



MAXIM HUNT

# ABOUT ME

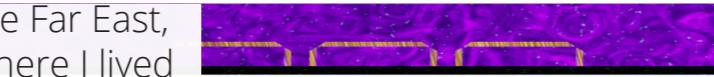
I am Max: A Design Engineering student at Imperial College London...  
But more than that: I am a creator, builder, innovator, tennis player, the list goes on..  
I enjoy leading teams to help tackle technical challenges and deliver highly polished, innovative solutions.



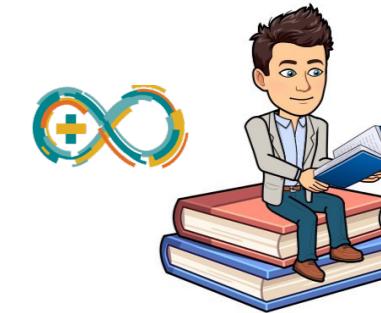
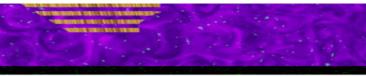
# MORE ABOUT ME



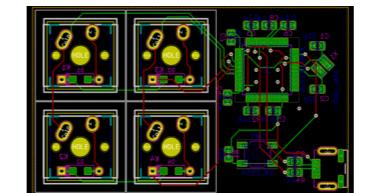
I was born in the Far East, next to Japan where I lived for a few years. During this time I picked up a sport I really enjoyed - Tennis 🎾



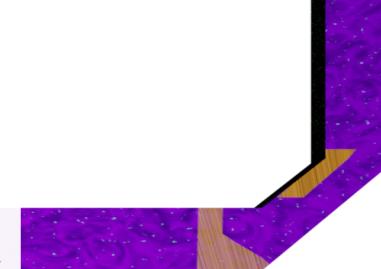
I moved to France and went to an international school. In addition to continuing tennis I started two new sports: sailing and rowing.



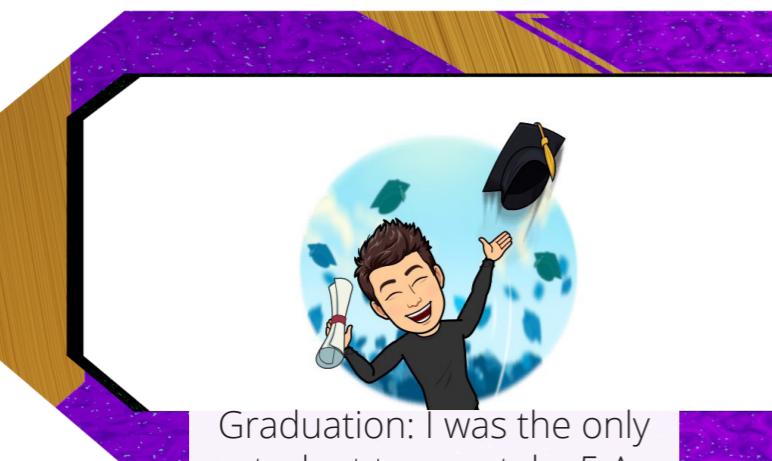
Whilst in school, my parents noticed my interest in electronics and for my 15th birthday I got an Arduino kit.



Designing my first PCB for a power bank project.



Graduation: I was the only student to ever take 5 A levels in my school, with a satisfying A\* A\* A A A result.



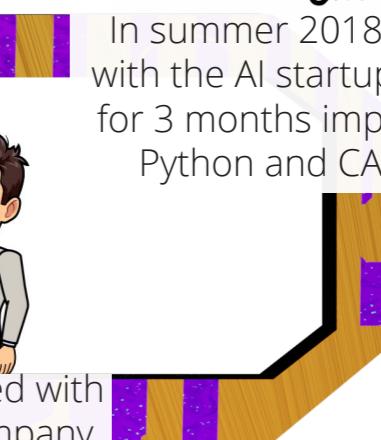
Designing my first PCB for a power bank project.



In summer 2018 I worked with the AI startup Emotech for 3 months improving my Python and CAD skills.



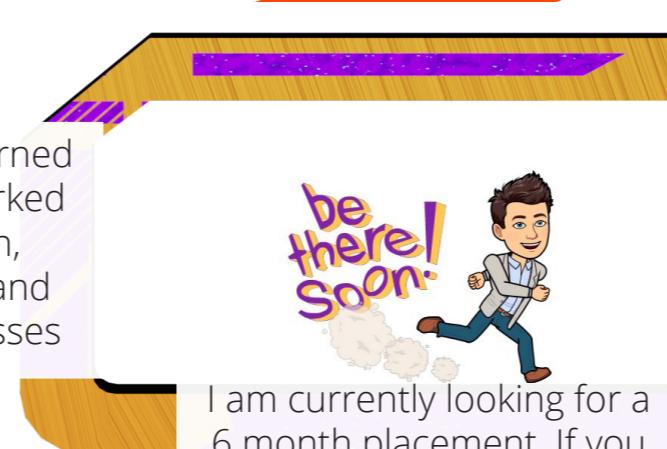
During 2nd year I worked with Firetech: a tutoring company that teaches kids how to make robots, circuits, videos, etc.



## native®

In summer 2019 I interned at Native Design. I worked on hardware design, coding optimisation and manufacturing processes

"Having a Max is great because he can do all the jobs you want to do, but don't have time to do"



I am currently looking for a 6 month placement. If you would like someone like me to contribute to your project feel free to drop me an email.



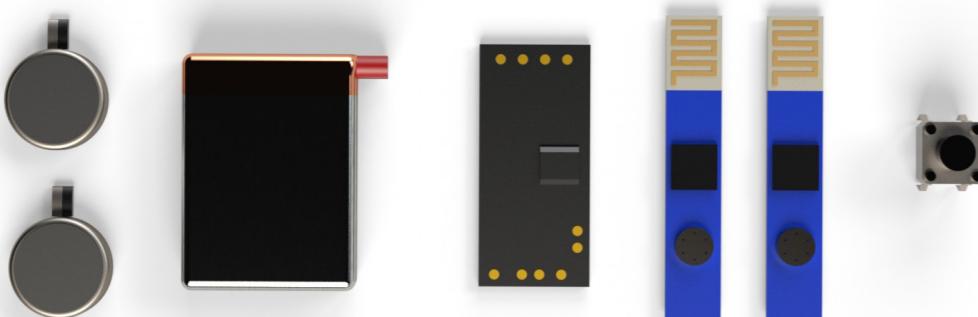


For most of my second year I worked on an inclusive product that would bring safe real-time navigation help to the visually impaired.

For three months we researched and conducted interviews. We discovered that the most dangerous part of a user's day was the journey, particularly when navigating alone.

