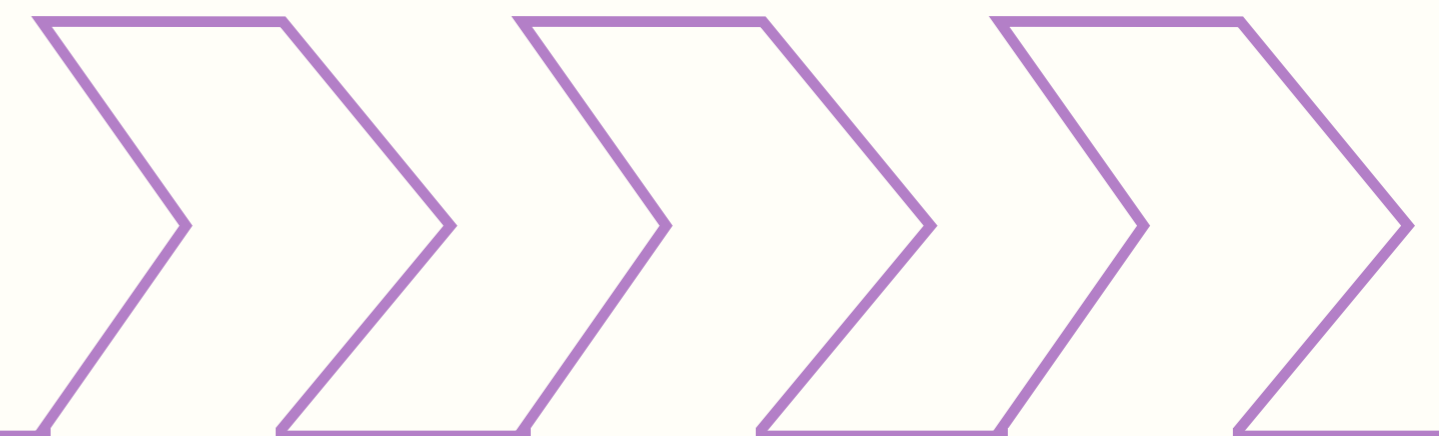
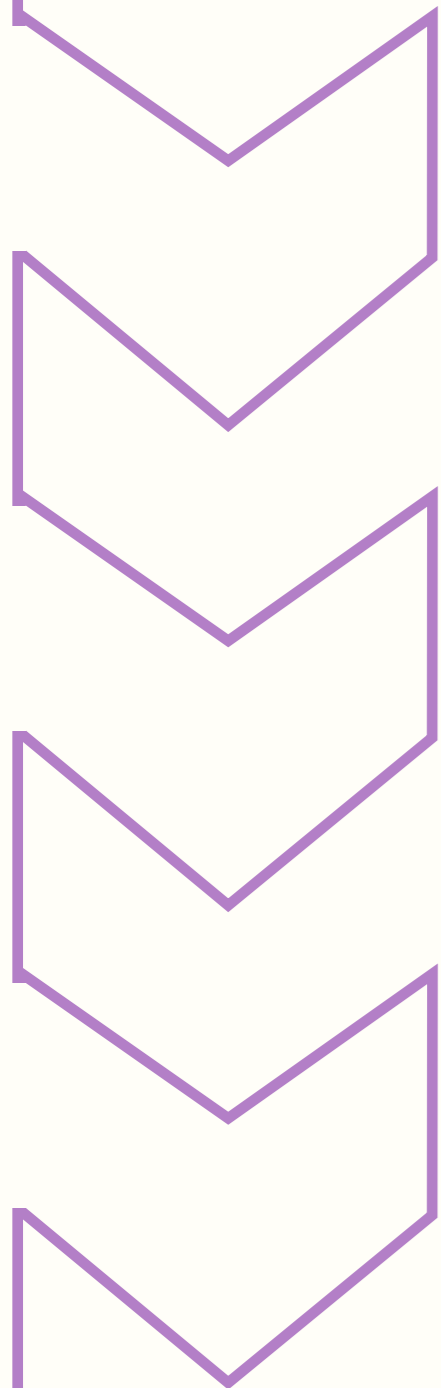


