

The Olympic Trading Card Game

Design Project Documentation

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Project Overview

The Olympic Trading Card Game is a fun and interactive game that aims to promote the Australian sporting spirit at the Olympic games. This game is aimed to be used for the upcoming 2022 winter and 2024 summer Olympics, but it could also potentially be used as promotional material for the Brisbane 2032 Olympics. The game is aimed towards children and teens, but it can be played by anyone of any age.

In a real-world scenario, this projector screen would be set up as a digital wall at South Bank. Families at South Bank may walk past it and see what it's all about. They then scan the QR code and begin taking a picture in front of their chosen background. From there, they will make their trading cards on the mobile web app and then print them out. These actions of spontaneous discovery and creativity, which relates back to the theme of ludic encounters.

After card creation, players still have many things they can do on the mobile web app. Trading cards each have a star value. Players can earn stars for each of their trading cards from other community members voting on them. If players don't want their cards being voted on by strangers, they can still earn stars from being active in the community and voting on other people's cards (with a set max per day). These stars determine the tier of each card (common, rare, epic, legendary).

Players can also join teams, such as their school, and compete with other teams on a leaderboard. The placings are determined on how many total stars each team has. At the end of an event, teams will receive prizes depending on their placings on the leaderboard.

Background Research

I started with general research on creating realistic and interactive augmented reality experiences as well as inspiring designs. During this, I had the idea of creating an AR experience for children and teens relating to the Olympics. To further refine this, I did further research on designing AR for kids as well as statistics on sport and the Olympics in Australia. After taking notes on four main sources and determined what could be learnt from them, I synthesized my research together to identify opportunities for my project.

According to a research paper by Alvaro Montero and others, digital objects require certain characteristics to create realistic and interactive AR experiences (Montero et al., 2017). These digital objects and elements in the mixed reality space require occlusion, collision, reflection and shadows to make them appear like they are part of the same world as real-life objects in the space.

Using these elements to create realism, users will be engaged with the content and interact with both the digital and real world. This is useful with creating an interactive experience that educates children and teenagers on a certain topic.

Researchers from the University of Lapland used an AR application to teach children about nature and observed their interaction with the experience. They found that the children grasp the idea of augmented reality quite quickly (Alakärppä et al., 2017). Although, some teamwork among the children was needed. The children who understood it well helped teach the children that did not.

The idea of collaboration when using augmented reality is also found in the digital art piece Story of the Forest at the Museum of Singapore. The digital art piece featured native flora and fauna in Singapore and gave visitors the option to use augmented reality on their phones to view information on animals and plants in the art piece (“Story of the Forest | teamLab”, 2016).

Competitiveness is a common value in Australia. Research by McCrindle found that 80% of Australians agree that sport is an integral part of Australian culture (“Australia, the sporting nation - McCrindle”, 2019). The average Australian spends 2 hours, 27 minutes participating in sport or physical activities each week.

From all this research, I saw the opportunity of creating an interactive and realistic AR experience for children and teenagers to teach them the importance of the Australian sporting and competitive spirit. The theme of this interactive experience is the Brisbane 2032 Olympics.

With the opportunities drawn out, I wrote a design brief for my project. My design should aim to:

- Create an interactive augmented reality experience that teaches children and teenagers the Australian sporting and competitive spirit in the Olympic games.
- Encourage and spark interest in the Brisbane 2032 Olympics in these children/teenagers as they will be our future athletes representing Australia.
- Create open-ended interactions using mobile AR that makes a ludic experience for the users.



Image of Museum of Singapore's "Story of the Forest"

Ideation and Concept Development

With the brief set out, I began ideating how this design could look and operate. Questions like “what is the best way to implement AR?” or “how can I make this design more ludic?” all crossed my mind. I started writing out and sketching concepts until I had three main concepts that are all different but have the same idea.

Concept 1 (Chosen Concept):

The first concept is a digital wall backdrop that syncs to the user’s phone via an app. When the user scans the QR code on the screen, the phone opens the official app for this design and allows them to change the backdrop to one of ten different presets which are all Olympic themed. The app then gives a list of different poses that can be done in front of the backdrop, all of which are the symbols for Olympic events.

The user then gets their friend or family member to do one of the poses in front of the backdrop as seen in this sketch here. The user is then given a menu that allows them to drag in AR elements into the scene. Once the user is happy with how it looks, they take the photo. The photo then becomes a trading card that is added to the user’s collection. The cards are then given a generated rarity and can be traded to other users.

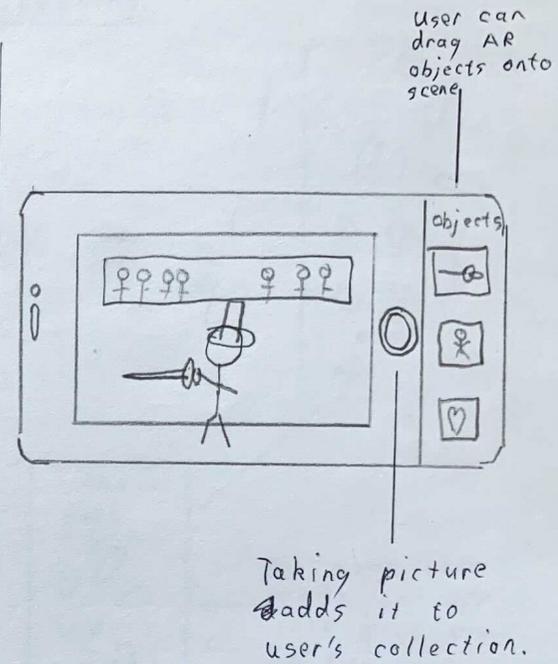
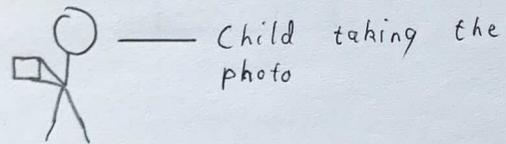
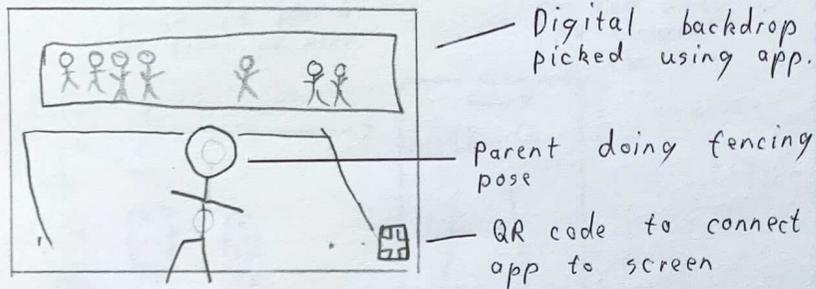


Event pictograms the user’s could pick as a pose

Concept 1 Sketch:

Sketches:

Concept 1:



Concept 2:

The second concept is a park installation that has many different Olympic events the children can participate in. These events use augmented reality to enhance the experience.

For example, the cycling event has the user place the phone in the holder in front of them and it uses the phone's camera to create a "racetrack" in front of them with a speedometer. For events that can't have the phone in front of them, like the sport climbing event, the user can point the phone camera at the climbing wall and it will give marker tips and the best path to climb to the top. After that, they do the event. When completing the event, the user receives a digital ribbon in the app.

Concept 3:

The third concept is different to the other two as it has several installations spread out across South Bank. Each installation has a large model of an event icon and is accompanied by a pole with a description and QR code.