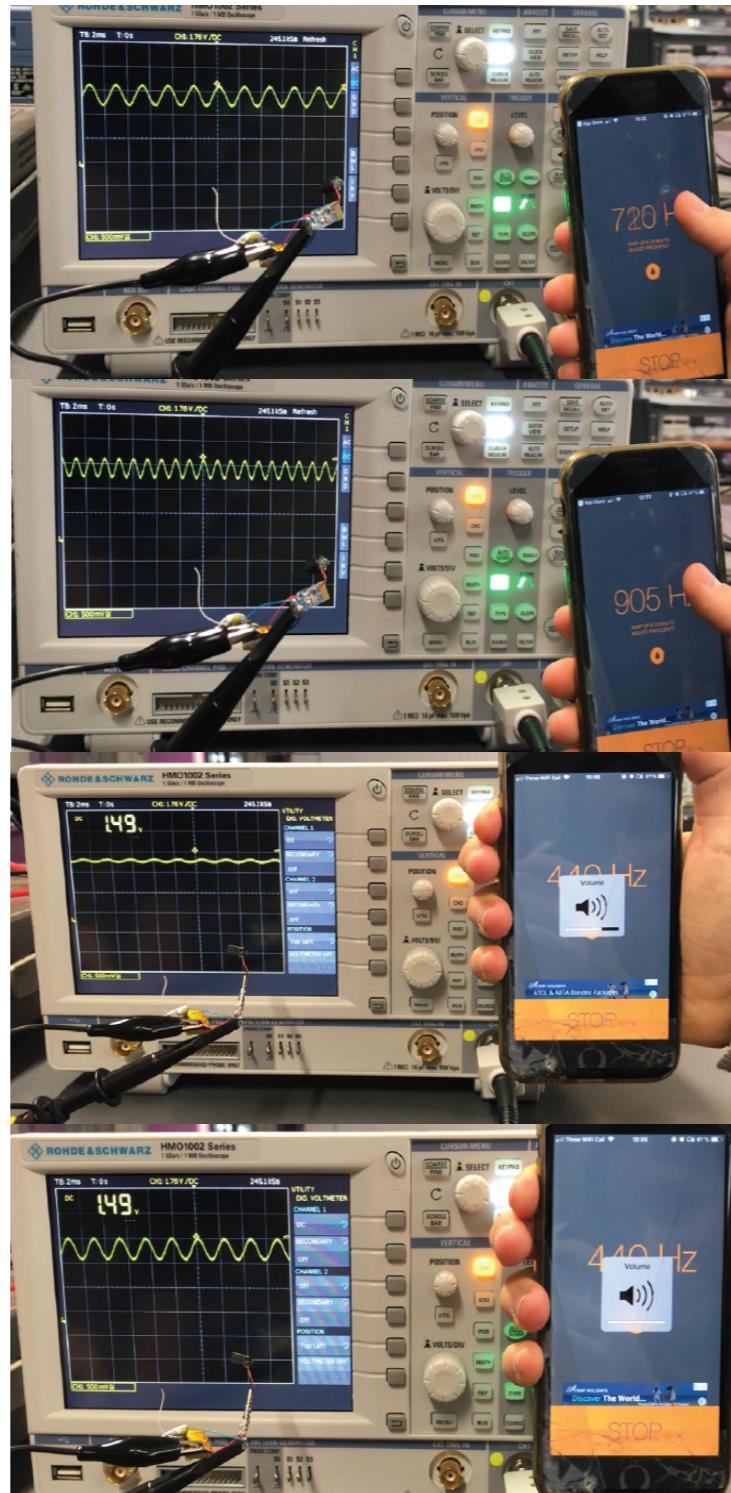
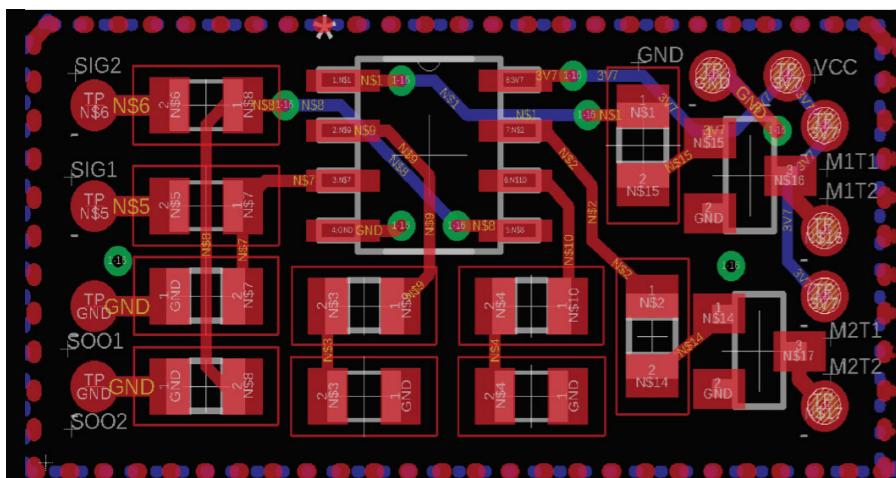
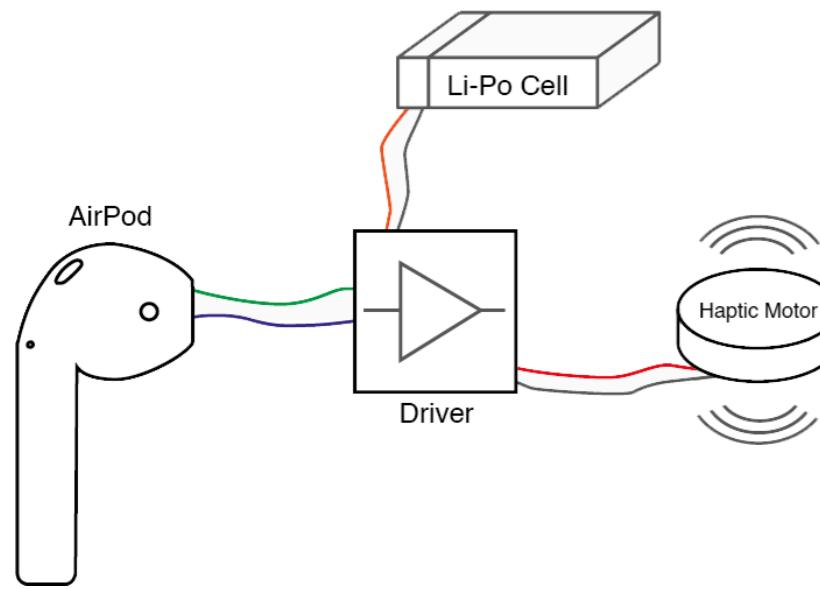
To try and solve this problem we decided to eliminate voice instructions completely and use discreet haptics to send turn by turn directions to the user

# Guibe - A new sense of direction





A new sense of direction



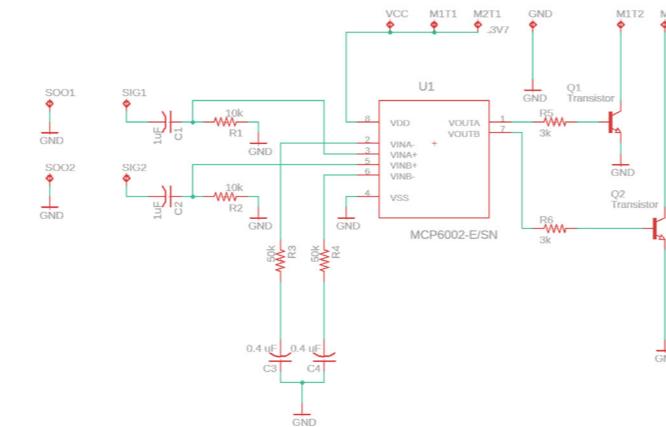
## The process

The bracelet was designed to interface with an iPhone app. We went with the apple platform because it offers far more accessibility features than any other smartphone and hence the VI market predominantly uses apple products.

