

**NANYANG
TECHNOLOGICAL
UNIVERSITY**

SINGAPORE

IM3080 Design and Innovation Project

AY2020/2021 Semester 1

Group Report

Title: Fettle

Github: <https://github.com/zonghangoh/fettleDIP>

Submitted by: Group 4

Supervisor: Dr Chan Chee Keong

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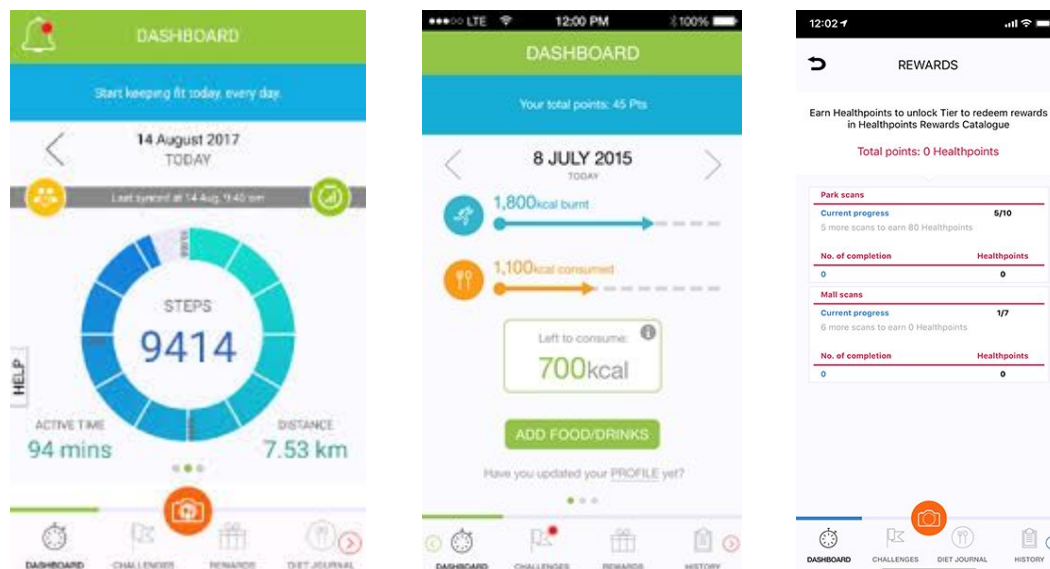
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1. Background and Motivation

In a bid to encourage healthy lifestyle habits, the National Steps Challenge was conceived and introduced by the Singapore government. The initiative empowers Singaporeans to take control over their health and wellbeing by tracking their progress with the aid of a free steps tracker and an accompanying Healthy 365 mobile application which syncs users' step activity for rewards and incentives.

NTU has been a fervent supporter of the initiative, having participated in the campaign's Campus Challenge edition, where students are encouraged to clock their steps and partake in step challenges as a unified student body.

While the idea sounds promising, the initiative did not really resonate with youths and failed to gain any considerable amount of traction. Our team believes that this is due to the Healthy 365 application's unintuitive and tacky design, as well as a lack of social engagement features. With *Fettle*, we challenged ourselves to rethink what a modern and youth-centric step-tracking application would entail. In addition to its cute design and aesthetic, *Fettle* also thrives on social gamification which we believe is a powerful tool to help cultivate long-lasting healthy habits.



The current Healthy 365 app has much to improve on with regards to UI/UX, design and social gamification.

2. Objective

Create a beautiful steps and health tracking application

We believe that the first step to building a health app that people enjoy using is designing an app that is delightful to look at. We focus on animations and custom design assets to make the user experience more enjoyable.

Capitalise on social gamification to drive peer-to-peer motivation

If you want to walk fast, walk alone. If you want to walk far, walk together. With features like group step-challenges, users are incentivised to add their friends and nudge each other towards achieving their step goals in order to earn coins which can be used to redeem rewards. We also facilitate real-time interactions between users via push notifications as well as text and video chat.

Create opportunities for people to work out together virtually

Due to the COVID pandemic, everyone has become wary of congregating in large groups. However, as we are all innately social animals, we still crave for the intimacy of working towards similar goals in the same space with the people we care about. On *Fettle*, we seek to provide an alternative and safe (virtual) space for people to come together and sweat it out.

Provide an intuitive and visual way to monitor their performance

Using a cat avatar as a caricature of the user's health/exercise profile is not just adorable eye-candy; it also provides practical value. Failing to stay active will gradually turn the user's cat avatar obese, providing a hard to miss signal for the user to get back on the right track. With activity graphs, users can also intuitively monitor their weekly step activity. Friends having access to each other's performance indicators also encourages peer to peer support and motivation.

3. Review of Literature/Technology

Flutter

Flutter is a software development kit created by Google. It enables developers to build native apps on iOS and Android from a single codebase. Flutter speeds up the process of developing mobile apps with its fully-customizable and reusable widgets.

We built our app with Flutter and it is available on both iOS and Android platforms.

Firestore

Cloud Firestore is a flexible, scalable database for mobile, web, and server development from Firebase and Google Cloud Platform.

Firestore is our database. We store user information and other data used in our app. It is a real time database so our app is able to stream data and reflect changes from the database on the UI as they happen.