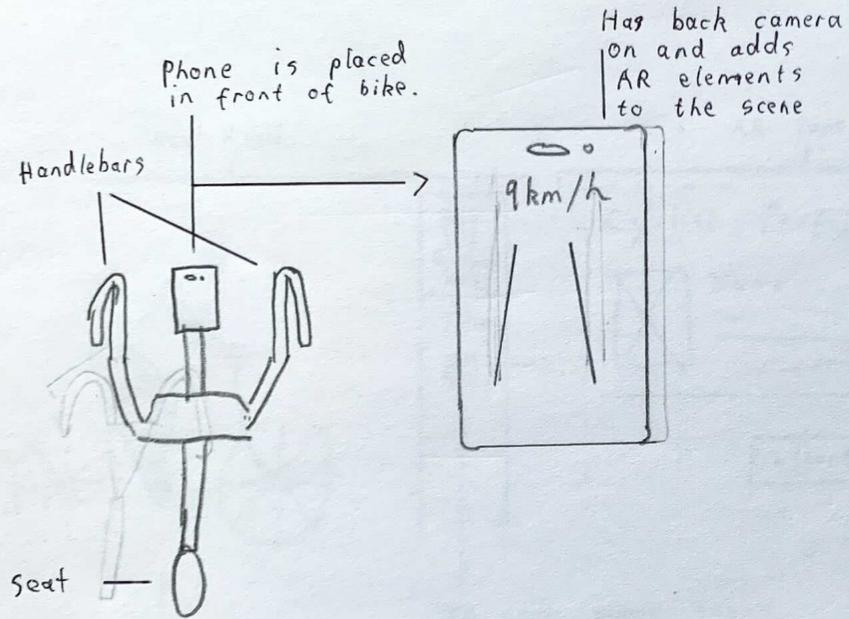
When scanned using the app, an AR panel appears next to the pole, which can be read by moving the phone around. It features a profile of an Australian athlete for that specific event and gives you the option to collect the athlete's sticker. The app also has the ability to give you a map of where all the installations are. Users can pick whatever order they want to complete it.

Concept 2 Sketch:

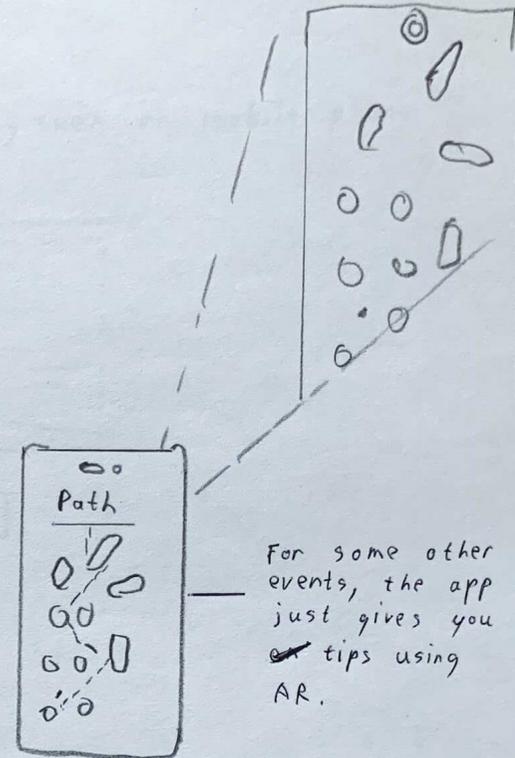
Concept 2:

Cycling:

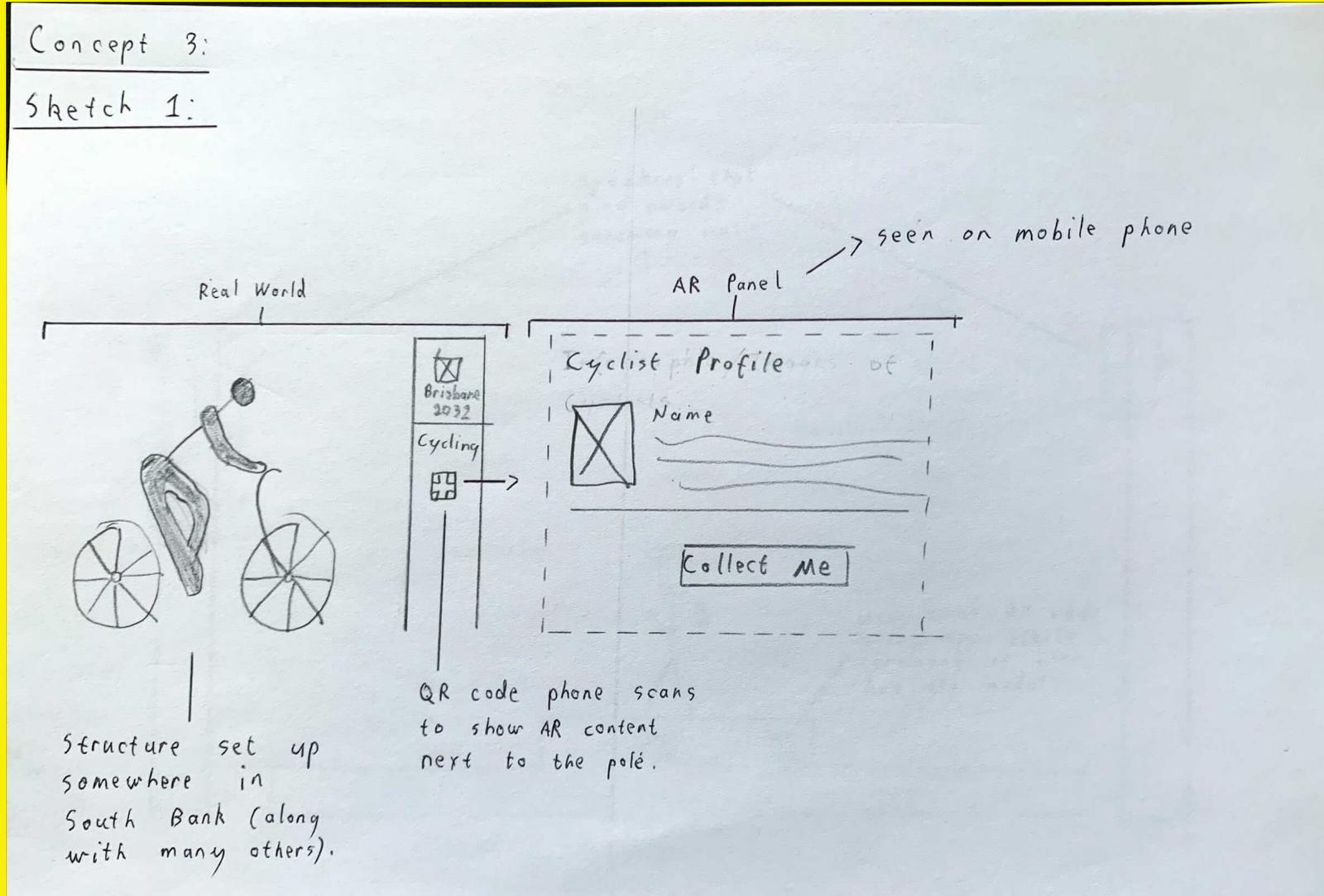
Top-Down (kind of):



Climbing:

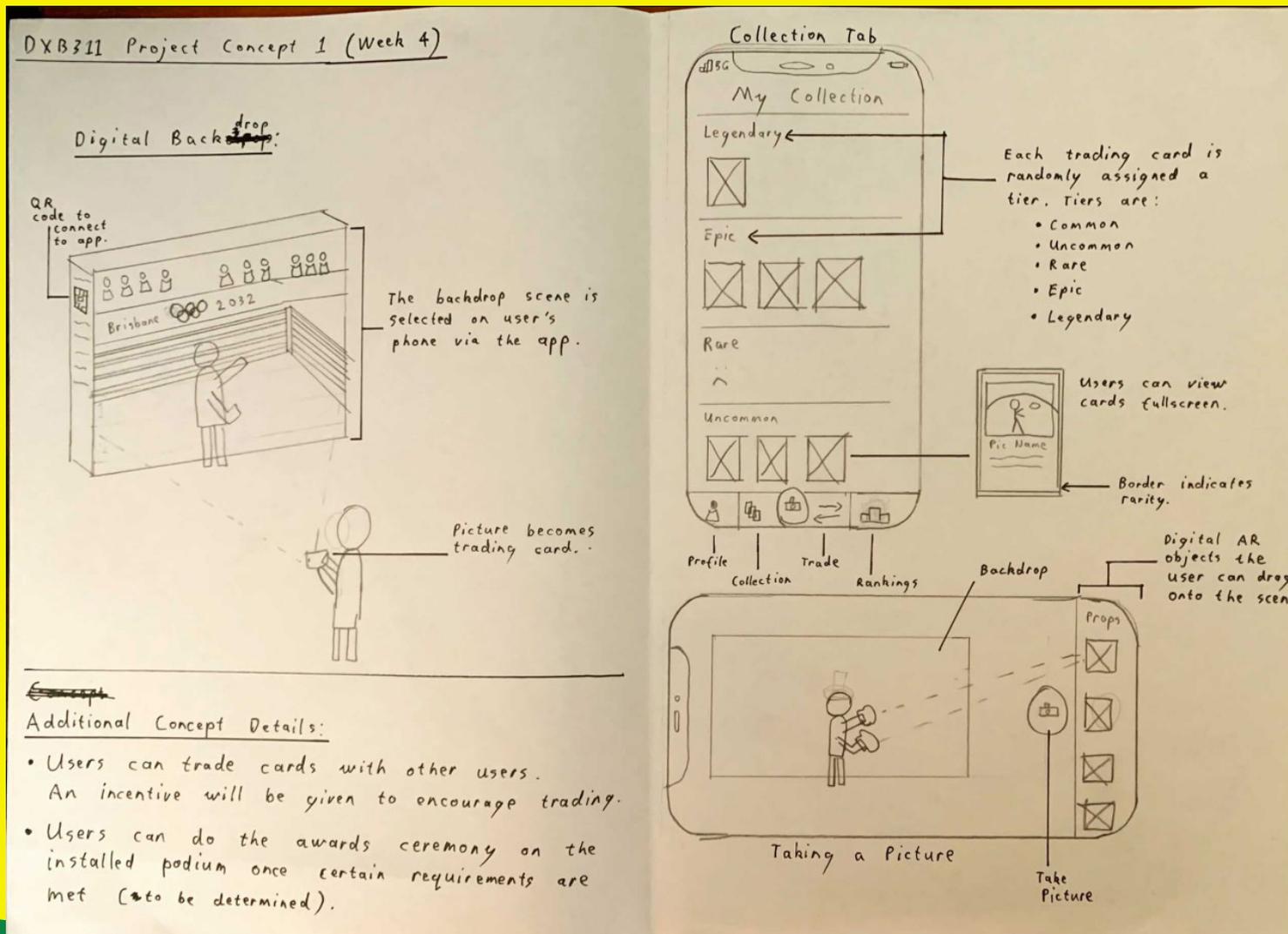


Concept 3 Sketch:



