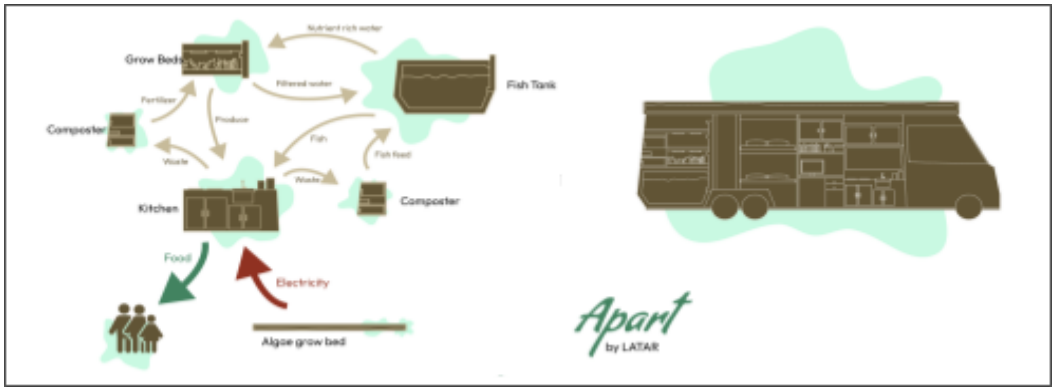
CEE 176G/276G SUSTAINABILITY DESIGN THINKING SPEC SHEET

APART

LATAR

Team Member Names: Alejandra Santos, Tom Shahar, Albert Tan, Rowan Winchell, Lateifa Alsamahi

Design Date: Wednesday, August 14, 2024



CONCEPT STATEMENT

The APART motorhome uses an algae-based biofuel grown on the roof. An aquaponics system recycles waste and provides food for the residents. APART communities can meet and exchange food varieties. Alternatively, APART can be used as a clean home powering system.

MVP FEATURES

- Recreational Vehicle
- Integrated aquaponics food production system
- Algae-based biofuel technology

MVP+ FEATURES

- “APART-Together” shared community in nature
- Greywater recycling system
- Alternative home powering system

PROBLEM STATEMENT

Declining environmental systems and public health from on-the-grid living causes people to feel stuck and stressed.

COMPOSITE CHARACTER PROFILE

Idle Ida: 35 years old, hates the noise of urban life, vegetarian; passionate about yoga, meditation, and traveling; 1 kid.

POV STATEMENT

Ida needs a flexible environment that balances relaxed, natural vibes with safe, cozy convenience because she wants to embrace a healthier lifestyle through meditation but without abandoning her family.

Algae Powered Aquaponics Recreational Truck (APART)

DESIGN SPECIFICATIONS

- Total Length:
  40’ (12m)
- Living area:
  26’ (7.9m) length
- Aquaponics system:
  12’ (3.7m) length
- Width:
  8’ 6” (2.6)
- Height:
  12’(3.7m)
- Algae bed:
  40’ x 7’ (12m x 2.1m)

RESOURCES USED

(Recycled or Renewable)

- Aluminum
- Steel
- Glass
- Wood
- Water
- Crop seeds
- Fish eggs

POWER REQUIREMENTS

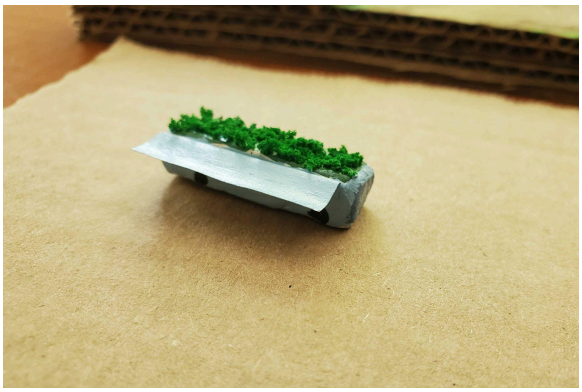
- Algae biofuel
- Supplemental Solar Power

OTHER FEATURES

- Bunk beds
- Kitchenette
- Washer and dryer duo
- Bathroom with toilet and shower
- Additional storage

SUSTAINABILITY

APART uses an algae-based biofuel, which sequesters CO2 during its growth cycle, resulting in net negative emissions. Food is also produced independently through the aquaponics system located in the back. Through this, a multitude of plant and fish varieties can be grown, either to cook soon after or to be shared with the APART community. Any waste can then be reincorporated into the aquaponics ecosystem. To ensure sustainability throughout the life-cycle of the vehicle APART strives to use entirely recycled materials in its construction.



DESIGN THINKING SELF-REFLECTION

Personal Self-Reflection: Road to Success
Laura Alejandra Santos

When first introduced to design project three in class, I felt overwhelmed by the number of prompts for ‘High-Efficiency’ community spaces and the different ways the options could be turned into ideas and designs. I saw my group assignment and became even more nervous as I had never worked with those individuals before, but those thoughts were quickly dispelled. My group consisted of the most hardworking individuals I could imagine, and we all clicked instantly. Once we picked and reviewed our three options for the project we all chose the same category of ‘Off-the-grid’ without hesitation and got to work.

