

Design Engineering Portfolio

Josh Williams

Hello! I'm Josh.



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My story.....

With the motivation of making my bicycle as fast as possible while I was racing as a teen, I became fascinated with producing my own custom parts and components. Studying Design engineering has given me the tools and skills to take this tinkering to a much higher level of expertise. This has lead me to continue within the realm of component production for sailing boats, but also moving to playing with form, beauty and function within Industrial design. This is all underpinned by a deep understanding for user needs.

Interests



Sailing



Mountain Biking



Music

Software



Figma & InDesign



Arduino



Photoshop



Ansys



Premiere Pro & After Effects



Fusion 360



Keyshot



SolidWorks

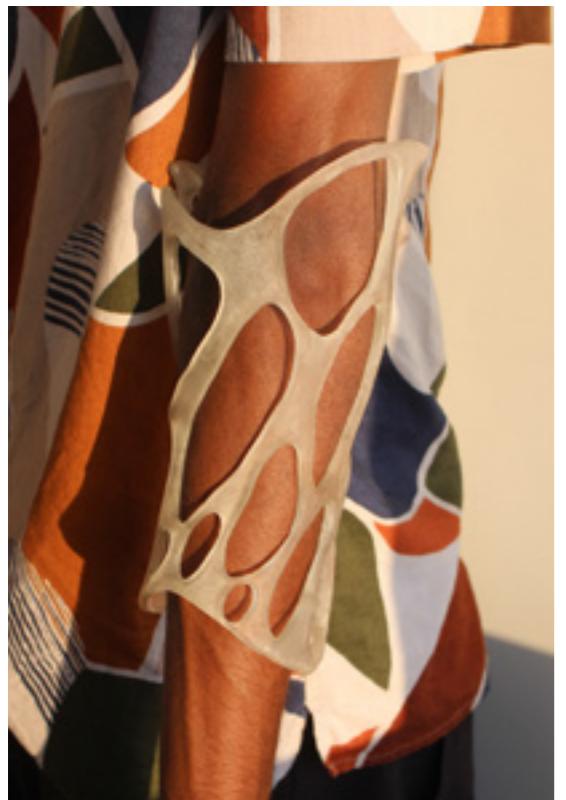
Contact

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Design Engineering Portfolio

Content



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TerraBand

2050 future fashion
wearable



02

Nest Assured

Bag scanning device



03

Boat Renovation

Custom components
for sailing Dinghies



04

GiggaSketch

Re-imagining a child
play toy



05

Chain Guide

One-piece bicycle
component

TerraBand

**2050 future design concept.
A wearable which transforms
clothing into a personal expressive
canvas.**

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Duration 5 weeks

Individual role Projection Mapping

Location Qingdao China

Team Harith Wilson
Mito
Licky
Dylan

Skills

Adobe After effects

Procedural CAD modelling

Working in diverse, international
teams



Click or scan for promo-video of
the TerraThread Band.



Scenario

This project was looking at the world in a 'bright' future; One where human consumption has been greatly reduced and the planet is healing.
Our job was to explore some of the new issues that we might now face.

What we imagine people might wear

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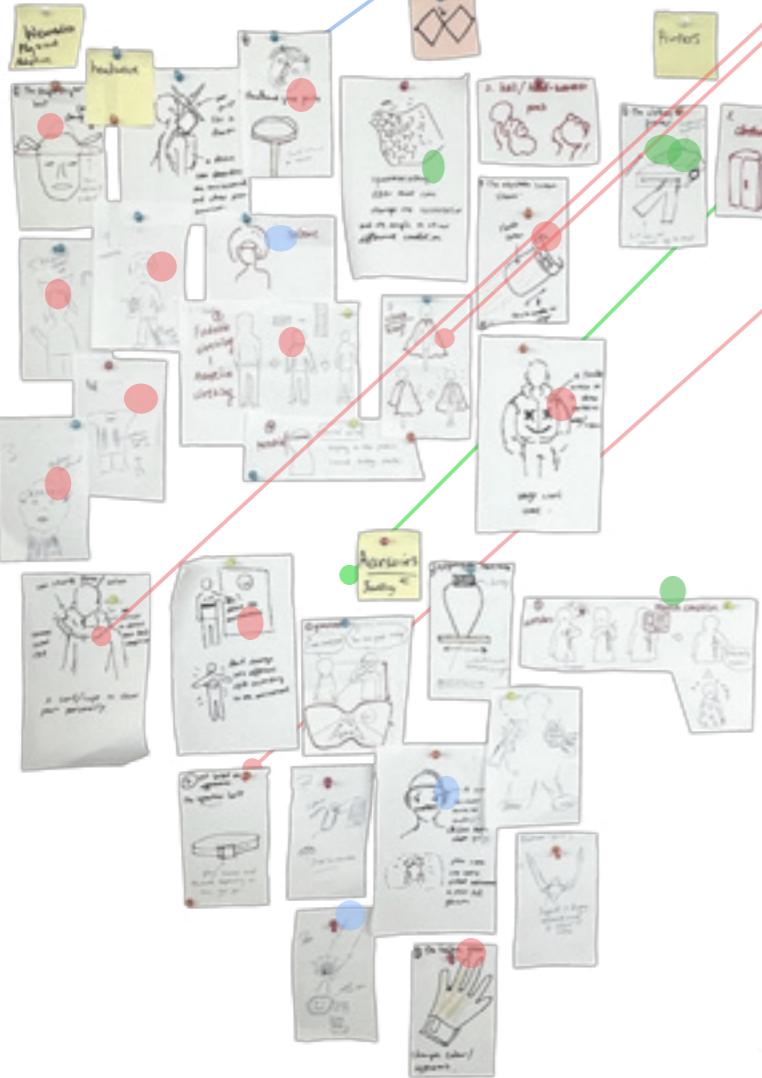
- White suits which look similar in appearance
- Contain sensors and technology to monitor health



Proses

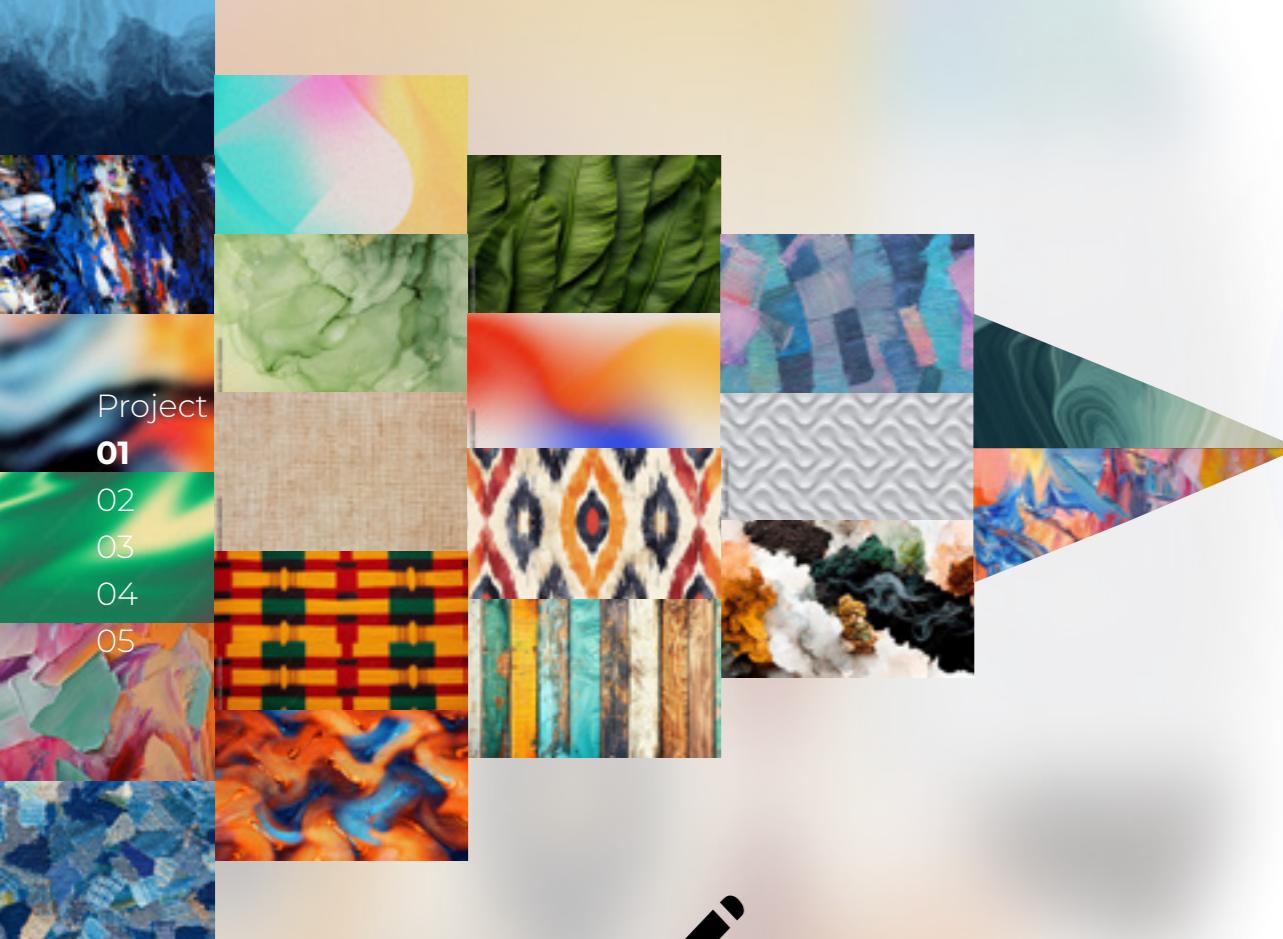
How might we instil healthy consumption practices while still allowing for creative self expression?

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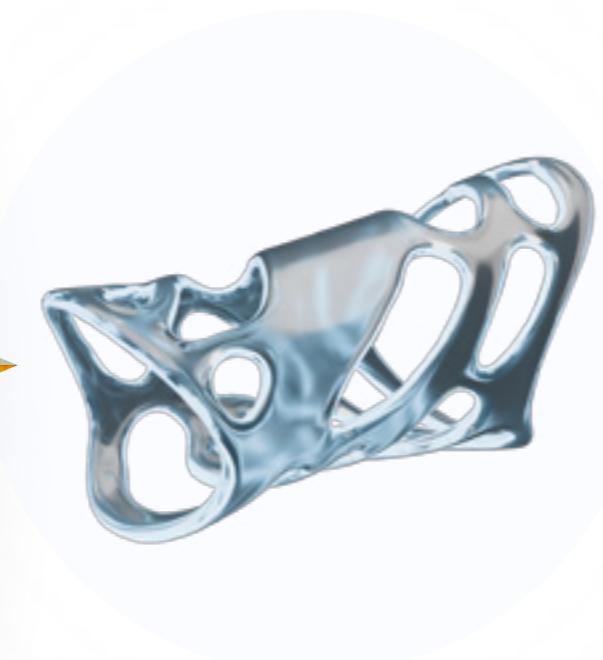
Wearables	Interface	Carry-ables
	<p>like a flower. a device can detect the environment and show your emotions.</p>	<p>can change form/color. coral coral like A scarf/cape. to show your personality.</p>
	<p>Lightweight, breathable Special photosensitive material.</p>	<p>plays Sounds and textures depending on how you feel.</p>
	<p>glasses I was confused You look good today!</p>	<p>HELLO</p>

Design proposition

The device bridges the gap, allowing **expression to be displayed**.