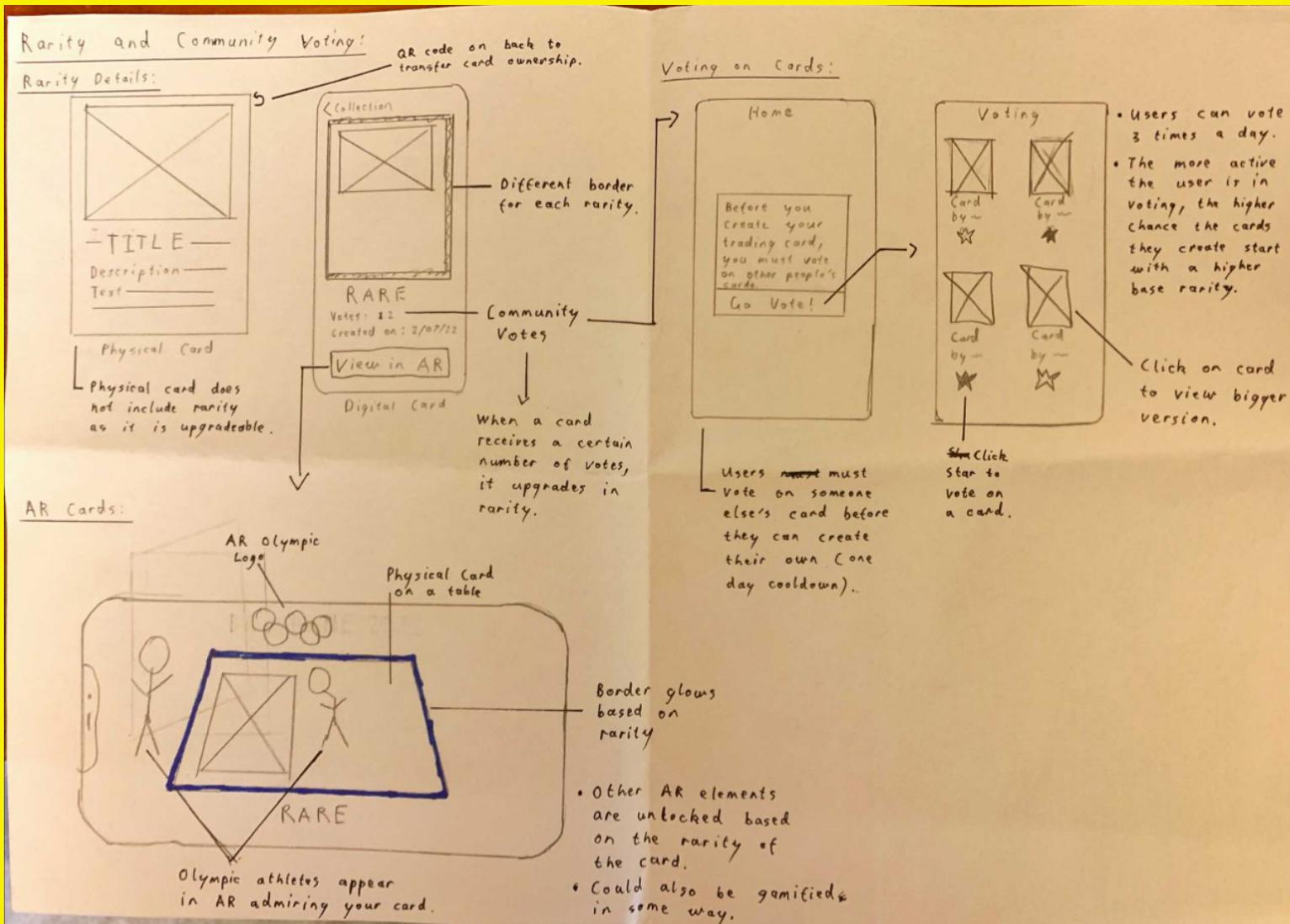
Design Process Documentation

Week 4



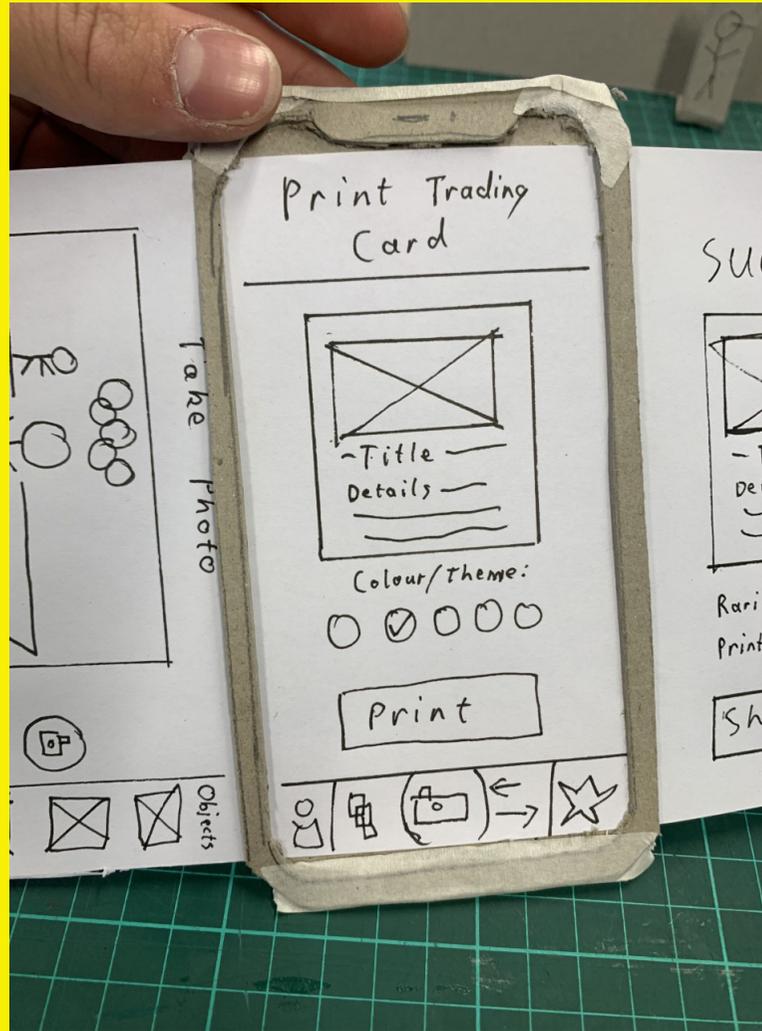
Once I determined the concept I wanted to follow, I created a detailed sketch of how the web app and digital backdrop would look. I also showed the basic functionality of how users would interact with the digital backdrop to create trading cards.

Week 5

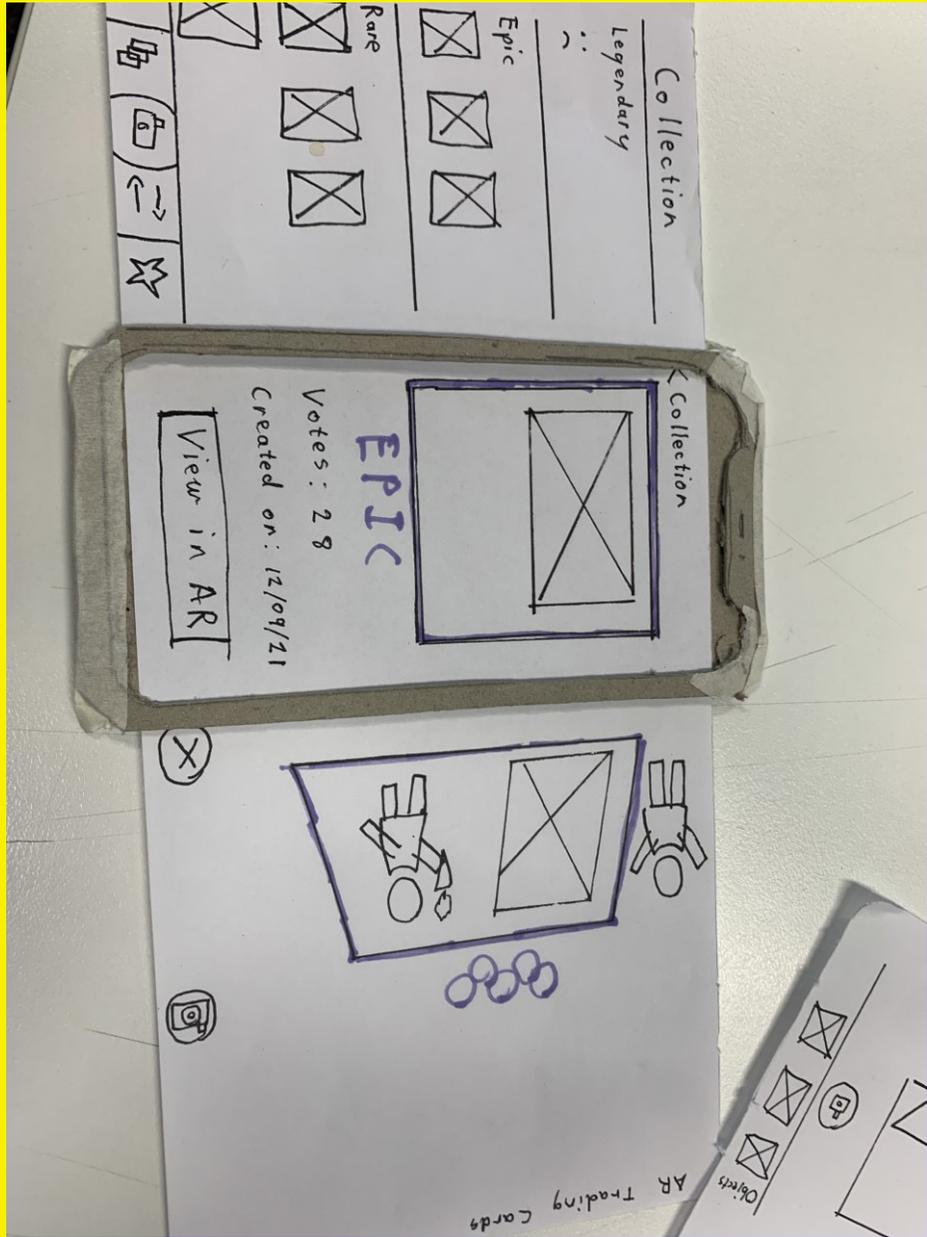
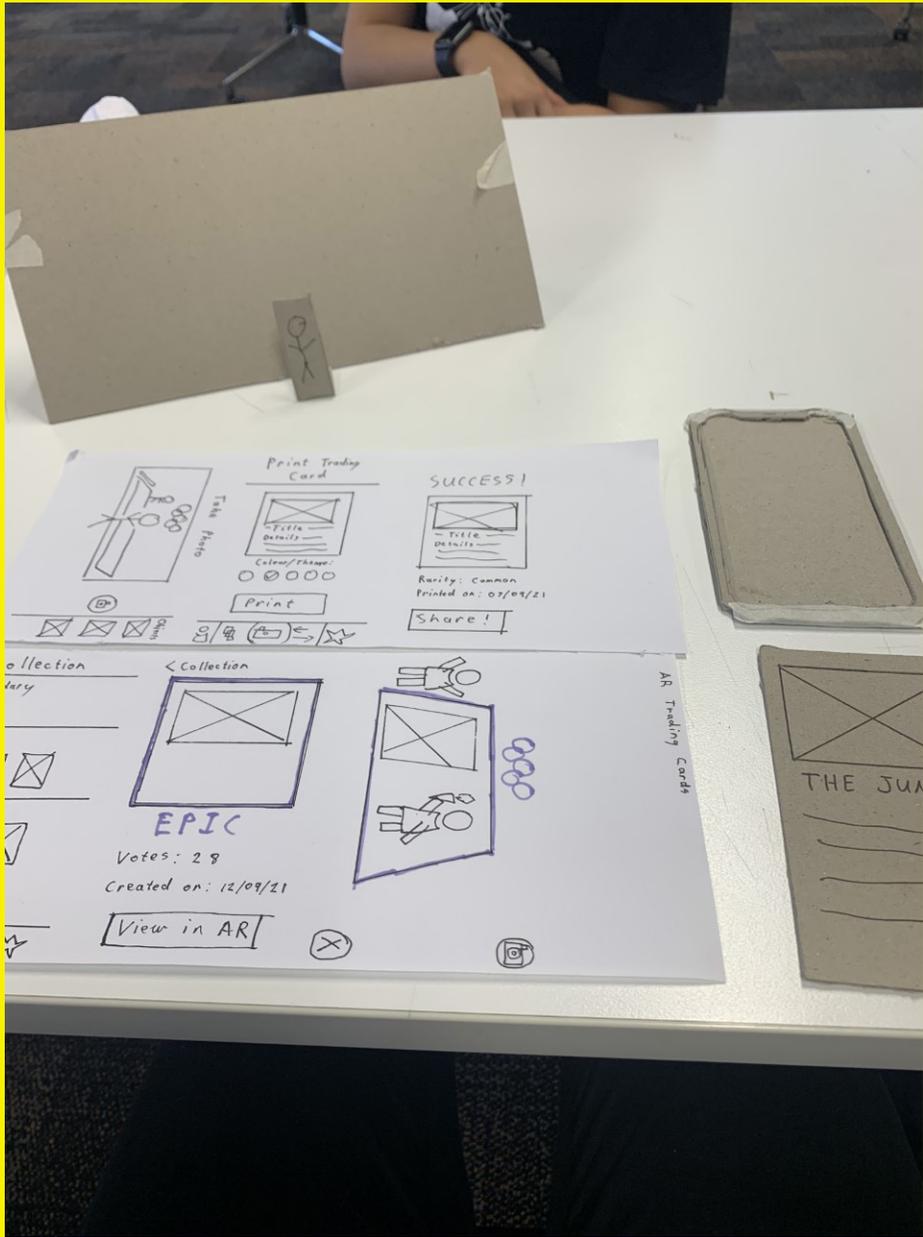


