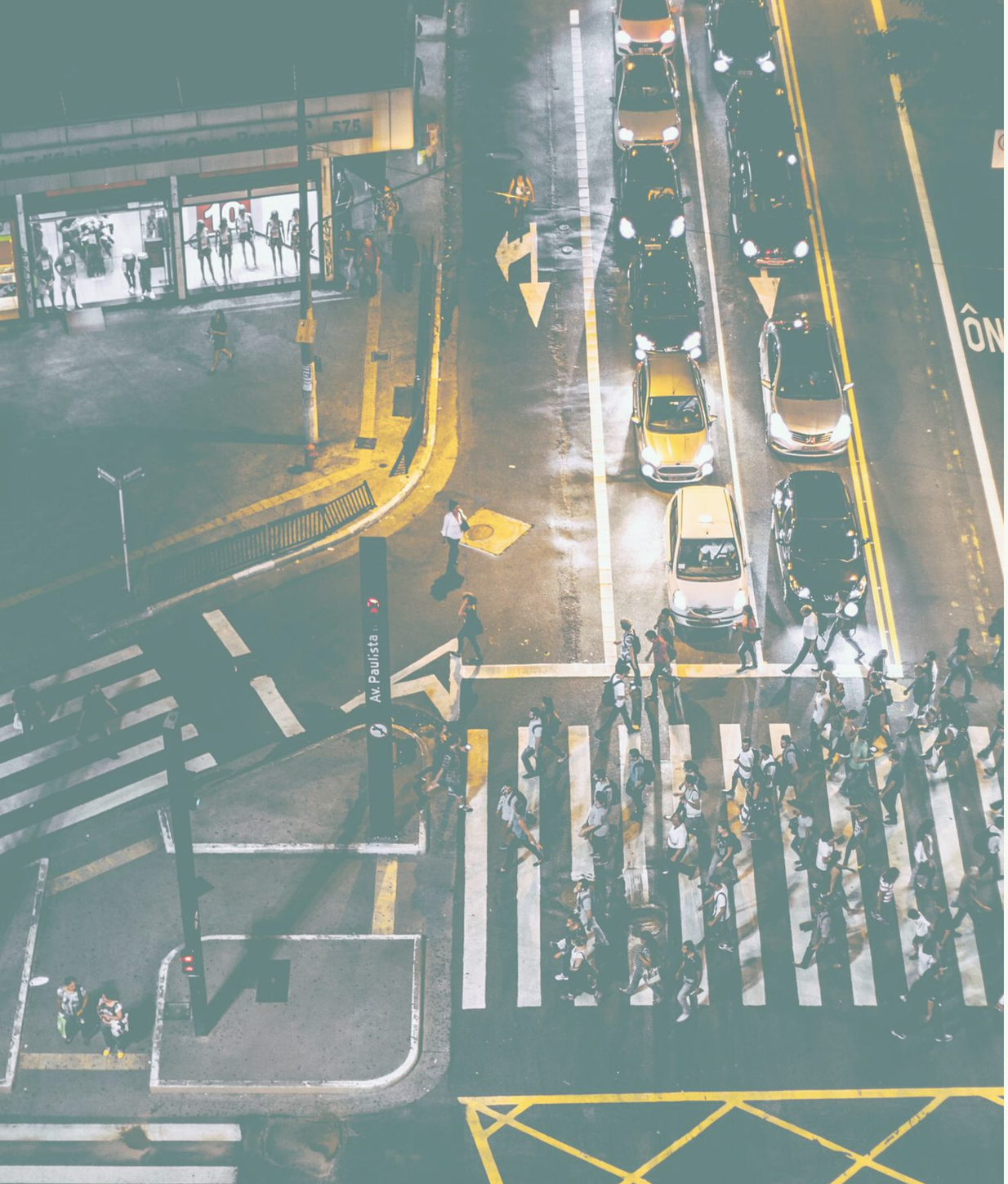
BIOSIMULATOR

An interactive, engaging installation helping to solve the issue of pedestrian disconnect by utilising the benefits of nature and appealing to the aural, visual and tactile senses.

Charlotte Casimir



Contents

Introduction

BioSimulator is an engaging installation that improves the pedestrian experience by alleviating stress, and fostering awareness of self and surroundings through interactive technologies.

Currently, there is little infrastructure currently in place in urban spaces to make pedestrians feel **safe, comfortable and aware** of their surroundings whilst commuting. For this reason, they often look to their mobile phones for entertainment, putting them in danger when crossing the road and making them feel isolated.

