

Project 2 Reflection

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I'm proud of the fact that I think our model encapsulated most of the relevant factors to the extent feasible without descending deep into many rabbit holes. I think that given the question we asked and the assumptions we made, it answered the question thoroughly and accurately. In particular, I think our model of insolation was relatively sophisticated and—apart from one bug we discovered too late to fix—was as accurate as was feasible. I'm also proud of how we rendered our results: I think we were able to distil our findings down to one heatmap, which made them easy to understand.

However, our model wasn't perfect. In particular, I'm intuitively skeptical of the claim that it a well-designed thermal house could remain within $20^{\circ}\text{C} \pm 4$ all year round in Needham, MA. While I haven't lived through a full New England winter yet, the few months I've been here have made me suspicious of this claim. I think this incongruity may be due to two things: First, our model doesn't take into account weather, most significantly snow. Second, our model didn't take into account solar intensity, but rather averaged it all year. I think that the addition of these two factors into our model would have likely substantially altered the result, leading to a more accurate outcome. Given more time, I would first investigate these factors. I would also, obviously, fix the solar insolation bug, which basically fails to account for the fact that there are only windows on one side of the solar house, meaning that insolation before noon and after noon are equal, when they shouldn't be.

I think this teaming went much better than Project 1's did, because my partner and I were both better matched in programming ability/concept mastery and better matched in what we were looking to get out of the project. This made it much easier to divvy up the programming work to be done in parallel, which drastically increased our velocity. Additionally, the closer matching of goals for the project made it much easier to have conversations like: "[some part of our model] is definitely wrong. Do we figure it out properly or call it good enough because all models are wrong and the project is due in [not that long]." That's not to say we totally phoned this project in—one of our learning goals was to produce a product we were proud of, and I know that I'm certainly proud of how our project turned out. However, it did mean that, when we realized that we forgot to account for solar intensity at 11PM on the day the project was due, we felt comfortable saying that we'd learned what we set out to learn and that wasn't a thing to spend 3 hours worrying about.

I think it would have been beneficial to spend a couple of minutes at the beginning of the project talking about how we behave when we get stressed. This wasn't a huge deal, and we made it through fine, but there were some times where I couldn't tell if Bill was actually having a problem or just was stressed. (And I'm confident the same thing was true in reverse.)

My four learning goals were (copied verbatim from Miro):

- "Successfully Complete Project to Requirements"
- "Go beyond the bare minimum to explore the model in some interesting way"
- "End up with a well-designed and executed final product"
- "Spend a reasonable amount of time on the project"

I feel like I was able to fulfill all of these goals to a satisfactory extent. We delivered a

product that met the requirements. While it wasn't perfect, I think it was well-designed and well-executed. Our model wasn't the simplest possible model of a solar house (particularly if you factor in Pass/No Record). We included things like outside air temperature, angle of the sun, and more. And, finally, while we spent a lot of time on this project, it felt like a reasonable amount of time to put into the project for the requirements at hand and the final product we produced. The biggest change I would make for next time is spending more time thinking through the entire process and doing top-down design ahead of time, which I think could of helped us flesh out our idea better.

With the caveat of the possible inaccuracies listed above, I think our model could be used to help design passive solar houses or to simply help optimize normal houses to be maximally solar efficient. This has the potential to significantly reduce energy consumption and greenhouse gas emissions, which is a priceless benefit to society and the world at large.