This was a sketch of how the trading cards would look in both physical and digital forms. It also showed how they could be voted on in the community.

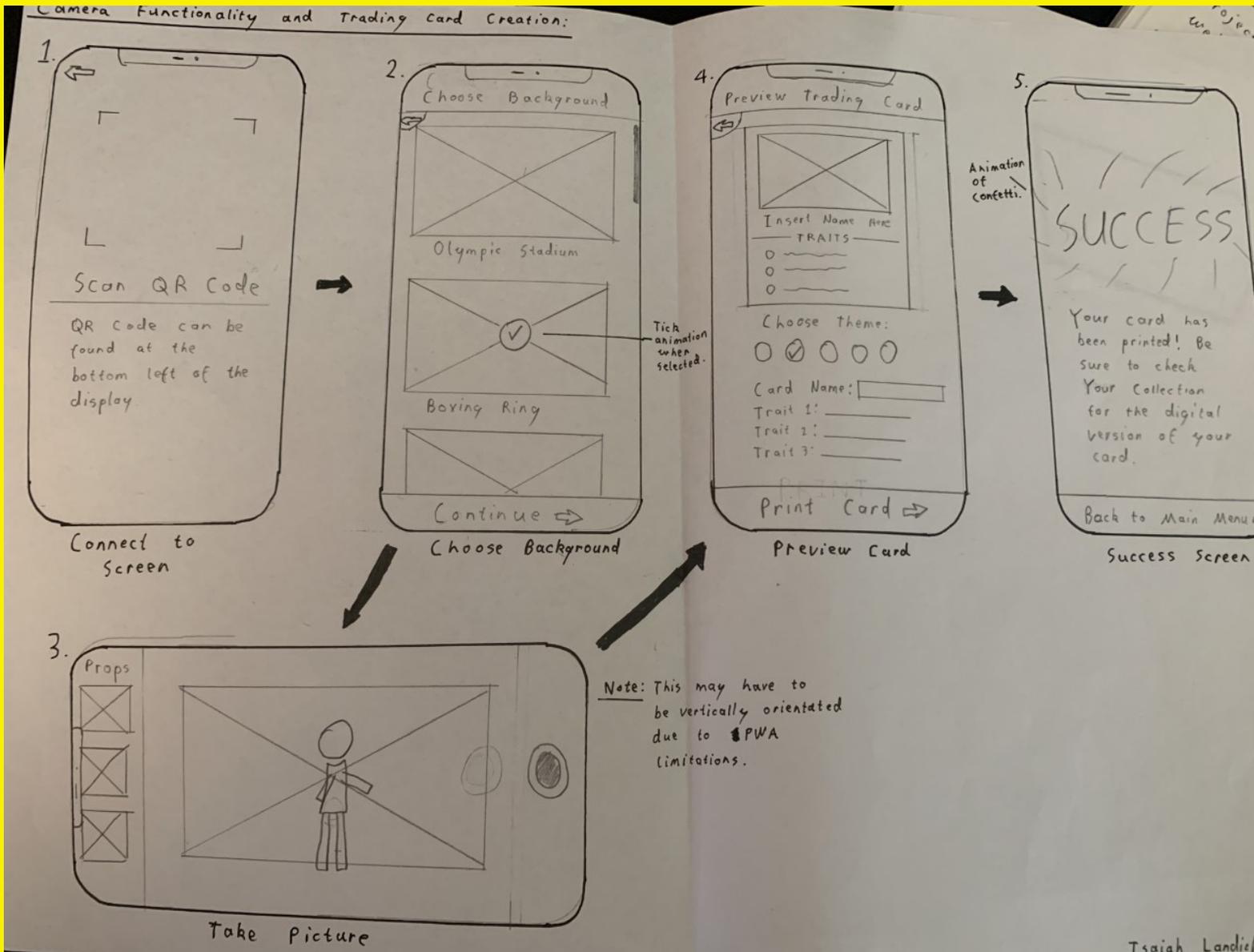
The AR functionality of the trading cards was a cool concept but was never implemented due to time constraints.



During the studio in Week 5, we tested our prototypes using paper and cardboard. This method allowed me to see how users would interact with the web app. It also helped generate more ideas of for the web app and digital backdrop.

