

## Design Evaluation Report (M6X01244-CW2)

I.G.-Z4 Pod

By Ellie Shutt (1800097)

Word count (excluding bibliography and table of figures): 3255

Global stress and anxiety levels are growing as the population works longer and harder. This project aims to tackle this taboo subject whilst designing an autonomous experience that calms the mind and enhances the senses.

I.G.-Z4 is an autonomous pod for the year 2050 that captures the essence of Ikigai and Zen, whilst enabling the occupants to create a tailor-made experience that promotes positivity and connectivity with nature. Inspired by Japanese culture and Zen gardens, the I.G.-Z4's interior aims to bring the outside in by using natural and organic materials.

In keeping with traditional Japanese colour schemes, the interior is designed with everyone in mind. Promoting equality and inclusivity, this project does not discriminate against age, gender, physical or mental health.

The current global climate is testimony to how important having a positive mind set is. The human mind is just as important as the body, and we must cherish and care for it.

### Developing the proposal

The beginning of the year included extensive research and design ideation, in which I presented three different proposals. The chosen proposal – an autonomous pod – proved the most in keeping with my personal brief which was to decrease the levels of stress and anxiety caused by work.

Unlike previous projects, where I have used sketching, photoshop or orthographic drawings to visualise my ideas, I decided that I would create 3D sketch models in alias to give a quick but accurate representation of my ideas. As a result of this, my development of the pod exterior and interior was done in alias as opposed to an orthographic drawing.

The initial proposal for the pod was interior centric, with aspects of the exterior being used for the floor plan and overall height/head clearance. However, as the process continued the project then became an interior and exterior led project. As shown in figure 1, there was not much consideration into the exterior of the pod for the initial proposal at the start of the year. Developing the project to become a more cohesive concept with an exterior and interior, resulted in some changes in the overall shape and package of the pod.

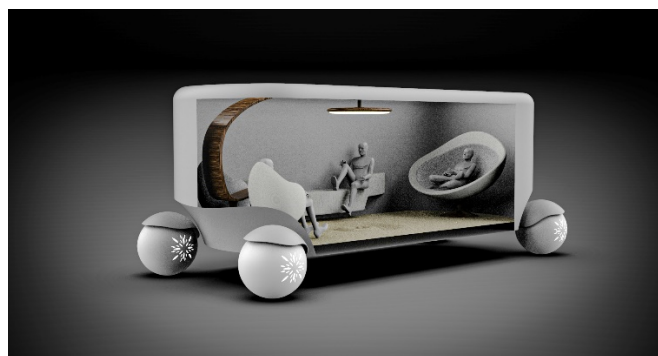


*Figure 1 - Initial proposal, created in alias, rendered in Keyshot (2020)*

The areas that needed further development and adjustments included the proportions of the pod, the surface structure and shape, the package layout, adding details to the exterior and adjusting aspects of the seats.

During the early stages of this proposal, the proportions were loosely based on a minibus. However, when analysing the overall appearance of the pod there was some obvious practicality issues such as the ground clearance, disabled access, and the wheelbase.

As you can see from the image above (figure 1), the pod has a relatively high ground clearance. This would have made it difficult for someone with a disability or even a child to access the pod. In addition to this, if the ground clearance were to remain as high as this then the pod could be perceived as aggressive. This is something that would be highly contradictory to the purpose of the project.

As indicated earlier, this project was initially an interior project. Therefore, having any form of disabled access to the pod was never considered when designing the concept at the start of the academic year. As the project developed to include the exterior equally, disabled access was something that would need to be taken into account. In order for this to be possible, I decided to include a ramp that could come from underneath the pod that would allow people with mobility issues to use the pod with ease. This combined with the lowered ground clearance would create a much more inclusive project for anyone to use.

In addition to lowering the ground clearance, a shorter wheelbase also needed to be considered. As you can see (figure 2), the wheelbase is quite long. However, I felt that the overall length of the pod was adequate to allow space for the interior. As a result of this, I decided to make the wheel size larger. This would not compromise the overall

length of the pod; however, it would result in improved proportions at the small cost of losing a little interior space – although less than what would have been lost if I were to shorten the whole pod.