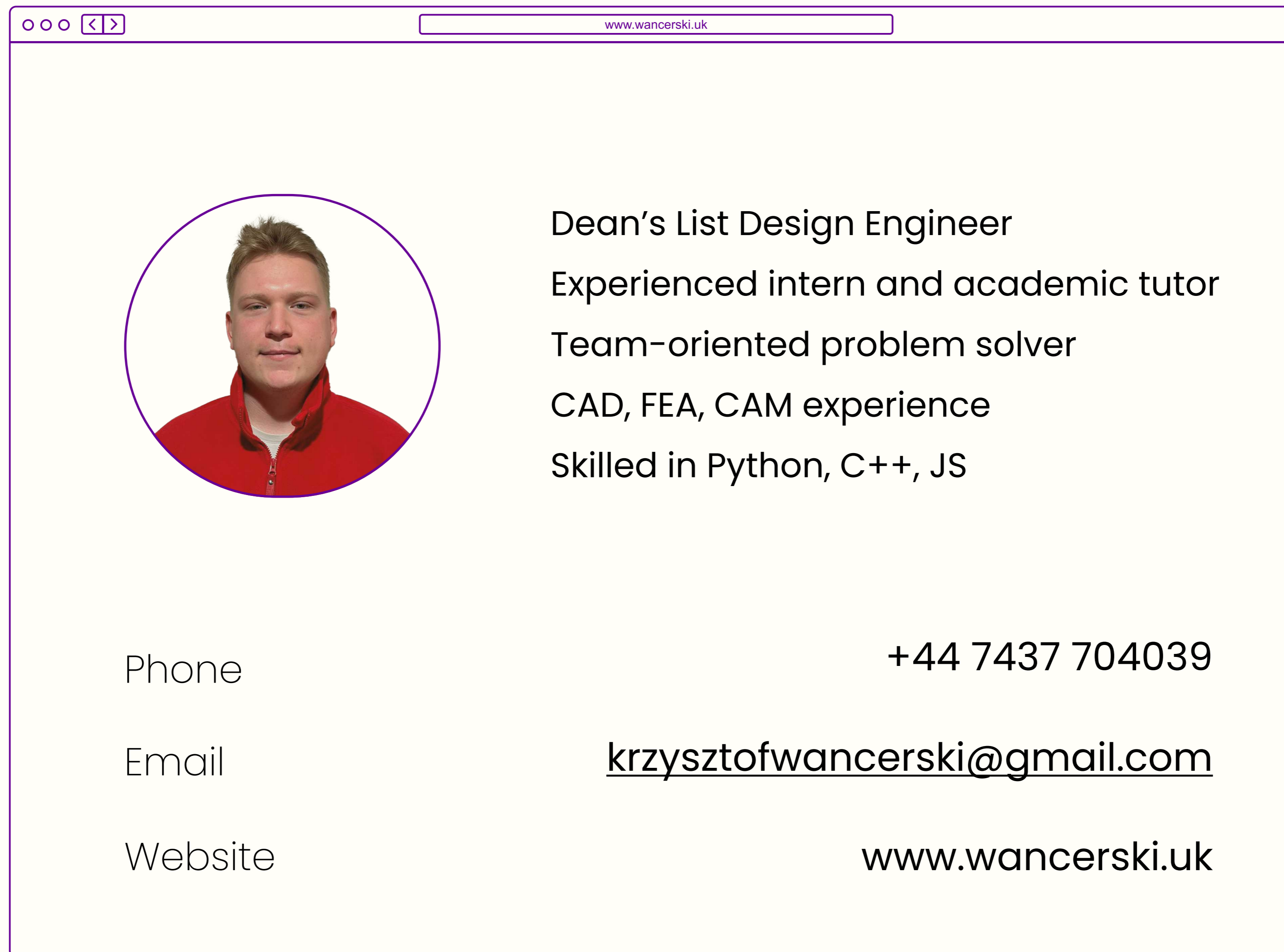
Krzysztof Wancerski

# PORTFOLIO

Master of Engineering  
Imperial College London



# ABOUT ME



# MY PROJECTS

1.



**t**imeline

2.



**BIN**  
BIOTIC

3.



TRUCK **CFD**

4.



**BLACK JACK+**

1.