Procreate

Procreate is a raster graphics editor app designed for digital painting. Since its launch in 2011, it has been favored by digital artists to create expressive sketches, rich paintings, gorgeous illustrations and beautiful animations.

We drew the cat illustrations, homepage backgrounds, and cat costumes with Procreate. We then export the files as PNG files to put in app or Photoshop files(.psd) for further editing.

Photoshop

Adobe Photoshop is a raster graphics editor.

We used Adobe Photoshop to adjust the sizes and proportions of the images drawn with Procreate. After the editing we proceed to create animations in After Effects.

After Effects & Lottie

Adobe After Effects is a digital visual effects, motion graphics, and compositing application used in the post-production process of film making, video games and television production. Among other things, After Effects can be used for animation.

We used After Effects to create the cat animations (waving hand, doing push-ups...). We imported cat images in separate layers and created an animation of 2 to 3 seconds for each of the images. Then we exported the animations as JSON files to put into the app. We adjusted the frame rates and resolutions of the images for maximized performance. We used Lottie which is a library developed by Airbnb that parses After Effects' animation files (.JSON) with Bodymovin before rendering them natively on our mobile app.

Premiere Pro

Adobe Premiere Pro is a timeline-based video editing software application developed by Adobe Systems and published as part of the Adobe Creative Cloud licensing program.

We used Premiere Pro to edit the video showcase for our app.

React

React is a JavaScript library for building UI components. It is component-based, which is good for composing complex UIs. Each component is able to maintain its internal state data. React is also favoured in building interactive applications because it runs faster and delivers better user experience.

We used React for our landing page at <https://fettle.vercel.app/>.

Next.js

Next.js is an open-source React front-end development web framework that enables functionality such as server-side rendering and generating static websites for React based web applications.

We used Next.js for our landing page at <https://fettle.vercel.app/>.

4. Design and Implementation

4.1 Design Consideration / Choice of components

Steps Tracking

Apple Health & Google Fit

As an app which aspires to replace the existing Healthy 365 app and facilitate the National Steps Challenge, being able to implement step tracking is essential in developing our proof of concept.

As the government issued devices which the Healthy 365 app supports do not provide a public API for us to interface with, *Fettle* syncs data from the Apple Health or Google Fit app on the user's device. In other words, the user's device here functions as a pedometer, and step data is collected by Apple Health / Google Fit before channeling it to *Fettle* where it is then handled and stored in our Firestore database.

Completing Step Missions as a Group

Firestore Database & Firebase Cloud Messaging

Currently, accumulating steps and redeeming rewards is a largely individualistic affair with the Healthy 365 app. This can lead to high user attrition as it is difficult for users to stay motivated and commit to a lifestyle that is all about challenging oneself to stretch beyond his/her comfort zone. Our team believes that peer to peer motivation is the key to sustaining one's commitment to a healthy lifestyle, which we hope to facilitate through the app.

Aside from implementing game rules which encourage users to form groups (eg. one's number of friends has a multiplier effect on coin rewards and group quests can only be taken on when one has a minimum number of friends), we also made it easy for users to communicate, motivate and nudge each other through push notifications and real time messaging. Instant messaging is implemented by connecting to a Firestore stream, which offers built-in live synchronization through a nonSQL database format.

Virtual Group Workouts

Agora, Lottie

Due to the COVID-19 pandemic, people are now susceptible to unpredictable nation-wide lockdowns. Across the globe, people are forced to serve quarantine at home and live life in painful solitude. Consequently, people are moving from offline to online spaces to seek out human connection. Online conference calls have become immensely popular for a variety of different use cases such as online classes, working from home or even playing party games with your mates virtually over a Zoom call.

Interestingly, there is an increasing trend of people hosting mini group workouts or fitness classes virtually. This gave us the idea of implementing live video workouts directly into our app. This feature provides a rich layer of connectivity that extends beyond synced step-tracking where users can breakout into spontaneous live workout sessions together in the same (virtual) space and feel deeply connected even though they are physically far apart.

To implement live video calls, we tapped onto Agora's Video SDK which provides a wrapper to easily integrate WebRTC technology into our app. Our live video calls are 5 minute high intensity workouts where users have to follow the cues of an animated cat character in the middle of the screen. To animate the cat, we used Lottie to bring Adobe After Effects' exported JSON files to life.