To bypass the need for MFI certification, I developed a custom circuit that will amplify analogue sound signals. I then purchased a small bluetooth receiver and connected it to the phone just like a pair of headphones.

For the phone side of the project, I learned Swift and wrote a navigational app (On page 13) that will extrapolate turn by turn directions, and when the user breaks a waypoint geofence it will stream a specific audio haptic recording to the bracelet. If the user started moving in the wrong direction the app would also react and stream a 'Check again' haptic to the bracelet.

The final bracelet was designed to be fully injection mouldable and contained seven components: two bluetooth boards (one for each channel), two haptic motors, the custom PCB, a button and a Li-Po cell.



# GIZMO

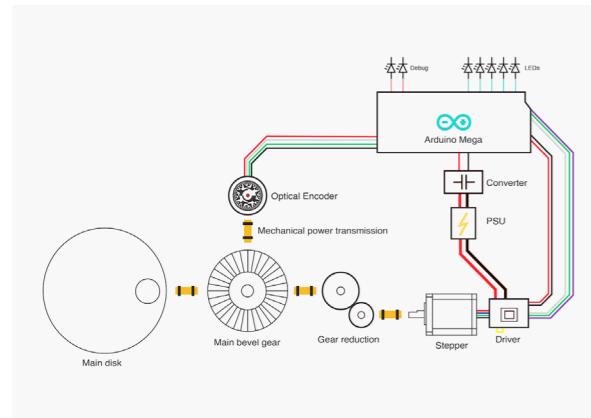


# GIZMO - PHYSICAL COMPUTING

My gizmo project involved designing, fabricating and testing a mechanical electronic device.

The scope was very open with the only requirement being a human interaction.

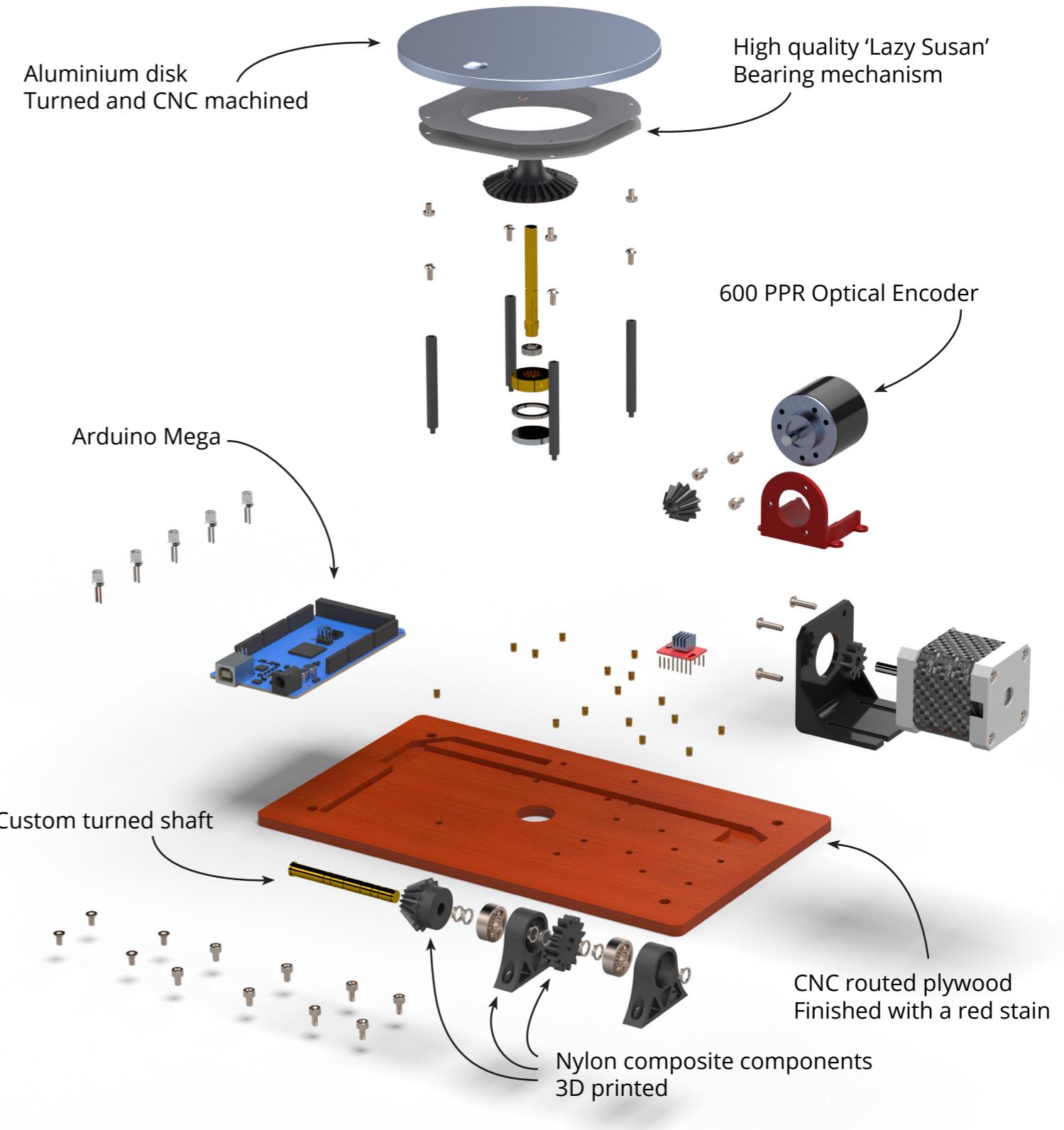
The goal was to teach us about sensors, actuators and control systems.