**t**.imeline

the 21st century way to organise time



fully functional prototype

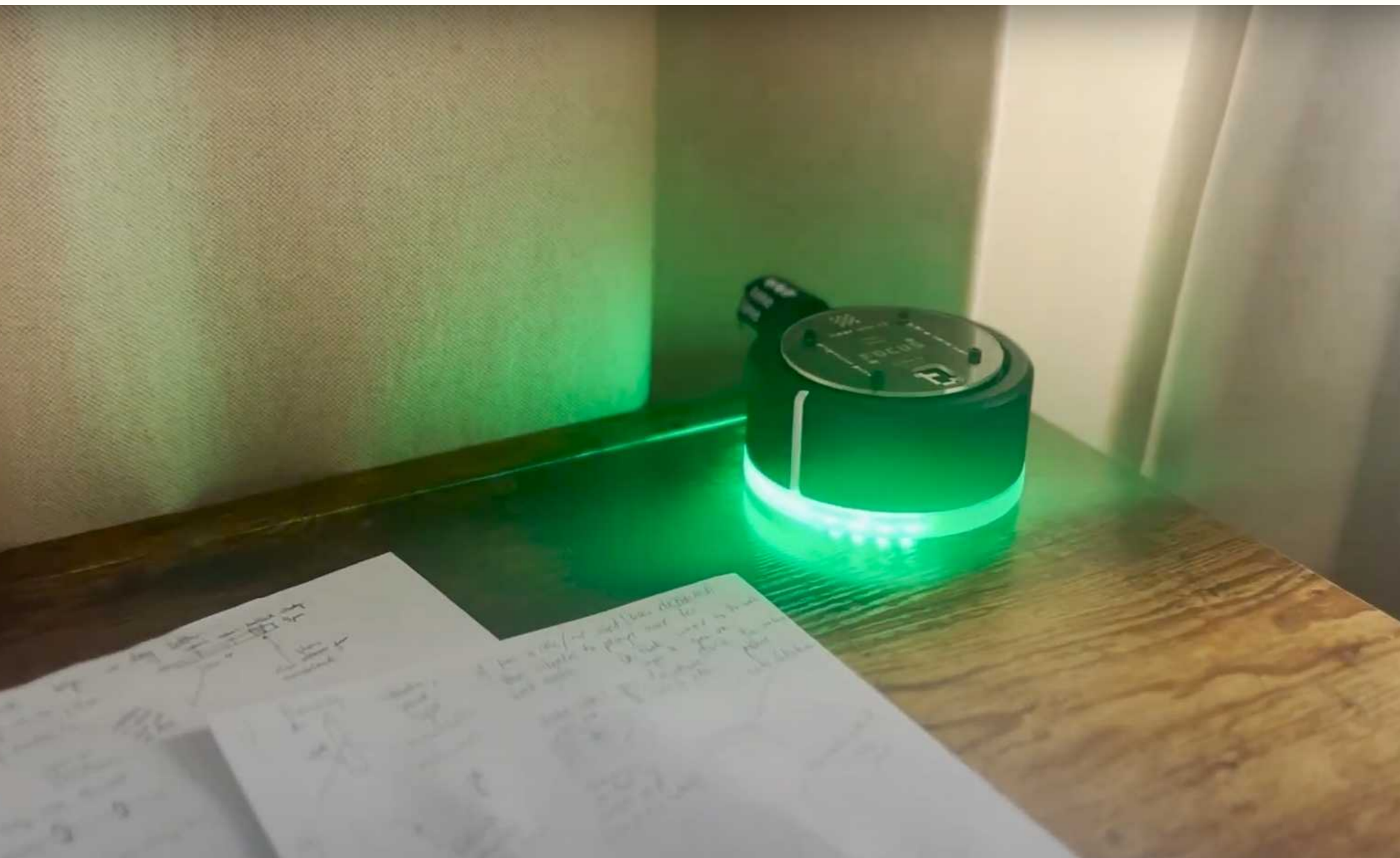


2 terms

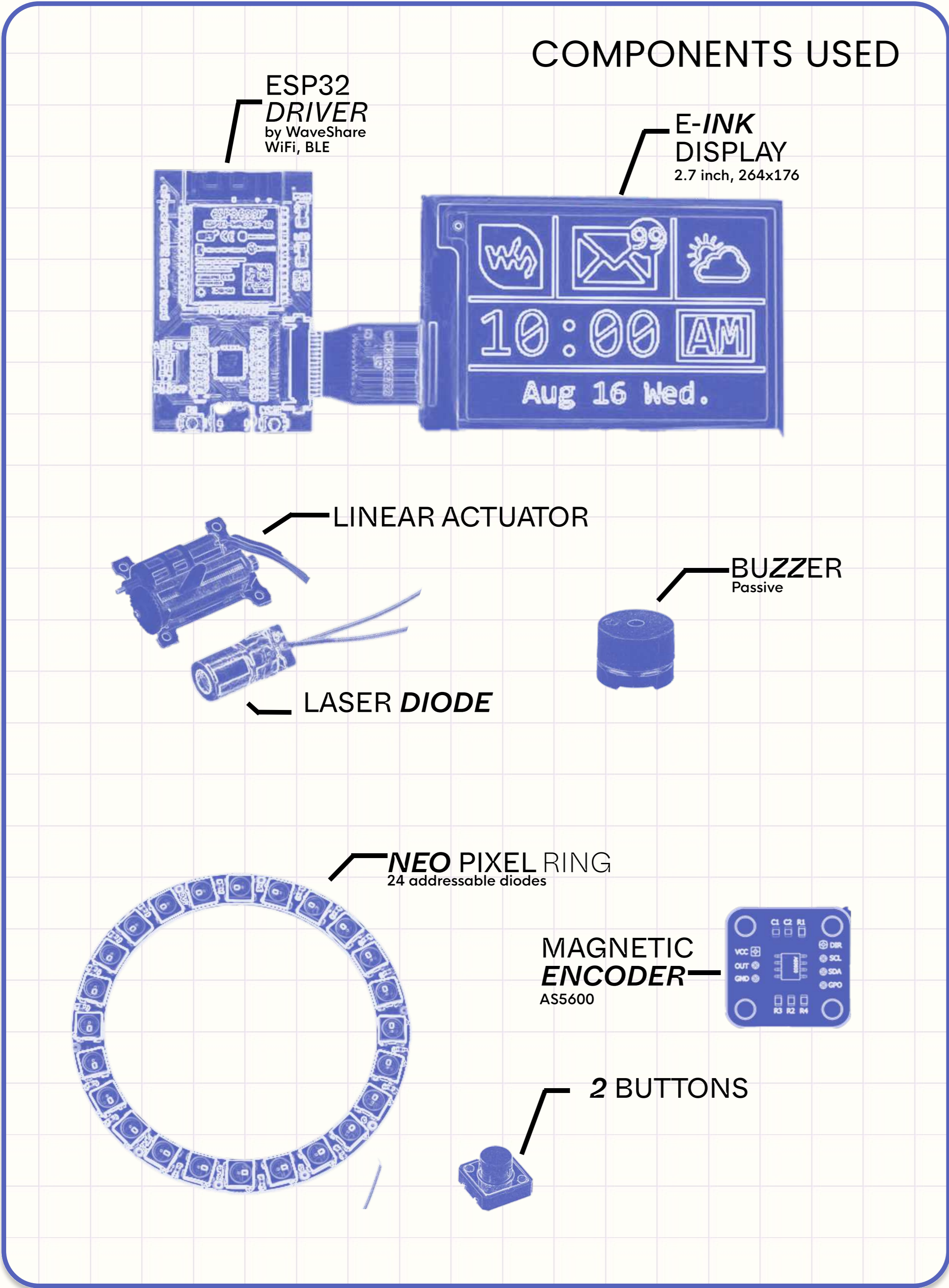
Industrial Design Engineering  
group project

Brief: Design and engineer **a battery powered hand-operated device for home**, garden or educational use that not only appeals to the mass market, but also **meets the needs of a specific (underserved) user group.**

# THE IDEA

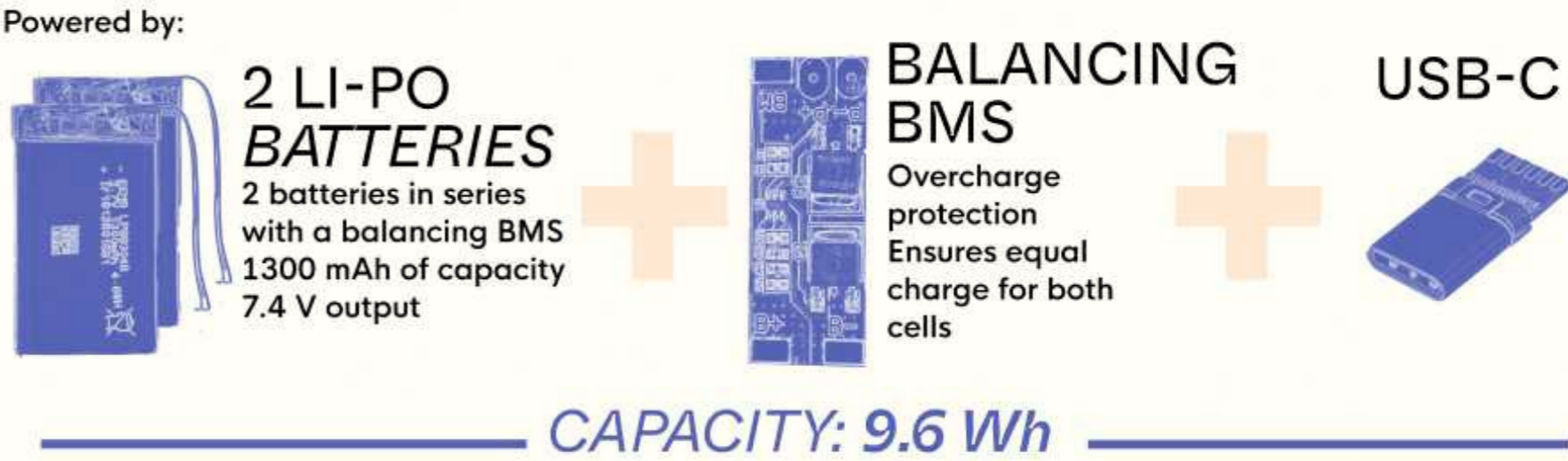
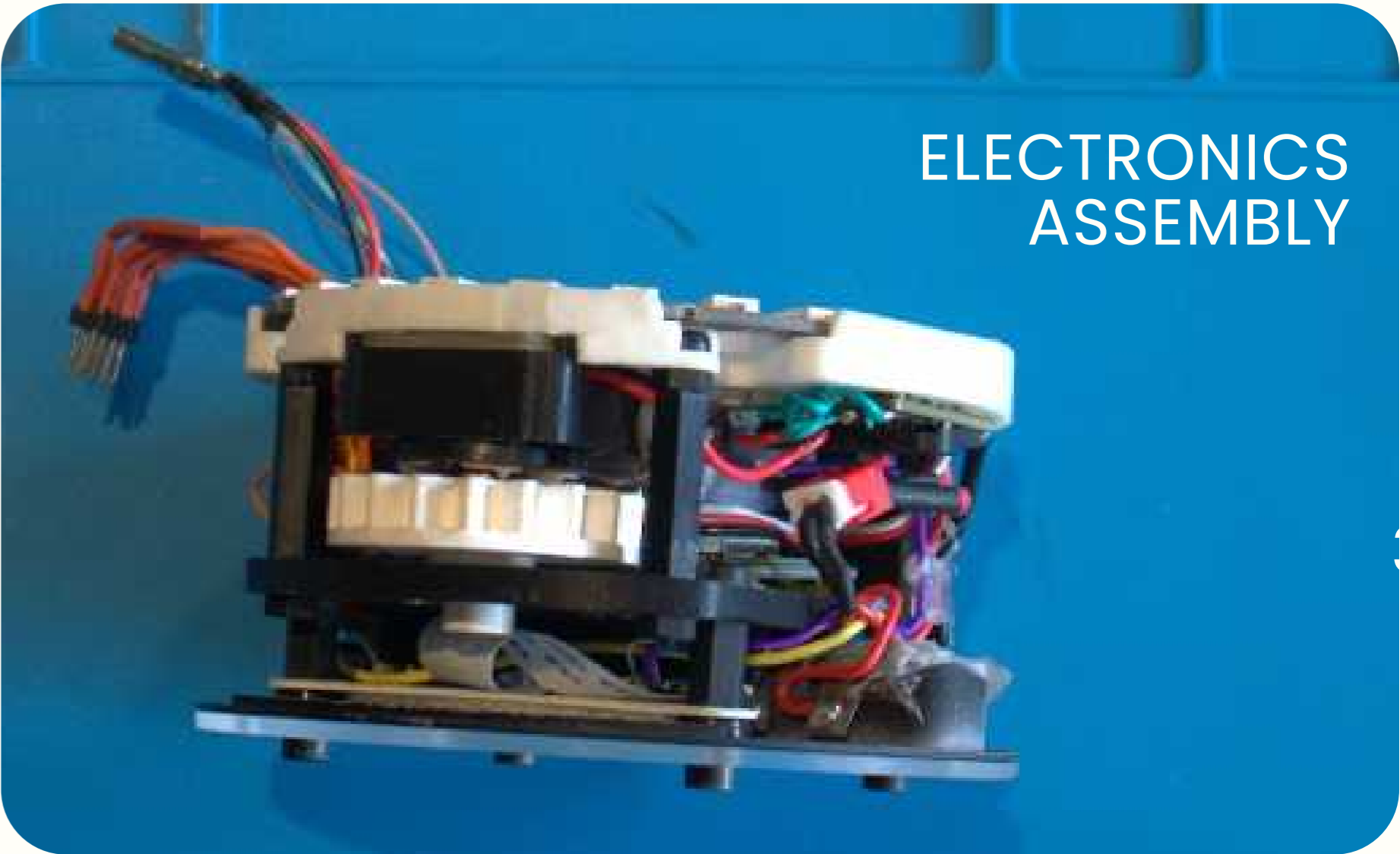