Chibi Design

Procreate, Photoshop, AfterEffects, Lottie

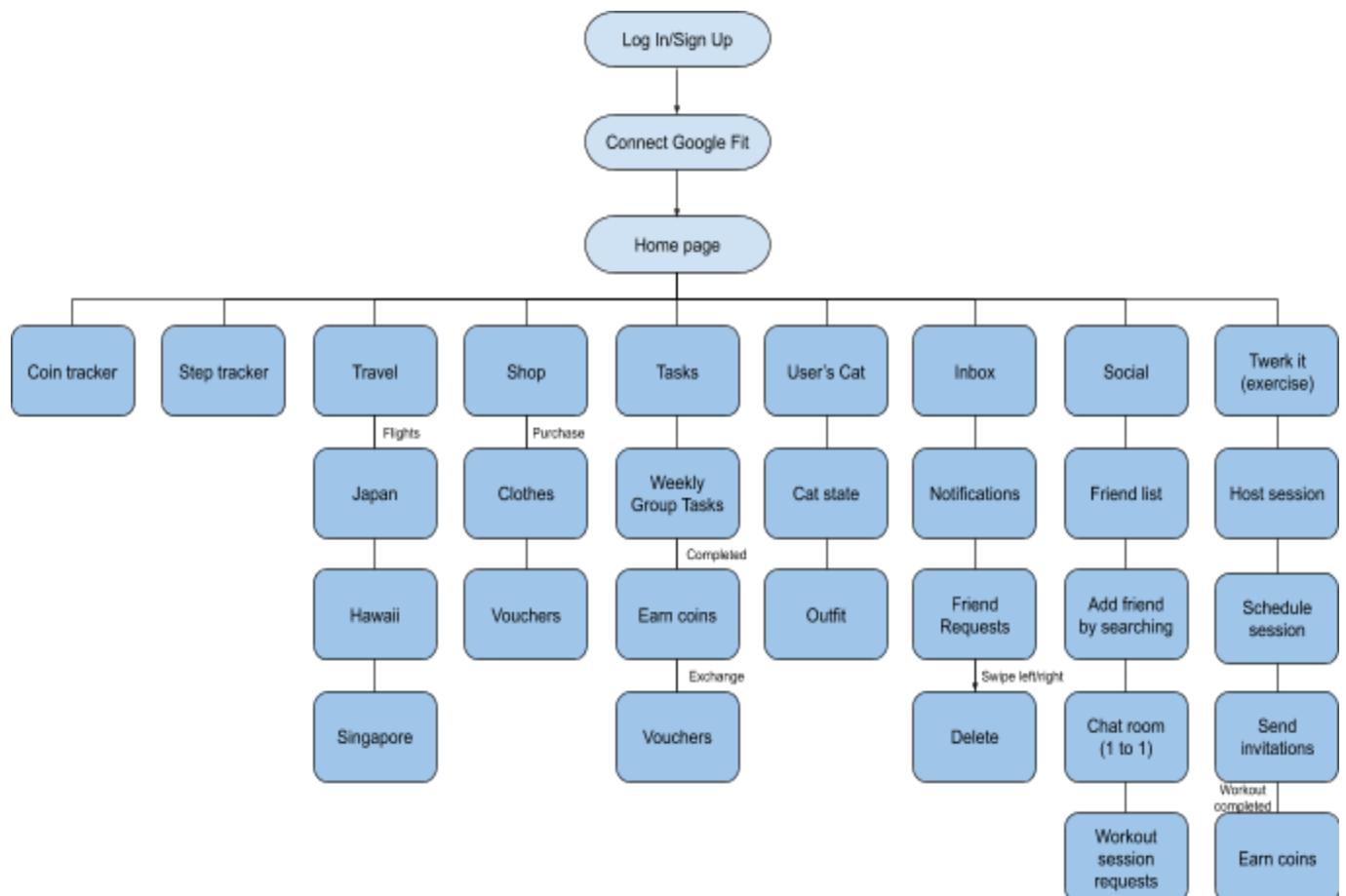
As gamification is a huge recurring theme throughout our application, we wanted our app to look and feel like an actual game, even though it might not necessarily be running on an actual game engine. We emulate the look and feel of popular passive mobile games by designing cute avatars with different pieces of equipment and animating them using Lottie. We also went the extra mile to design beautiful landscapes for the home screen which is customizable by the user.

