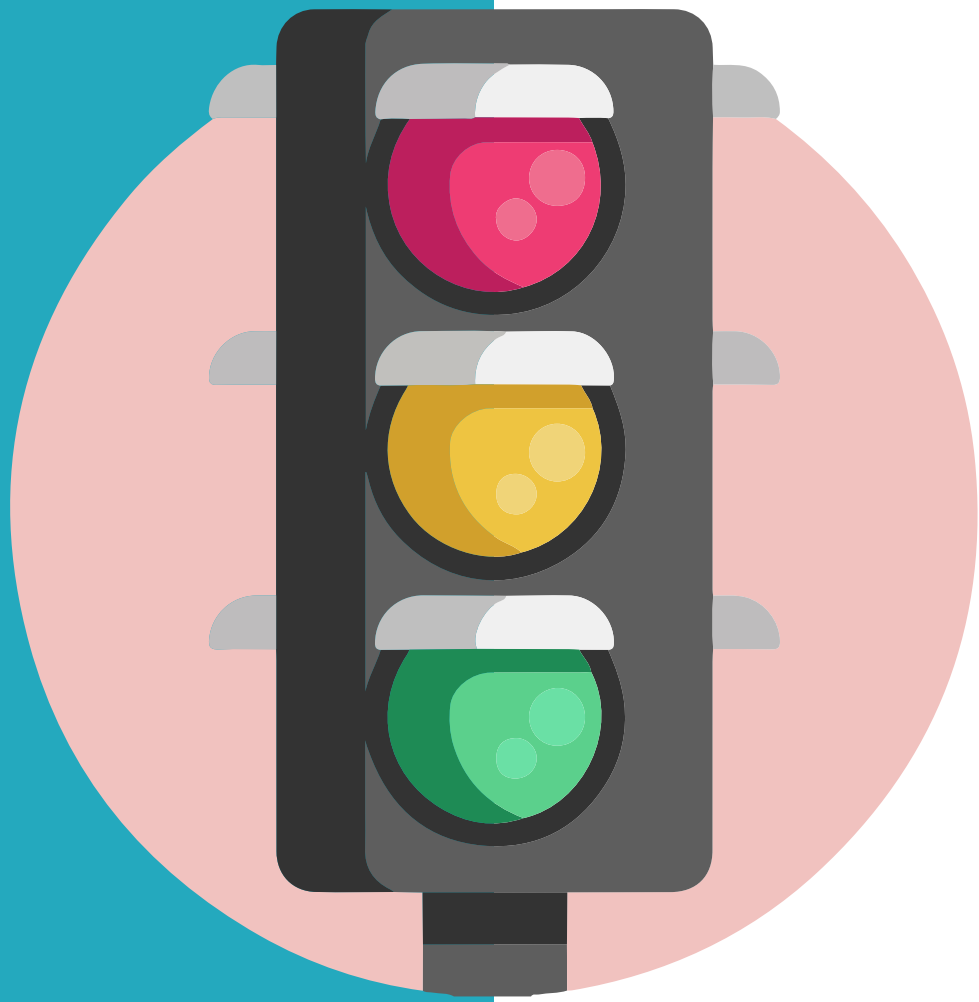
11 NOV 2019

Neo Kinesis

An Interactive Product Design Portfolio



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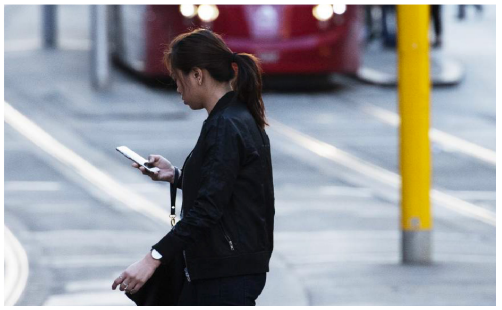
Introduction