Young adults commonly experience tendencies to hyperfocus intensely and experience **time blindness**, or become easily distracted - all of which leading to incomplete tasks. And that's why we made TimeLine - **the 21st Century way to organise time.**



# MY ROLES

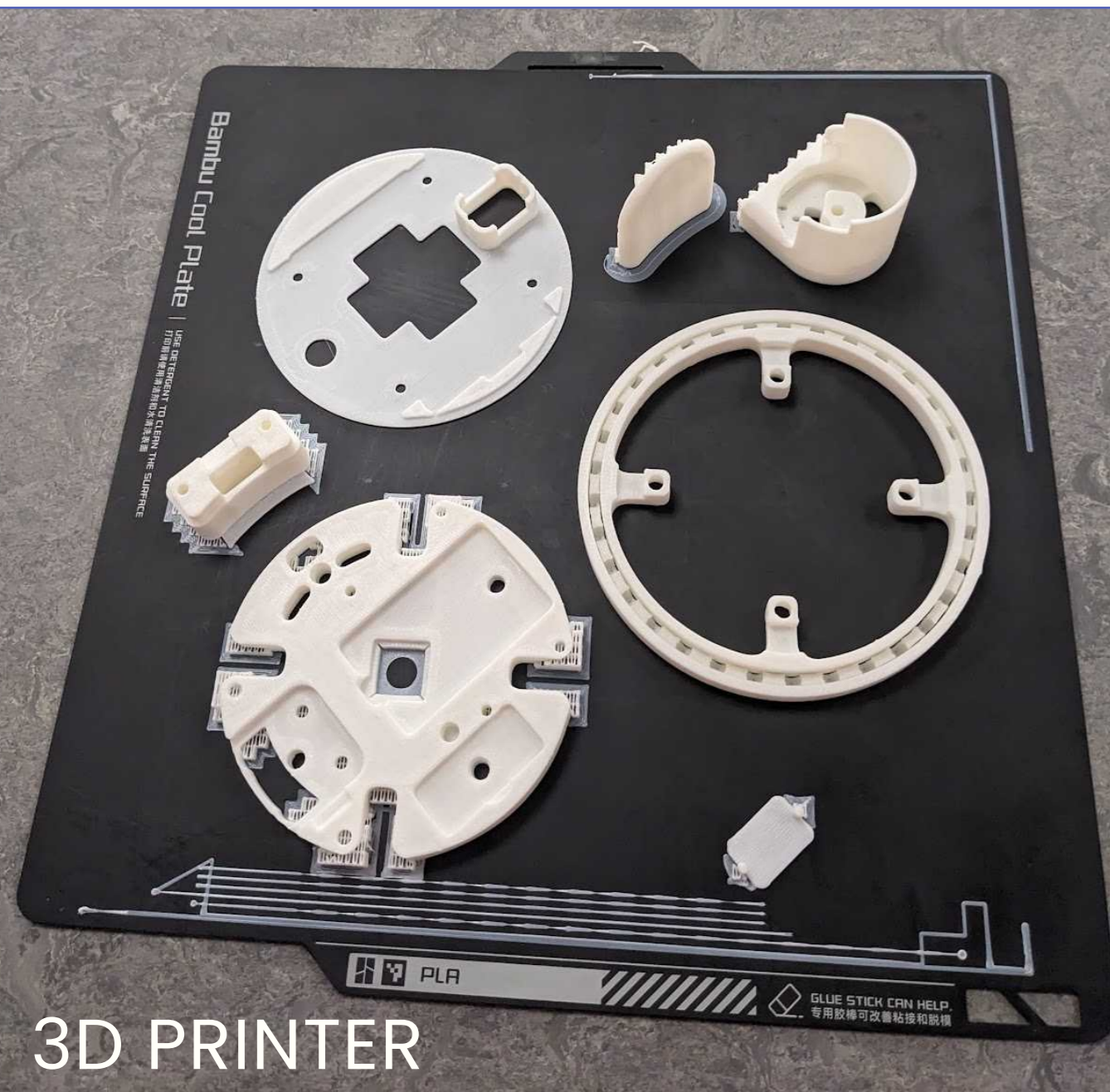
## 1. ELECTRONICS



Based on the established operational requirements, **I researched and then selected the components listed.** I then used C++ to **integrate all into a fully functional prototype** for testing.