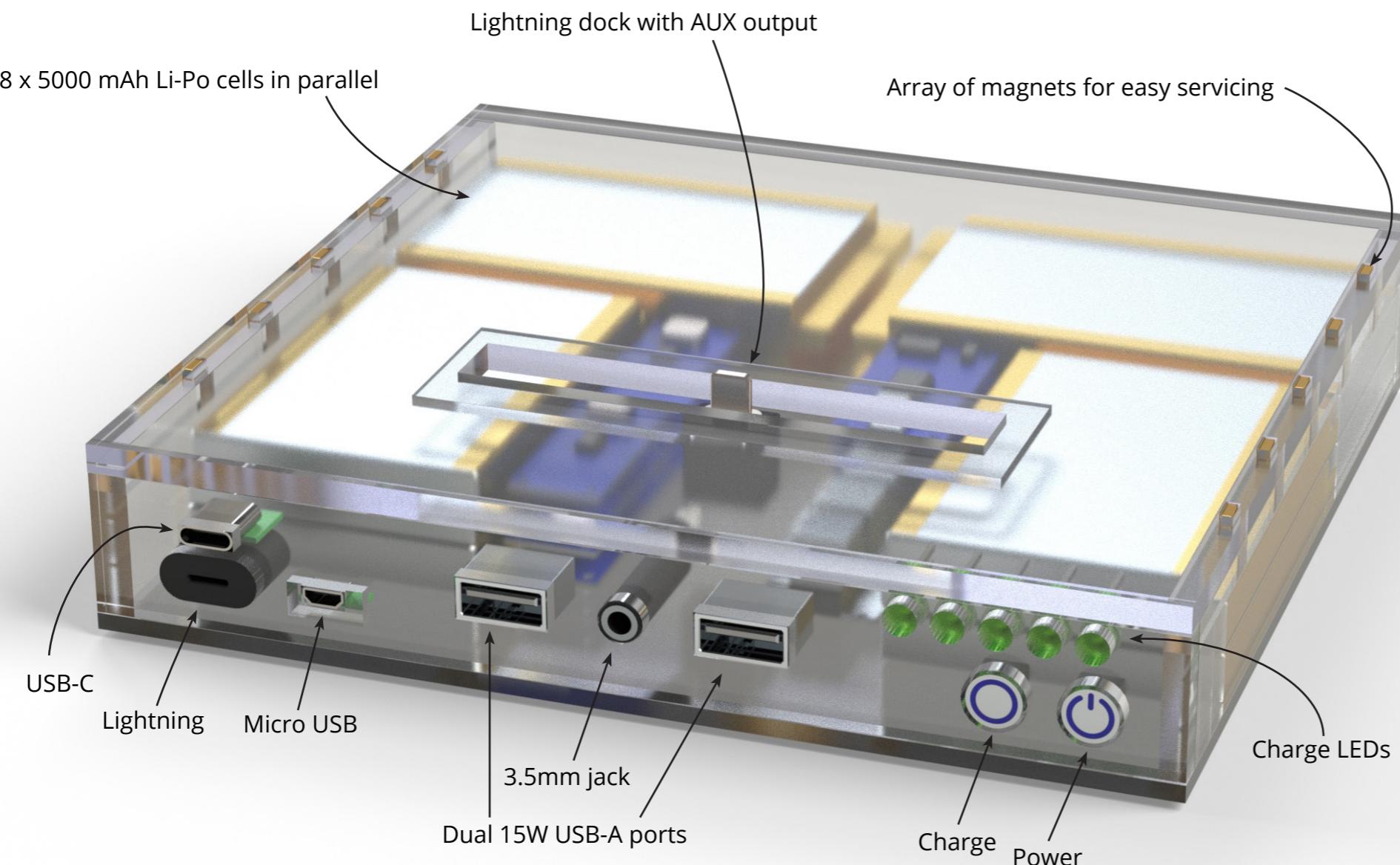
My idea involved a large dial that the user could rotate. It had to be in the correct position to proceed to the next level. An indication is given to the user by the brightness of an LED - the brighter it is the closer they are to winning.

To make the game more challenging I added a powerful stepper motor connected to the disk through a gear train. If the user made an incorrect move or spun the disk too slowly the motor would add resistance to the motion, or completely take over fighting the user for control.

The game is beaten by either not making any mistakes (the patterns can be learned), or by going with brute force and overpowering the motor.



# OP POWER BANK



During summer 2017 I decided to attempt making my own power bank.

The goal was to make something universal and have a very large capacity, rarely needing to be charged.

I tried to find complete modules and assemblies where possible since at the time my manufacturing resources were limited to a soldering iron and hot glue gun.

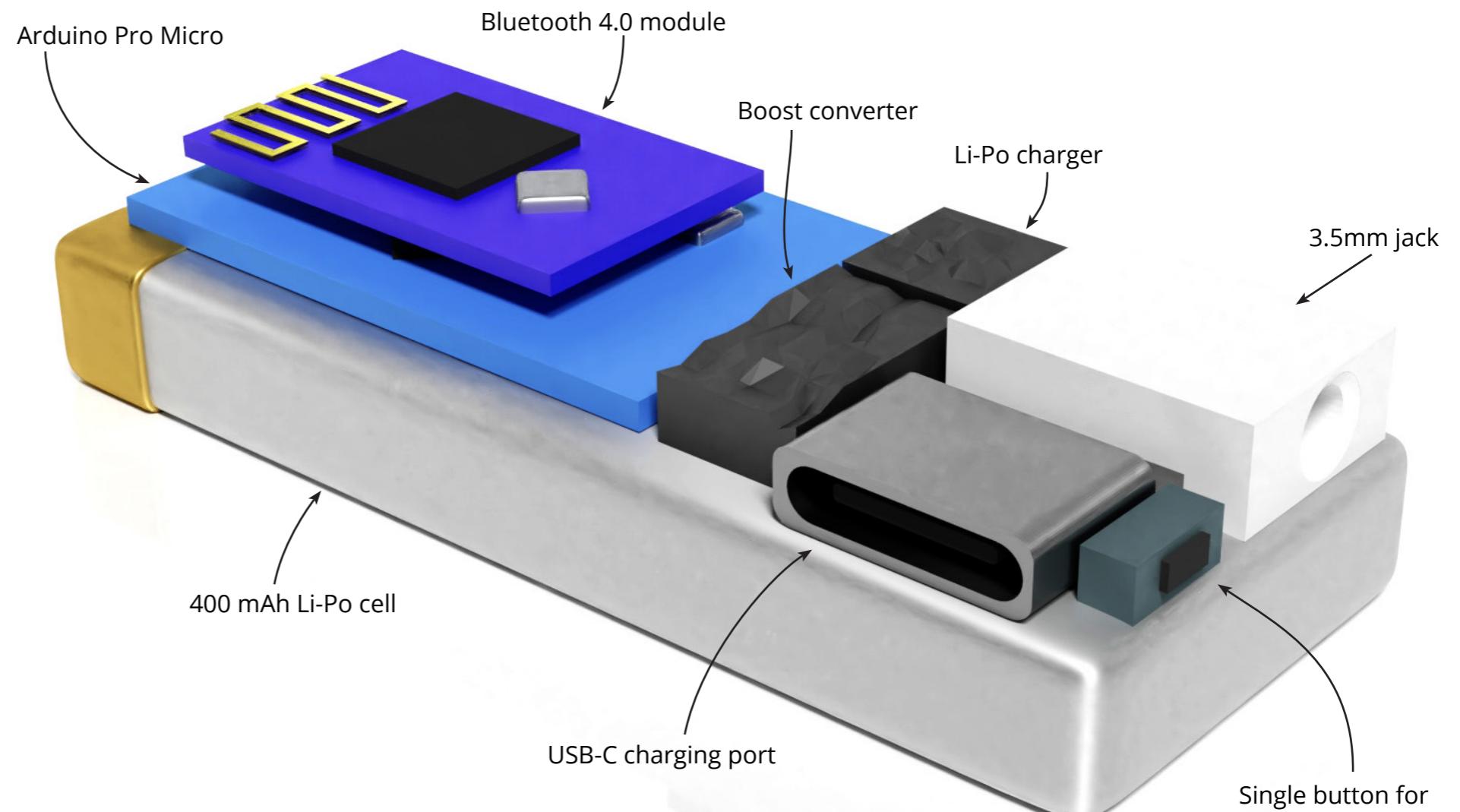
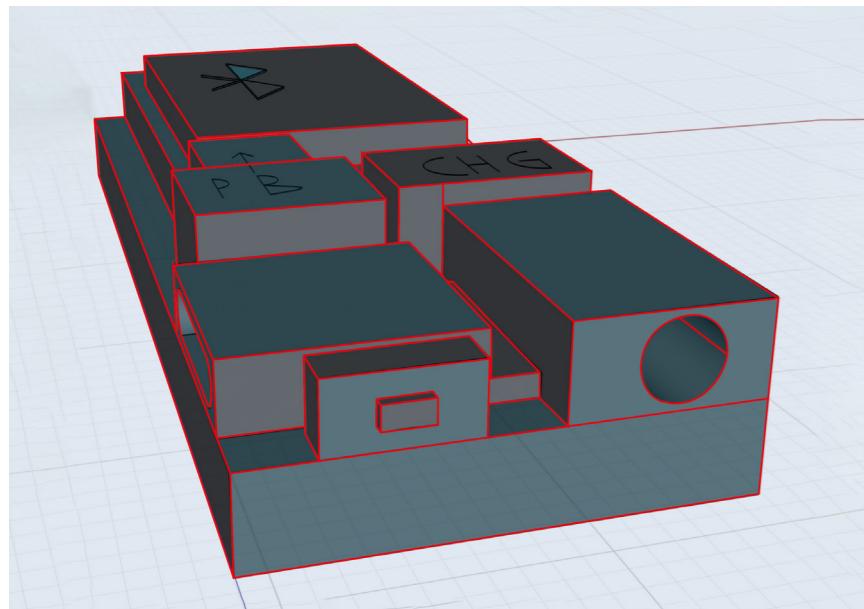