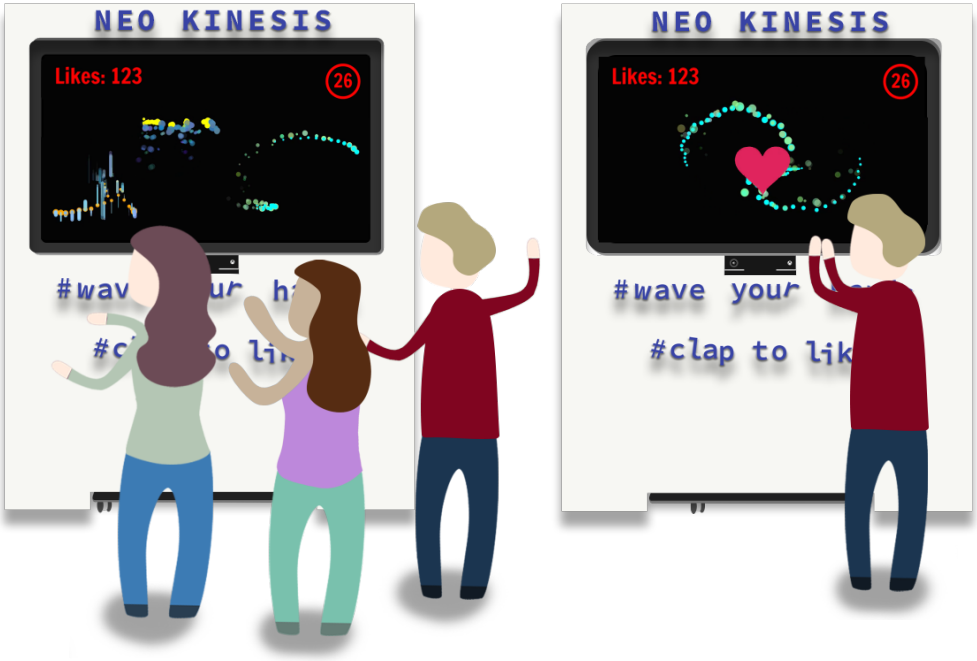
Approximately 270,000 pedestrians fatalities occurred each year worldwide, representing 22% of all deaths in global road traffic accidents (WHO, 2013). In Australian context, causalities found in pedestrian incidents have seen an increase from 41 deaths in 2014, to 74 in 2016, making up 19% of all deaths that year (Transport for NSW, 2017). More specifically, most pedestrian crashes occur between 6pm – 9pm on weekdays, and 12am-3am on weekends (Australian Government, 2015). To combat this issue, the identified problem statement is:



Problem Statement

*"How might we ensure **pedestrian safety** when crossing at **night** by **attracting their attention** and making their pedestrian experience more **enjoyable**?"*

The **final concept** created to tackle the targeted problem is an interactive instalment called **'Neo Kinesis'**, with neo meaning new and kinesis meaning movement. The goal is to breathe new life into the movement of pedestrian crossings by connecting them to the road environment.



Neo Kinesis allows **up to six** pedestrians to **'wave to draw'** interesting designs at one time on a large LCD screen using their body and hand movements, with different generative patterns randomly assigned to them. A red heart appears when players **clap** their hands, which raises the number of the total like counter, mimicking the 'like' function common to social media platforms. These interactions are made accessible by utilising a Kinect motion controller.

Neo Kinesis combats one of the core reasons of distracted walking: **boredom**. As an easily accessible method of simple interactions for people to engage with, it incentivises people to look up from their phones. Through **entertainment**, both **awareness of the environment** and **safety concerns** are enhanced among distracted pedestrians, more specifically young adults as the targeted users, at crossing facilities. **Collaborations** are welcomed and encouraged as a method of being able to interact with not only your friends but also strangers effortlessly.

Team Structure

Team Free-Wifive

Developer
Building the digital prototype
In charge of both the software & hardware

Visual Director
In charge of overall aesthetics
Coordinating user research
Create design mock-ups
Video production

Team Leader
Monitoring team performance
In charge of documentation & aesthetics
Main presenter during demonstration

Artisan
In charge of the physical parts of the prototype including the frame, the supporting structure and materials
Assisting user testing

Researcher
Main conductor of rounds of user testing
Assisting the artisan for building the physical parts of the prototype

Responsibilities

Background Research & Concept Generation

During background research phase, my main role was to lead the group for conducting user research and analyse the key findings. I've created two personas compiling findings of both core and latent user needs and their pain points. For concept generation, I helped combine and iterate features and attributes as well as constraints of the ideas. I also created the persona-based stories for all of the four concept ideas.

Concept Evaluation & User Testing of Low-fidelity Prototypes

For testing low fidelity prototypes, I assisted the team for building the paper porotypes and evaluation questions, recording observations and interviews during all rounds of user testing, and analysed the results. I worked with the team in all evaluation stages for guiding design considerations of each iteration made, and eventually came up with the suggestion of combining two concept ideas together as our final concept idea – Neo Kinesis.