People feed their style, textures
and emotions into the device



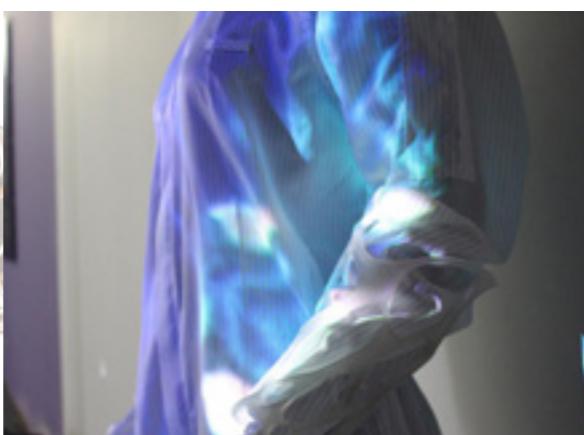
'Visual personality' is
stored forever



The suit is the medium for an
individual to express themselves

Projection mapping

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We explored projection mapping to create moving colours and graphics on the body of the suit.

Final form

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The aim of the final form was to create something organic and unique in a now very uniform world-scape.

Presenting

Presentations were an important part of this project. The decks were presented each week in two languages, to an international audience.

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Nest Assured

Bag scanning device to help you
not forget your items.



Click or scan for promo-video of the
Nest assured.

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Duration 5 months

Individual role Hardware design
Video rendering
Technical specification

Team Stefan Saar
Anne Lee
Arancha Ramirez

Skills

KeyShot
Design for Manufacture
Mechanisms





Nest Assured

Nest assured is a device which scans the contents of your bag, so that you will never leave items behind again.

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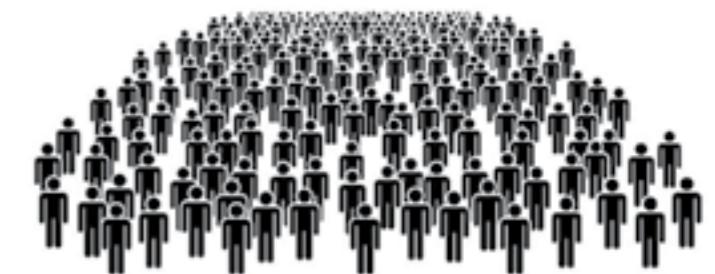
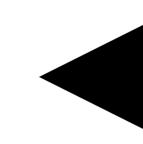
The story



The concept was conceived when finding product opportunities for people with ADHD.

Pain points:

- Forgetting items builds up stress throughout the day.
- Object permanence.



However the finalised design is proving to be useful for a much wider audience.

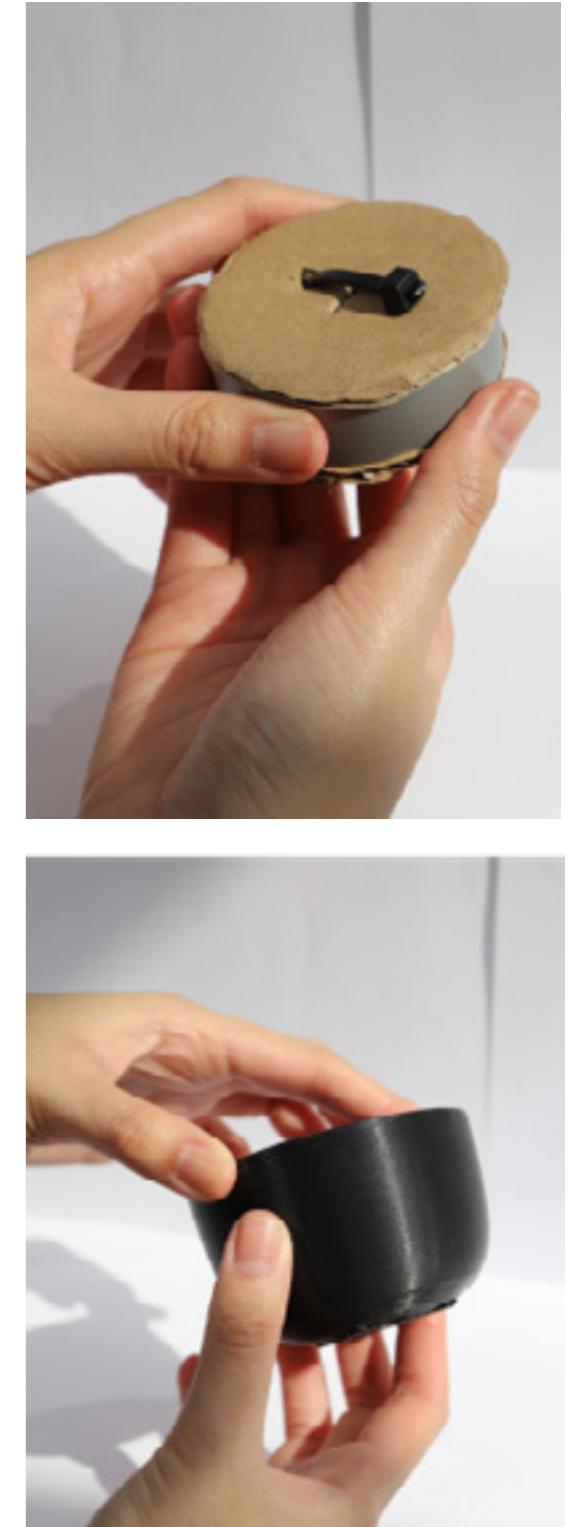
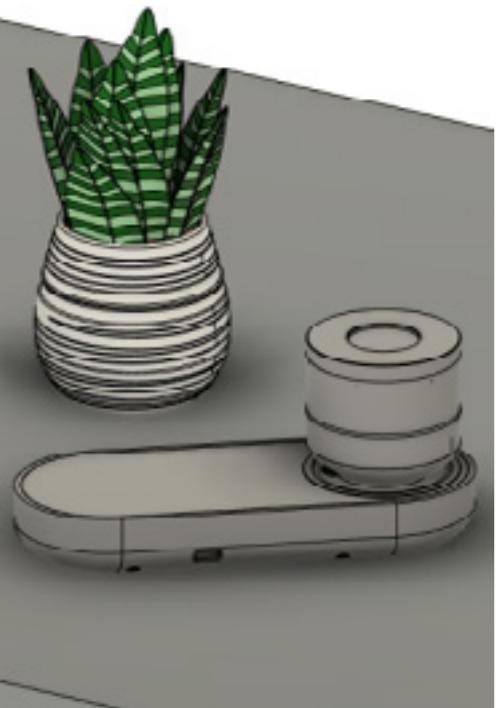
The product is made from two modules:

- The dial which sits outside the bag and is used to select the activity.
- The scanner which sits inside the bag.

Prototyping

A constant iterative prototyping approach was used, starting with low-fi models to validate the correct proportions.

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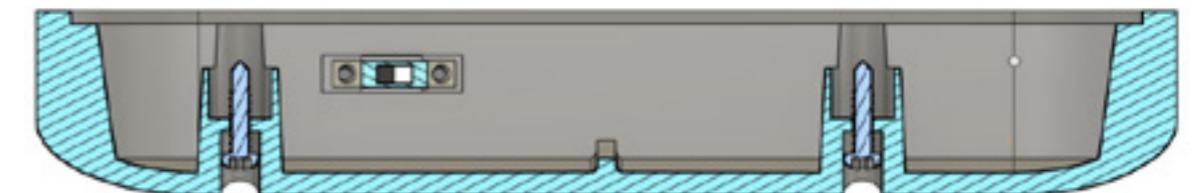
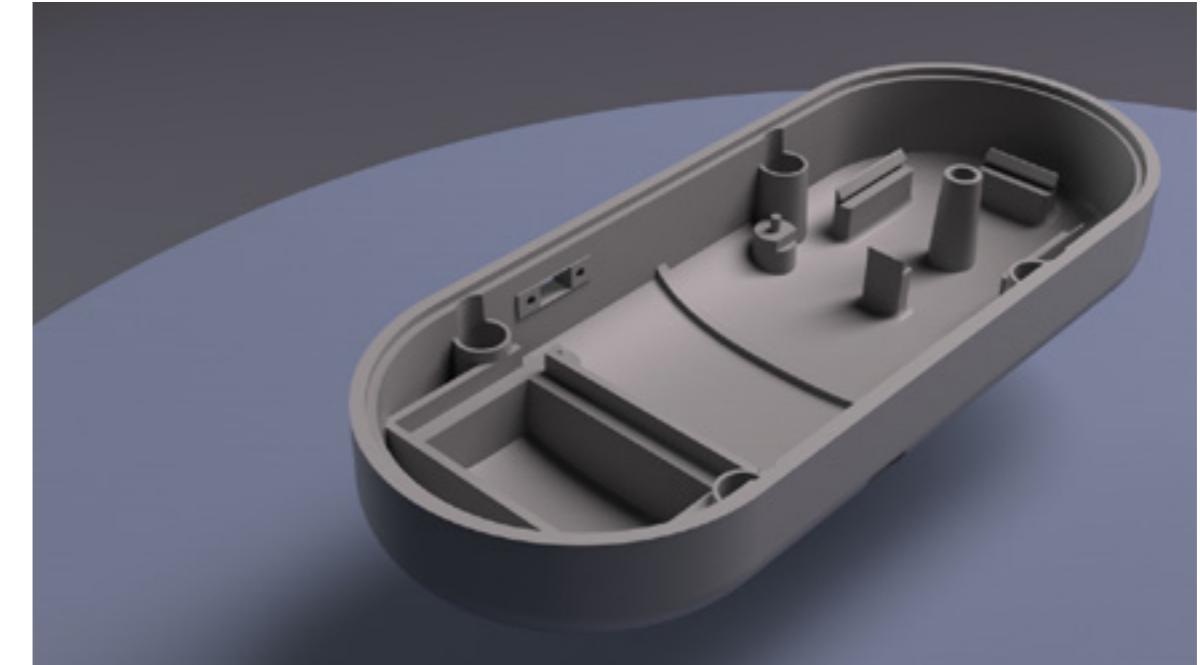
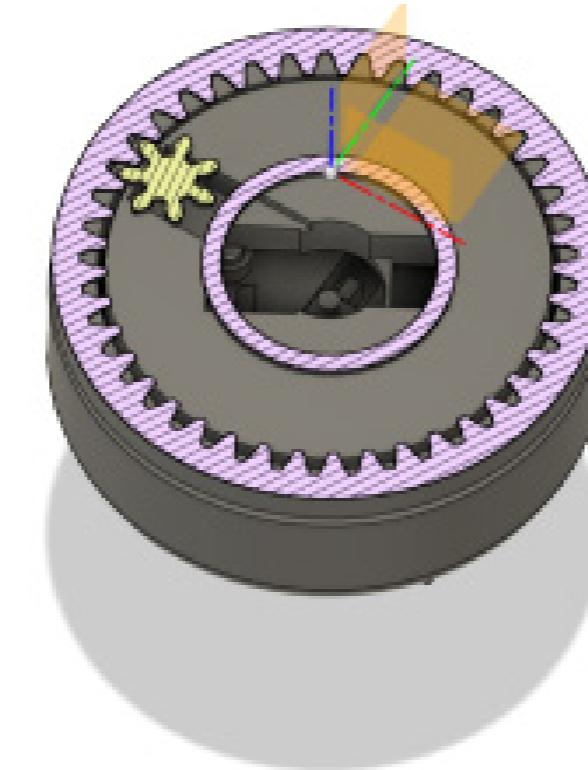
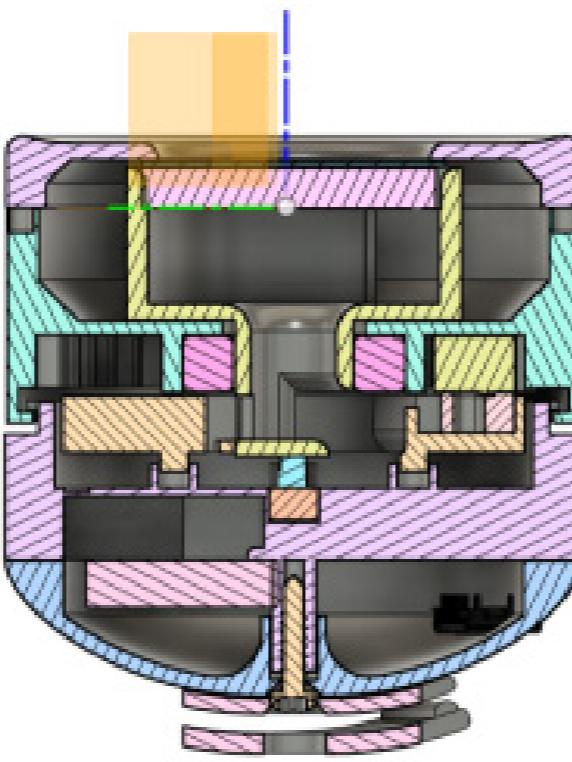