# PROJECT WIRELEXX

In summer 2016, following the rumours of an iPhone sans audio jack, I built a prototype dongle.

Simple audio transmission would not suffice, it also had to integrate in-line remote control and mic functionality as those features now come with most headphones.

To keep it simple to use I used the AUX port as a power button: it would turn on once headphones were inserted.



# HARDWARE

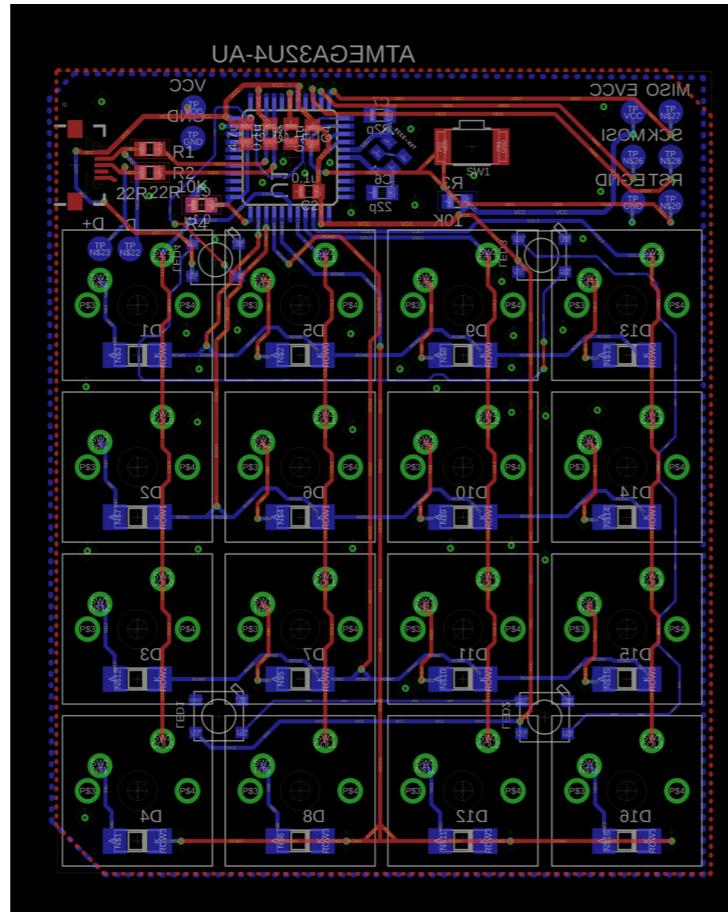
## PCB design

Some of my projects required more complex and smaller circuitry, during summer 2015 I learnt how to design and fabricate PCB's.

I learned to use both Eagle and KiCad, and for a small period I used the Fritzing PCB builder.

So far, I have used my PCB skills to make a boost converter charger and battery gauge combo board capable of delivering 15W continuously.

My other main PCB project was a mechanical keypad running on an Arduino IC.

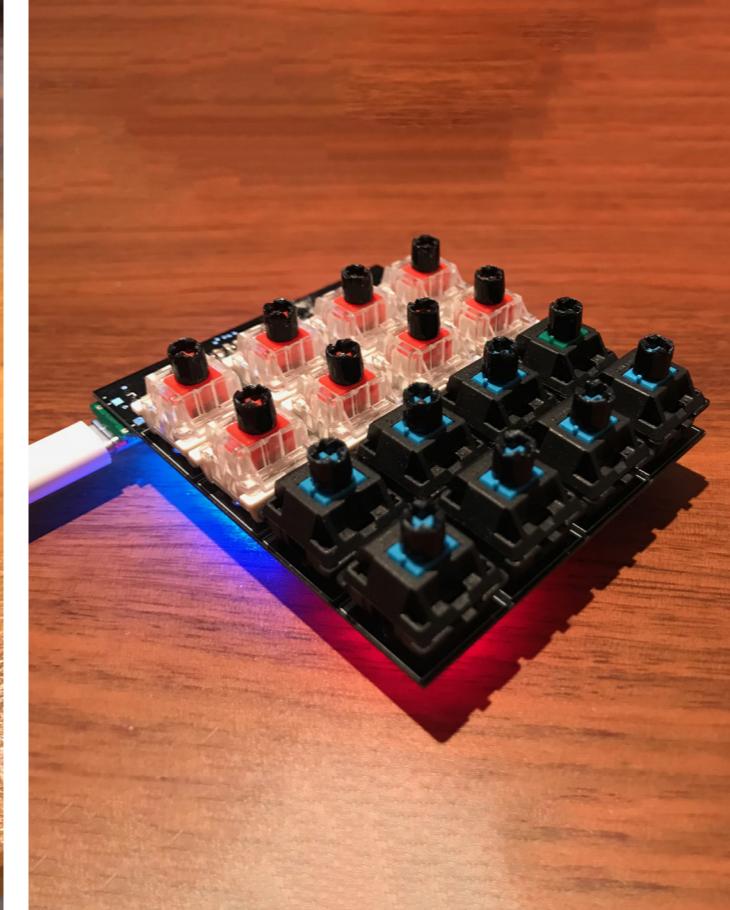


## Self-Balancing Robot

During my second year of Design Engineering I programmed a two wheeled robot to balance using a Proportional Integral Derivative (PID) controller.