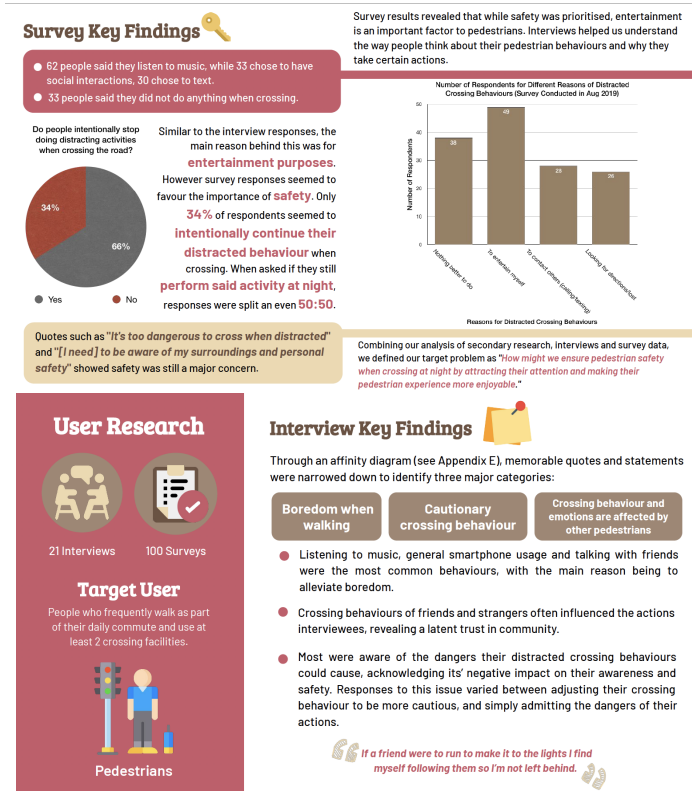
High-fidelity Prototypes

My major responsibilities at the stage of building high fidelity protypes was to create and iterate the digital mock-ups of physical aspects including the design of the frame and displayed instruction stand. I assisted the team in getting appropriate materials and conducting the final rounds of user testing for coming up with the idea of adding 'clap to like' interaction simulating social media to engage users more effectively.

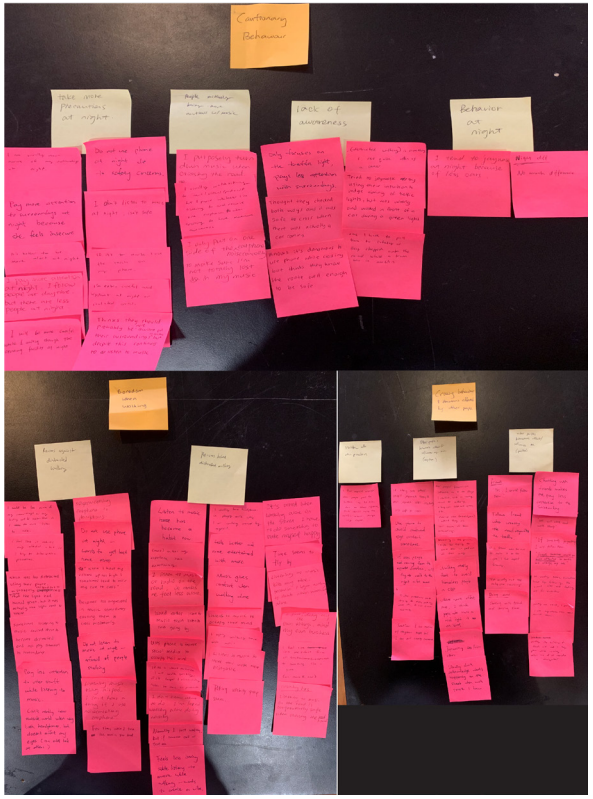
Documentation & Video Production

Overall, I worked collaboratively with the team for producing and editing the documentations for all three phases and helped with the visual aspects. I was also in charge of directing and producing the video for our final prototype.