Hardware Design

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As the product developed, the CAD model became more complex as the mechanism was contained within a hand-sized unit.

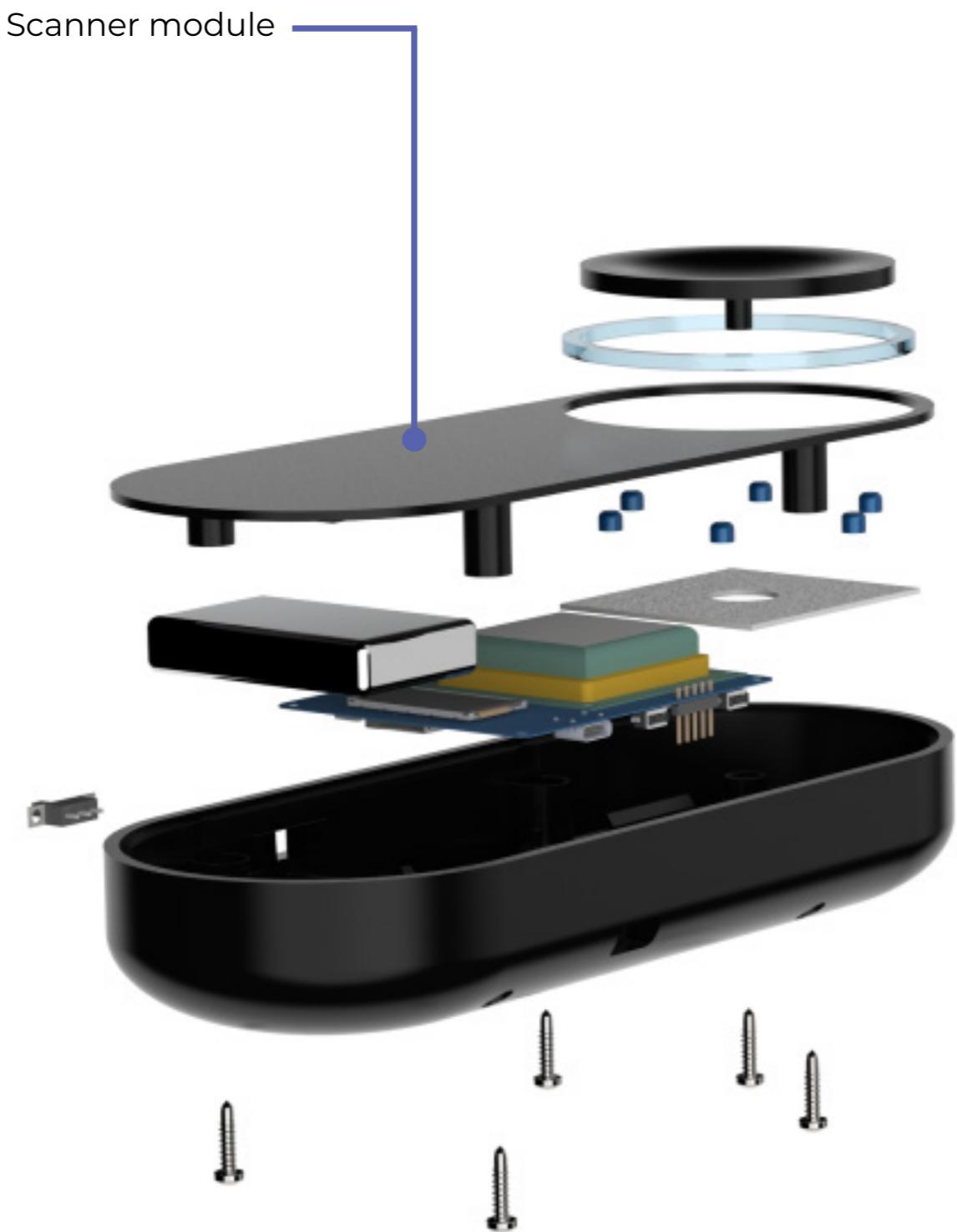
Design for manufacture in the form of injection mould-able parts and snap fittings was also heavily considered.



Exploded Views

The two modules wirelessly communicate with each other.
The challenge was to fit all of the components and
mechanical systems into the smallest space possible.

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Final form



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Boat Renovation

Saving six Firefly team racing boats from the grave, while developing custom parts and components.

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Duration 2 months

Year 2024

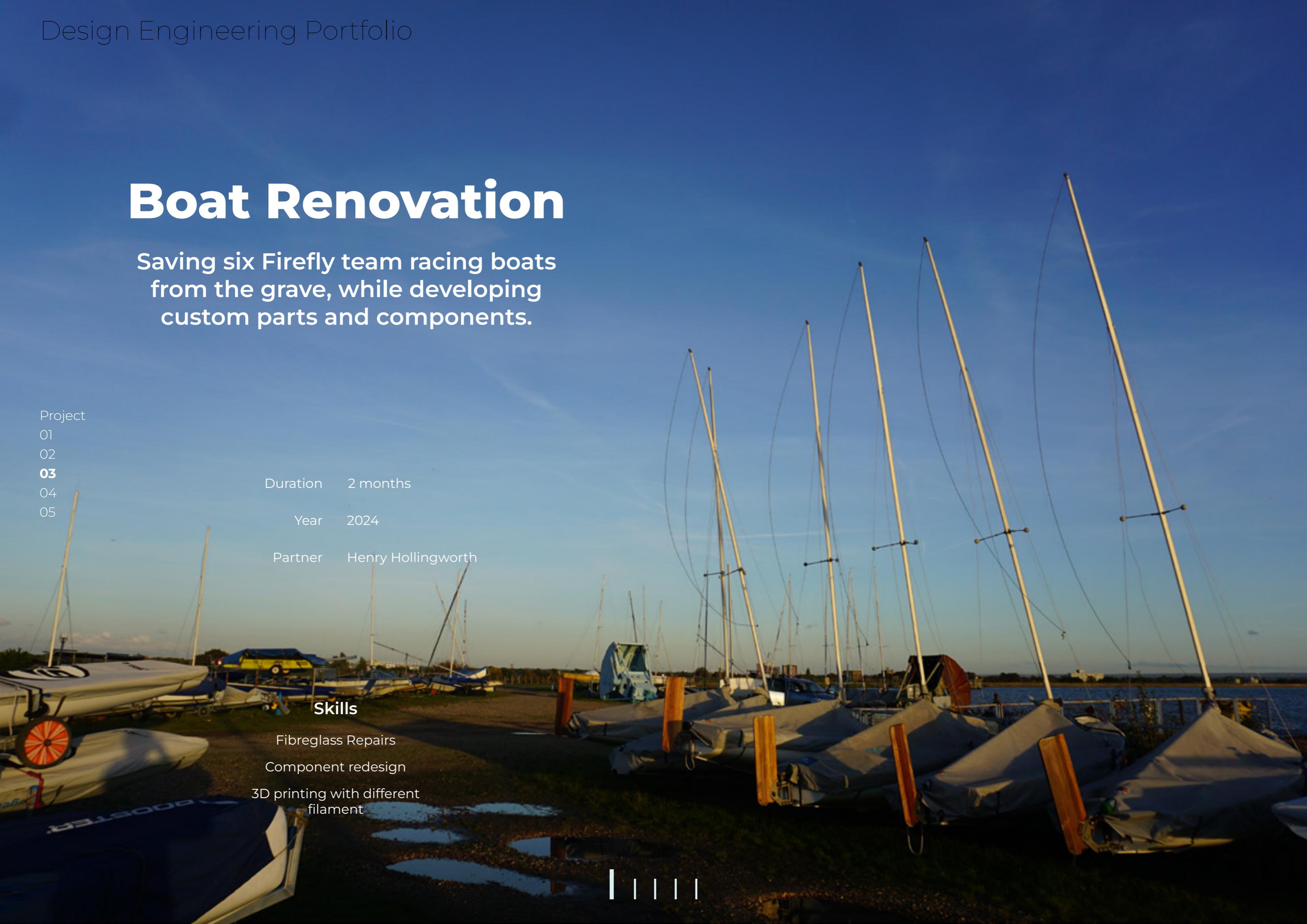
Partner Henry Hollingworth

Skills

Fibreglass Repairs

Component redesign

3D printing with different filament



The 'project'