Rewards

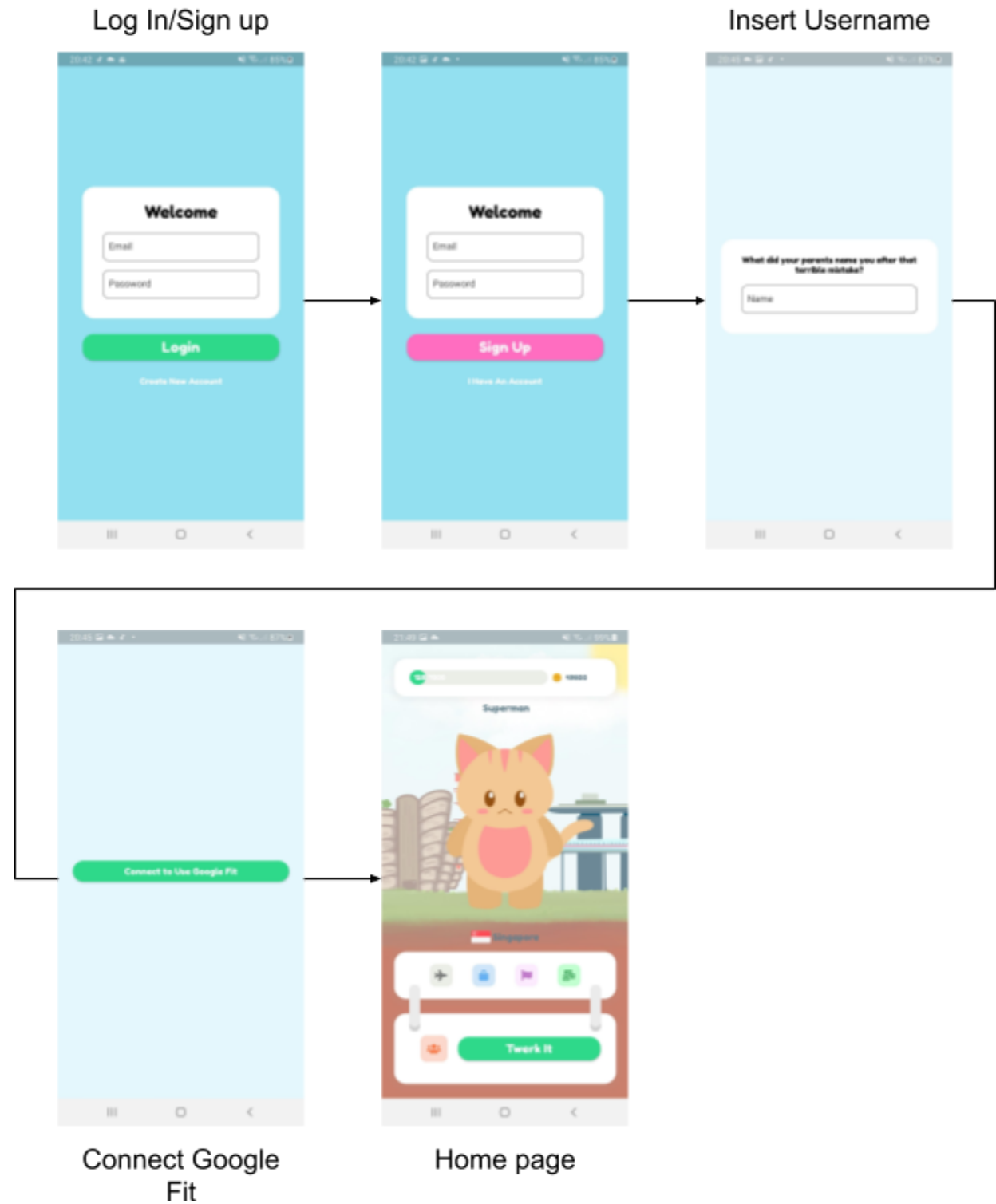
Firestore Database

Social gamification is *Fettle's* means to an end, and the end goal here is a healthy body and redeemable vouchers. Just like the Healthy 365 app, users are incentivised to accumulate steps and partake in step challenges by earning coins which can be used to redeem food and drink vouchers. We implemented a simple and straightforward interface for the entire redemption cycle, syncing data through our Firestore database.

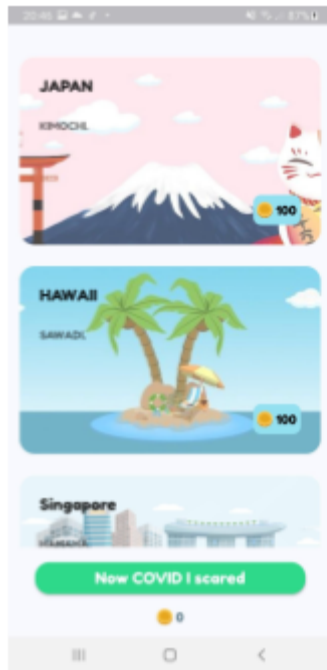
4.2 Final Design (with block diagrams)



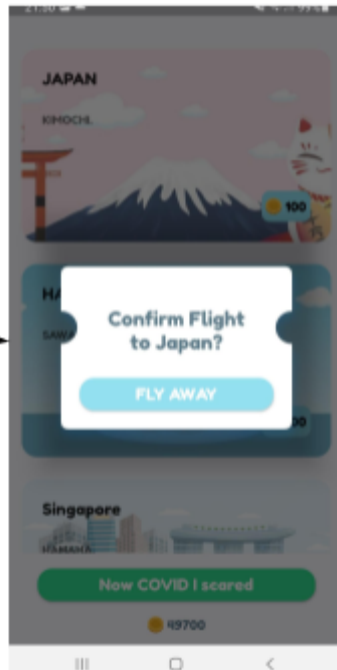
4.3 Implementation (with photos)



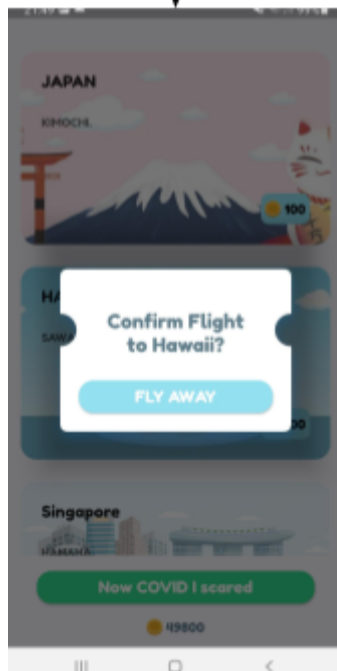
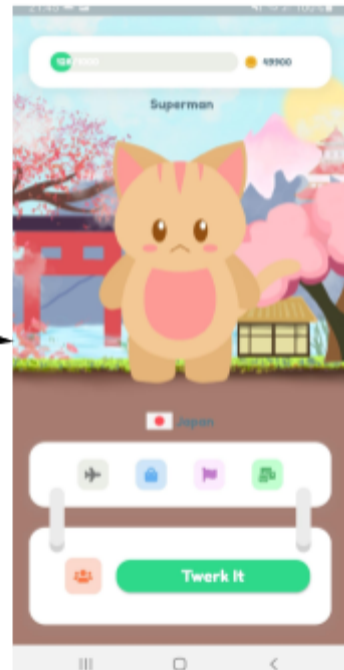
Travel Page