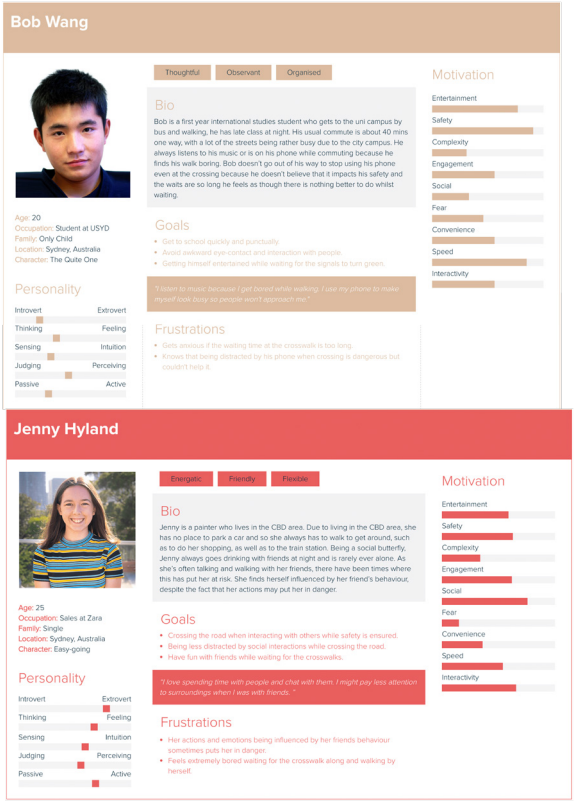
Contributions



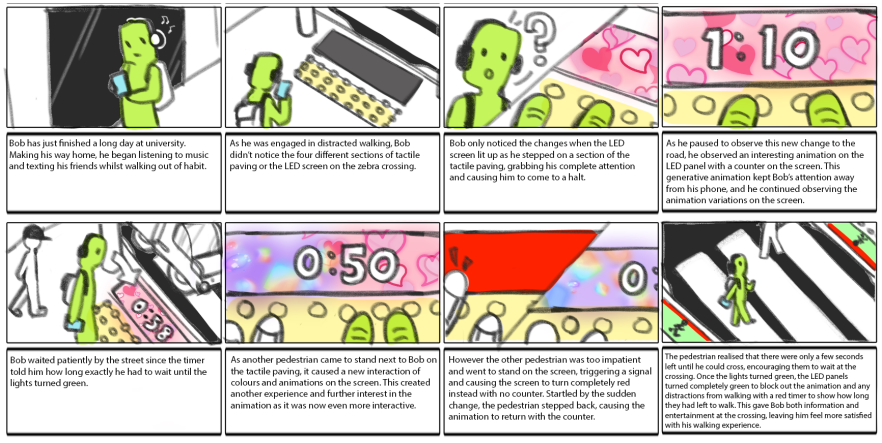
Lead user research by summarising key findings from interviews and surveys.



Analysed data from interviews and user testing feedbacks using affinity diagrams.

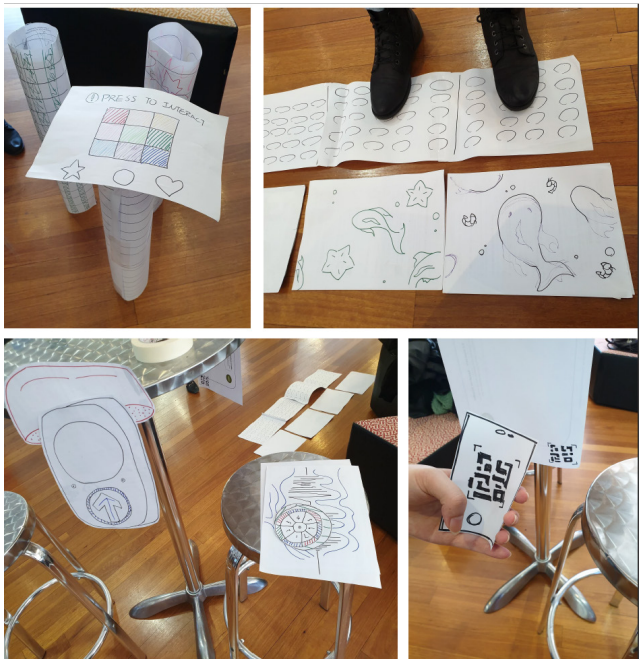


Created two distinctive personas to summarise key user needs.



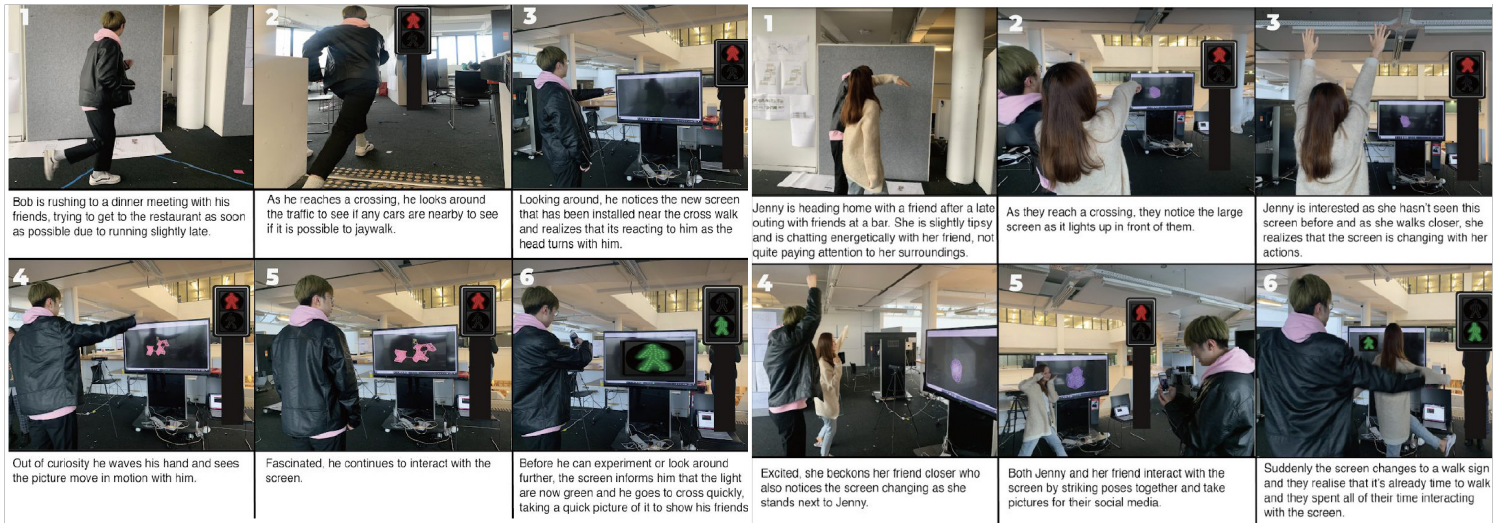
Came up with interesting storylines for both personas for all of the four concept ideas.