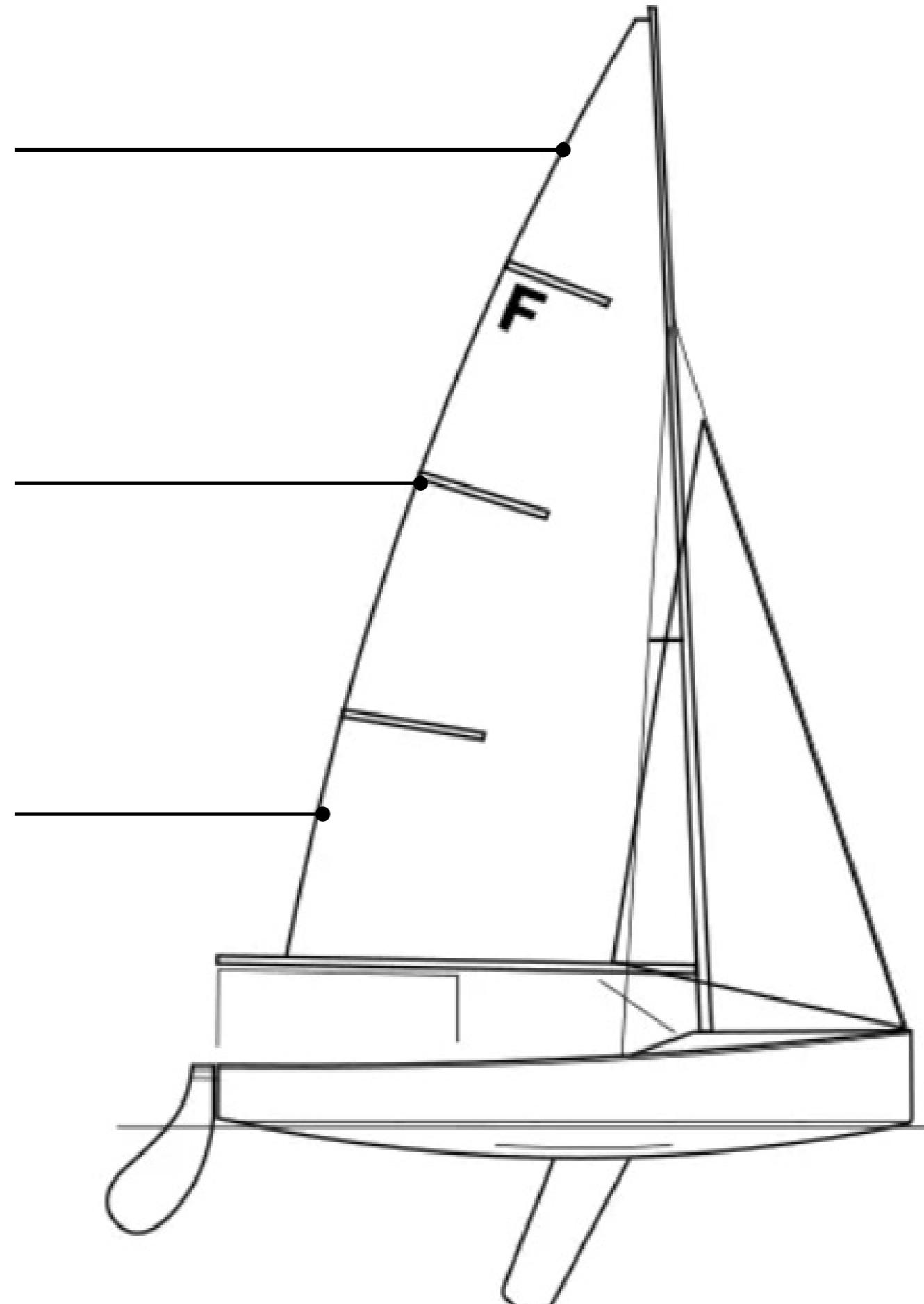
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FireFly sailing boats were originally designed in 1946.

They are now the backbone of university sailing.

Owners battle to keep them on the water with spare parts being hard to come by, being manufactured with aged technology.

Me and a friend acquired six which were in dire need of repairs, and spent part of summer working on them.



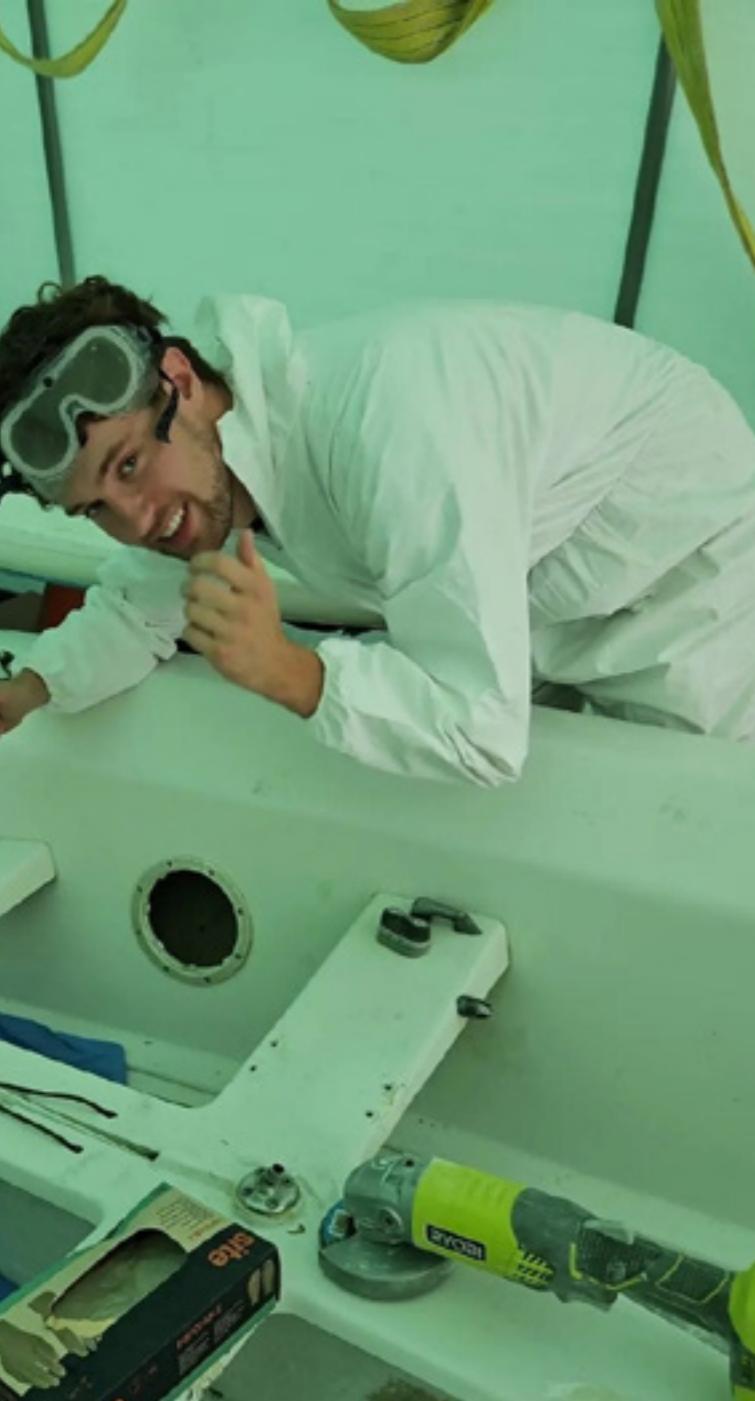
Fibreglass repairs

RYA. FIREFLY

SCALE
SCALE

FEET
METRES

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A major part of the restoration process was carrying out large fibreglass repairs.



Boom-End Protectors

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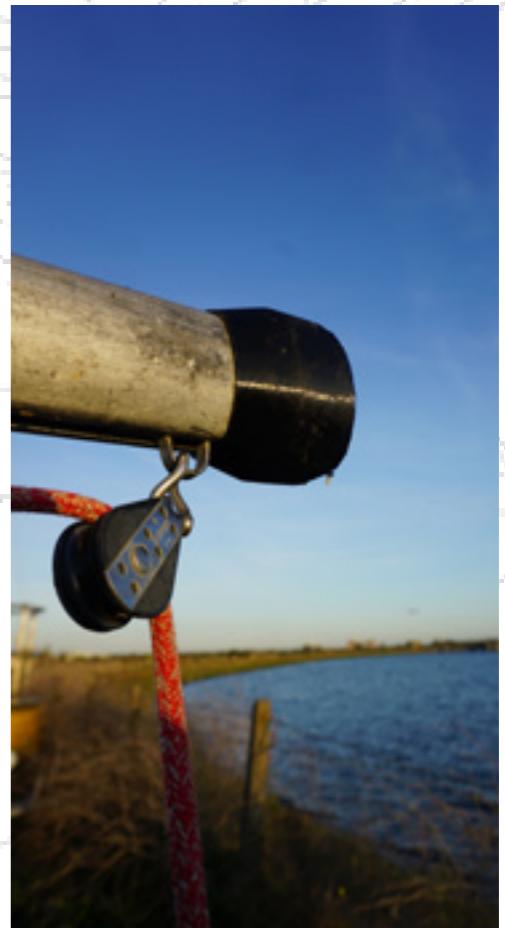
The aim of this component is to fit in, serve its brief, and be forgotten about.

Using 3D printing I have been able to produce this at 10% of the cost of what is available on the market.

This has lead to me selling this component on Ebay.



Click or scan



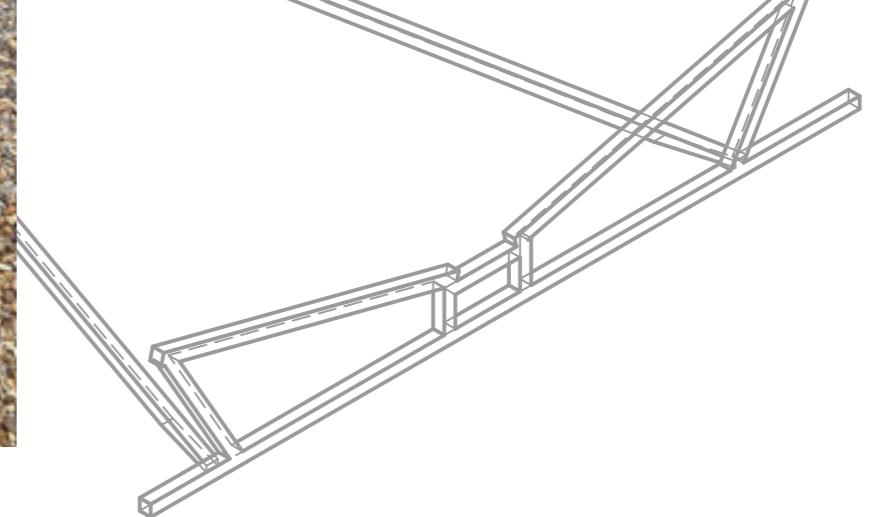
Trolley Fabrication



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We took a trolley from a different type of boat and fabricated a new one to match the profile of a Firefly.



