Sundance Weekly Progress Report

Week 4

13.11.2022

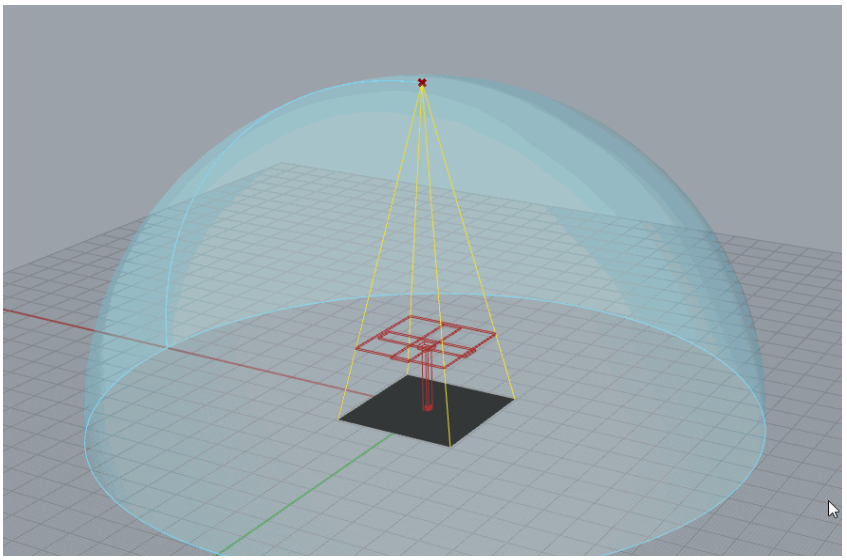
1. Previous Week's Overview

Last week, we revised the objectives; the main concern was properly separating the project objectives since it might favor some objectives more than others mistakenly. After separating, we choose two projects with the highest points and the most number of ideas. It was selected as the shadow-fixing intelligent canopy. We later continued our system-level research and gathered ideas on the miro board. Lastly, we started working on the proposal report and created a template to start working on the paper.

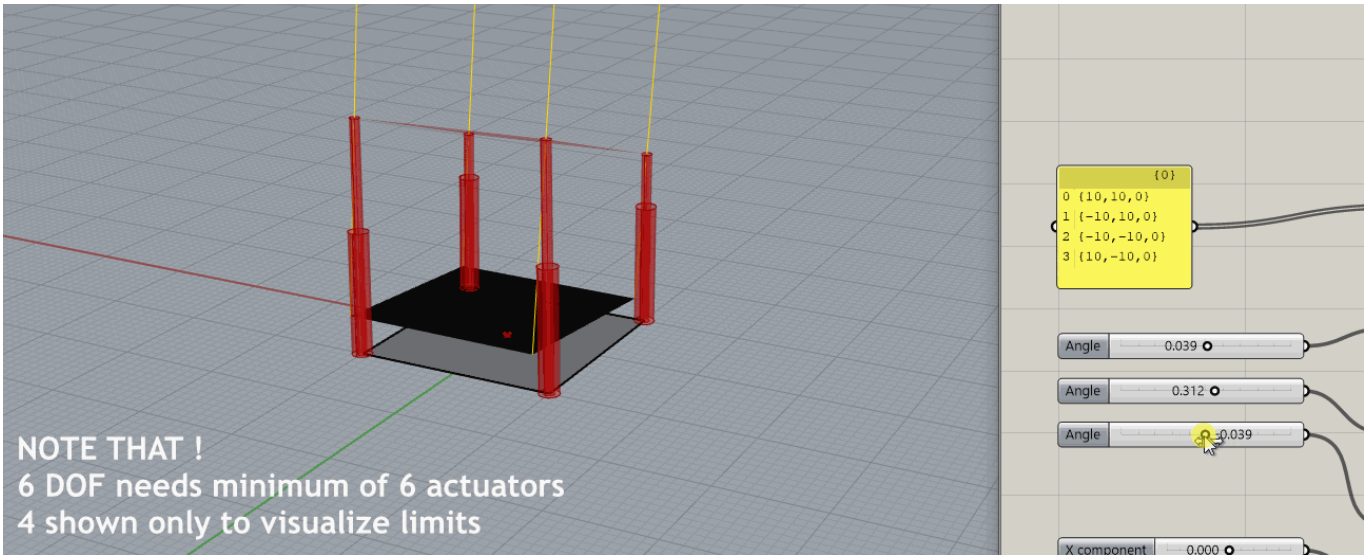
2. This Week's Progress

Planning and Simulations

The most crucial part that is highly decisive on the project's direction and the "bottleneck" of the project is the structural design. We tried to come up with different initial structures and wanted to evaluate these primal constructions in the simulation environment created last week. The evaluation of different structures leads to new ideas, and they also need to be tested. Last week the sun part of the simulation is written and the sun can be placed anywhere in the scene with the limitations coded. For this week, we focused on mainly two mechanisms. The first one is the XY platform which enables just translation on three axes. The outcome of this structure can be summarized with, it is enough to keep the coverage the same, but the move on these axes needs to be quite large.