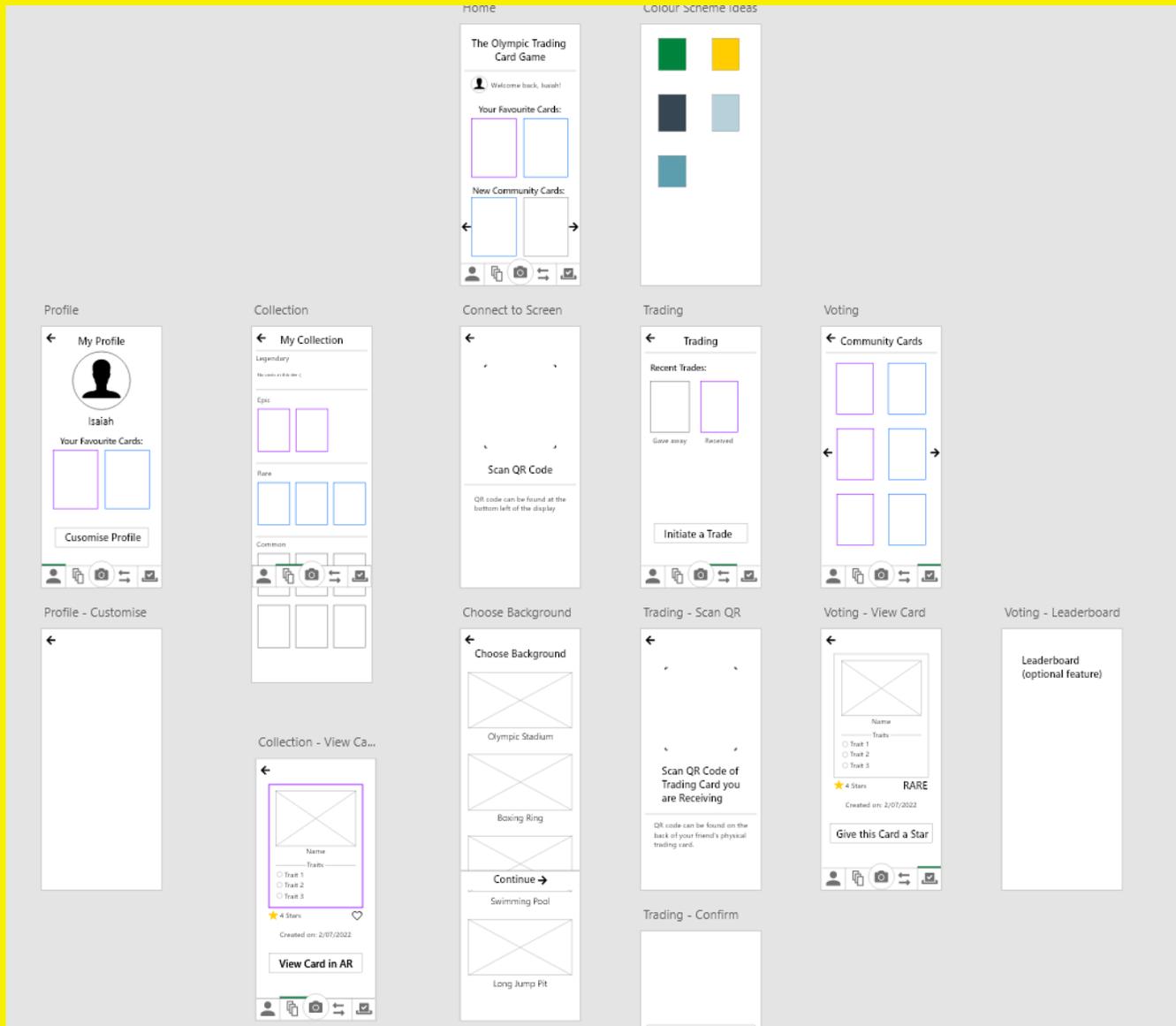


Week 6



This is a more detailed sketch of the journey of the user creating a trading card using the web app and digital backdrop.

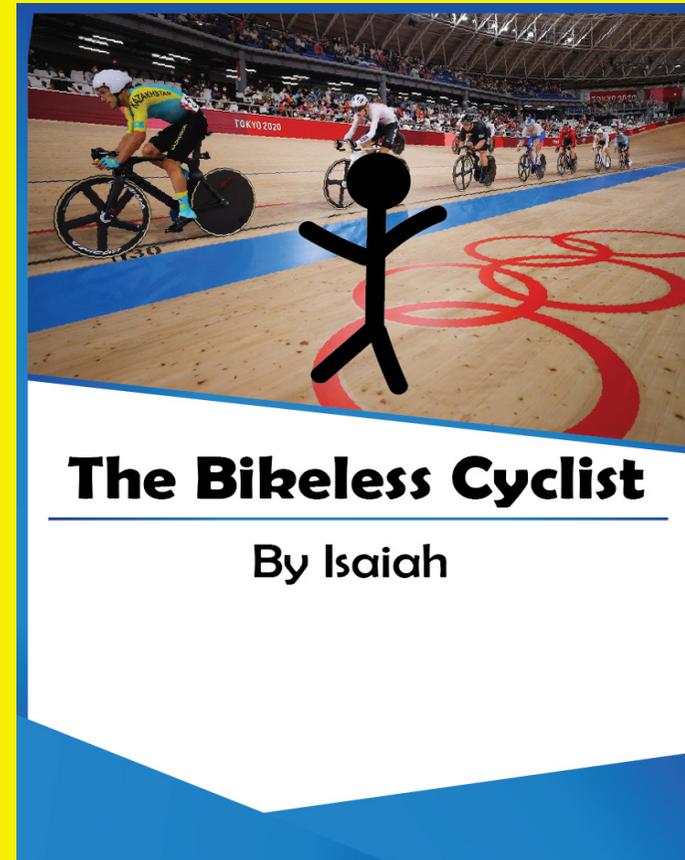
Week 7



After all my sketches were done, I created a mid-fidelity prototype of the web app inside Adobe XD. It featured the basic layout of the app and the interactions the user could make with it.

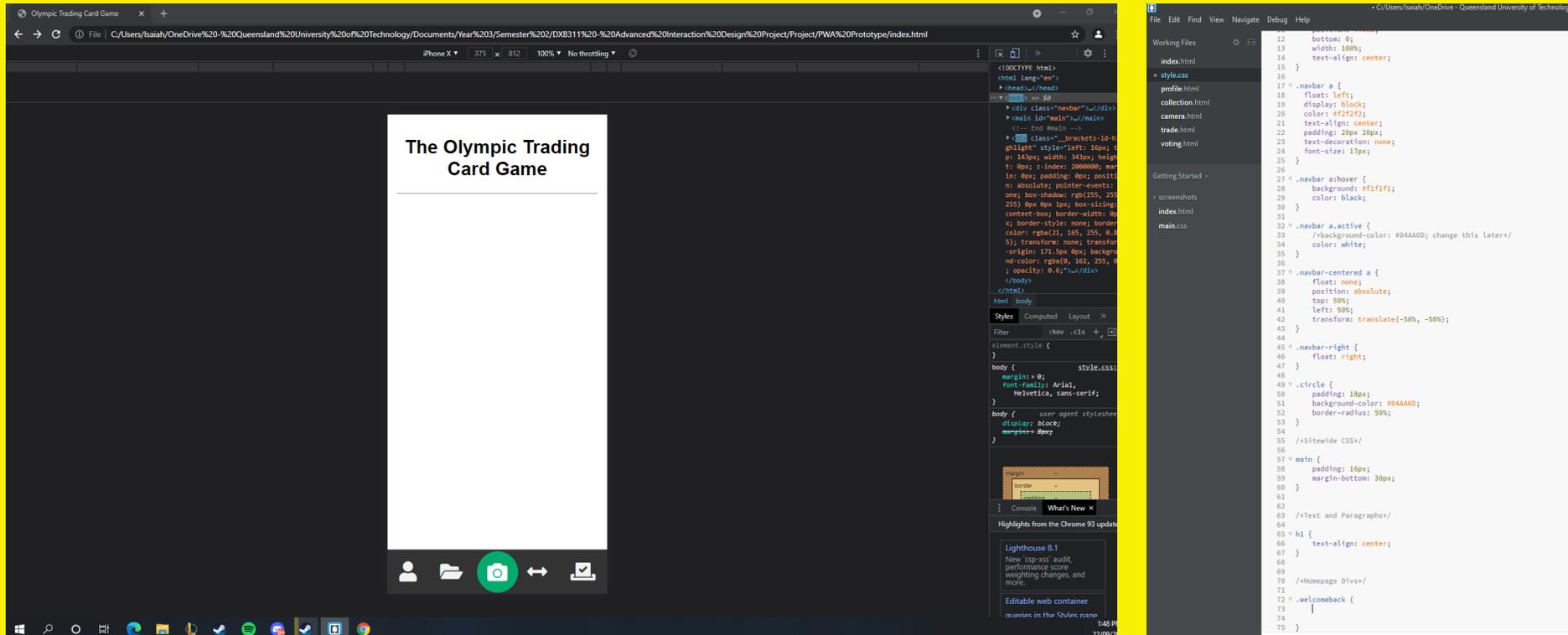
I always referred back to this prototype when coding the actual prototype.