GiggaSketch

Reinventing a classic toy to by adding mechatronic interaction and hidden game elements

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Duration 8 weeks

Individual role Arduino Coder

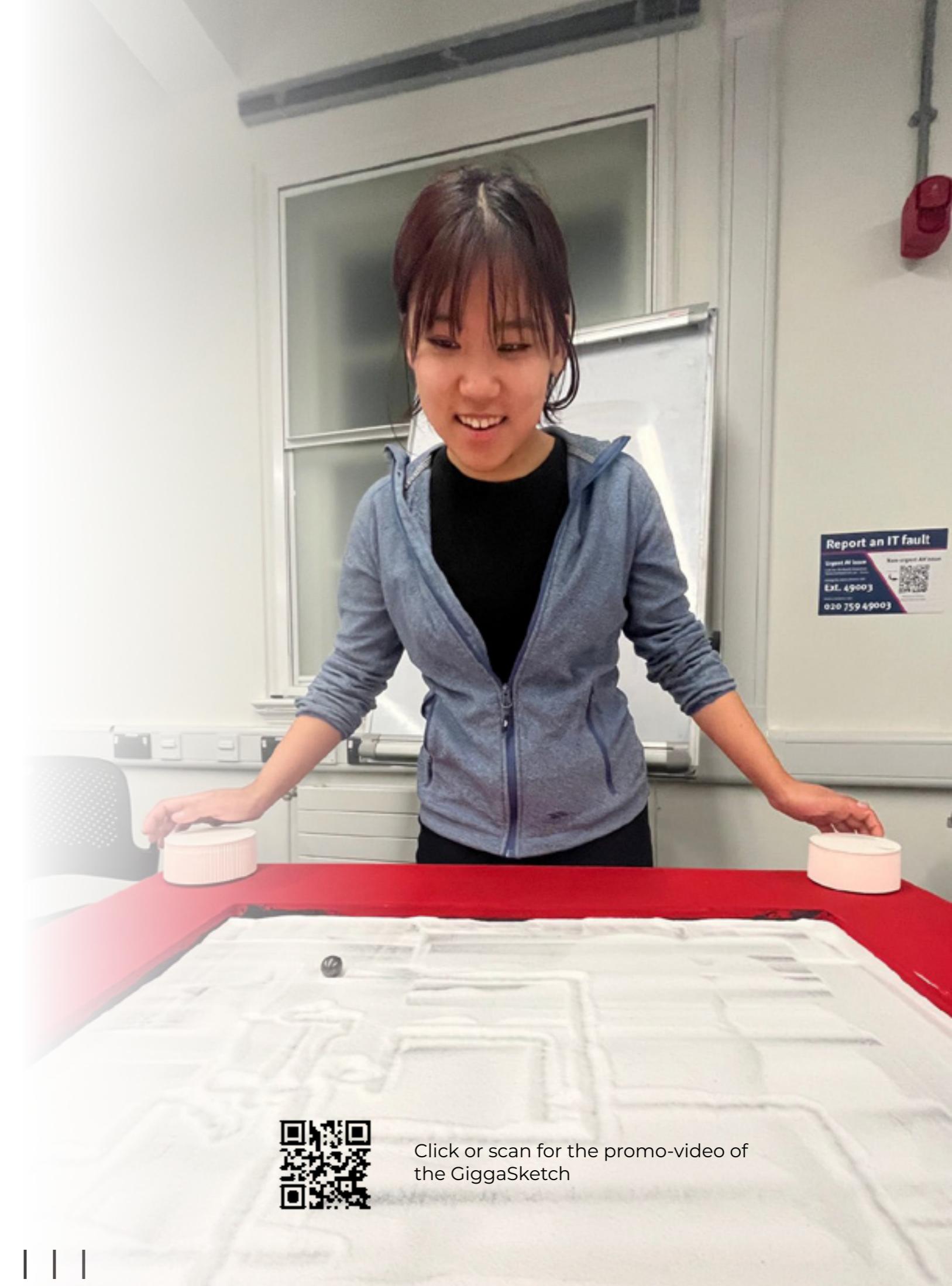
Partner Josh Reynolds

Skills

Arduino

Stepper motor control

Custom Linear actuators

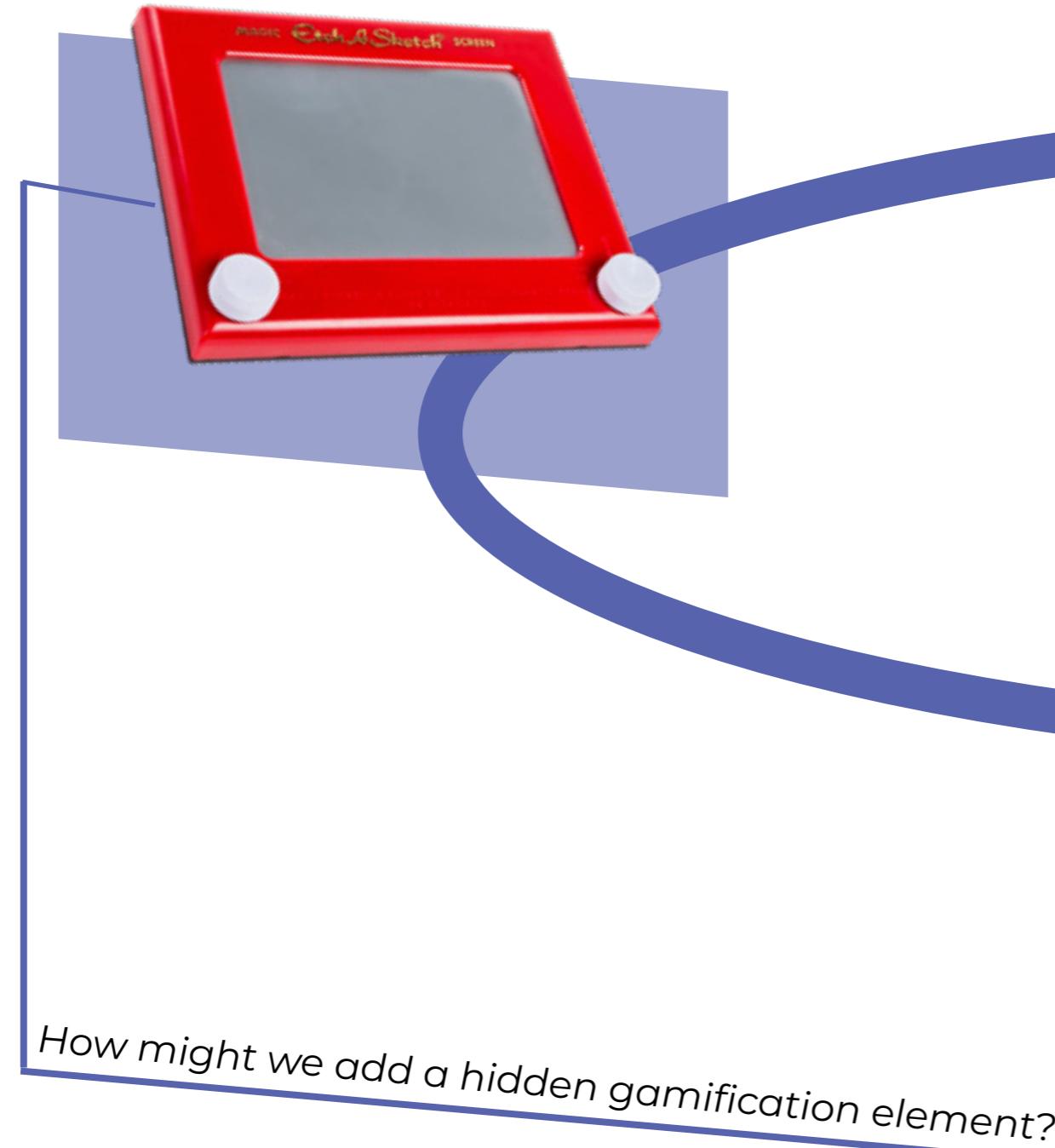


Click or scan for the promo-video of
the GiggaSketch



More than meets the eye

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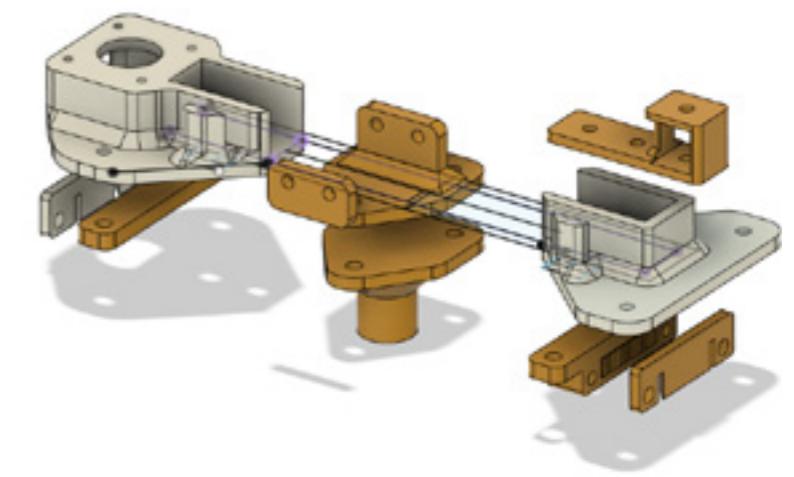
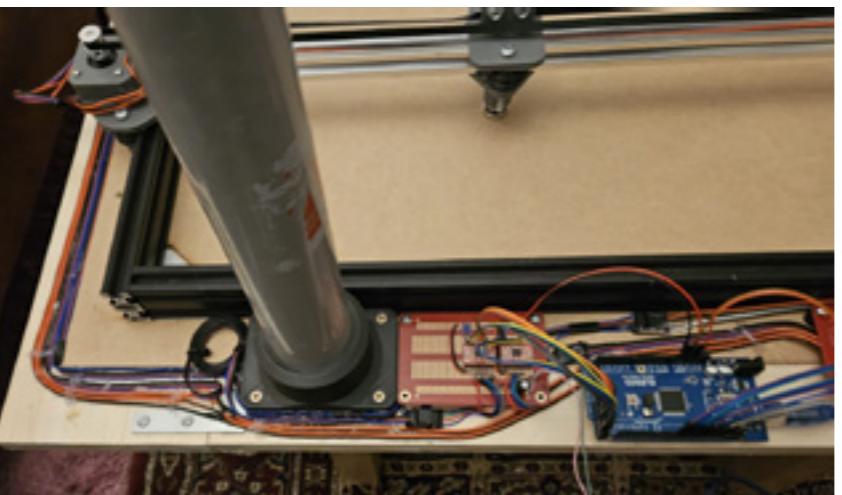
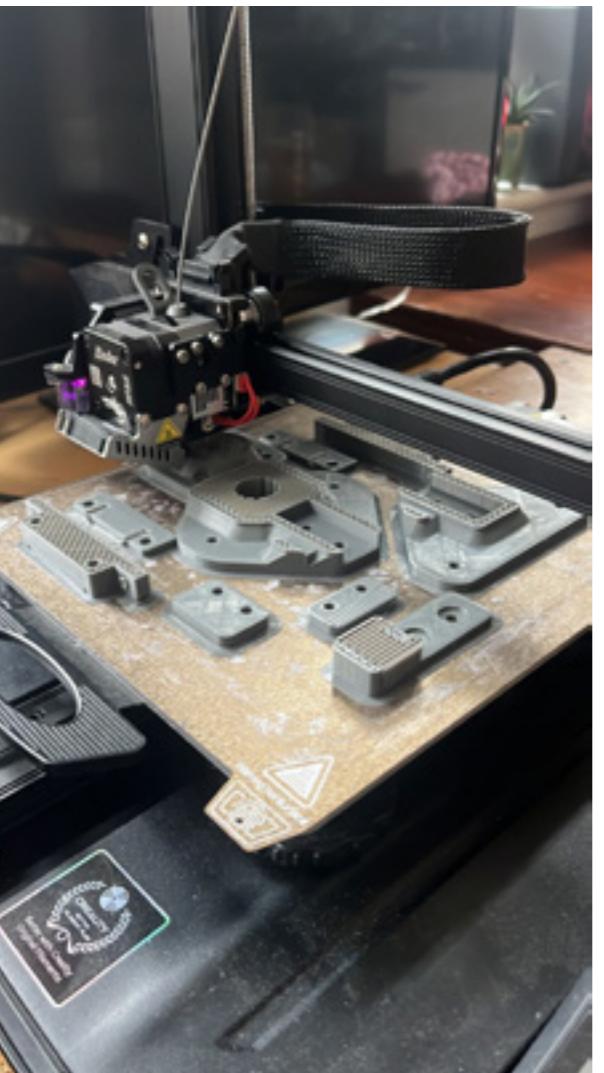