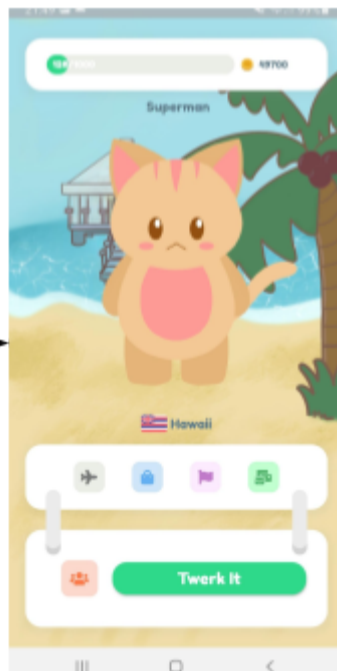
Travel to Japan?



Japan

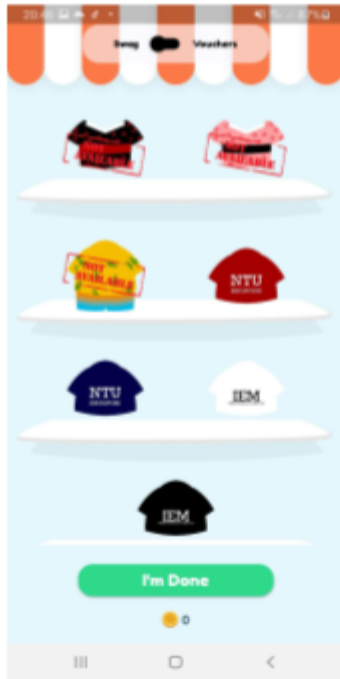


Travel to Hawaii?



Hawaii

Shop Page



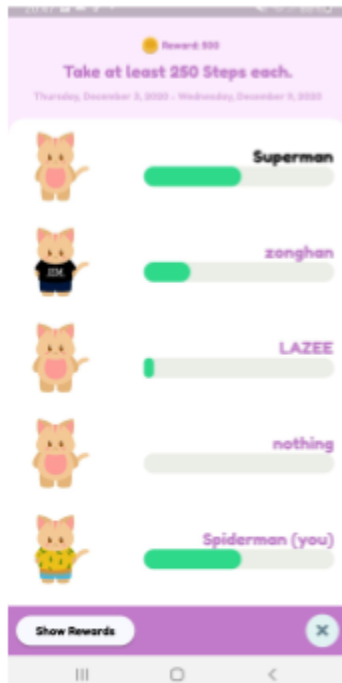
Buy Clothes?