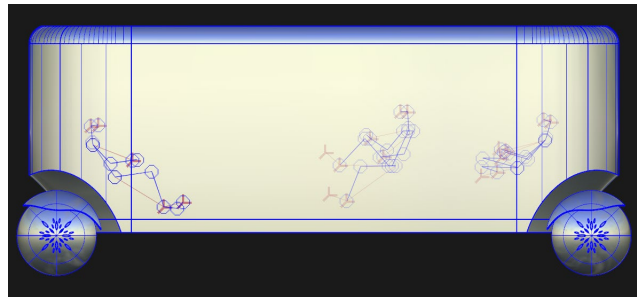


*Figure 2 - Pod exterior proposal side view, made in alias (2020)*

The exterior of the pod was visually underdeveloped as it stood during the proposal stage. Through development it would later include windows, sliding doors, shut lines, as well as 360° sensors as it is an autonomous vehicle.

Once these adjustments were noted, I began analysing the surfaces that were on my proposal model to understand how I could evolve them to create cleaner and more organic surfacing.

Using the proposal as a template I began looking at how I could change the shape of the exterior to have more curvature. This included some experimenting with adding tension to the frontal and rear facing surfaces, this is visible from the side (figure 3). I

also added some crown to the side surfaces to help it look visually lighter with positive and negative surfaces as shown with the shader on (figure 4).

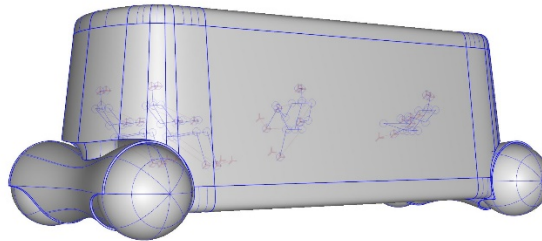


*Figure 3 - Proposal model side curvature, made in alias (2021)*

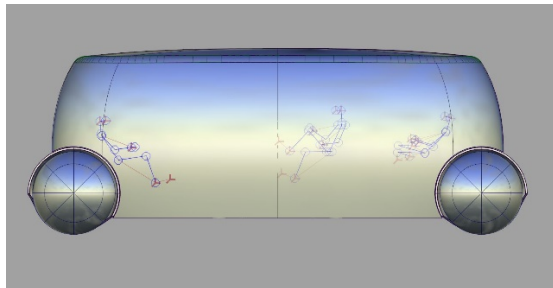


*Figure 4 - Proposal with full curvature, made in alias (2021)*

From an interior point of view, I was relatively happy with how the seats looked as well how they were positioned within the pod. I however felt that the seats did need some small adjustments so that they all work as a cohesive set of furnishing. The image below (figure 5), emphasise that the overall aesthetic of the seats are not as cohesive as they could potentially be. In order to rectify this, the seats will have a more simplified curvature that is more ergonomic as well as a more aesthetically pleasing shape. The leg on the Papsan chair will also be re-designed to suite the single seater chairs.

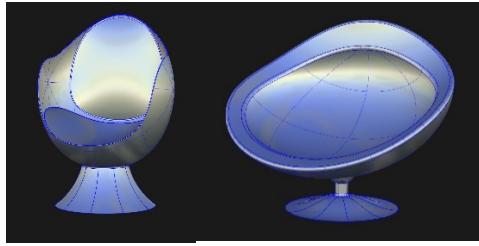


*Figure 5 - Proposal seats, made in alias (2020)*

## Surfacing

Once I was happy with what needed to be changed for a better outcome, I moved onto building the final model in Alias. As stated above, I used the model created for the proposal as a reference, opposed to a traditional orthographic. I also imported manikins supplied by the university as a more accurate representation of scale and modelling the seats to a higher standard.

After creating a simple wireframe to indicate surface structure, I began to create simple surfacing without curvature or fillets. This allowed me to make any changes needed quickly without encountering any issues with surface history. An example of this was building the floor surface (see figure 6 and 7) where the bottom surface was over complicated and resulted in a failed trim operation.