◀ MineSweeper was chosen as the perfect game to add into the GiggaSketch; It fits well within the workspace and creates an engaging interaction.

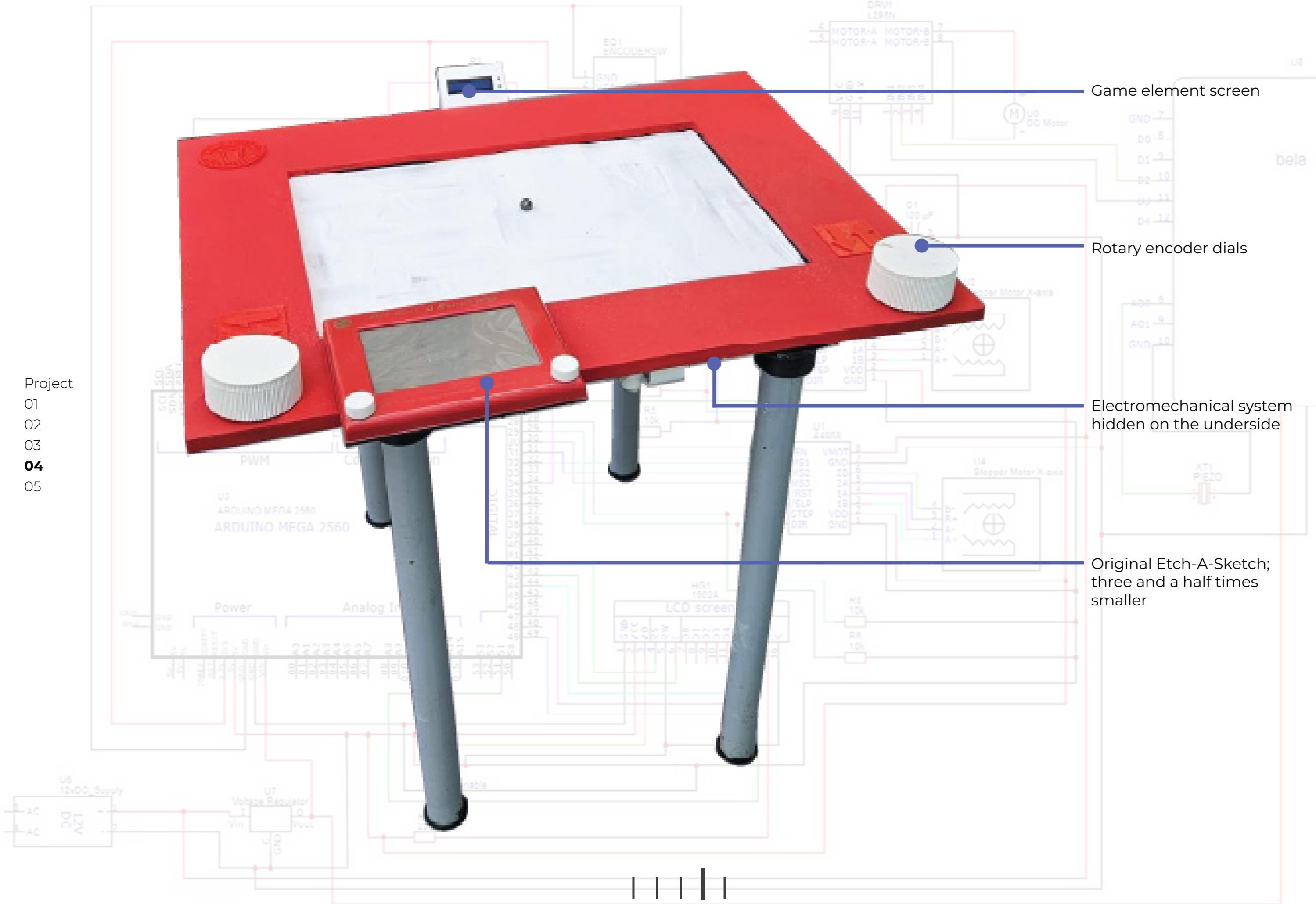
Process

▼ This was such a diverse project; Effort was spent on everything from getting the code running efficiently, to sanding for hours on end making the top surface smooth.

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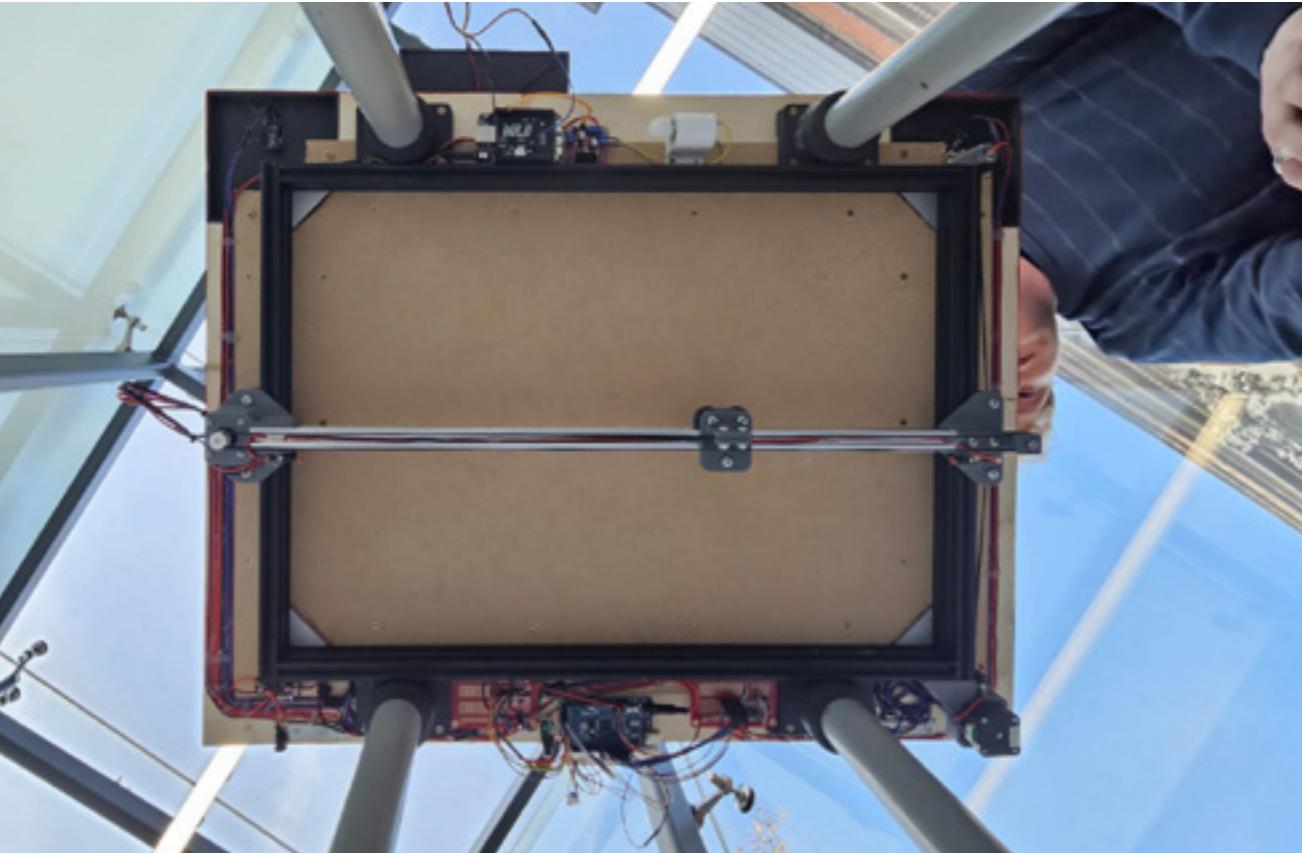


Final Outcome

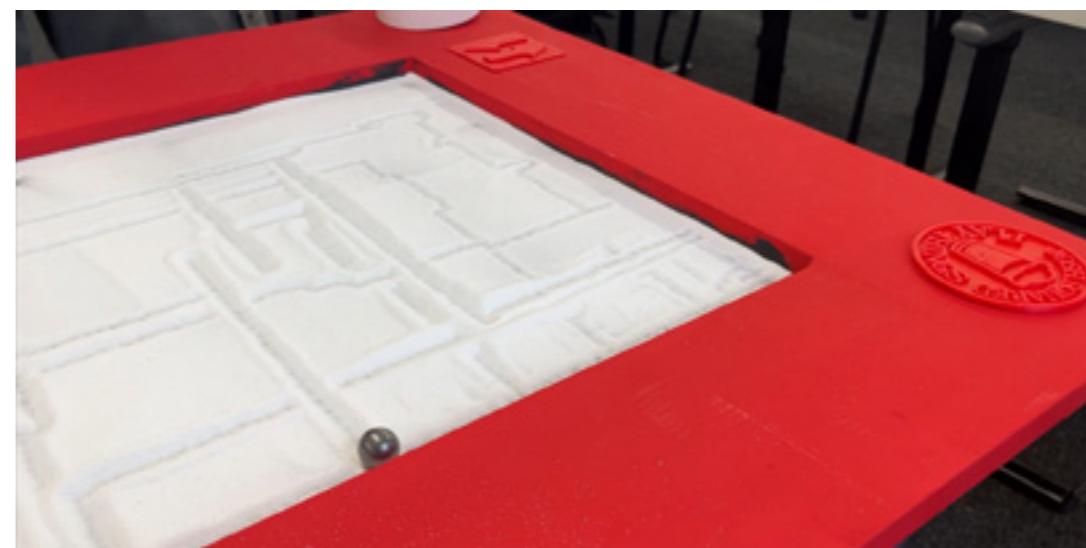


Becoming a kid again

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The GigasSketch ➔
created an engaging
interaction for the
users which grabbed
plenty of attention
on demo day.