# MY ROLES

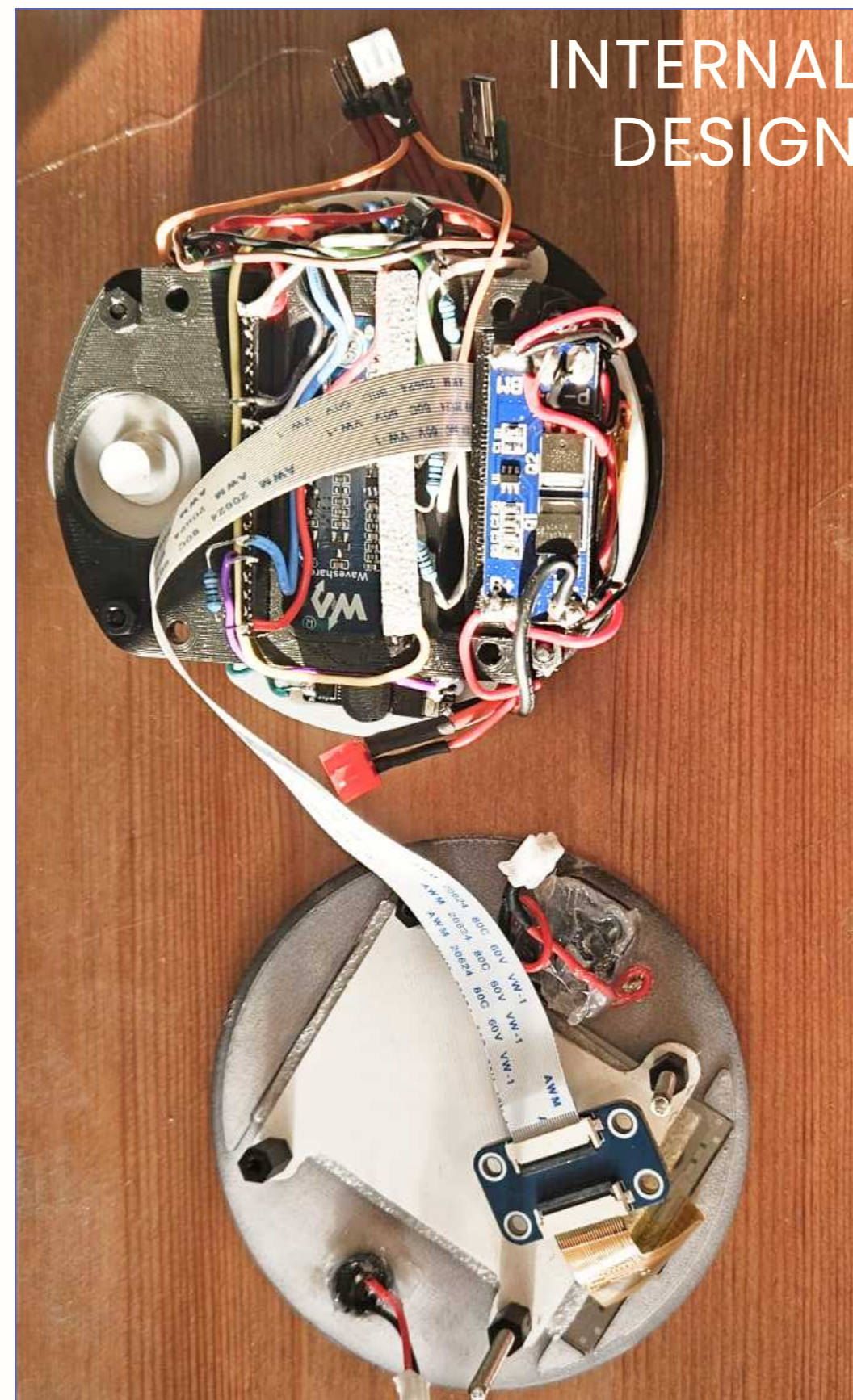
## 2. PROTOTYPING



3D PRINTER



CNC ROUTER



INTERNAL  
DESIGN



VINYL CUTTER

Based on the CAD designs, I prepared **CAM files for 3D printing, CNC routing and Vinyl Cutting**. I used a variety of other workshop tools, including the soldering iron.

# MY ROLES

## 3. PROGRAMMING

### EXAMPLE USE

Hold button for 3 seconds;  
buzzer sounds;  
triggering mode switch

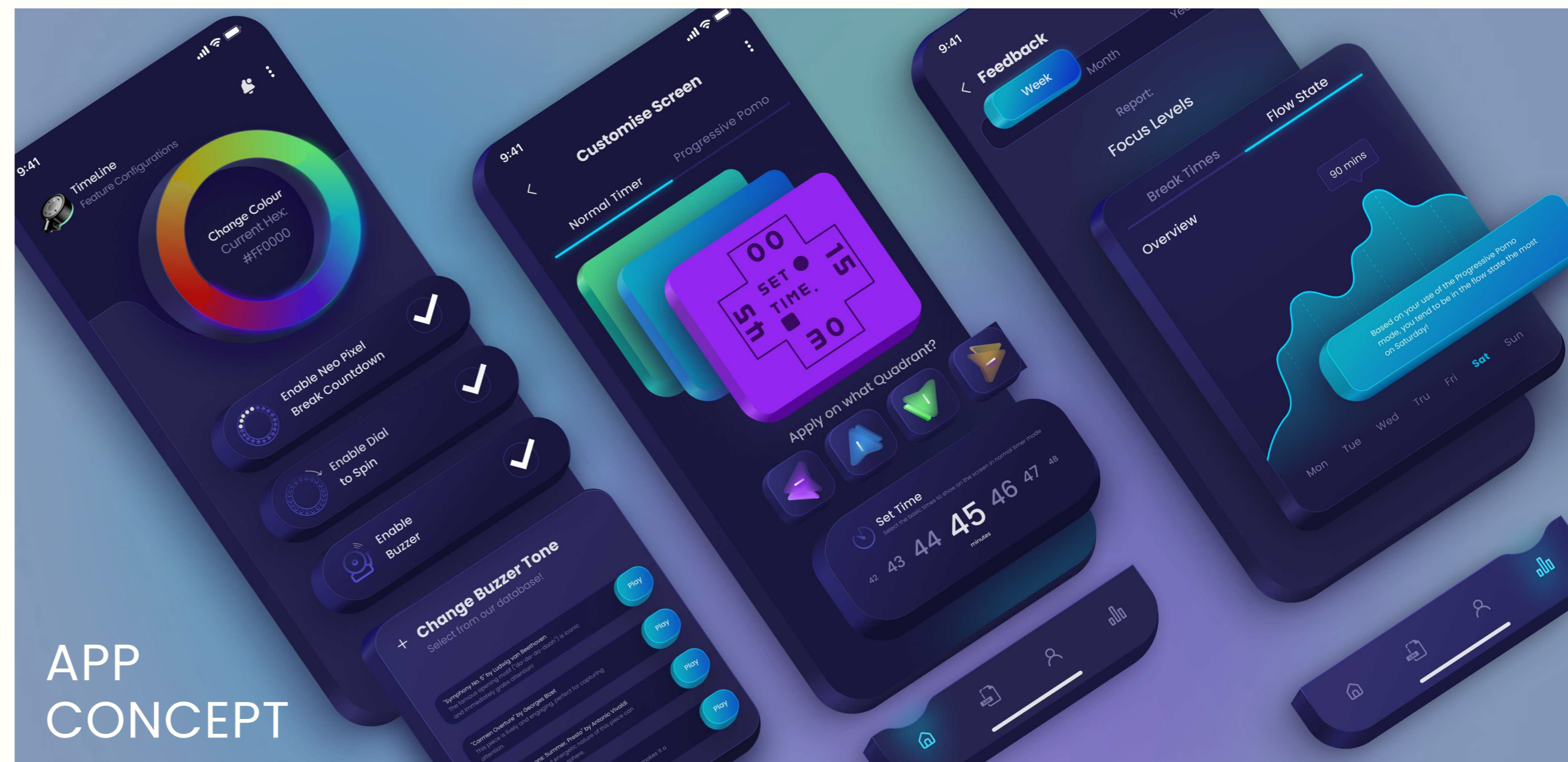
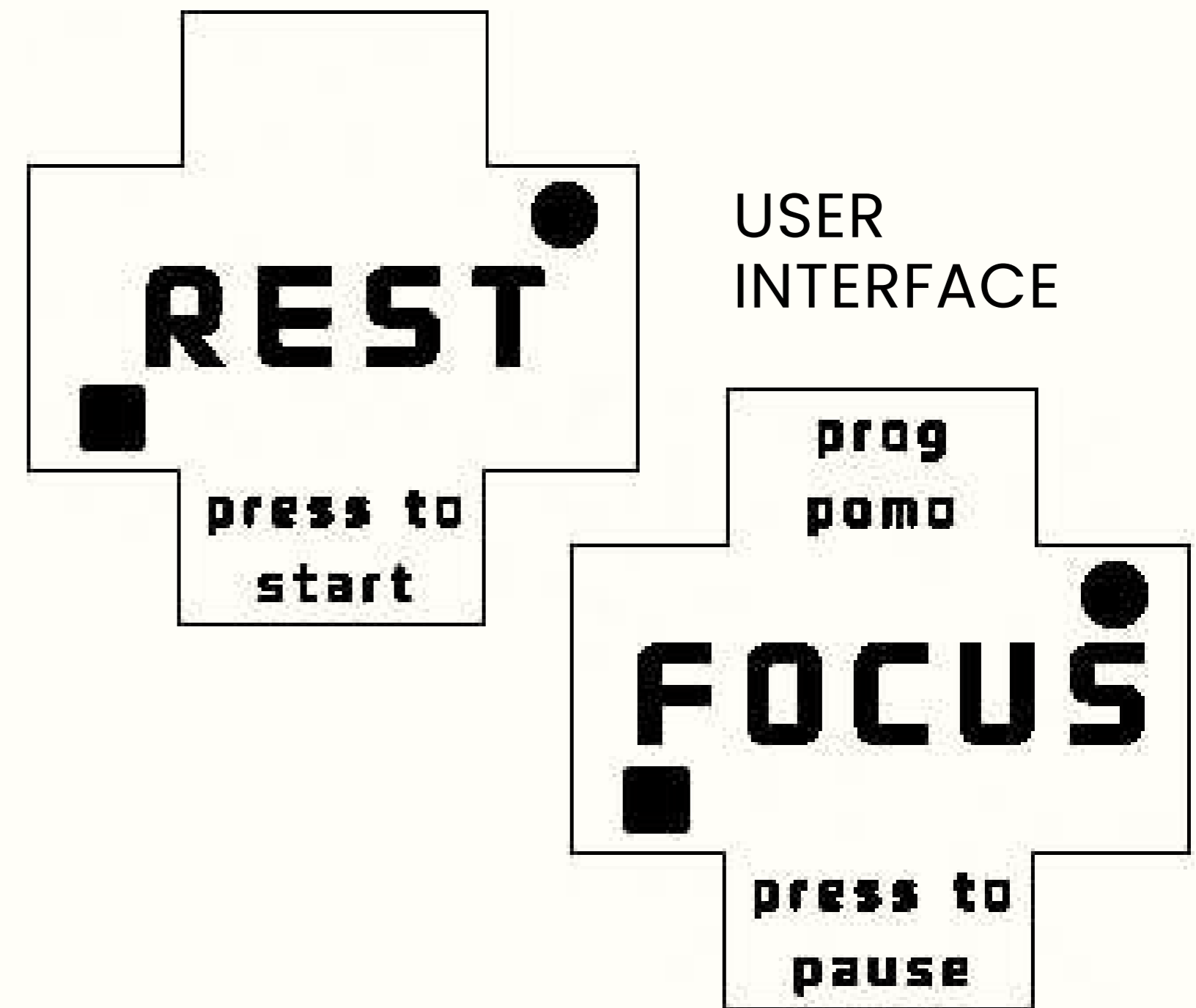
Dial is turned to select current focus  
level: if currently distracted 5 minutes  
runs on the timer