Contributions



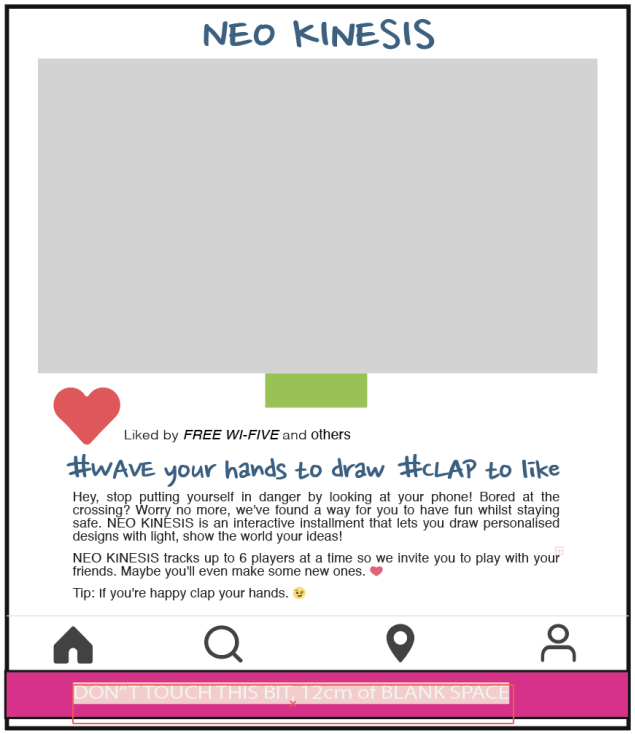
Created paper low-fidelity prototypes for user testing for all four concept ideas.

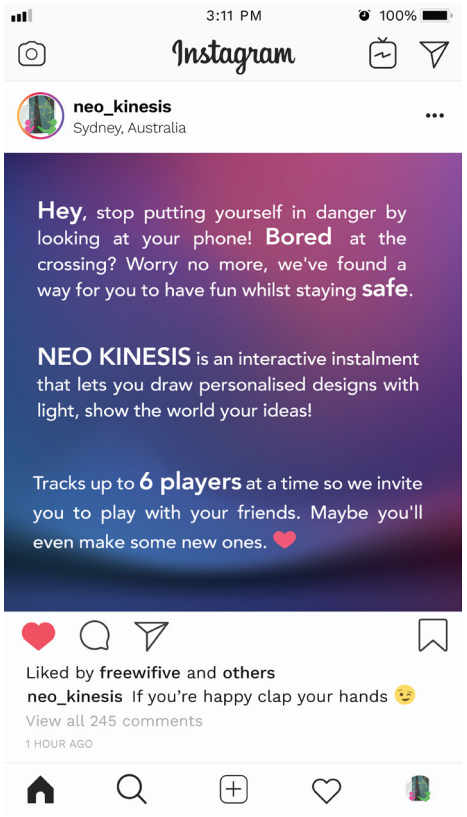
Instructured and assisted in different rounds of user testings and helped record and analyse data.