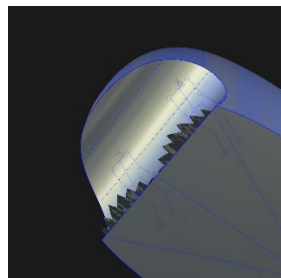


*Figure 6 - Final model failed trim, made in alias (2021)*

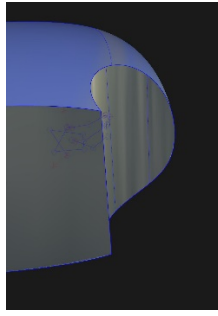


*Figure 7 - Final model successful trim, made in alias (2021)*

After the main body of the exterior was ‘blocked in’ I built a large fillet that wrapped around the roof of the pod to give a better representation of the proportions and overall shape of the pod. Once happy with the fillet size I moved onto building the wheel ‘arches’ and wheels. My previous proposal model included wheels that were intended to be magnetized, however, after re-visiting them I felt that they were no longer in fitting with the ‘feel’ of the project. I therefore decided to build wheel arches that had a tubular structure that held the wheels within them whilst also giving the impression that they were growing from the main exterior body (figure 8)

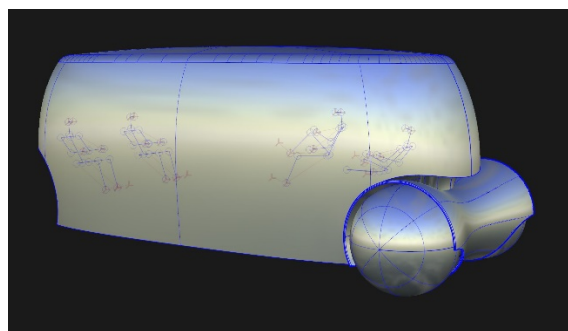


*Figure 8 - Final model exterior with wheels, made in alias (2021)*

As the initial proposal did not include windows or a door it was imperative that they were included in the final model. My aim was to create windows that would provide a

panoramic view of what could be seen through the glass, aswell as allowing for the screens that are part of the user interface to be as immersive as possible (figure 9). When completing the door surfaces, I was inspired by Japanese shoji screens that open from the centre to reveal a beautiful garden, so I felt it important that the doors were two doors as supposed to one big one (figure 10). At this stage I also built in the ramp shut lines that indicate where the ramp would be located at the bottom of the pod to ensure that the access to the pod was as smooth as possible. This did result in me rebuilding the door so that the bottom was flat with the ramp – this enables easier wheelchair access.

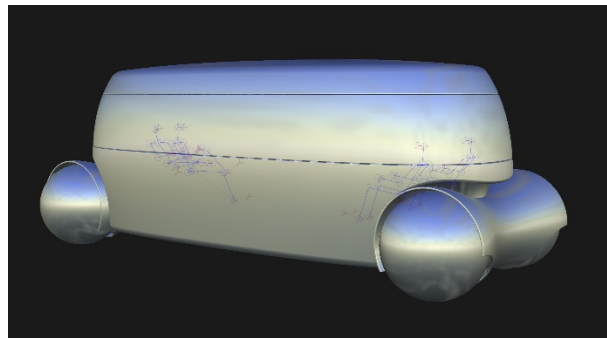


*Figure 9 - Final model with window, made in alias (2021)*

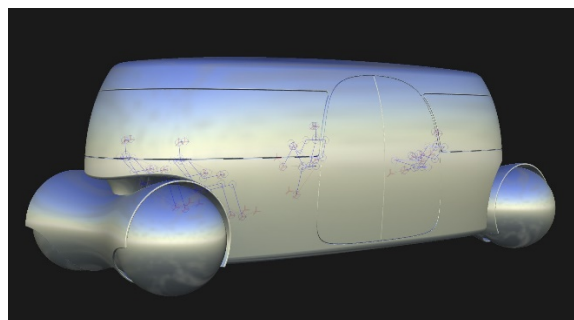


*Figure 10 - Final model with door, made in alias (2021)*

As I was now happy with the exterior of the pod, I moved onto modelling the seats. The focus of the seats was to build surfaces on Alias that could be effectively rendered on Keyshot to give a soft furnished feel. Developing this from my original proposal, I completely rebuilt the seats, starting with simple surfacing to get the correct proportions. To further ensure that my proportions were correct I modelled the seats around the manikin supplied by the university (97%ile male). In order to achieve the effect of a soft and squishy material I created the cushion out of a sphere and manipulated the CV's to create a flowing surface that would intersect with the main body of the seats. Once intersected and trimmed, I created a small fillet that wrapped around the cushion so that it did not look like the seat and cushions were one big surface (see figure 11 and 12).