The final prototype has been created with background research and the results of several rounds of user testing in mind. BioSimulator is comprised of a series of elements that simulate nature in a pedestrian tunnel environment, which is typically a barren and uncomfortable space. Interconnected elements that make up BioSimulator are foliage (real and artificial), motion activated fans, microphones and speakers that allow for sound interactivity, and a projected visualisation displaying native flora and fauna. This projection visualises the frequency of people within the space by capturing their the frequency and amplitude of ambient noise made by foot traffic.

Team Structure

1

Luke

- Sourcing hardware
- User testing
- Creating structure for final prototype
- Coding/sourcing motion sensor fans

2

Gabrielle

- Bulk of coding
- User testing
- Creation of projected visualisations
- Prototype and software testing and iteration.

3

James

- Bulk of coding
- Creation of microphone input/speaker output system for sound interaction.
- Synthesis of data from user testing
- Background research

4

Charlotte

- Bulk of written content and documentation.
- Some code (rain scene)
- Sourcing hardware/materials and making the high fidelity prototype structure.
- In depth background research

Team Structure

My role on the team was mainly to collaborate and compile each persons written contributions into a visual report structure, and do the final edit before submission to ensure the report was visually consistent and adhered to the design brief.

My responsibilities also included sourcing some software and hardware elements, such as foliage (artificial and real), and brainstorming the structure of the final prototype, keeping in mind the insights we had gained from user research. I also played the role of the key organiser - making gantt charts to ensure everyone sure of what they had to do and creating deadlines.

Similarly, was also tasked with recruiting participants for user testing, creating scripts, and researching the most appropriate testing methods for our project.

A/B testing with users for BioSimulator

Figure 2: Interior of the Toledo Metro Station, Naples, Italy

Figure 3: The LowLine Lab, New York City

Secondary background research conducted in Assignment 1

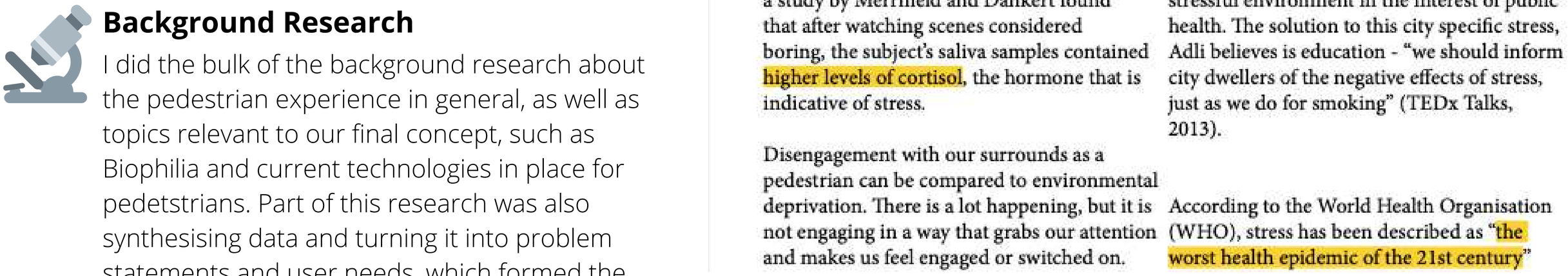
Contributions

Written Content and Documentation

One of my main responsibilities was to compile all written content into a single document to submit. As well as writing a substantial amount of content, I made everyone else's writing fit seamlessly into the document. For each assignment, I created a template with a general layout, which group members gradually added to, however I gave the assignments the final check before submission.

Background Research

I did the bulk of the background research about the pedestrian experience in general, as well as topics relevant to our final concept, such as Biophilia and current technologies in place for pedetstrians. Part of this research was also synthesising data and turning it into problem statements and user needs, which formed the basis of our concept.



MARKET ANALYSIS + BACKGROUND RESEARCH

Boredom and disengagement have far reaching and extensive impacts on our lives than one might expect. In fact, it has become obvious that boring experiences actually change the brain and body's chemistry in a way which generates stress.

It was found that even small doses of environmental deprivation generate "stress, Impulsivity, lower levels of positive affect, and risky behaviour" (Ellard, 2011). Furthermore, a study by Merrifield and Dankert found that after watching scenes considered boring, the subject's saliva samples contained higher levels of cortisol, the hormone that is indicative of stress.

Disengagement with our surrounds as a pedestrian can be compared to environmental deprivation. There is a lot happening, but it is not engaging in a way that grabs our attention and makes us feel engaged or switched on.

to a city specific social stress" (TEDx Talks, 2013). This 'city specific stress' explains why "depression carries a 40% higher risk in cities… anxiety disorders have a 20% higher risk" (TEDx Talks, 2013). Disturbingly, Adli's research also showed that "the risk for schizophrenia is twice as high in cities than in rural environments" (TEDx Talks, 2013).