Once completed, focus is  
rated on timer from  
distracted to focussed

If distracted, then new short  
focus block is set

If focussed, then longer  
block is set

My responsibilities included **designing the user interface**,  
**creating a flow chart** for the user will interact with the device,  
**programming the device using C++ and testing.**



# PRODUCT RENDERS



EXPLODED VIEW



PACKAGING DESIGN

*Reimagining time as a linear progression* →

A timer designed to help you ~~be in the zone~~  
get, stay, and leave the zone as appropriate. ↗



# 2.

2 terms

Human-Centered Design Engineering  
group project



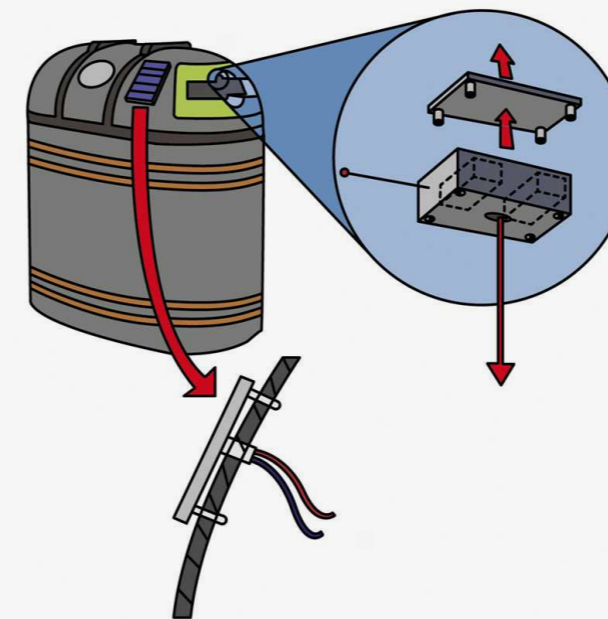
optimising urban waste collection

BinBiotic can be installed in **any bin**  
**and work in any environemnt** -  
 campus, office and city-wide.

BinBiotic **collects data about the state of a bin** through a range of state-of-the-art sensors.

System-wide data processing creates **live, most optimal collection routes.**

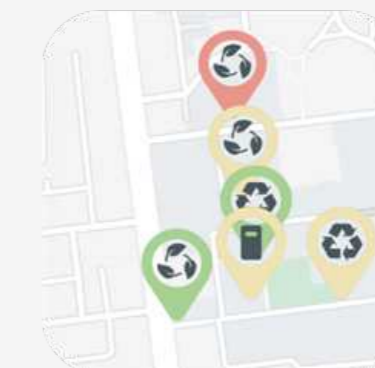
Full-bins are a thing of the past!