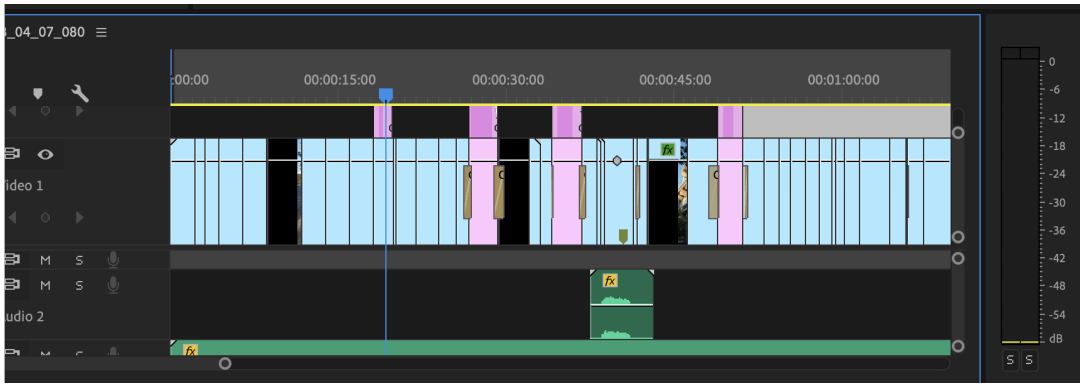
Produced the persona-based walkthrough for the final combined concept idea.

Contributions





Made mock-ups for the physical frame and created different iterations.
Assisted in building the physical frame.



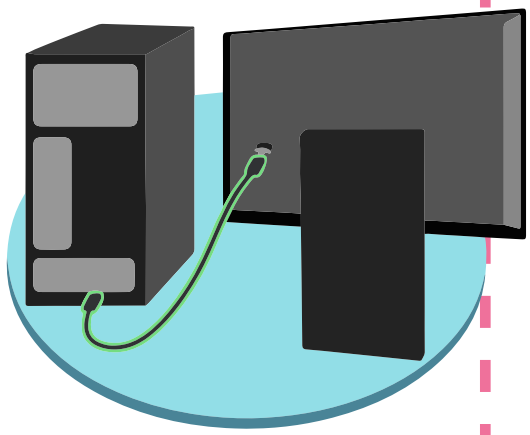
Responsible for the video production including filming and editing.

Communication

While working in the team with five members with different backgrounds, communication was the major challenge we had to overcome. There have been constant arguments among the team throughout the entire group project, arose from conflicted opinions regarding on how to combine concept ideas, improve design iterations and fix the overall aesthetics. Occasionally, what the team leader has envisioned was too complex for the developer to code digitally or infeasible for the artisan to build physically, both due to technical limitations and accessibility of materials. They used to have debates that last for hours just to agree upon one single approach. To solve this issue, my role was usually the team's 'middle-man'. I would sometimes break off the conversations to cool them off, ask suggestions from both sides and try to work out a balanced solution that satisfies both members. In addition, the team leader being absent in group meetings several times due to personal reasons has resulted in miscommunication. Despite after each meeting we updated the member through Facebook messenger, there was still one time that the whole group had to postpone the user testing to the following week, because of the iteration ideas that the team leader proposed later when the team reformed again. To minimise miscommunication, we frequently updated each other through Facebook messenger and made sure we responded as soon as possible.

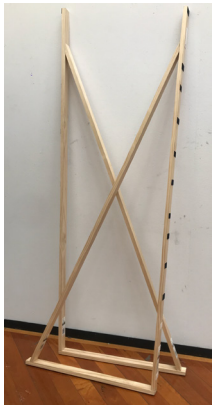
Technical Issues

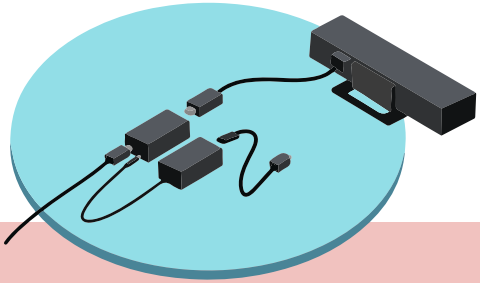
The lack of skilled developers available in the team hindered the development of more complex interactions within the given short time frame, such as making the tracking of entire body movement appear on screen via Kinect motion controller, more recognisable gestures other than clapping or even customizable design pattern options and SNS integrations. However, we still managed to create generative patterns randomly assigned as brushes to mimic users' hand movements. These distinctive designs were made sure to be thoroughly tested through multiple rounds of user testings of low-fidelity prototypes to optimise user satisfaction. One of the considerable obstacles was the noticeable lag of detected movement that a majority of users complained about when interactions appeared visually on-screen during user testings for low-fidelity prototypes. Initially the team was using Windows 10 Surface laptop to run the program. However, due to the fact that Neo Kinesis is a graphics heavy program that receives tracking coordinates from the Kinect over Node.js and display them through a HTML web server, as more players are tracked the more demanding the program becomes on a computer. To overcome this hardware issue, the team tried several different laptops with higher GUP. We eventually acquired a desktop computer – Nvidia GeForce GTX 1660 Ti, with an adequate GPU to achieve optimal performance for building the high-fidelity prototype.