These alarming statistics demonstrate the need for cities to somehow become a less stressful environment in the interest of public health. The solution to this city specific stress, Adli believes is education - "we should inform city dwellers of the negative effects of stress, just as we do for smoking" (TEDx Talks, 2013).

According to the World Health Organisation (WHO), stress has been described as "the worst health epidemic of the 21st century"

An excerpt from Assignment 1, which details my research into the effects of stress on pedestrians.

Contributions

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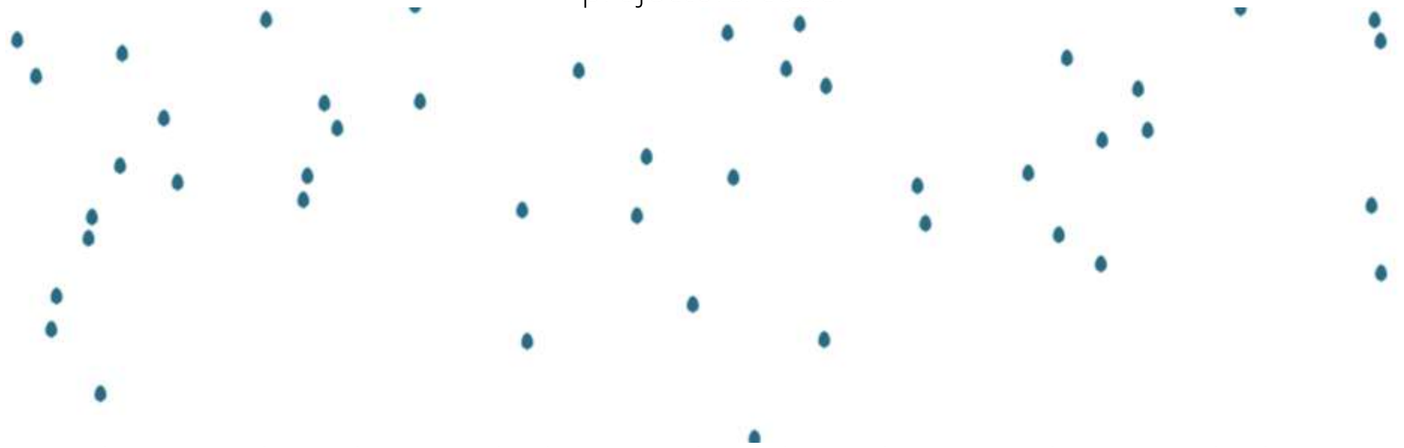
Coding/Visualisation

I was tasked with ideation for the projected visualisations for the high fidelity prototype. This included brainstorming which scenes and settings would be best suited for our installation, and sourcing images/graphics for them. I also researched code for the rain/jungle scene, which was adapted for the final version.

p5js and openprocessing were used to combine graphic elements (e.g. the background and raindrops) with the sound input.

The jungle background that I used and altered to fit with the projectors/code.



The original raindrops code that was altered to take a sound input and adjust the number of raindrops based on frequency/amplitude.

Contributions

Final Prototype - Hardware + Structure

For the high fidelity prototype, I sourced some hardware elements, such as the artificial and real foliage, LED lights, and velcro tape and thumbtacks to attach elements to the wall. Luke and I ideated about the best way to build a structure, and we worked together to create the structure in the days before the exhibition.

Luke and I compiled all of our resources for the structure a few days before the exhibition, and tested how the prototype would look, and if it would work well in the space.

During this time, I also wrote and laser cut the blurb displayed at the entrance to the installation.

The laser cut plaque which displays a blurb about the concept.