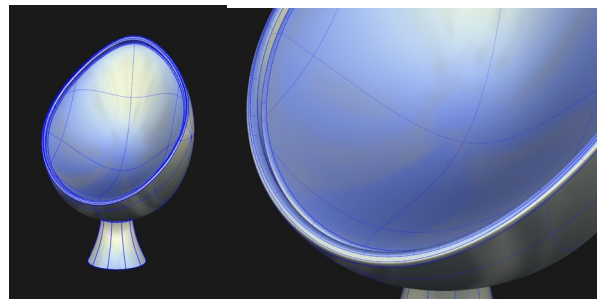


*Figure 11 - Final seat model, made in alias (2021)*

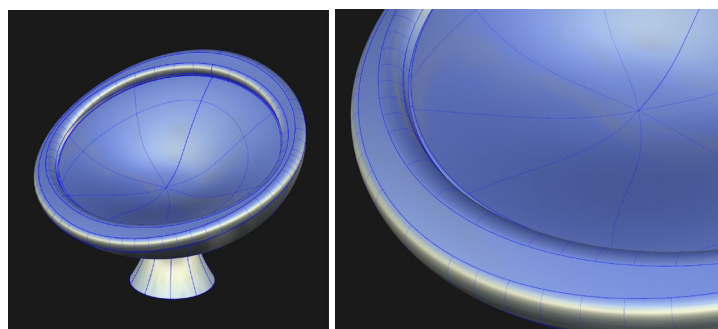


*Figure 12 - Final papasan model, made in alias (2021)*

One of the key features of the pod is the floor. Inspired by the sand patterns in Japanese Zen gardens, the floor of the pod was modelled to create a rippling effect to promote calmness (figure 13). By building curves and aligning them to G2 Curvature, I was able to create the correct shape through manipulating the CV's and then creating a surface using the revolve tool. To ensure that the ripple was connected to floor correctly, I overbuilt the curves so that the surface could be intersected and trimmed to the floor. I then built a fillet between the two to create a smooth transition between the two surfaces (figure 14).

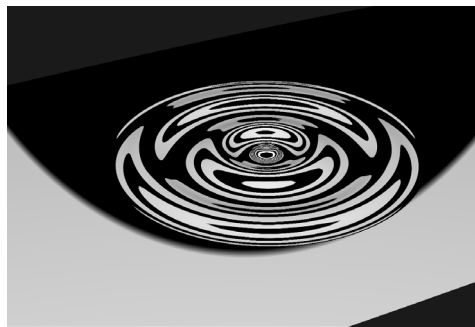


*Figure 13 - Ripple floor zebra, made in alias (2021)*

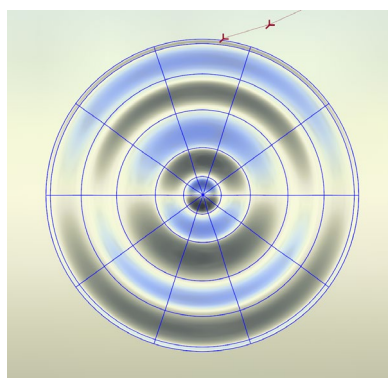


*Figure 14 - Ripple floor, made in alias (2021)*

With every successful project detail is always key. To create as much detail as possible on my model, shut lines were needed. This proved tricky as it would result in the panoramic effect of the windows being disrupted by shut lines. However, it was unavoidable. To create the shut lines, I used a combination of the panel gap tool and the tubular offset tool. At first glance, the shut lines on the pod look relatively simple; however, due to the exterior having fillets at the top and bottom of the surfaces this resulted in some issues regarding surface quality and continuity. Especially on the fillets created using the panel gap tool. To rectify this issue, drafts were created around the surfaces needed to fillet, they were then closed off using squares surfaces to ensure that the model continued to be watertight (figure 15). This was a long and difficult process which did eventually result in all my shut lines working successfully.