Week 8



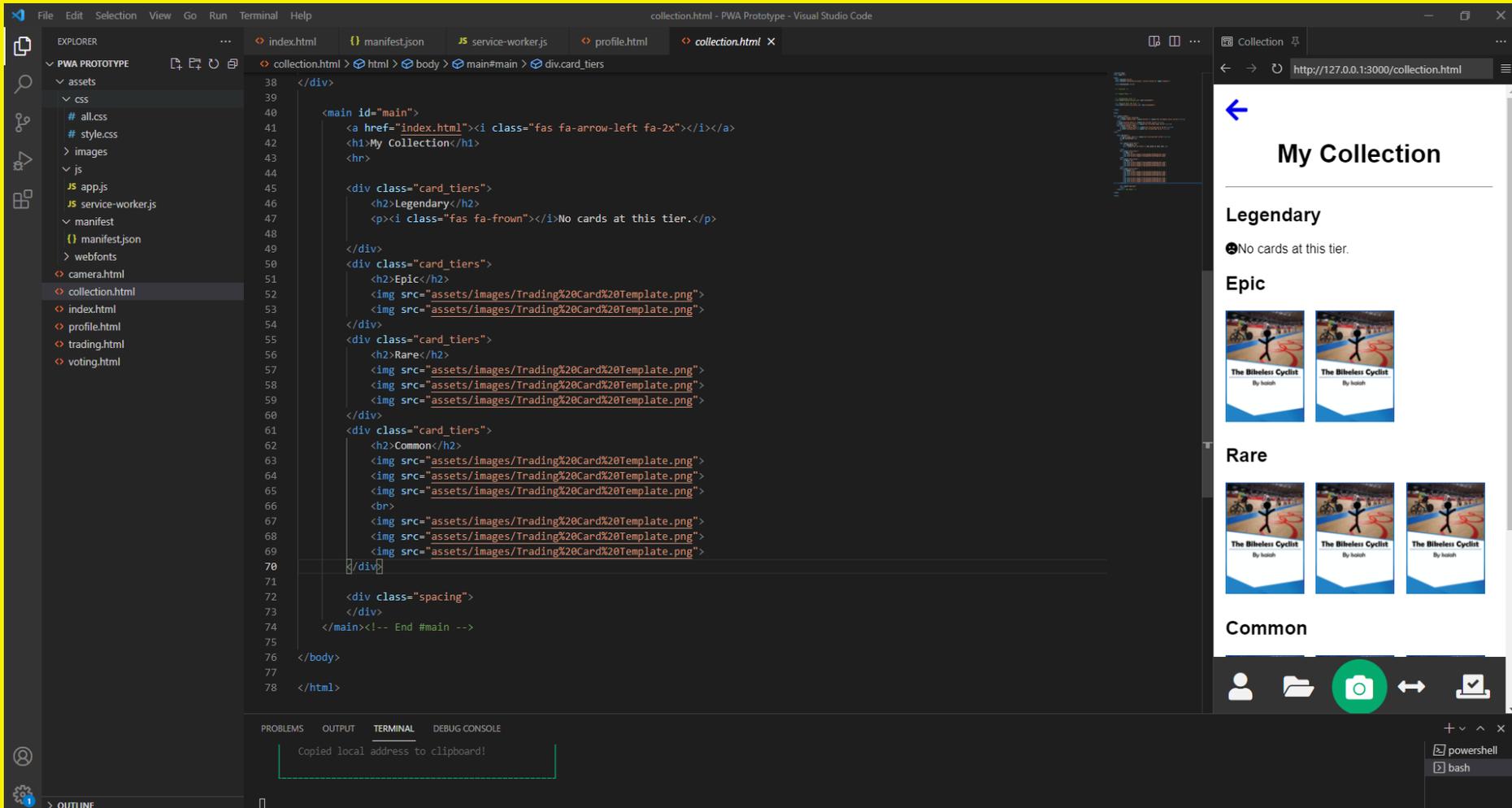
In Week 8 I mainly focused on exploring how the website would look. I created a simple moodboard to help inform the style and colour scheme of the web app and digital backdrop. I also created a mockup design of the trading cards.

Week 9

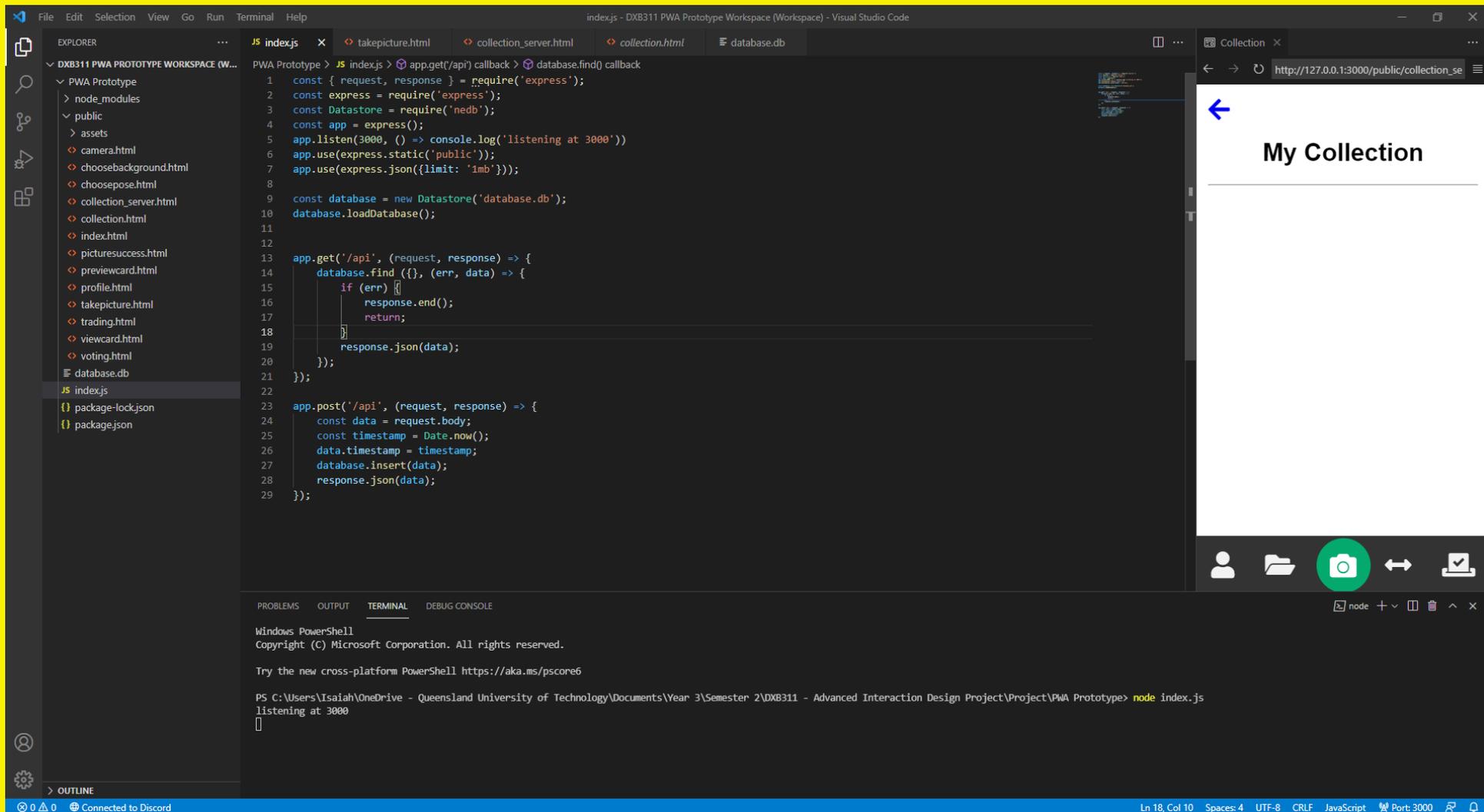


In week 9 I began coding the website. I began coding the basic HTML and CSS of the web app inside of Brackets. I aimed to mirror the Adobe XD prototype through CSS.