While balancing, the robot could be remote controlled via Bluetooth UART and the final task was to do onboard signal processing to enable the robot to 'dance' to a music beat.

The robot has two separate feedback loops: the main one reacted to the pitch angle of the base while the second counted the wheel displacement from zero and corrected to ensure the robot does not drift.



## Mechanical Keypad

During my internship in summer 2018, I became interested in mechanical keyboards and the enormous community around them.

After some initial research I designed and ordered a custom PCB with a mechanical switch array and RGB LEDs controlled by the Atmel ATMega 32U4 microcontroller running Arduino.

For convenience I used USB 2.0 with a type C port making it compatible with most devices.

Because this keypad was an accessory to programming, each key injected a custom keystroke such as making a new pane in tmux or git adding, committing and pushing.

# SOFTWARE

# Microcontrollers

I initially learned about Linux through my Raspberry Pi.

After completing the bare minimum tutorials (GPIO usage and basic python), I put it to good use as a file and download server. At the time I was living in a house with an extremely slow Internet connection so I could offload large downloads to the Pi and later ftp into it to retrieve the files.

The process taught me how to use basic packages in Linux (ssh, ftp, curl, etc.) as well as some basics about dynamic DNS and port forwarding. (as I wanted to have access to it globally)

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## Bash and Automation

Whilst working on personal and Emotech software projects I learned how to use shell to access headless servers, configuring services and writing small automation bash scripts.

I also learned about virtual environments and became interested in learning about docker images as they offer a very useful feature set for projects that may require portability.

At some point I plan on self teaching Tensor flow for machine learning - I intend on training a convolutional neural network for advanced image processing and enhancement.

## Linux and Servers

For a small side project I tried hosting a git server on a Raspberry Pi. Following that simple project (literally [apt install git](#)), I attempted to install Gitea.

Gitea has much more functionality on top of the git command line including a visual GUI, protected branches and user privileges.

After discovering that my Pi architecture was no longer supported by PostgreSQL, so instead I installed Ubuntu on an old MacBook and set up Gitea, Dynamic DNS and a basic backup service.

The project was a great opportunity to learn about Linux, ssh and the networking (port forwarding, authentication keys, etc.)

# SPORTABLE

During my first year at Imperial College I worked on a project aiming to promote health and well being.

Our team focused on improving the portability of commonly used sports equipment through prototyping and human centred design.

My proposal consisted of a collapsible badminton racket that would easily fit in user's bag without taking up much space.



**SPORTABLE**  
Wherever | Whenever

After conducting all the necessary research and some human factors measurements, I produced low fidelity blue foam prototypes, testing the experience.

Once I was confident about the concept, I moved on to high fidelity and functional prototypes which I later combined into a functional product.

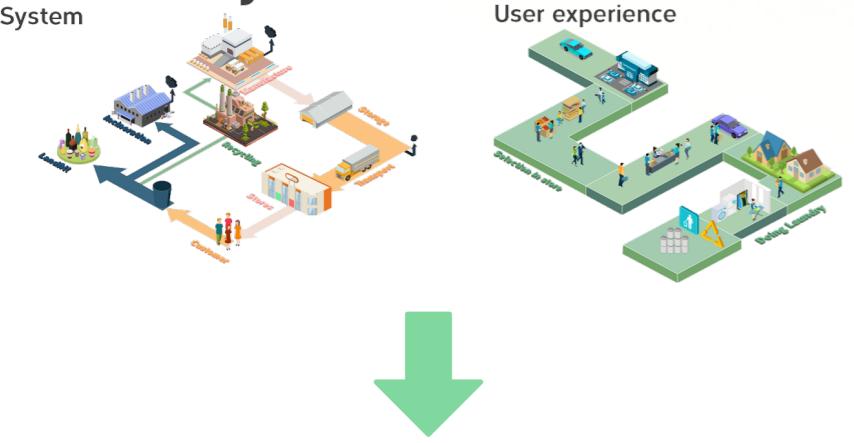
The racket has an aluminium design with titanium and nylon composite connectors that ensure the racket will not come apart during heavy use.



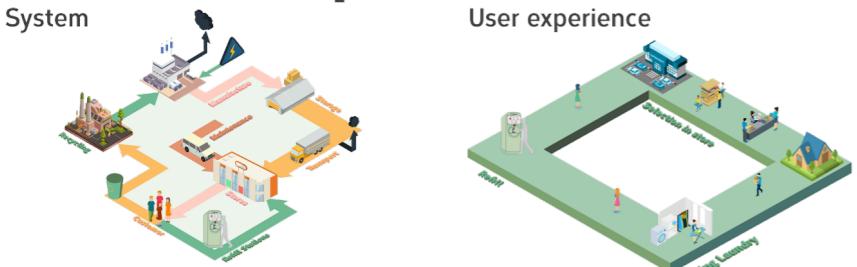
My second year design project explored the environmental impact of FMCG products.

After tearing down donor products, analysing their cradle to grave journey and understanding the product service system as a whole, we developed a proposal for a more sustainable solution.

## Current system



## The C!lean improvement



My solution was to package detergents in standardise aluminium can.

Cans are 14 times more recyclable than plastic packaging and the cylindrical shape is 30% more space efficient, further reducing the carbon footprint.

To make the cans resealable I used a mechanism inspired by Cano water, allowing the can to be opened and closed over 100 times.