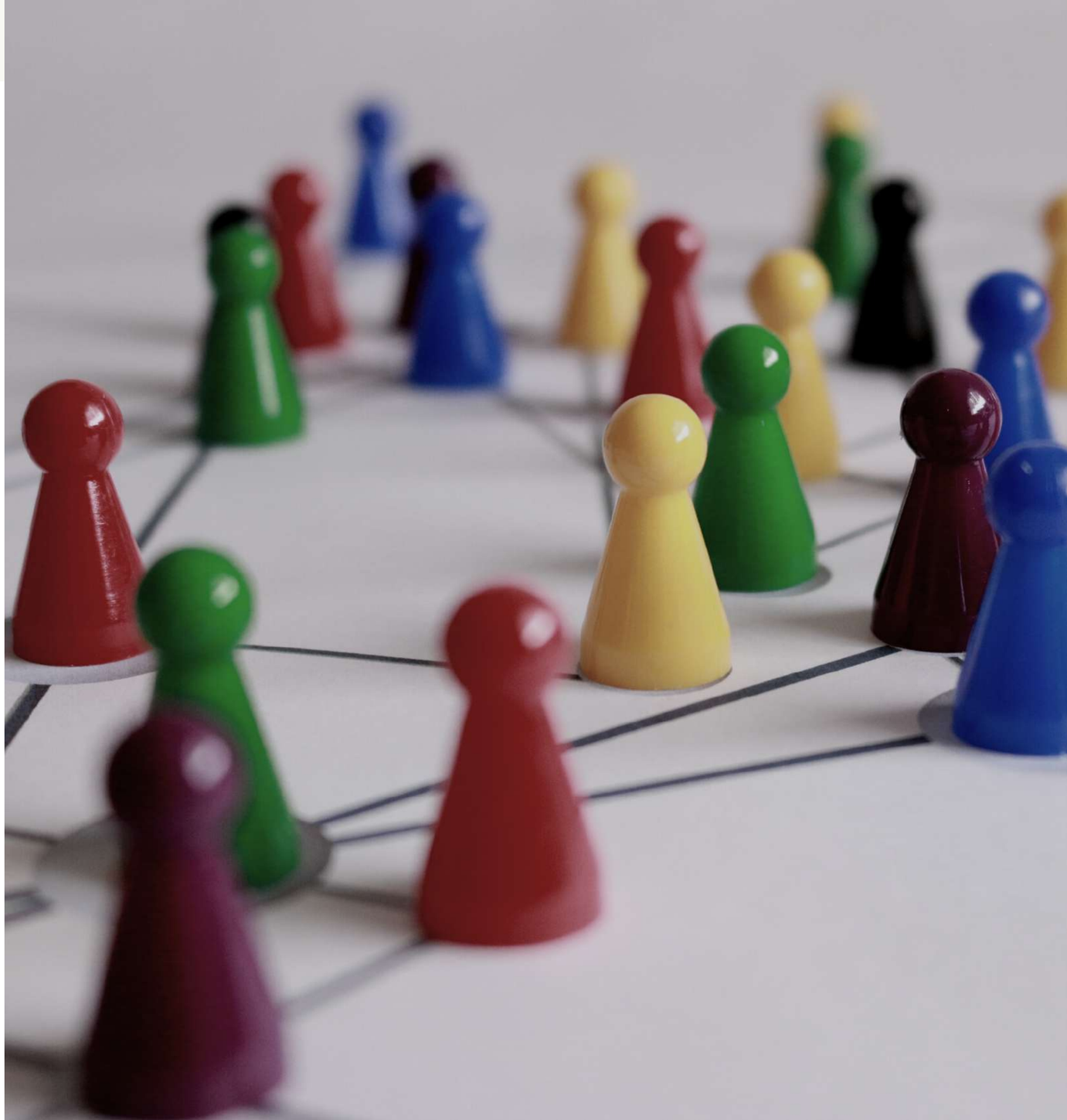
I sourced the majority of foliage

Challenges

Communication and Expectations

Our group found communication and setting realistic and achievable goals very challenging. Initially, although we were working on a group assignment, each of us wanted to complete work individually and then combine it later. This proved to be an inefficient way of working, and resulted in doubling up on work, or important work not being completed at all.

To combat this, we set up some group meetings, and decided to create a gantt chart, which outlined each persons task and deadline. We also made sure we communicated with much more frequency, to keep everyone on the same page.