Week 10



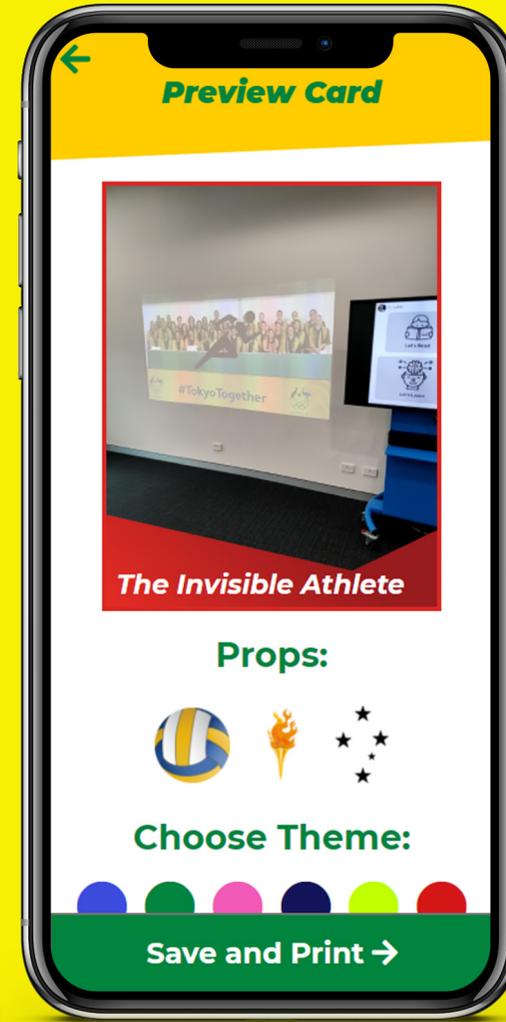
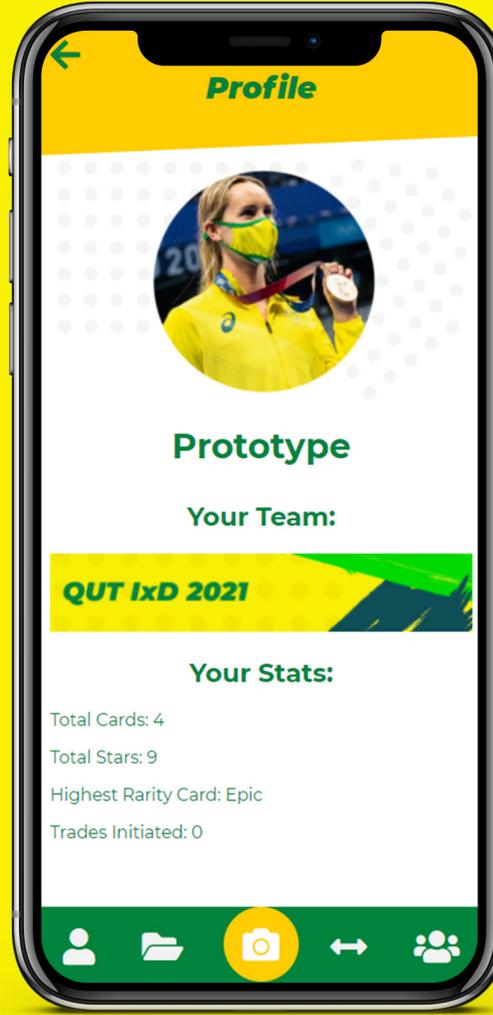
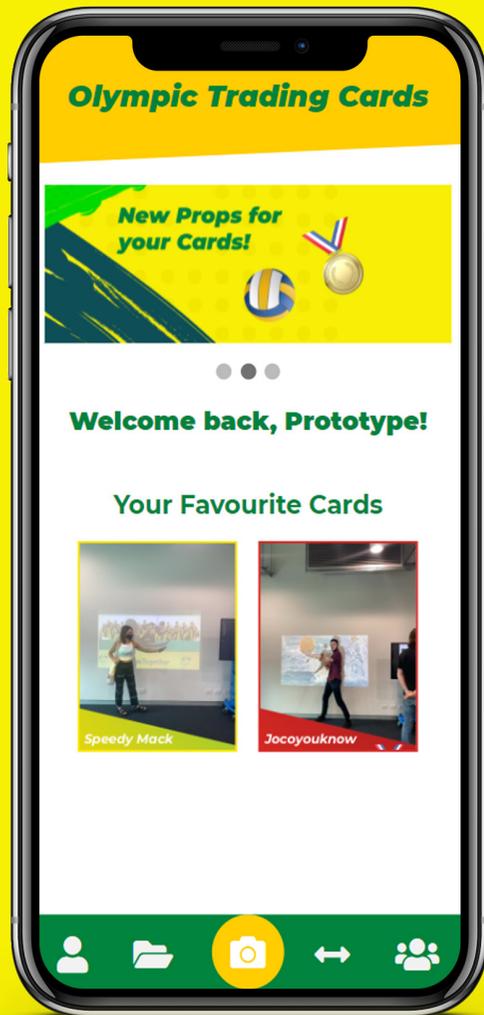
In Week 10, I changed my coding program from Brackets to Visual Studio Code, due to the latter being easier to work with when coding in JavaScript. I continued with the HTML and CSS of the website and began working on the JavaScript functionality.



In this screenshot, I am coding the JavaScript for the server. This server receives data from the client (like an image or trading card) and saves it to the program's database. It was a lot of hassle trying to write all this JavaScript code as I was learning a lot of it from tutorials and StackOverflow as I went.

Final Prototype

Web App:



Digital Backdrop:



User Changing the Background using the Web App:



Project Instructions

To create this prototype, I wrote the web app in Visual Studio Code, using HTML, CSS and JavaScript. For server-side code, I used the Express and Mongoose libraries to receive data from the client and send it to a cloud-based database (MongoDB). On the client-side, I used the p5.js library to help code the camera function of the web app. I also used the html2canvas library to capture the <div> container of the user's trading card and send it to the database as an image.

Regarding styles and design, I used a mix of Adobe Photoshop and Illustrator to create the graphics seen in the web app and digital backdrop. All the icons in the web app are from the Font Awesome icon set.

For the materials of the physical prototype, I used a projector to show the digital backdrop. Users could access the web app on their own phones by scanning the QR code on the backdrop.

```
app.post('/api', (request, response) => {
  const data = request.body;
  const timestamp = Date.now();
  data.timestamp = timestamp;

  if (data.imageType === "RawImage") {
    const sendRawImage = new rawImage(data)
    sendRawImage.save()
      .then((result) => {
        response.send(result)
      })
      .catch((err) => {
        console.log(err)
      });
  }
  if (data.imageType === "TradingCard") {
    const sendCardImage = new cardImage(data)
    sendCardImage.save()
      .then((result) => {
        response.send(result)
      })
      .catch((err) => {
        console.log(err)
      });
  }
  response.json(data);
});
```

Excerpt of the server's JavaScript Code

References

Alakärppä, I., Jaakkola, E., Väyrynen, J., & Häkkinen, J. (2017). Using nature elements in mobile AR for education with children. Proceedings Of The 19Th International Conference On Human-Computer Interaction With Mobile Devices And Services. <https://doi.org/10.1145/3098279.3098547>

Australia, the sporting nation - McCrindle. McCrindle. (2019). Retrieved 9 August 2021, from <https://mccrindle.com.au/insights/blog/australia-the-sporting-nation/>.

Montero, A., Zarranandia, T., Diaz, P., & Aedo, I. (2017). Designing and implementing interactive and realistic augmented reality experiences. Universal Access In The Information Society, 18(1), 49-61. <https://doi.org/10.1007/s10209-017-0584-2>

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