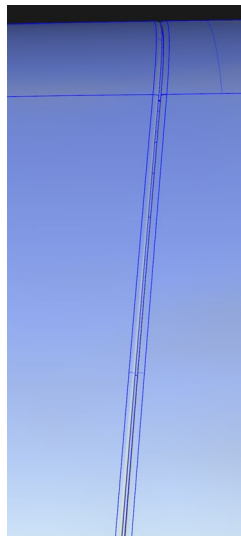


*Figure 15 - Shut lines, made in alias (2021)*

The table has been designed to be a statement piece that behaves as a practical table as well as a sculptural element of the interior. From the first prototype the table design

change has not required much evolution. Most of the focus whilst surfacing the table was to ensure that the surfaces looked as smooth and appealing as possible. Building a wireframe that outlined the basic shape of the table allowed me to change the proportions, keeping it within the proportions of the pod/interior. Once happy with the wireframe, I began 'blocking in' surfaces without curvature to make some adjustments to the thickness of the table as well as analysing surface structure. To make the surfaces appear smoother, I cleaned up the surfaces and used less of them so that the surface structure was simplified and flowed successfully when applying G2 Curvature to them.

I felt that the light fixture for my proposal, although successful, needed to be developed to create a more cohesive mood to the interior. I therefore, designed a light fixture that created a calming effect by having multiple small lights of different sizes and lengths. This process included experimentation with positioning and the shape of the light housing which resulted in a minimalistic design that captures the calmness that mood lighting requires. As you can see from the image below (figure 16), the light housing has been simplified from the original proposal that will create a low light effect when rendering in Keyshot.

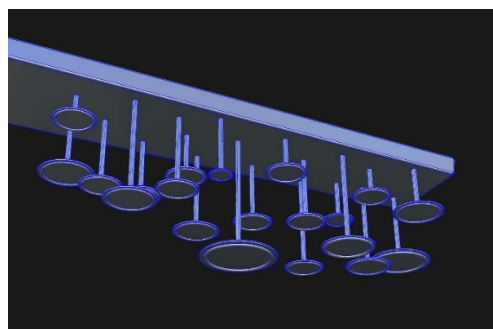


*Figure 16 - Re-designed lights fixture, made in alias (2021)*

Taking inspiration from bamboo leaves, I designed and produced simple, spherical wheels that included a crescent shape of leaves that also served the purpose of a cooling system for the motors. As my design was focused on using nature as inspiration, I felt that including small details in the wheels shown below (figure 17), gave the pod a more finished and polished feel whilst remaining understated.

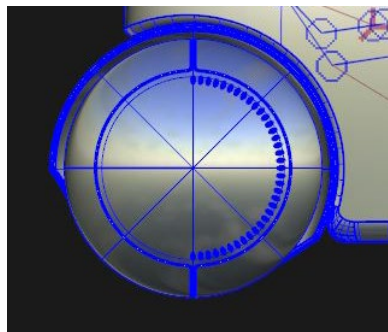


*Figure 17 - Wheel design, made in alias (2021)*

The final stage of the modelling was to design and create a bench seat that is positioned opposite to the door. To create a more natural and cosier feel to the pod, I created a parametric bench design that also acted as storage for the occupants of the pod (figure 18). Modelling the bench consisted of creating and replicating panel-like surfaces that could be trimmed to mould itself around the seats and overall shape of the pod. Ensuring that the panels appeared as natural as possible whilst also finished to high standard, each panel was filleted individually as they were all different shapes and sizes. With the addition of a cushioned area for users to sit on, this created a statement piece with the added use of seating space.