Challenges

Software and Hardware Hurdles

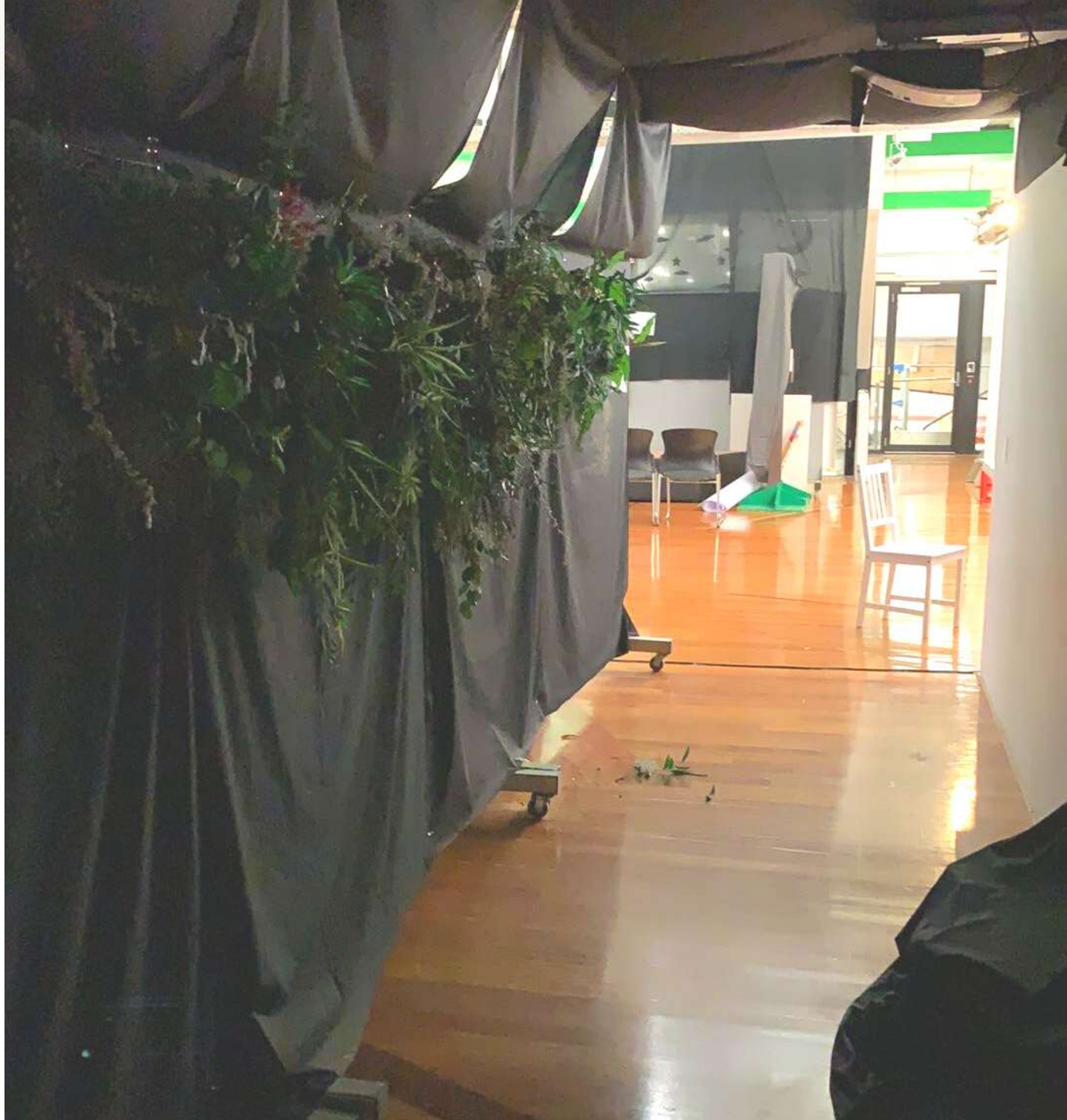
We made quite grand plans for our software and hardware components, and drew up a plan of how each element would fit together and its purpose. However, we did come across hurdles when parts didn't arrive in time, or there was an unexpected issue in the code. A specific example of this is the call and response sound interaction, where the user makes a loud sound and a bird sound responds with a delay. We found that the microphone was picking up additional sounds and the output was becoming distorted. We overcame these challenges through trial and error with the placement of elements, and changing the code, which took lots of time but worked in the end.

Challenges

Structural Issues

Once we had secured where our exhibition was going to be held, we had to consider how we were going to mimic a pedestrian tunnel in a confined space. We considered several options such as foam, wood and perspex, but landed on fabric as it was cheap and easily accessible. We struggled to keep everything structurally intact, as everything was held by thumbtacks or small hooks, meaning that parts of fabric or plants would constantly fall off.

We overcame this issue by taking extra measures to stick everything together, such as using velcro tape and creating frames out of rope and string to hold the elements effectively.



Reflection

Upon reflection, BioSimulator met all the criteria for success and the high fidelity prototype was well received by users.

I worked well in my team by making sure everyone was on track and meeting the deadlines we had set. When we planned to communicate more often, I initiated group conference calls, which was far more effective in getting our ideas across as opposed to messaging.

If I could have done things differently, I would have allowed much more time for planning and gathering materials, so we could do our trial and error process with more time to spare before the deadline. I would also have split work up according to each persons strengths within the group, rather than expect everyone to complete a little bit of every task.

Although we did enjoy creating BioSimulator, our team hasn't made any plans to continue working on the prototype because this is an expensive and time consuming endeavour.

Bibliography

Original Raindrops Code - "rainDrop" by RomanWong, 2019. http://www.openprocessing.org/sketch/211168Licensed under Creative Commons Attribution ShareAlikehttps://creativecommons.org/licenses/by-sa/3.0https://creativecommons.org/licenses/GPL/2.0/

Jungle background image by brgfx on Freepik, 2019, retrieved from https://www.freepik.com/free-photos-vectors/background