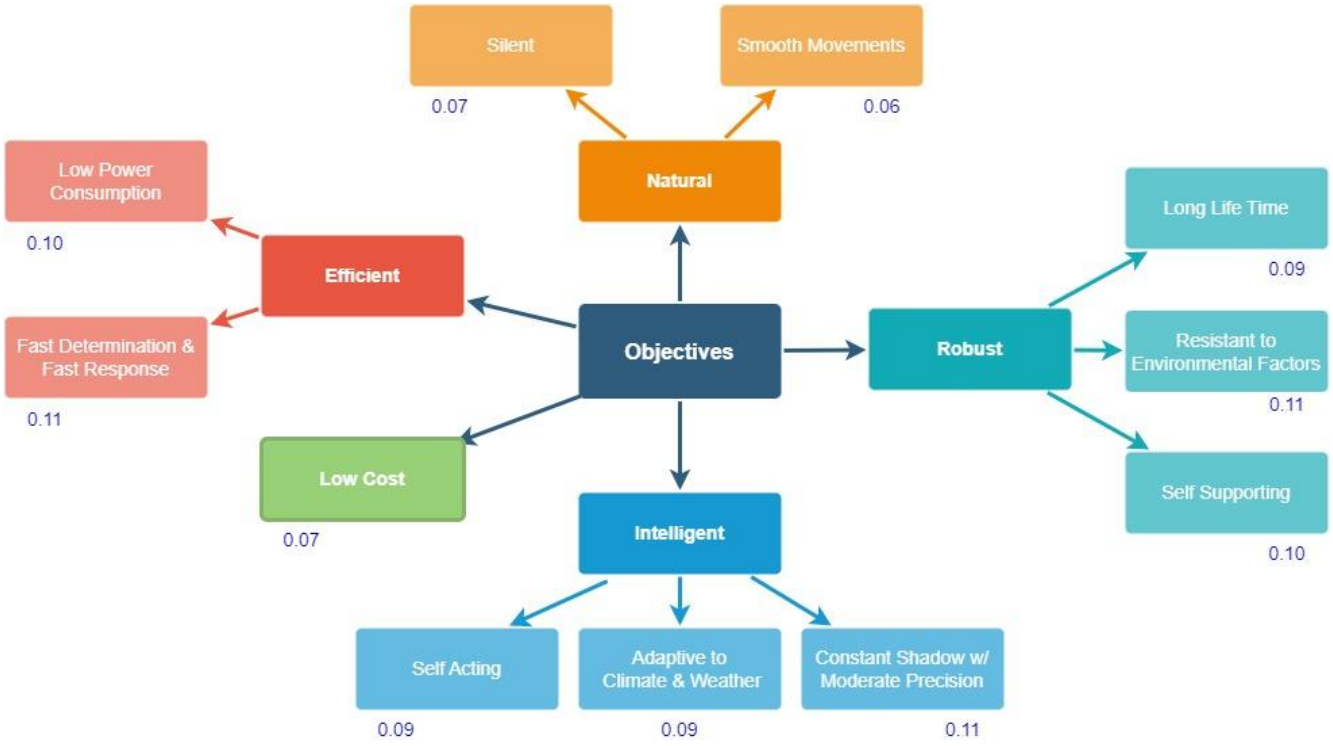


The second mechanism is some sort of Stewart platform where the flat surface is mobilized in 6 axes. This approach seems to be again sufficient to fix the shadow with less actuation distance.



Proposal Report

As we decided on the scope and the technical requirements of the project, we made an objective tree and determined its weights by voting for each objective and normalizing the values. The objective tree can be shown below:



Our solution procedure includes the initial design of subsystems, implementation of basic features of the subsystems, implementation of the critical subsystems, system integration, and finalizing the project. In the first step, the initial design of subsystems, actuators, sun detection system, coverage detection algorithm, and structures will be done. In the second part, we will implement the basic features, such as control algorithms on MCU. Then, in the third phase, we will build up subsystems and test them. In the fourth part, we will integrate our subsystems and test the overall system. Finally, we will finish up the project.

Additionally, we prepared a Gantt Chart that lasts till the end of the project. This chart consists of the initial design of subsystems, implementation of the basic features and subsystems, implementation of the critical subsystems, system integration, and finalization of the project.

Task Assignments

In our solution procedure, we had four initial tasks which could be shared among the team. We shared the tasks as follows:

1. Lighting Simulations to Compare the Suggested Structures - Özgür, Işık
2. Experimentation with Basic Coverage Detection Algorithms - Furkan, Gamze
3. Design and Simulation of a Sun Detection Subsystem - Feyza, Furkan, Özgür
4. Simulation of Basic Control Methods to Drive the Actuators - Işık, Gamze, Feyza

The tasks are shared considering the skills, experiences, and current interests of the team members. Also, each task is shared between multiple members so that we can enhance the process through collaboration. This will also help each team member to get to know the technical details of multiple subsystems.

3. Next Week's Plan

Next week, we plan to advance key subsystems of our project, usually through testing and research. As we discussed above, we shared the to-do tasks this week. Our next week plans to compare the chosen structures by simulating lighting, finding and trying coverage detection algorithms, choosing the sun detection system and simulating it, and lastly, with basic control methods driving actuators in simulation. As we gain experience with the basic concepts, we will choose and order the critical parts for the subsystems so that we can start implementing the simple designs in the next step.