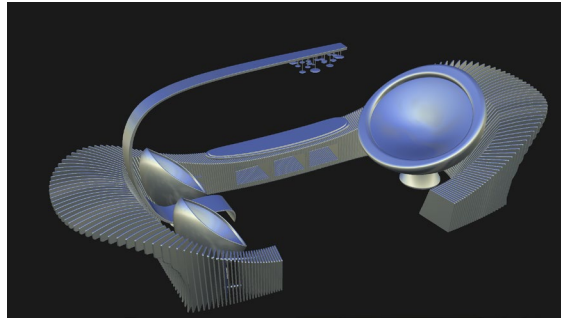


*Figure 18 - Parametric bench, made in alias (2021)*

## Render Set-up

To create final visuals that would look as photorealistic as possible, I created some texture materials using Keyshot as well as implementing bump textures on photoshop. Creating the floors 'fuzzy' material allowed me to create a material that was not necessarily perfect (figure 19). By adding fly-aways to the fabric created a more natural looking material as all material have imperfections.



*Figure 19 - Fuzzy texture, made in Keyshot (2021)*

The texture on the seat cushions is used as a Bump Map. The patterns are bamboo plants so that the interior soft furnishings and the exterior details have a subtle

connection (figure 20). Creating the bump image on photoshop as a black image with transparent background and importing it into Keyshot, the software enables me to adjust how much of the pattern I want to be visible as well as how small I wish the pattern to be (figure 21).



*Figure 20 - Bamboo bump map on material, made in Keyshot (2021)*

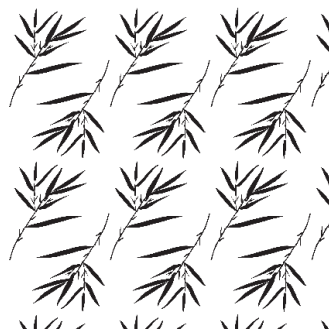


*Figure 21 - Bump map, made in Photoshop (2021)*

To create the correct atmosphere for the project, it is important to choose the correct environment to situate the model. After researching into possible environments, I chose two different ones that I felt best suited the pod being an autonomous vehicle for 2050. The first environment is a tunnel system leading into a large city (figure 22). As the pod is aimed at removing the occupants from the hustle and bustle of working

life – both physically and mentally – the almost construction like environment that the pod is situated in creates a contrast from what would be expected from a vehicle in 2050. This environment also created some lovely shadows that cast over the pod which enhances the overall presence of the pod with the contrast to the almost white exterior colour.



*Figure 22 - Pod in environment, made in keyshot (2021). Image: CTC Creative Studio*

The second environment that I chose is in a modern city with subtle hints of nature. I used this environment to showcase the calmness that the pod has in what would be a relatively busy environment. Using the white organic buildings as a background for the pod reflects how seamlessly the pod interacts with the background as it not appearing out of place (figure 23). The hints of green and pink created by the plants in the backdrop create a contrast to the pale colours of the buildings which subsequently add a depth to the image and pushes the pod to be the focus of the viewer.

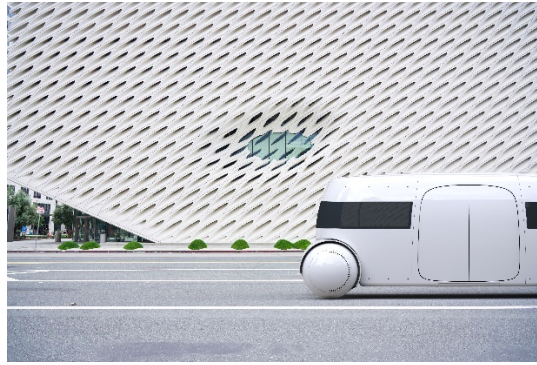


Figure 23 - Pod in environment, made in keyshot (2021). Image: CTC Creative Studio

## Product Design Specifications

|                       |                                                                       |
|-----------------------|-----------------------------------------------------------------------|
| Capacity              | Carry 4+ comfortably                                                  |
| Sustainable Materials | Recycled, Organic, Renewable                                          |
| Target Audience       | Family friendly, Professionals,<br>Shareable                          |
| Floor Plan            | Promote connectivity with optional<br>privacy                         |
| Sensory Options       | Promote positivity and connectivity with<br>nature                    |
| User Interface        | User friendly interface suitable for 2050                             |
| Colour Pallet         | Cool, natural, organic, low saturation,<br>pastel tones               |
| Modular options       | The ability to be used in multiple vehicle<br>types and architecture. |

The original product design specification is virtually unchanged since being produced at the start of the academic year. As the project began its journey as an interior project it has become increasingly balanced with the exterior elements. It is arguable that the pod no longer has modular options, however, the premise of the project is to reduce the levels of stress and anxiety through the interior's mood and features. This can be reflected within a different vehicle such as a car or a yacht that uses the same aspects of the pod such as the seats, parametric bench, etc.