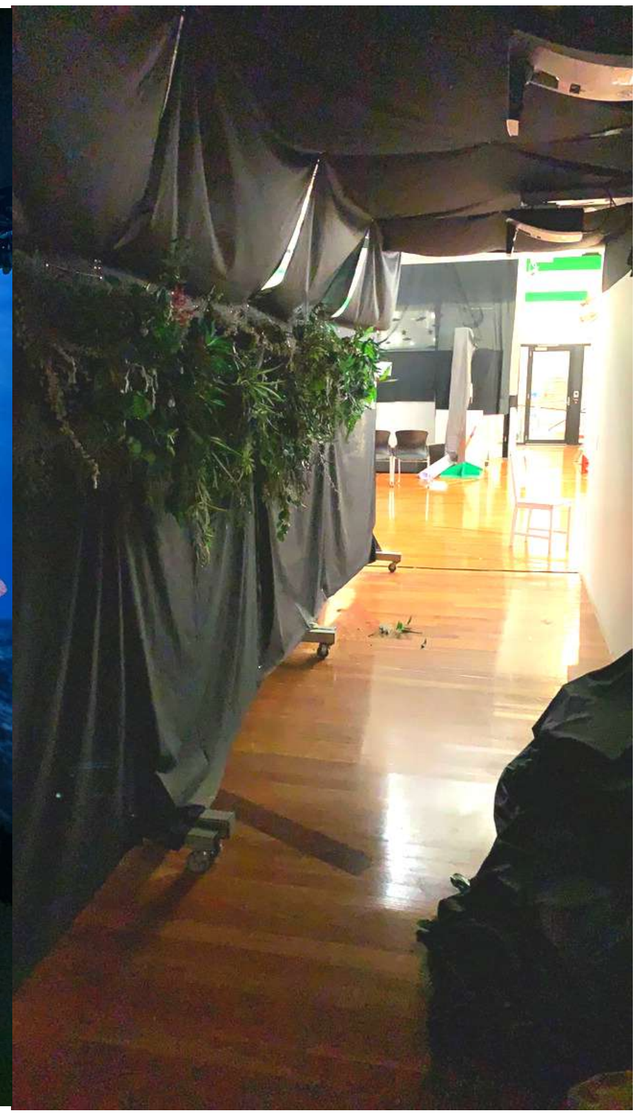
Images on pages 1,2, 9,10 retrieved from Canva, 2019. www.canva.com
Iconography on pages 6-8 retrieved from Canva, 2019. www.canva.com

Appendix

Rainforest/Jungle background adapted to be used for projection/raindrops.