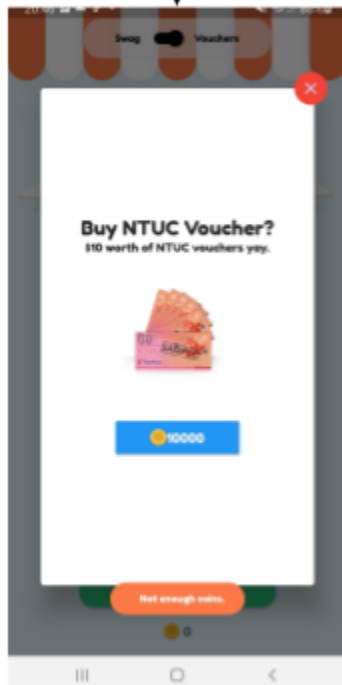
Wear Clothes



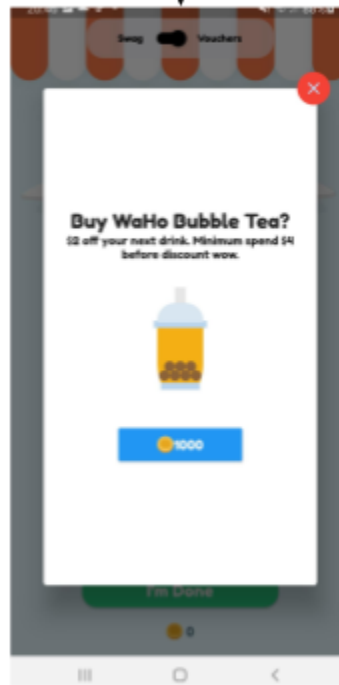
Complete Tasks



Redeem Gifts

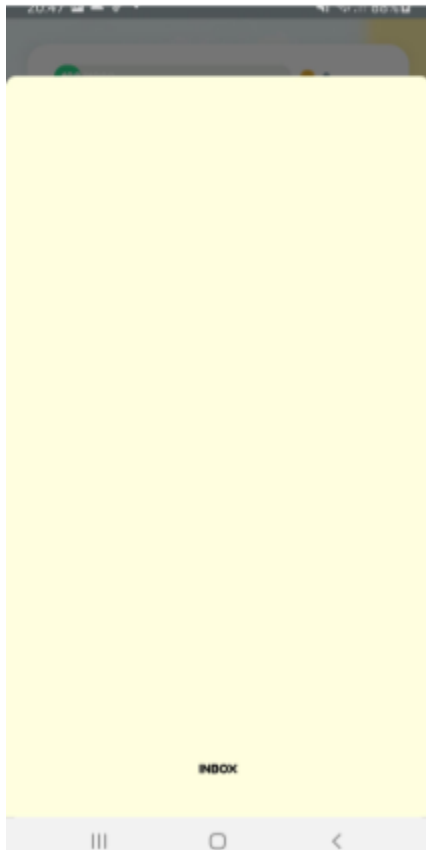


NTUC Voucher



Bubble Tea

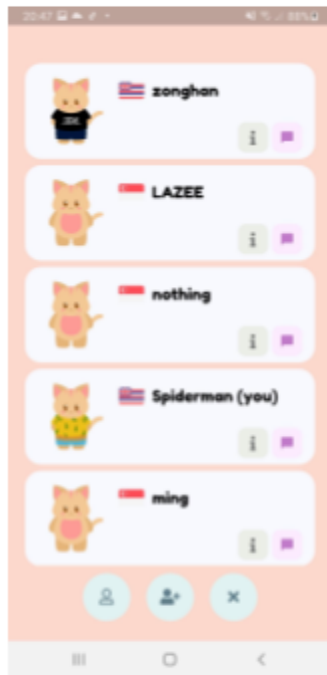
Empty Inbox



Filled Inbox with Friend Request



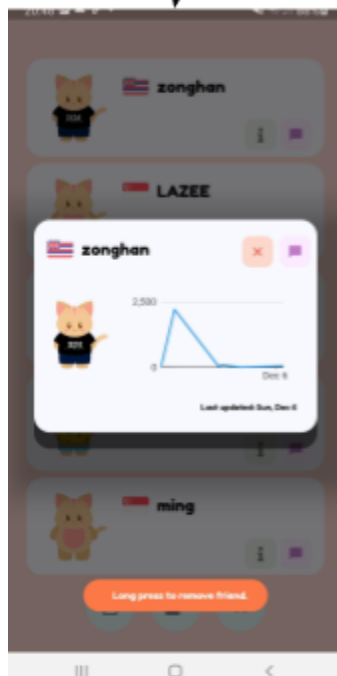
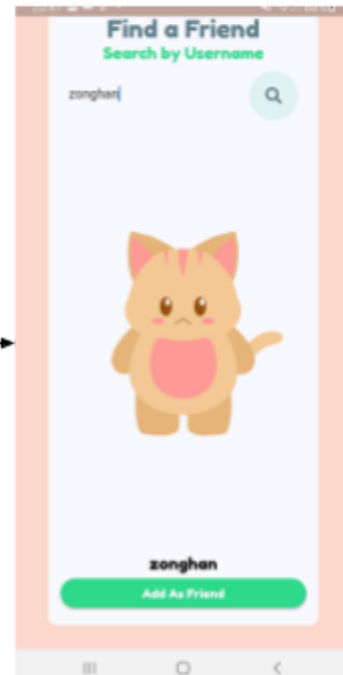
Friend List



Search for friend



Add friend

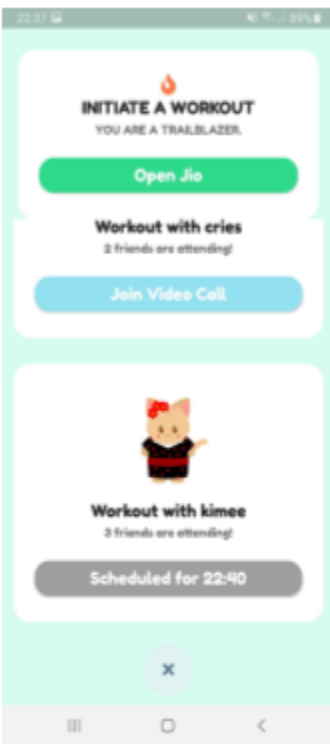


Check friend stats



Chatting System

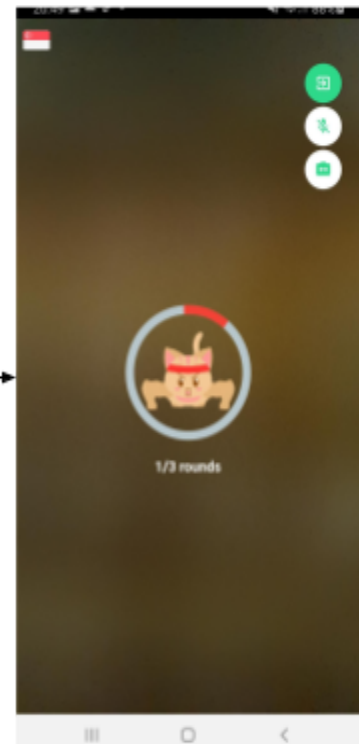
Create or Join Exercise Session



Invite Friend



Workout



4.4 Discussion

By tapping into the Google Health and Apple Fit SDKs, we were able to navigate ourselves around the absence of a public API for government issued step trackers and managed to develop a working proof of concept which extensively explores the possibilities of syncing said trackers with a modern mobile application which gamifies the user experience, making it a social one. As a whole, we are pleased with the end product.