In addition to this, the pod now features disabled access which was not considered at the beginning of the project; therefore, the product specification has been improved to be more inclusive to all.

## Evaluation

The last nine months has seen this project evolve from an interior to a fully-fledged vehicle. Looking at my work as it stands, I am immensely proud of what I have achieved in what has been a difficult year for many. This project has exaggerated and reflected the struggles many people have felt at present, including myself, proving the need for this type of transport. I feel that I have produced a product that would help someone to overcome these problems.

Disconnecting someone to the stresses and problems of life has largely been associated with being in nature, however, I feel I have successfully created a space

where subtle aspects of nature – materials, lighting, sound, smell, - without physically being in a forest or touching a plant can do so much more.

I began this course with the intent on becoming a clay modeller. But since starting this project, my skills as a CAD modeller have infinitely improved to be something that I personally thought I would ever be able to achieve.

Researching this project has also been fundamental in opening a passion for project inspirations and mood boards which I feel has now become one of my strongest assets.

## Table of figures

|                                                                                         |    |
|-----------------------------------------------------------------------------------------|----|
| Figure 1 - Initial proposal, created in alias, rendered in Keyshot (2020).....          | 3  |
| Figure 2 - Pod exterior proposal side view, made in alias (2020) .....                  | 5  |
| Figure 3 - Proposal model side curvature, made in alias (2021).....                     | 6  |
| Figure 4 - Proposal with full curvature, made in alias (2021) .....                     | 6  |
| Figure 5 - Proposal seats, made in alias (2020).....                                    | 7  |
| Figure 6 - Final model failed trim, made in alias (2021) .....                          | 7  |
| Figure 7 - Final model successful trim, made in alias (2021) .....                      | 8  |
| Figure 8 - Final model exterior with wheels, made in alias (2021) .....                 | 8  |
| Figure 9 - Final model with window, made in alias (2021) .....                          | 9  |
| Figure 10 - Final model with door, made in alias (2021) .....                           | 9  |
| Figure 11 - Final seat model, made in alias (2021) .....                                | 10 |
| Figure 12 - Final papasan model, made in alias (2021).....                              | 10 |
| Figure 13 - Ripple floor zebra, made in alias (2021) .....                              | 11 |
| Figure 14 - Ripple floor, made in alias (2021) .....                                    | 11 |
| Figure 15 - Shut lines, made in alias (2021) .....                                      | 12 |
| Figure 16 - Re-designed lights fixture, made in alias (2021).....                       | 13 |
| Figure 17 - Wheel design, made in alias (2021).....                                     | 14 |
| Figure 18 - Parametric bench, made in alias (2021) .....                                | 15 |
| Figure 19 - Fuzzy texture, made in Keyshot (2021).....                                  | 15 |
| Figure 20 - Bamboo bump map on material, made in Keyshot (2021).....                    | 16 |
| Figure 21 - Bump map, made in Photoshop (2021).....                                     | 16 |
| Figure 22 - Pod in environment, made in keyshot (2021). Image: CTC Creative Studio..... | 17 |
| Figure 23 - Pod in environment, made in keyshot (2021). Image: CTC Creative Studio..... | 18 |

## Bibliography

CTC Creative Studio, *Compton*. Available at: <https://ctccreativestudio.com/hdri-backplates-compton-los-angeles> (Accessed: 4 May 2021)

CTC Creative Studio, *The Broad*. Available at:  
[https://gumroad.com/ctc?recommended\\_by=search&sort=most\\_reviewed](https://gumroad.com/ctc?recommended_by=search&sort=most_reviewed)  
(Accessed: 4 May 2021)