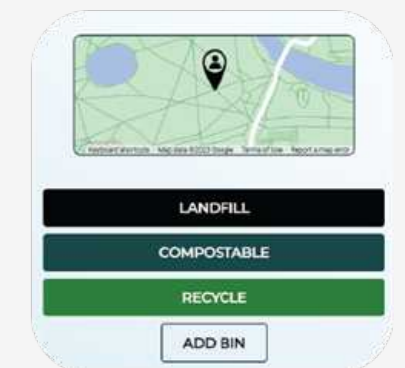
Heat Map



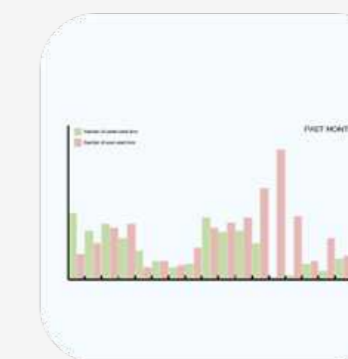
Bin State Information



Map



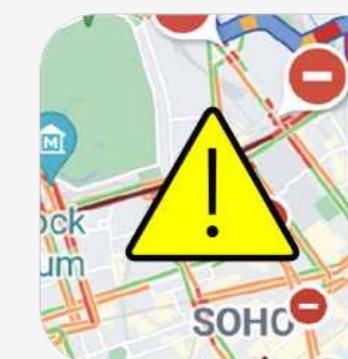
Registering a Bin



Usage Analytics

Bin ID	Location
1. AS4D7H	55 Victoria Road, London, SE15 8VY
2. F718U	228 Stanley Road, London, SE29 7AX
3. BLUXC4	90 Grange Road, London, SW76 5QH
4. AS4D7H	56 Victoria Road, London, SE15 8VY
5. F718U	228 Stanley Road, London, SE29 7AX
6. BLUXC5	91 Grange Road, London, SW76 5QH
7. AS4D7H	57 Victoria Road, London, SE15 8VY
8. F718U	230 Stanley Road, London, SE29 7AX
9. BLUXC6	92 Grange Road, London, SW76 5QH
10. AS4D7H	58 Victoria Road, London, SE15 8VY
11. F718U	231 Stanley Road, London, SE29 7AX
12. BLUXC7	93 Grange Road, London, SW76 5QH
13. AS4D7H	59 Victoria Road, London, SE15 8VY
14. F718U	232 Stanley Road, London, SE29 7AX
15. BLUXC8	94 Grange Road, London, SW76 5QH
16. AS4D7H	60 Victoria Road, London, SE15 8VY
17. F718U	233 Stanley Road, London, SE29 7AX
18. BLUXC9	95 Grange Road, London, SW76 5QH