Chain Guide

**Creating a product service system
to reduce the number of parts of a
mountain bike chain guide.**

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Duration Jan 2024 - Ongoing....

Stage Product testing

Project Personal

Skills

Finite element Analysis

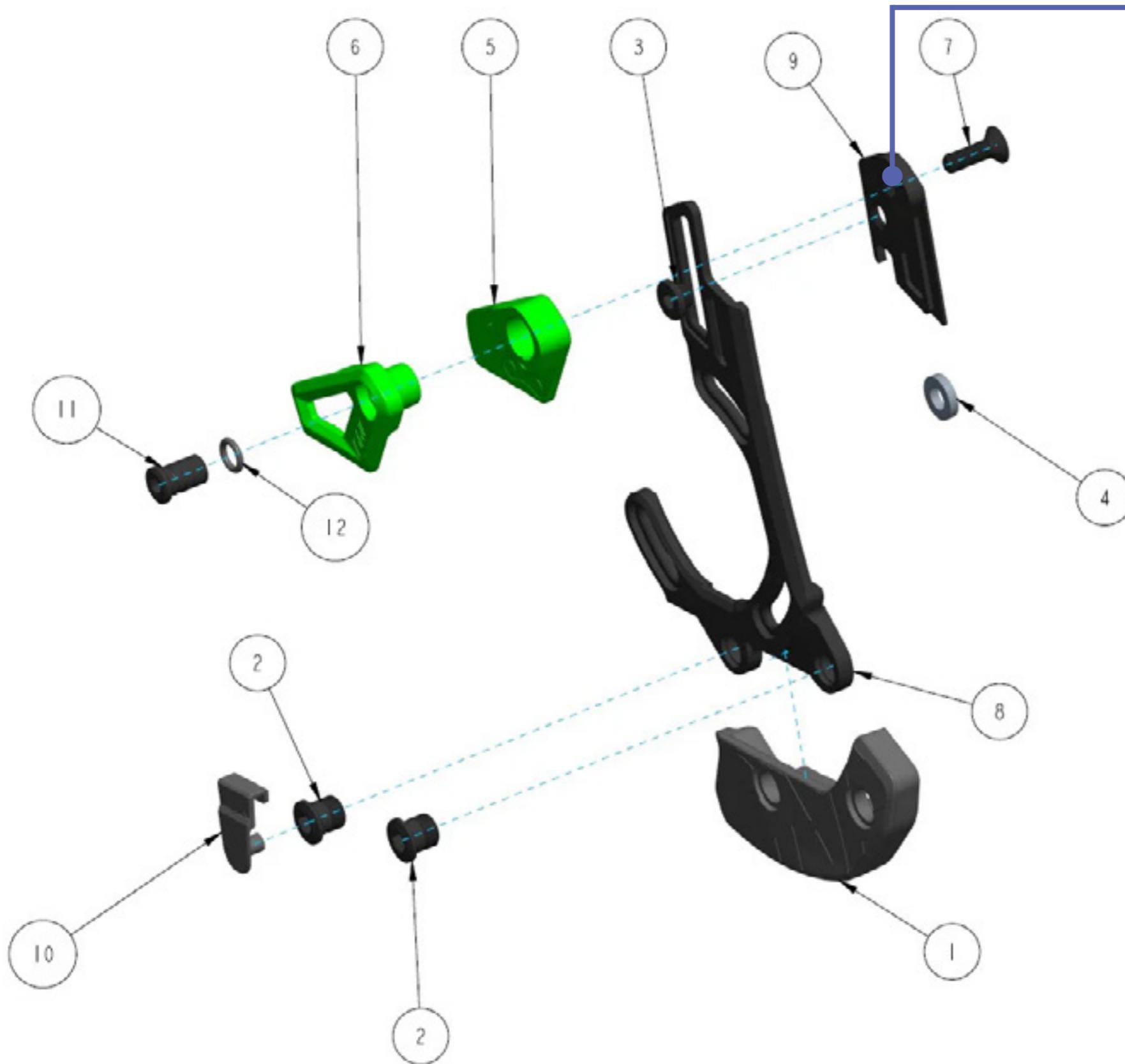
Adaptable geometry 3D
print work flow

Testing a product in
the real world



Too many parts

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Current chain guides comprise of a large number of parts.
Fitting them to a bike becomes a very fiddly process.

Every bike is different, meaning shims must be used to adjust to this.

◀ **How might we produce a chain guide which is easier to install by making it custom to each user?**

Design Engineering Portfolio

Product Service System

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User decides that they need a new chain guide.

Cuts out template from online and measures their bikes dimensions.

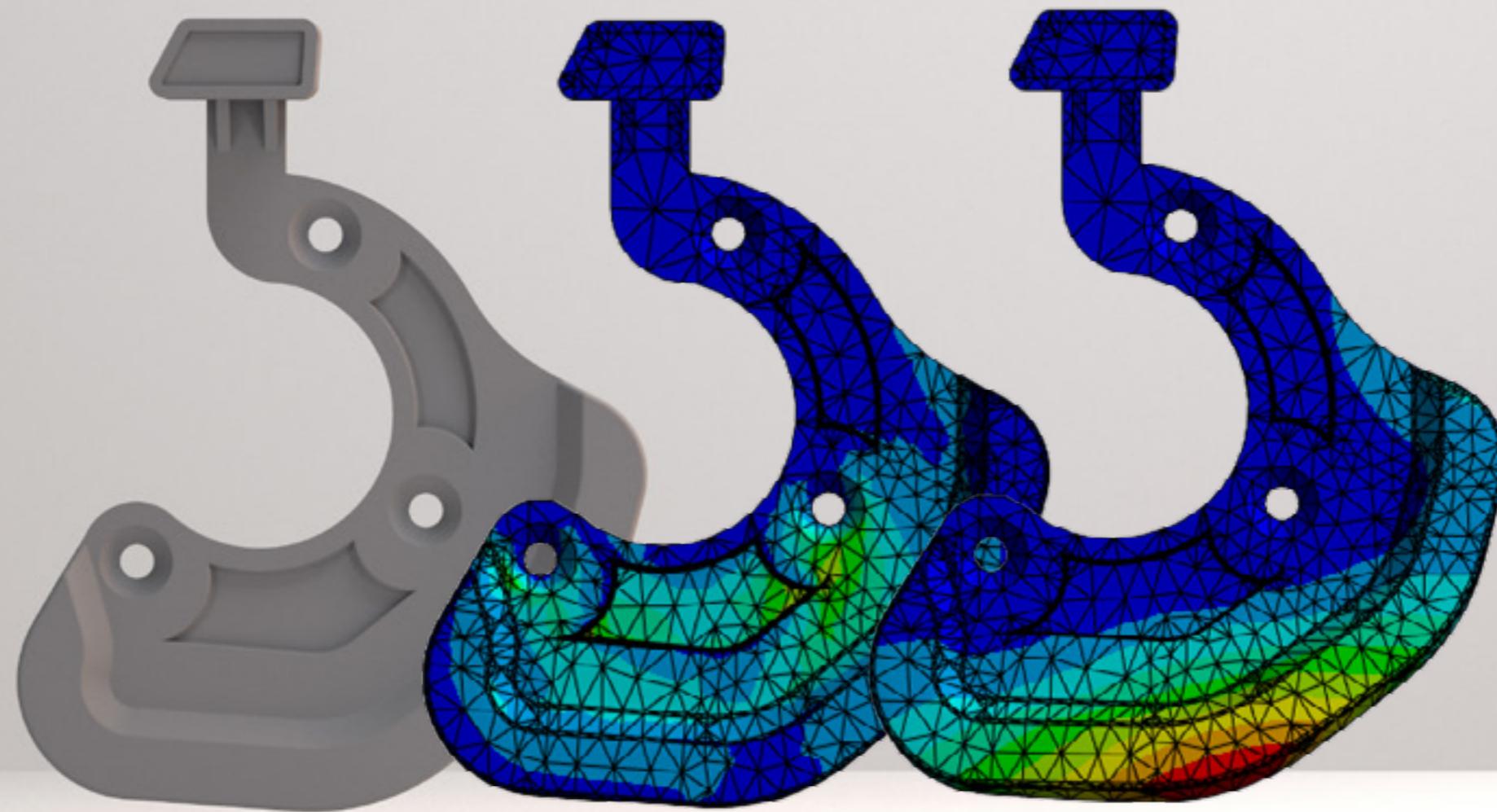
Enters the dimensions into the website which are then stored in a database.

Custom Chain Guide is printed and sent to the user.

It's then their job to go and enjoy the outdoors.....