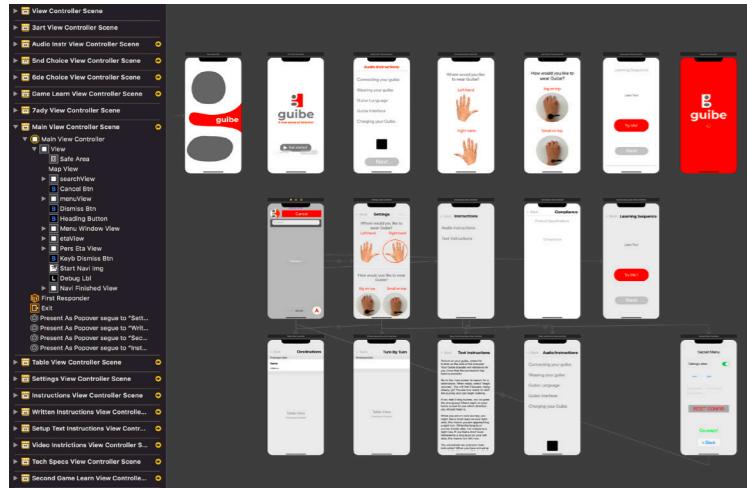
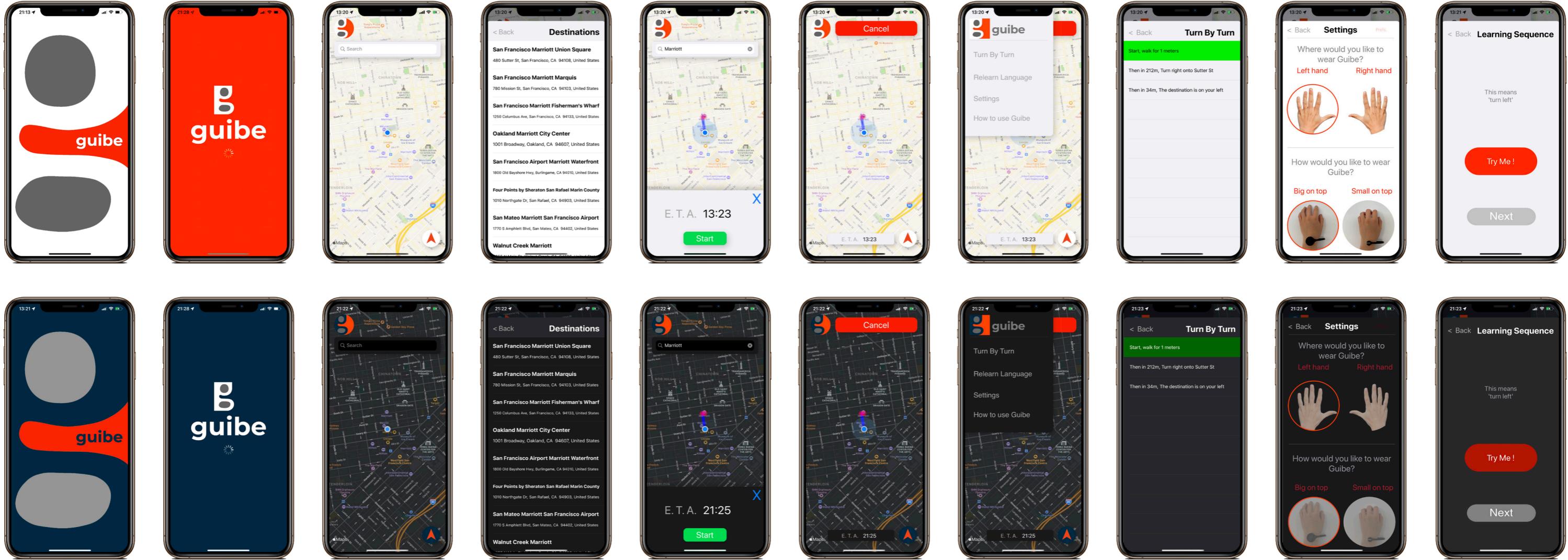




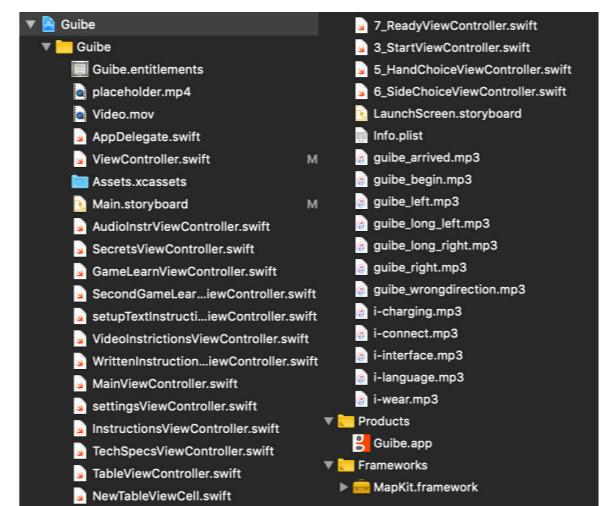
# Guibe Xcode Application Development

The Guibe bracelet needed to integrate with an iOS application. In the app the user can (with help from VoiceOver) enter their destination, select a route and navigate whilst receiving step by step instructions via their bracelet. The application is fully functional as a navigational assistant and has full VoiceOver integration. As a bonus I added dark mode support and a simplified UI in anticipation of iOS 13.

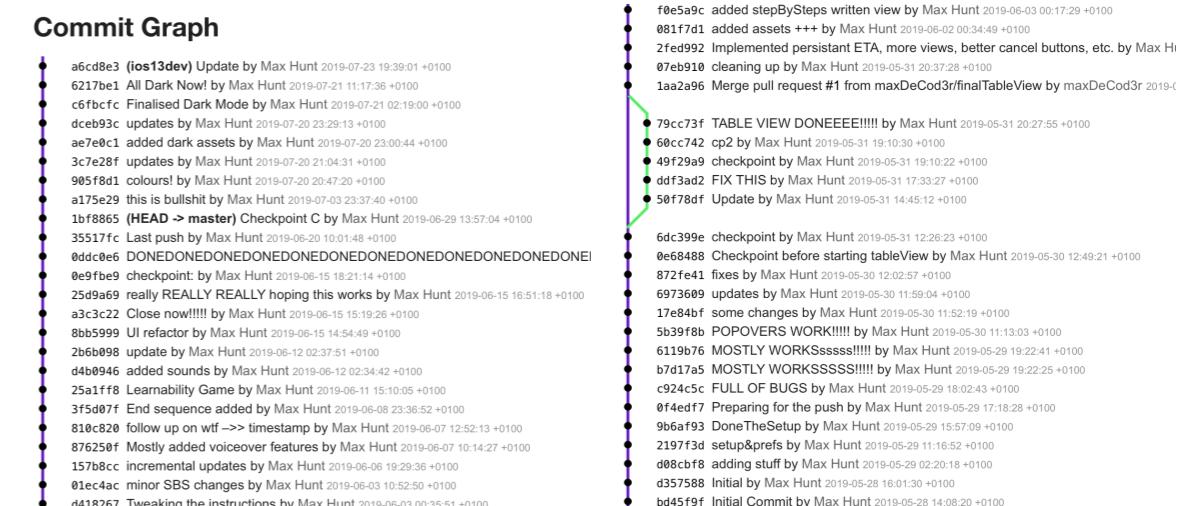
The entire app took me a month to develop and I consider it one of my greatest programming achievements so far as all of my Swift knowledge was self taught from YouTube and StackOverflow.



Entire storyboard for the project



Project File Hierarchy



Commit History

# RENDERING

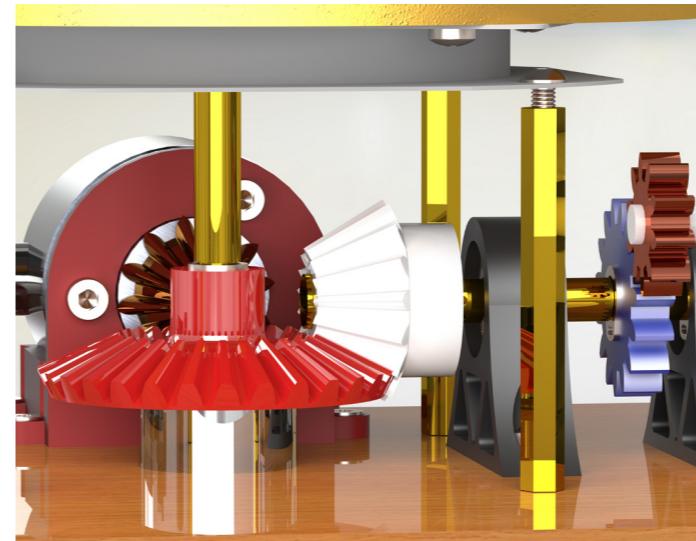
For many uni projects and during free time, I like to make renders of concepts, real products or other interesting scenes. I was inspired by professionals such as Blender Guru (YouTube) and @sam\_does\_design, who produce incredibly beautiful renders that both convey a product and are satisfying to look at.