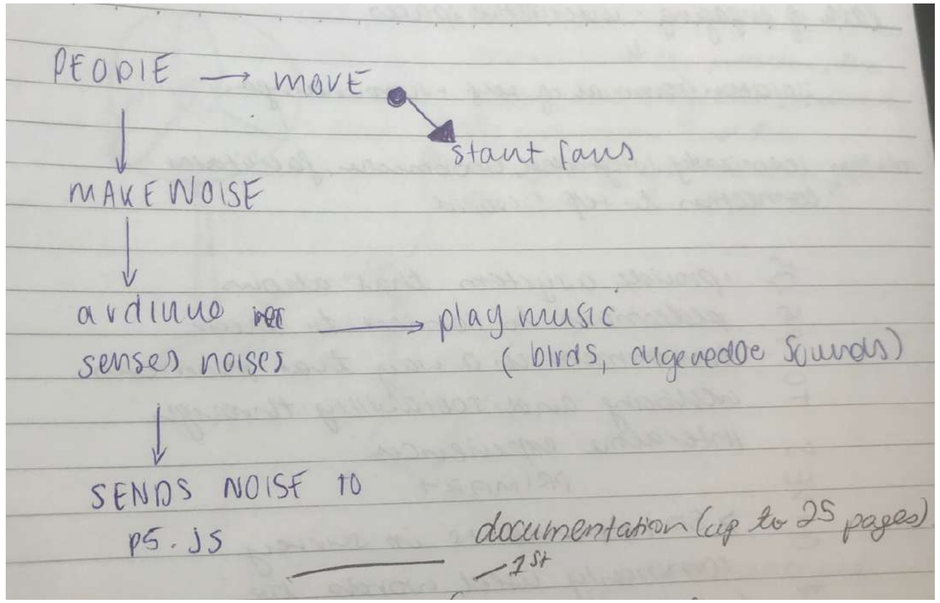
Appendix

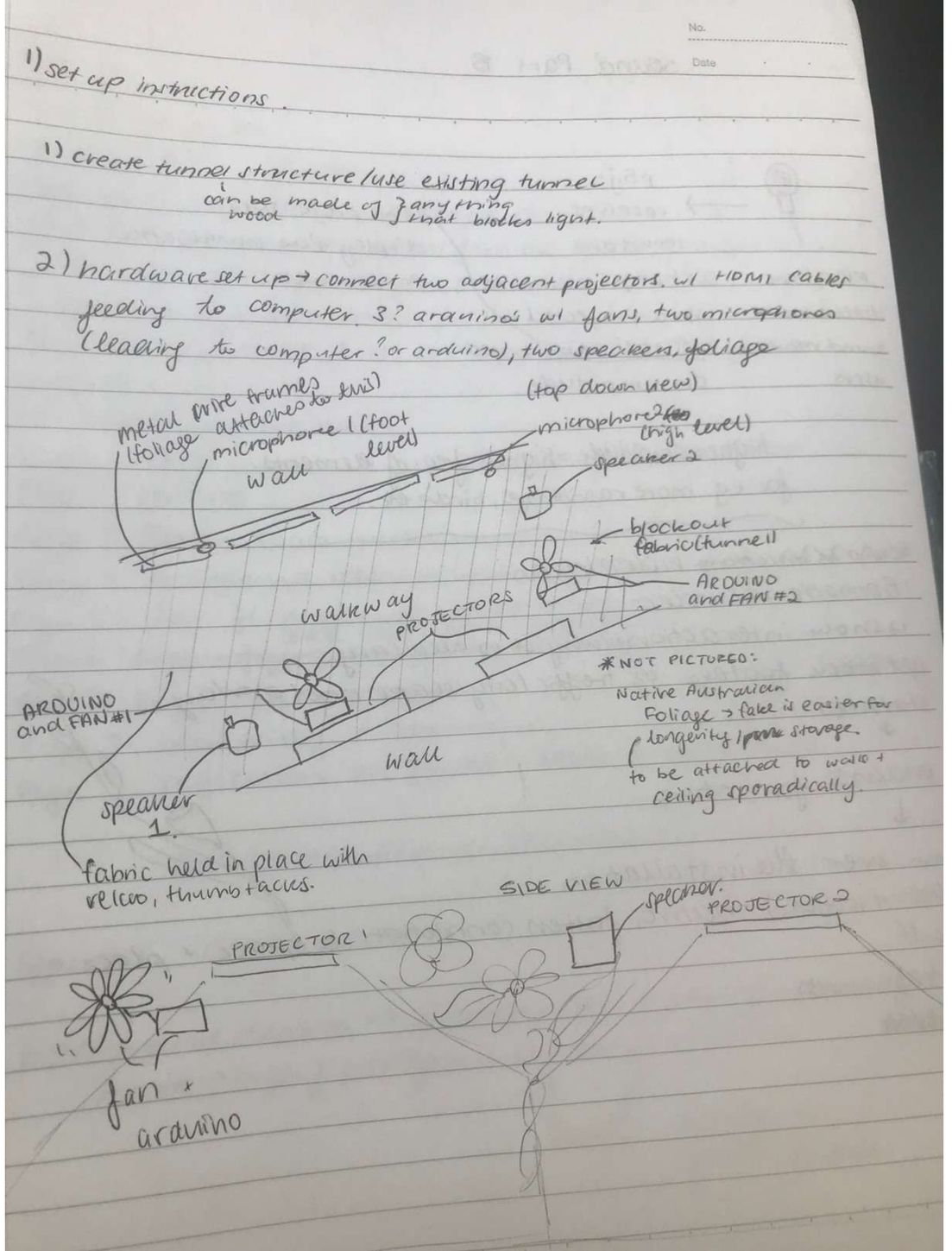
Final Prototype Images



Appendix

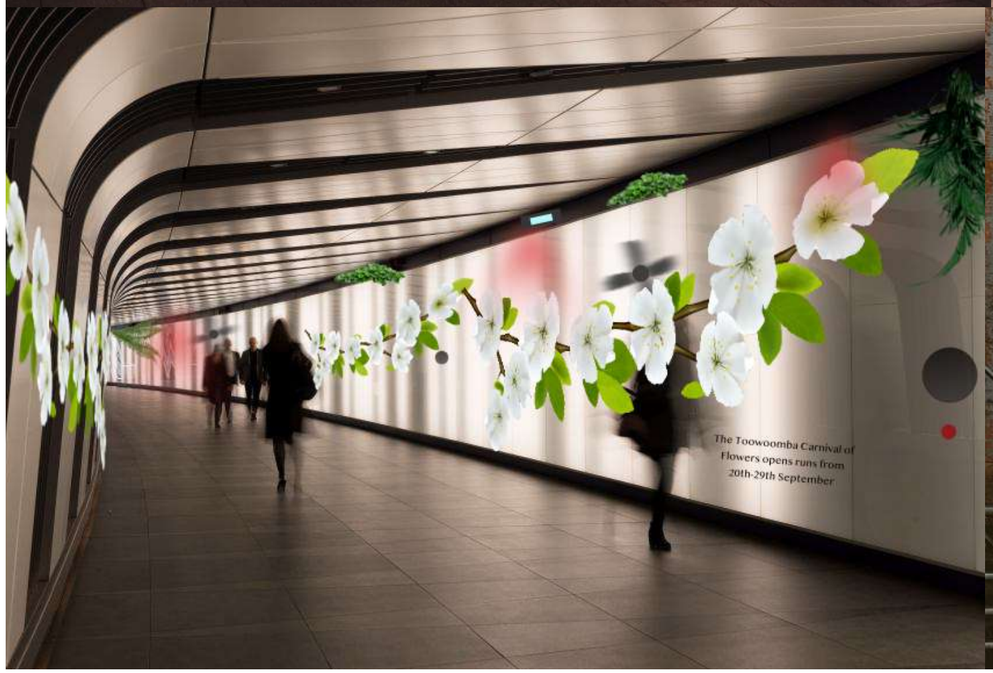
Ideation for structure of prototype and sound interactions