FEA validation

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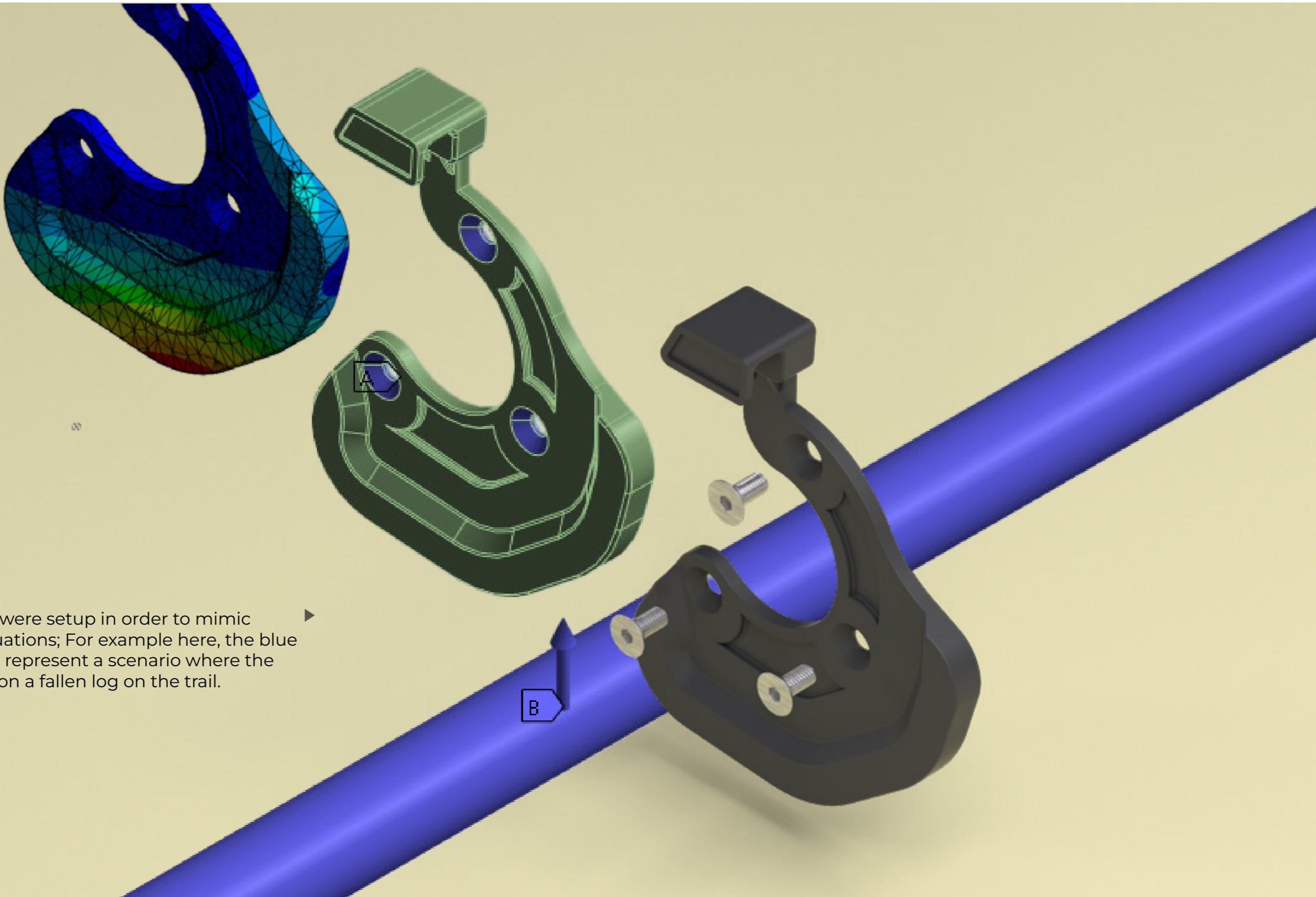


◀ Both static and impact analysis was completed on the Chain Guide to validate that the design would withstand the requirements.

Impact Analysis

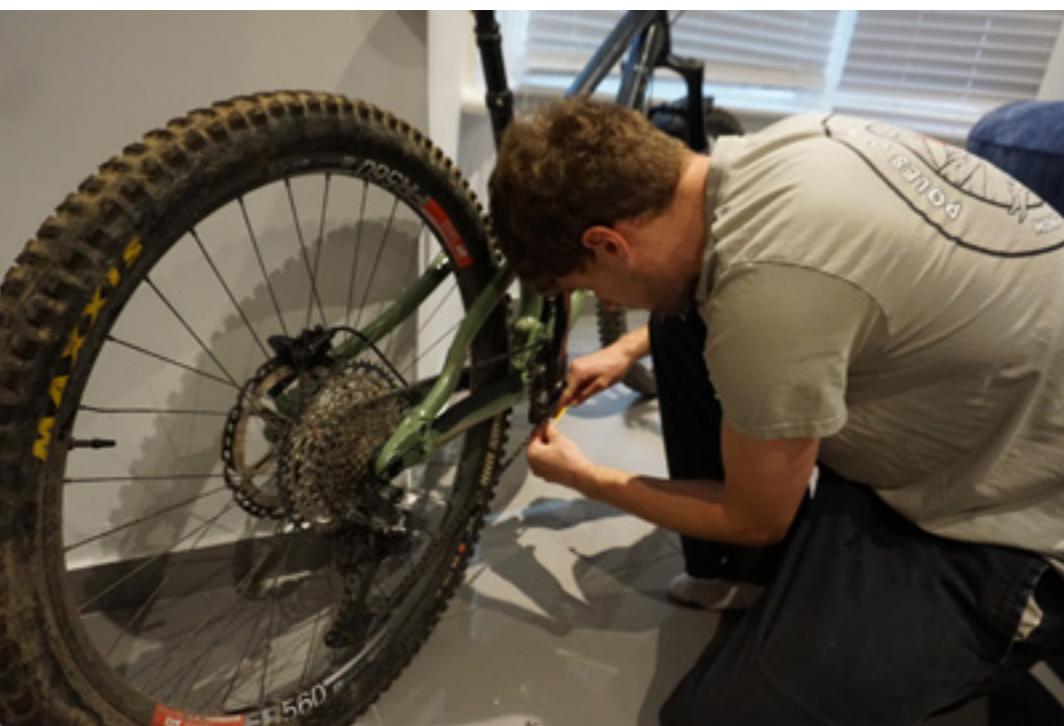
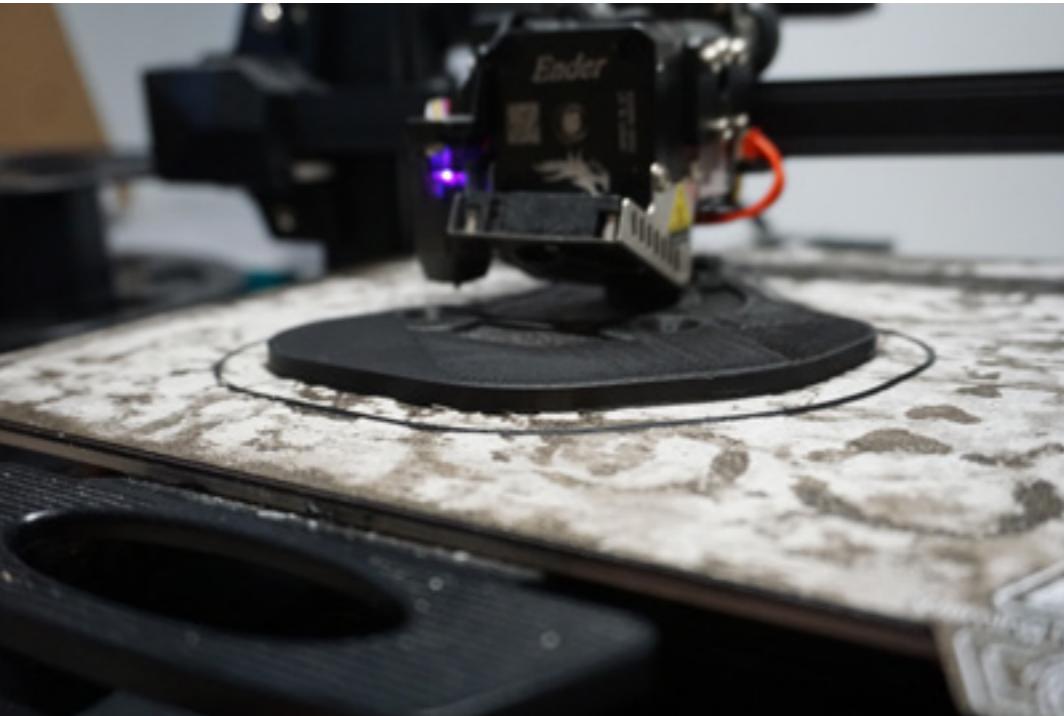
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Conditions were setup in order to mimic realistic situations; For example here, the blue tube would represent a scenario where the rider lands on a fallen log on the trail.



Product

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◀ This project highlights the quick development and customisability that 3D printing brings. 3D printers are easily accessible in lots of the world, it would be easy to get this product to customers without the need for complex distribution chains.



What's next...



◀ The chain guide is currently being tested on a number of my friends bikes where I will be able to assess its performance and identify any issues that arise.

◀ I would also like to explore using generative design in order to further optimise the strength of the component given the physical perimeters and force requirements.

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Additional projects

I would love to chat in more depth about all of the projects mentioned in this portfolio.



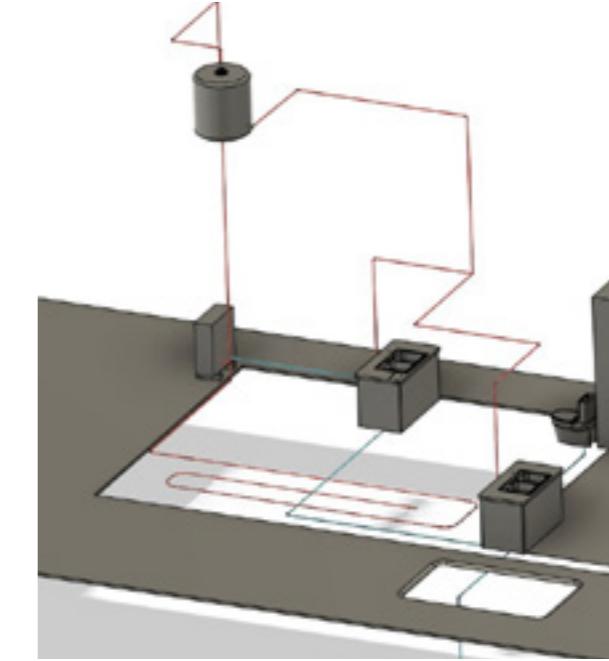
Dryer Lint Recycling

Collecting lint from Uni halls for sustainable re-purposing.



Mongol Rally Car

Fixing and modifying a 2002 Nissan Micra ready for a trip across the world.



Thermofluids house Design

Designing a house pipe system and calculating pressure loss.



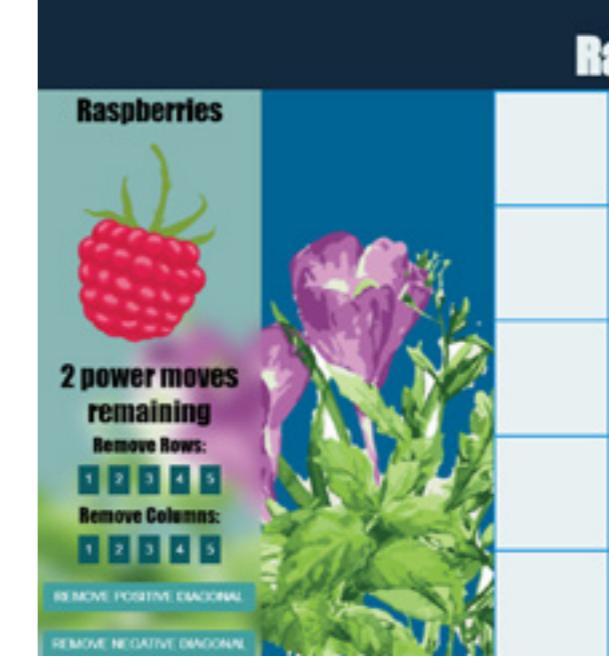
FEA Hip Implant

Redesigning a hip implant with Finite element Analysis tools.



Neilson Bike Route Design

Exploring Fuertaventura to produce new bike routes for a holiday resort.



Web-App Game

Creating a web-app board game in JavaScript, HTML, CSS.