Equipment & Funding Limitations

One of the major constraints that impacted the construction of high-fidelity prototype was the limited budget the team had. Initially the design of the LCD screen was intended to be vertically placed like the bus stop billboards. However, the cost of acquiring a new large LCD screen was relatively high. Because of both funding and equipment limitation, for this first version of the high-fidelity prototype demonstration, we borrowed the television stand from the university to simulate similar interactions on a horizontal screen. Thus, to provoke a sense of fully functional high-fidelity prototype, a physical frame had to be built to cover the rest part of the TV stand. Due to the large size and fragile nature of the chosen 3mm wood boards, the initial transportation of the material from Bunnings Warehouse to the DMAF was extremely difficult. The team therefore decided to cut the material into separate parts to solve the issue of storage. These the parts could be steadily assembled together later on when needed and were supported by triangular wooden structures.

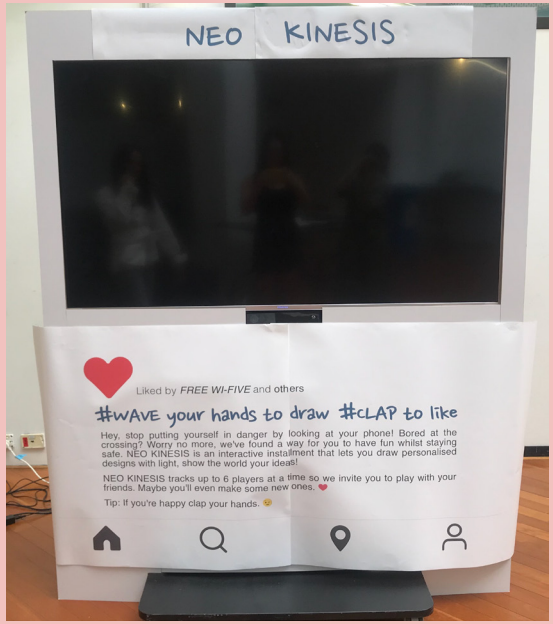




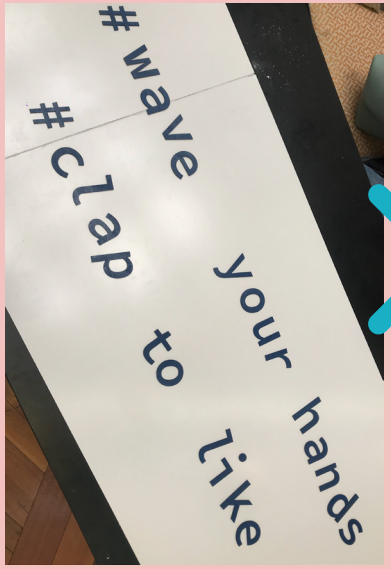
The limited tracking space allowed by the hardware, the Kinect, brought drawbacks on the area of interaction, with only a maximum tracking range of 4.5m². Thus, our team decided to constraint the number of players within the 4.5m² range to a maximum of 6 players at a time. This was to enhance the pedestrian experience through minimising any potential safety hazards that could have been caused by congestion.

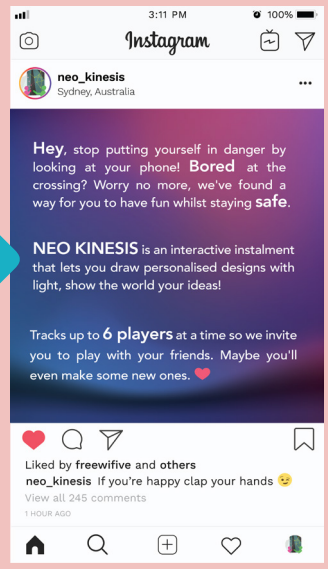
Finalising High-fidelity Prototype

The most time-consuming challenge we faced while building the high-fidelity prototype was actually the design of the physical frame. We originally designed an Instagram-like social media frame mock-up to be printed on the wooden frame to go with the 'clap to like' interaction and for the purpose of attracting pedestrians' attentions away from browsing social media on their own phones to interact with Neo Kinesis. The largest paper size for printing was A0, so we had to connect two pieces of paper together and stick them onto the frame. However, this has resulted in a low fidelity look due to the use of paper, and the fact that the proportions of the horizontal frame would not trigger an immediate connection between the frame mock-up we made and social media on mobile devices. To overcome this issue, the team decided to only laser cut the title 'Neo Kinesis' and the two instruction lines '#wave to draw' and '#clap to like' instead. The letters were than spray painted in blue and assembled on the white frame to generate a clean and minimalistic outcome. Later on, our team decided to print the iterated version of intended social media mock-up in A3 size to be put on a stand next to our prototype as the displayed instruction.