Inspiration



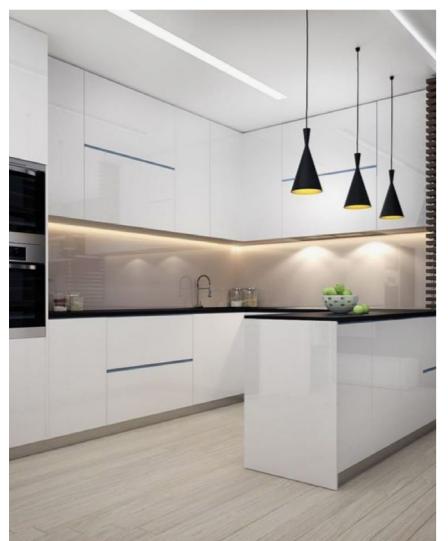
Final render



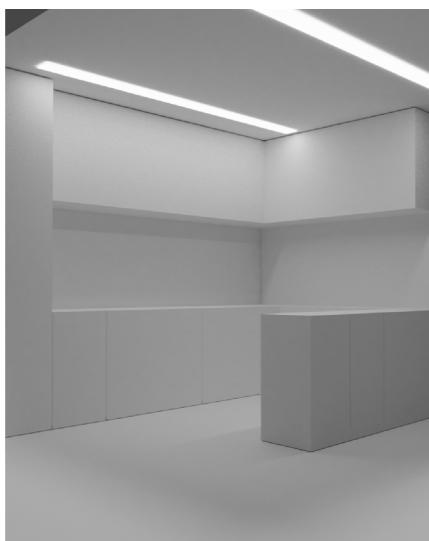
Gizmo closeup



Guibe render



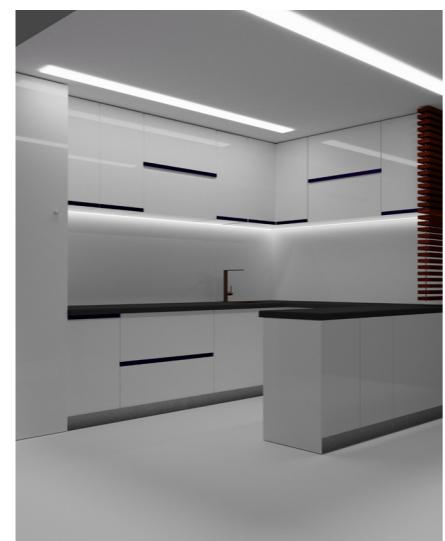
Inspiration



Outline



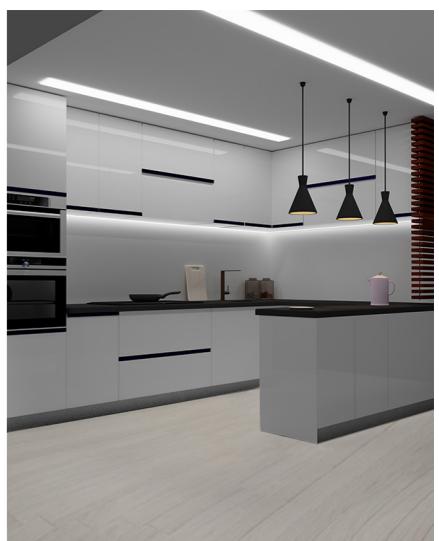
Unrendered scene



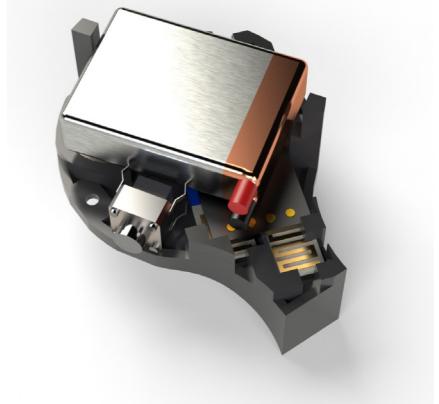
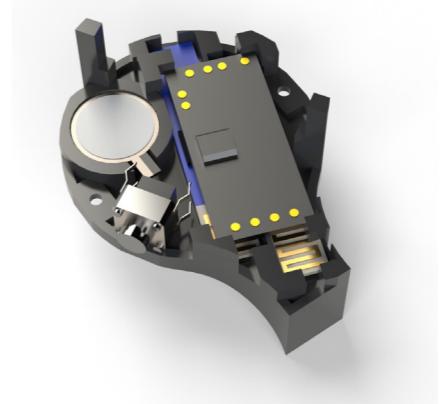
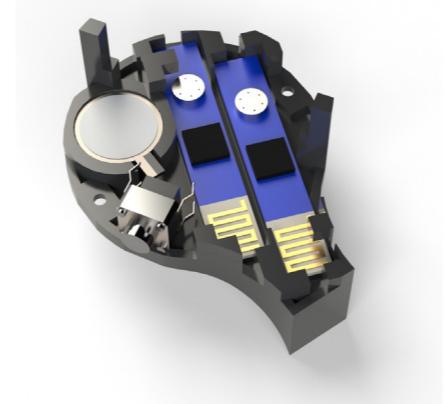
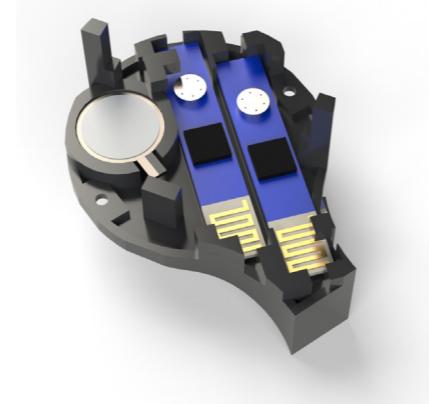
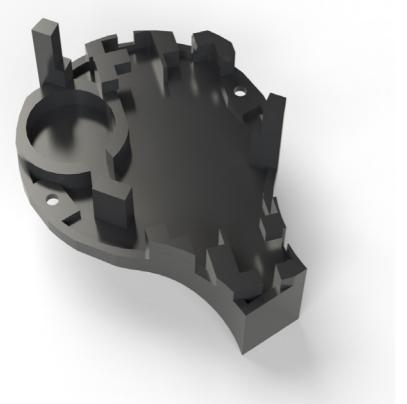
First detail



Second detail



Final render



Detailed assembly render for my Haptic Bracelet project

