also a correlation exists between room and external temperature.

**Conclusions**

**References**

**Appendix A: Figures**

Fig 1: Geographic location, plan of building

Fig 2: Pictures of existing thermostat, Arduino setup

Fig 3: Time series data between room, thermostat and external temperature

Fig 4: Scatter plot, correlation between room and external temperature

**Appendix B: Python code**

Dark sky weather endpoint

<https://api.darksky.net/forecast/28bbca577244c08e371c215bf3c75a5f/41.7352158,-111.8485149>