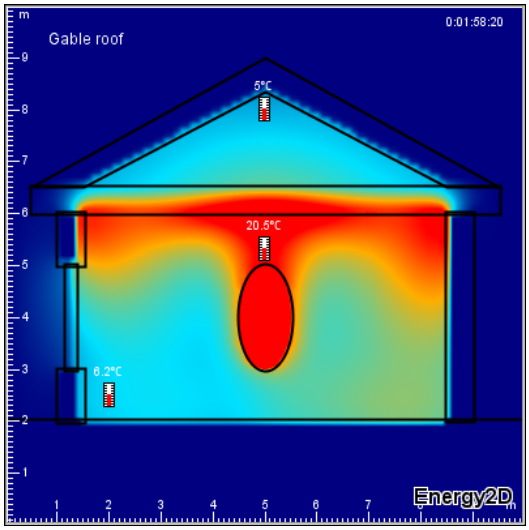
Home Heating 3D Simulation



Abstract:

This project is going to attempt to model the interior of a home based on a variety of factors. There will be interior heating and exterior temperature that are both constantly affecting the value of interior temperature around the house. Thermal insulation between the outside and inside will also play a role. To simplify the model, the house will be a simple cube with consistent insulation across all six sides.

This project was picked because I have been interested in smart home applications for a while now. I have developed my own smart home communication device with a raspberry pi that can control the lights. This project presents itself as a potential fun upgrade to the current system.

Schedule:

Week 1: Nothing because I am gone half the week
Week 2: Finalize understanding of formulas and map out relationship between all (info flow)
Week 3: Pseudo Code the math
Week 4: Code it up and ensure that formulas are working correctly and can spit out data. 2D.
Week 5: Spring Break
Week 6: Work out modeling in 3D space
Week 7: Speed up code with parallelization
Week 8-10: Things will probably break and/or go horribly wrong. This is time to fix it.
Week 11: Write up paper. Visualizations. Make it look pretty.
Week 12: Final Review and turn in.

Software Exploration:

I am currently not familiar with any optimization software. This will be explored as I learn new content in class. However, I will be using a combination of python and c++ to do much of my coding and visualizations will be done either in python or separate software. Subject to change.

Benchmark and optimization:

Currently I believe that the math is going to take up most of the time in the code. As a result, all focus will be on optimizing the math through specific packages, through parallelizing as much of it as possible. Again, I do not have specifics on how this will be done, but this is the rough idea. Visualization will probably take quite a bit of time, but I am not focusing on speeding that aspect up.