Challenges

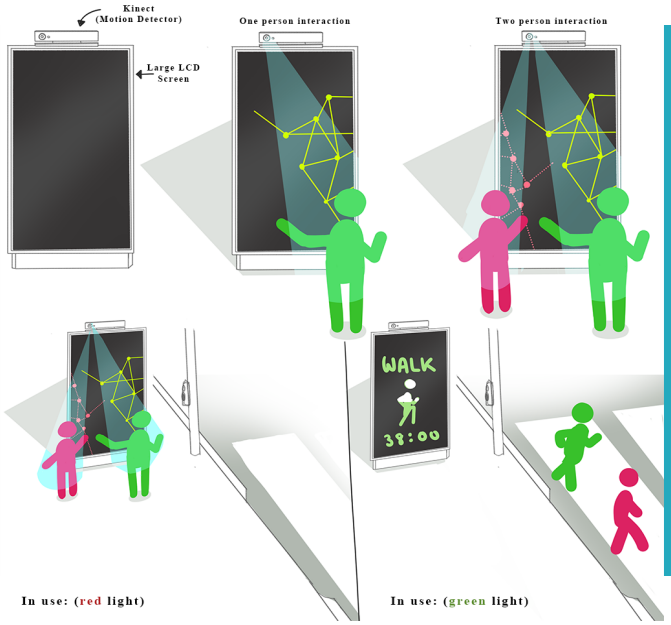




The change of the frame design has resulted in refilming of footages for the video production. Due to the limitation of power supply in realistic settings, we were not able to conduct usability testing or film the high-fidelity prototype video at the crossing facilities. The questions of whether the instalment would cause congestion, along with the issue addressed above of whether the horizontal screen would potentially block the pathways were arisen during prototype demonstration. Therefore, to simulate the real environment when filming, we borrowed a traffic light stand made by the other project group and synced the timing to match our screen (the interactions would be completely cut off when the traffic light turned green). While editing, some of the shots were cut back and forth between the screen caption of the interactions and the users moving and clapping their hands next to the crossing facilities. This was also to create a more immersive story of the video and set the product in the intended realistic environment despite the equipment limitations.

Reflection

Despite the challenges we have encountered, the performance of our team was at a satisfactory level. We have divided the workload equally according to our main roles and everyone completed their assigned parts on time. Since programming wasn't my best area of strengths (which was a major part for building the final prototype), I put extra effort in other parts of the project to balance off the contribution, especially during the user research and user testing phases as well as creating the mock-ups and final video production. I was able to keep on top of the plans and were present at all outside studio meetings. When conflicts occurred, I would reach out to the team members and were supportive for all of them.



What could have been done differently?

If the known equipment and funding limitations could be resolved, our team would have acquired an LCD screen to be placed vertically at the crossing facilities with proper power supply. This was to improve the validity of the feedback data gathered from user testings, since users would have been fully immersed in the realistic environment setting and better understood the purpose of Neo Kinesis's interactions. Some of the potential issues raised during demonstration could have been uncovered at earlier stages, such as the likes and time counter being less notable while users are fully engaged in the interactions. There could have been some sort of animation alerting users 5 seconds prior to the green light to avoid rushes, and the likes counter could have been visualised using a heart icon to become more obvious. The quality of video production could also have been improved with footages of targeted pedestrians interacting with Neo Kinesis. Neo Kinesis prototypes could also have been installed at each end of a crossing to allow interaction between pedestrians from both sides to encourage community engagement. Players from each end would be able to see interactions of players from the opposite end, allowing them to interact despite their physical distance apart.

With more time and advanced programming knowledge, more improvements could have been made on the interactions, features and attributes based on feedbacks from the more immersive user experiences. To ensure the displays do not become too chaotic, further visual feedback would have been created to determine which hand movement being tracked is coming from which player, on which side. Another aspect that could have been considered is limiting the number of players on each end depending on environmental contexts, to forcibly prevent the screen from becoming too chaotic. This could have provided a better experience to the original Neo Kinesis set up.

Other potential modifications could have been implemented, such as additional drawing designs like using delaunay triangulation, brush strokes, smoke effects, etc. The heart animation could have been improved to give the heart more character and more feedback by having it float off the screen. Aspects of customisation could be added to cater users' strong preferences for the ability to choose their own colours and designs in order to improve their overall experience. Additional gesture recognition could be introduced to create a more engaging experience and encourage collaborations among pedestrians, such as the peace sign, or interactions between two players (such as high fives or holding hands). Our team will try our best to keep working on the prototype in the future to make these potential features available.

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