In our search for resources on how to implement our desired features, we were amazed by how much modern third party SDKs and APIs are able to simplify the complexity of otherwise difficult-to-implement features through abstraction.

a) Animations

Despite our lack of experience, we were still able to develop and ship extremely smooth and high fidelity animations for our app using Airbnb's Lottie library, which makes incorporating animations as simple as using static assets.

b) ACID transactions

To minimise lag, we limited the number of participants in a video call to 4. This meant that we had to prevent incidences of users oversubscribing to a room, most likely due to 2 users carrying out a concurrent fetch, process and edit sequence. However, we were able to easily run sophisticated ACID transactions against our document data through Firestore using simple syntax. With traditional databases, this would not have been so straightforward.

c) Video Chat

While implementing WebRTC technology on a small scale is relatively easy, scaling it isn't much so. Despite our small team, we were able to put together a smooth video calling experience by tapping into Agora's sophisticated infrastructure to ensure smooth and fast data transmission with low latency in a scalable and affordable manner.

d) Real-Time Database

Our emphasis on social gamification meant having to implement a UI which reacts to live changes in data in real-time (eg. instant messaging). Firestore's easy-to-use syntax made listening to and updating streams a lot easier than trying to sync websocket connections, clients and databases.

e) NoSQL Database

Given the tight timeline to produce a production-ready application, an emphasis on development speed inevitably meant frequent changes to the database schema as our ideas continuously evolved and new product requirements repeatedly surfaced. Firestore's NoSQL schema made making changes to data models effortless and fuss-free as we did not have to constantly do messy database migrations.

5. Conclusion and recommendation

5.1 Conclusion

Fettle is here! We have accomplished most of the goals and ideas we had in mind for this app and we are proud to deliver *Fettle* to you.

We have learned a lot through this project. Through sheer dedication, we evolved from being mostly clueless when it comes to building an application to acquiring a practical understanding of modern software development frameworks (React, Flutter), database services (Firestore), design (Procreate, PhotoShop), animations (AfterEffects, Lottie) and various other developer tools (Firebase, Agora, etc). This hands-on-experience in building a piece of software to production has also deeply developed our Product Management and Software Engineering skills. Having gone through various iterations and redesigns based on feedback from professors as well as personal epiphanies throughout our development journey, we are now more aware of the various considerations one should make when building software which can help smoothen the development process in the long run. For instance, taking early consideration of reusable components can help mitigate repeat work.

It is amazing how everyone found his/her role in this project. We have a multifaceted team with talents in designing, coding, project management, animation and even video editing. Our desire to learn compelled each of us to contribute across different pillars of the development process and learn as much as we could in these 4 short months.

There were initial concerns over the practicality of developing too many features and overstretching ourselves. However, we made the bold decision of sticking to our gut that every minute detail and feature, though seemingly unassuming on its own, would be what eventually makes the app feel complete and robust as a whole. Through effective work delegation and raw passion, we are proud of how the thematic synergy between these different components eventually paid off in delivering a coherent, thoughtful and enjoyable user experience.

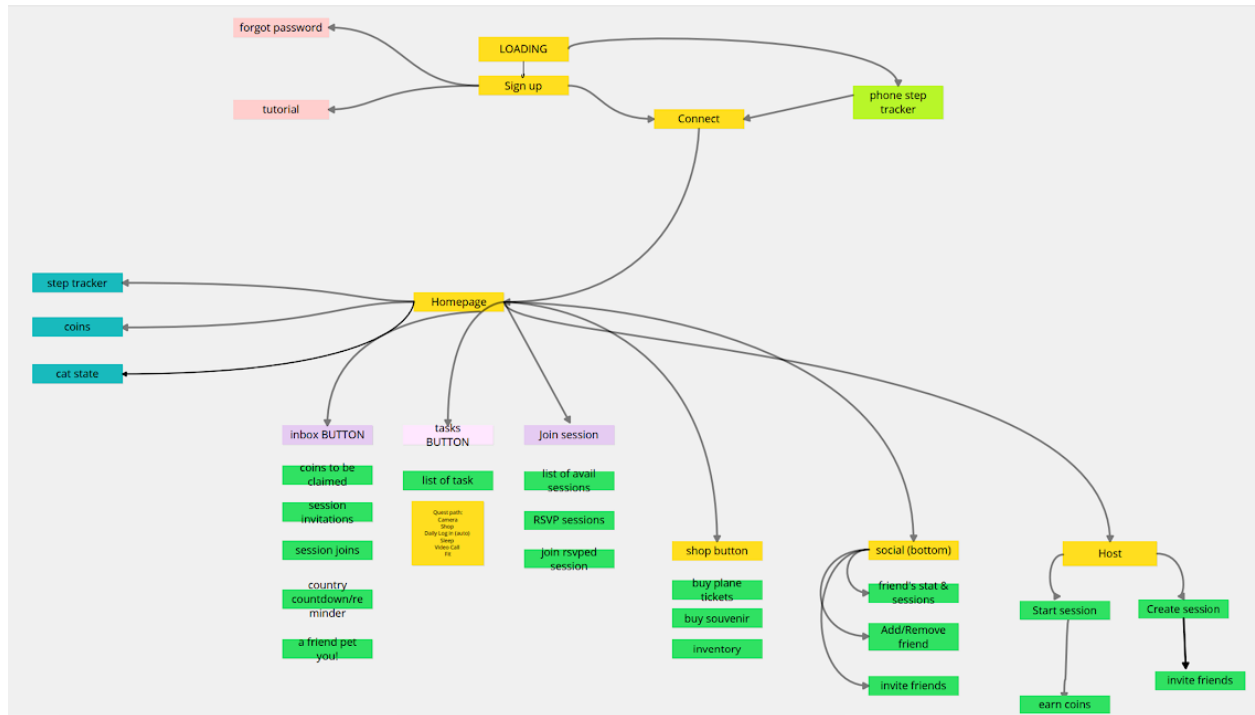
5.2 Recommendation for Future Works

Due to time constraints, there are a few features which we were not able to implement at this time. In future, developers could work on these ideas:

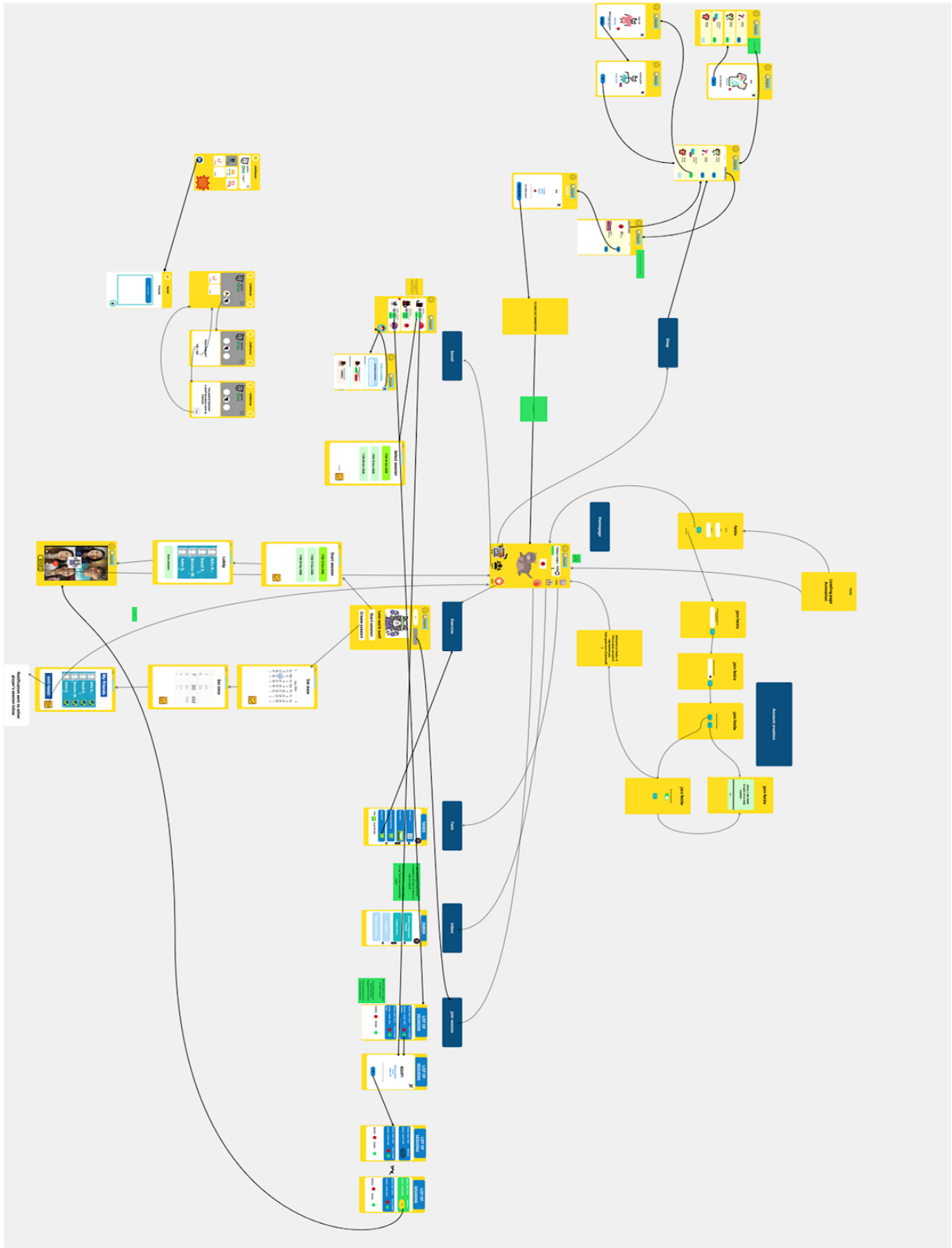
1. Physical activity is just one part of the equation for maintaining good health. One might want to consider the development of features which cover other tenets of health, such as tracking of calories or water intake as well as sleep activity.
2. More sophisticated team quests. Beyond just simple game mechanics, one might endeavor to make the experience more visual. For instance, “Golden Mouse” events where teams try to catch an elusive virtual mouse while journeying through a virtual interactive map by accumulating step points in real life.
3. Further development of design assets (equipment for avatar, homescreen backgrounds)
4. Sound effects and background music to boost user experience, as well as explore other micro interactions to delight the user.

6. Appendices

6.1 Design Diagrams



Sitemap



Wireframe

6.2 User Guide

Website: <https://fettle.vercel.app/getstarted>

6.3 Source Code

Website: <https://github.com/zonghangoh/fettleDIP>

6.4 Illustrations