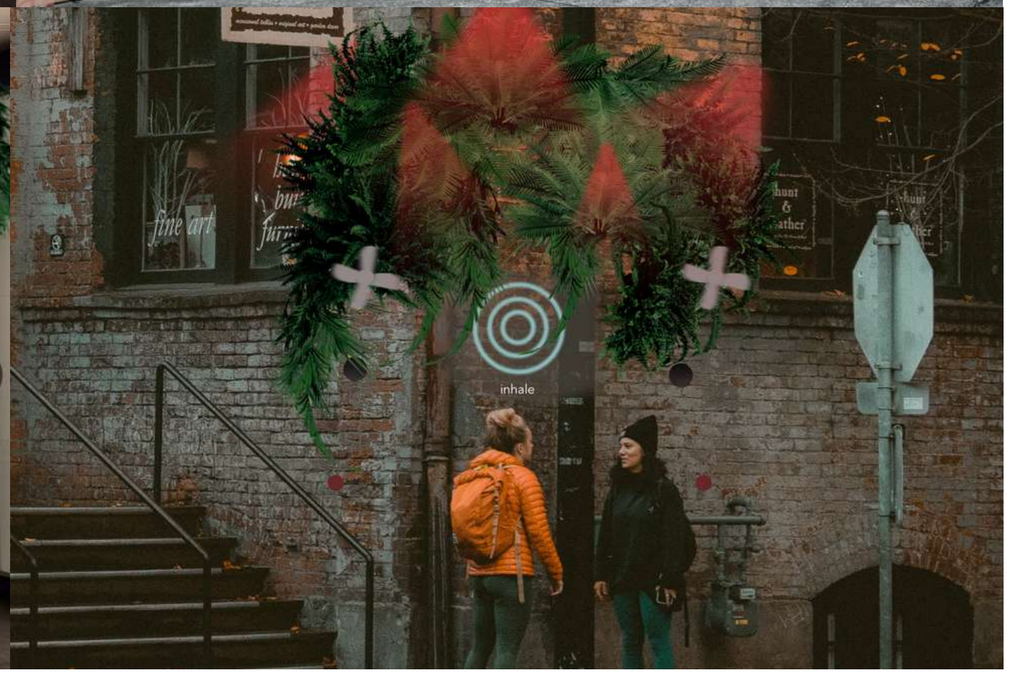




Appendix

Concept Art





Appendix

Focus Group 1 Findings:

Common experiences/feelings when being a pedestrian:

Cramped, people get in my way because I'm a fast walker, stressful and annoying. Waiting ages at the lights. Loud. Uncomfortable.
Very frustrating - can't get around groups.
Little access to shelter when raining.
Self conscious because of cat calling being beeped at.

What do you engage yourself whilst being a pedestrian?

Reading on my phone whilst walking because I'm bored and I know when I need to stop and when I don't. Autopilot.
I don't really listen to music much because its loud already.
I listen to music with sound proof headphones. Music relaxes me, passes the time.
I zone out when I am walking. Set on my destination, constantly checking when my train and bus arrives.

Thoughts on Concepts:

BioSimulator:

Spread out the elements over the space, not all clumped together.
Make it customisable - e.g. if you are cold, turn on the heat lamps.
Australian natives - make it about history and a story. Should be dependent on the context of use. Could change with seasons. Needs to be more interesting.

Focus Group findings, and insights drawn from user feedback, which informed future iterations.

User Testing - Tabulated results from A/B testing

		Setting A: Busy City Setting					Setting B: Nature Setting				
User	Resting HR	1	2	3	4	5	1	2	3	4	5
Isabelle	75	78	73	72	70	68	88	75	60	62	60
Mia	80	81	86	89	84	86	76	73	74	76	78
Lisa	64	66	65	70	69	70	67	64	61	69	64

Appendix

Group Gantt Chart