Our idea shifted quite drastically from our original pitch in class; we went from a ‘build-your-own-aquaponics kit’ to a recreational vehicle that was powered by algae and had an integrated aquaponics system. To ideate our final project, we did almost a ‘Post-it’ method of thinking, where we all sat down and began to say our ideas out loud with no regard for normalness. By using a tactic that had the same aim as the ‘Post-it’ method, we were able to widen the scope of our creativity for the project. After that, just like in design project two, communication was key. Because of the limited time, we all had to work quickly and efficiently, so I mainly took to Slack to keep the team updated on my designs, models, and writings to ensure there were no miscommunications.

Overall, this was a fun project to quickly merge all of the class concepts.

DESIGN THINKING SELF-REFLECTION

Personal Self-Reflection:
Tom Shahar

First and foremost I want to give special credits to my group for this project! I think we all brought something important to the team and I really appreciate everyone's contributions especially in the ideation stage. When I saw the "Off-the-grid" topic I had a very particular vision in my head, but that changed so drastically multiple times over the course of the project in very productive ways. We began by thinking of an off the grid community with a number of different features, but it was clear that there wasn't really a unified idea that got at the theme in a way we all liked. As we moved through the design thinking process, we each had ideas, whether it was ways to make it more futuristic, more revolutionary, more sustainable, or more human centered. The idea for a RV was able to unify each of our ideas, and I think we did a good job representing everyone's goals and visions.

Another thing I appreciated about this project was the opportunity for research. While this didn't end up being a huge portion of the final deliverables, I did a lot of reading about algae-based power, aquaponics, and self-contained ecosystems. This opportunity was super enjoyable and a great way to nail home the 'sustainability' aspect of the class. I really feel like I learned a lot about both sustainability and design-thinking from this project.

DESIGN THINKING SELF-REFLECTION

Planning the Unpredictable
Albert Tan

I love how the design project was set 30 years in the future.

The unpredictability was challenging. The world is changing at an unprecedented rate, so imagination of the future environment is necessary to identify potential improvements. The setting redefined the observation phase in design thinking. We had to take one step further to make bold assumptions based on our observations, experiences, and knowledge. The hole-in-the-paper approach made sure we didn't forget the details when putting these aspects together. Ultimately, we aimed for a comprehensive yet careful scenario that best balanced creativity with practicality.

The unpredictability was empowering. The sustainable options today seem to be so limited; nearly everyone included solar panels or artificial intelligence in the previous two design projects. The futuristic perspective allowed us to utilize potential solutions that seem unattainable today yet quite promising in the future, namely the algae system. The setting really helped the ideation phase in design thinking: it once more reminded us that we should not give up crazy ideas too early. Everything might be possible in the future, and we need iterating prototypes to find out what's really within reach.

The unpredictability also raised human-centeredness to a new level. What people needed 30 years ago was quite different from what is valued today; what is valued today will deviate significantly from what will be in the trend 30 years later. Our solution was to focus on the universal wish to seek peace in the natural environment as the pivot for our design.

DESIGN THINKING SELF-REFLECTION

Personal Self-Reflection: Avoiding Potholes and Racing Home
Rowan Winchell

The time constraints for design project three led to a drastically different process than the previous two had. The rapid pace forced many of the tasks to be completed simultaneously rather than in succession, as it had mostly been done in my earlier projects. However, it felt very achievable. Our team was extremely efficient at planning, completing the tasks, and communicating.

There was a sense of urgency that drove our team on from the very beginning. We quickly agreed on the domain of our project and set out brainstorming our preliminary concept. We agreed on the off-the-grid domain and something involving aquaponics, though our original idea was somewhat dull. Remembering the revelation that my team and I had in DP2, I suggested coming at the concept with a different perspective in our next meeting. I explained my desire to travel in the future and presented some possible routes we could take with the project. The others were extremely receptive and it was then that Tom proposed the motorhome concept we used.

My experiences in DP2 involving changing my perspective on how to approach design, allowed me to more easily identify when our concept was growing stale later in DP3. Additionally, I knew what to look for when our team agreed to rethink it. It wasn’t hard to convince them to do so as they also seemed to have been considering it, yet my actions helped initiate that process. Overall, this class has helped me to identify issues both in the world and with my own thinking, and I am thankful for the opportunity to work on both!

DESIGN THINKING SELF-REFLECTION

Personal Self-Reflection:
Lateifa Alsamahi

I want to extend my heartfelt thanks to everyone in our group for the incredible work we did on the “APART” project. Working with such a dedicated and talented team made this experience both enjoyable and enriching. Together, we designed an entirely self-sufficient community, focusing on minimal land use and achieving zero emissions. Our concept revolves around an aquaponics food system and renewable energy sources, creating a self-contained environment with modern appliances and essential outside communication and health systems.

Participating in this project has been a profound learning experience. From conceptualizing a self-sustaining community to understanding the benefits of subsistence living, I have gained valuable insights into sustainable living and collaborative problem-solving. Our modular, premade system aims to lower barriers to entry for those interested in this lifestyle, offering a pathway to healthier living and a stronger community bond.

I also want to express my sincere gratitude to Dr. Glenn and Dr. Colin for their guidance throughout the course. Your expertise and support have been instrumental in our success this summer quarter. Thank you for fostering such a dynamic and engaging learning environment.

In summary, this project has not only been a testament to our collective effort but also an inspiring glimpse into a sustainable future. Thank you all for making this journey so rewarding.