Operator Schedule Generator

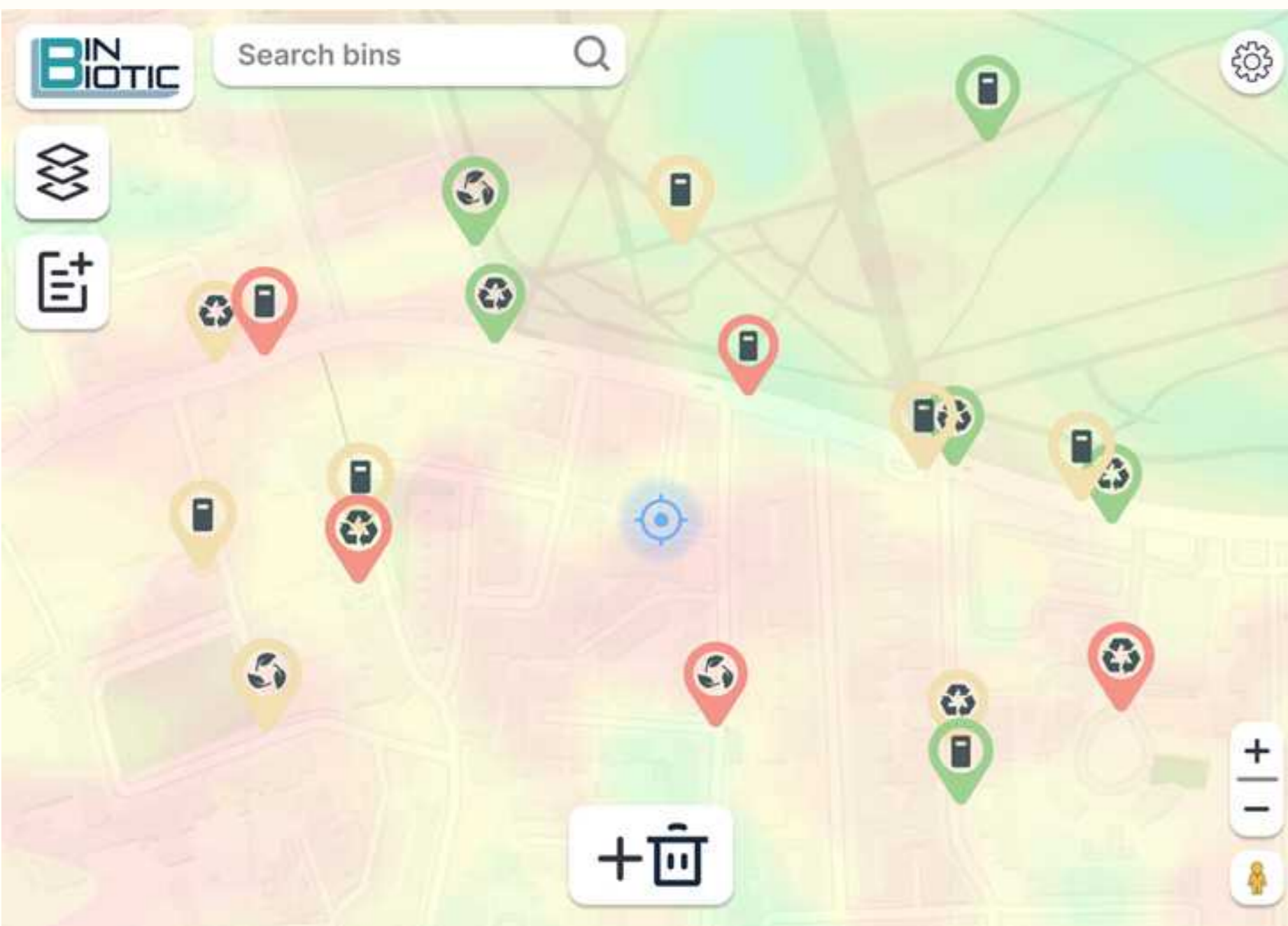


Bin Issue Warning



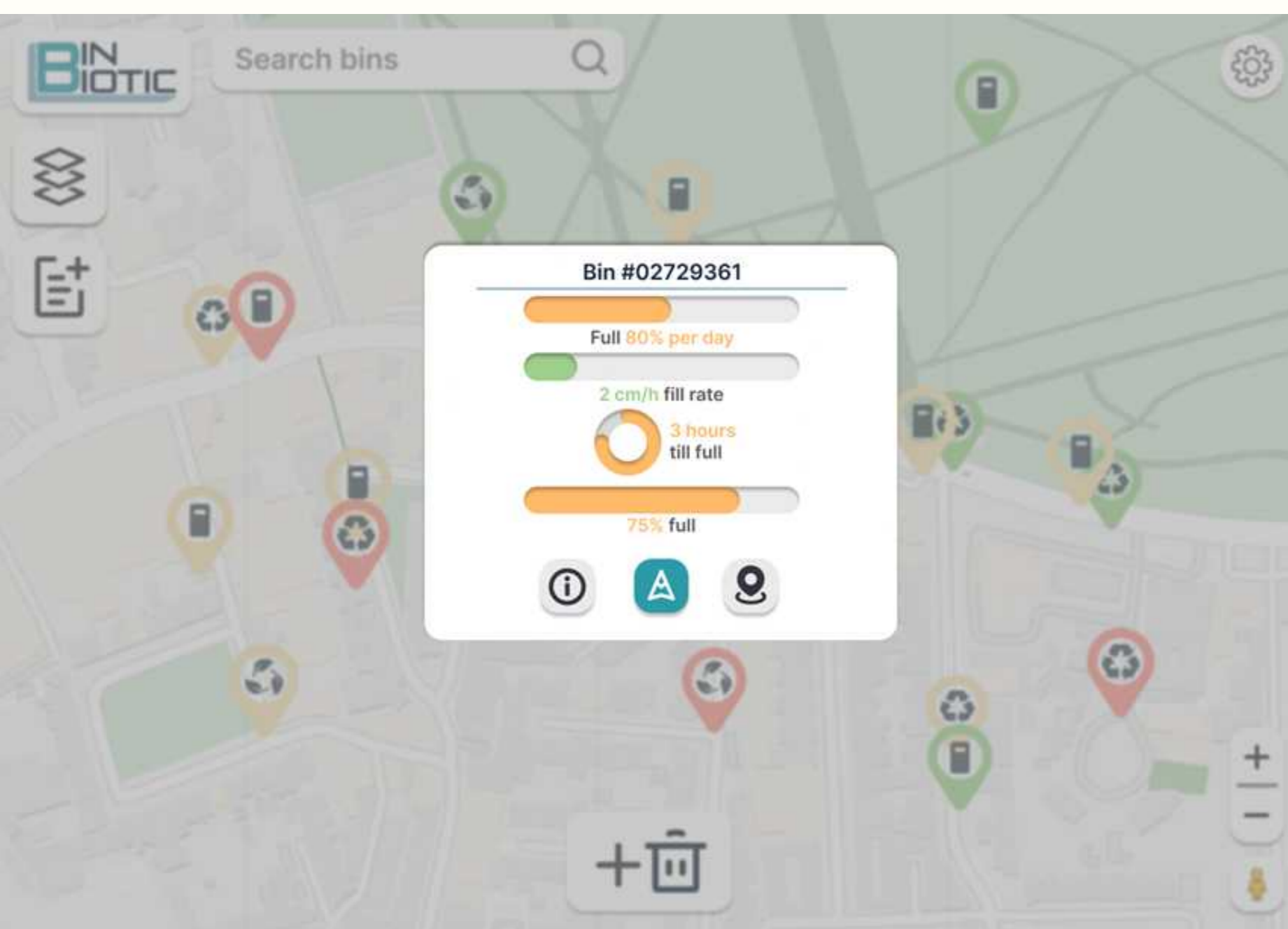
Bin Placement Optimisation

# DIGITAL PROTOTYPE



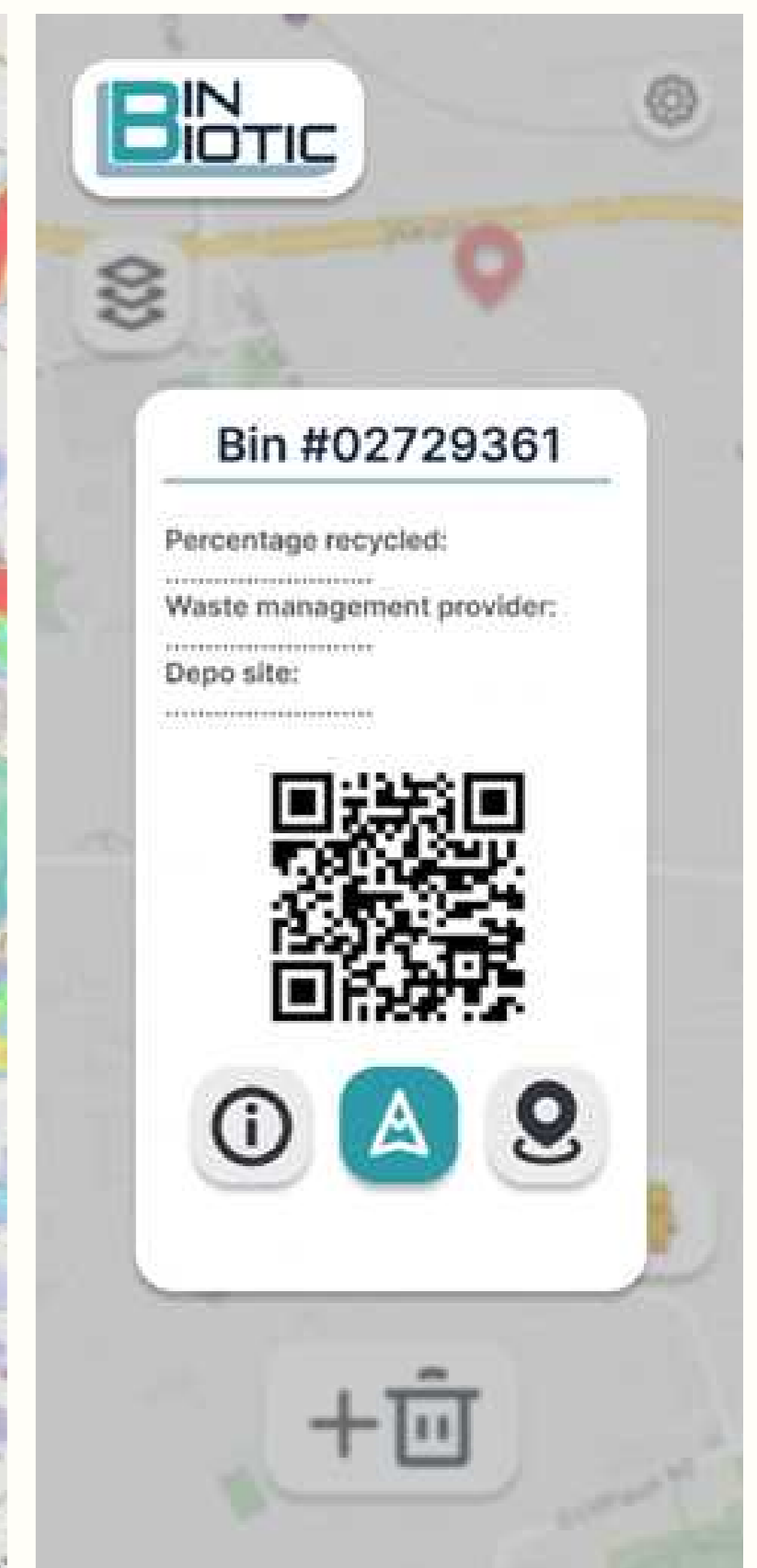
## ADMIN VIEW

Administrator console developed through **co-design sessions with relevant stakeholders**, including the site operations manager at Imperial.



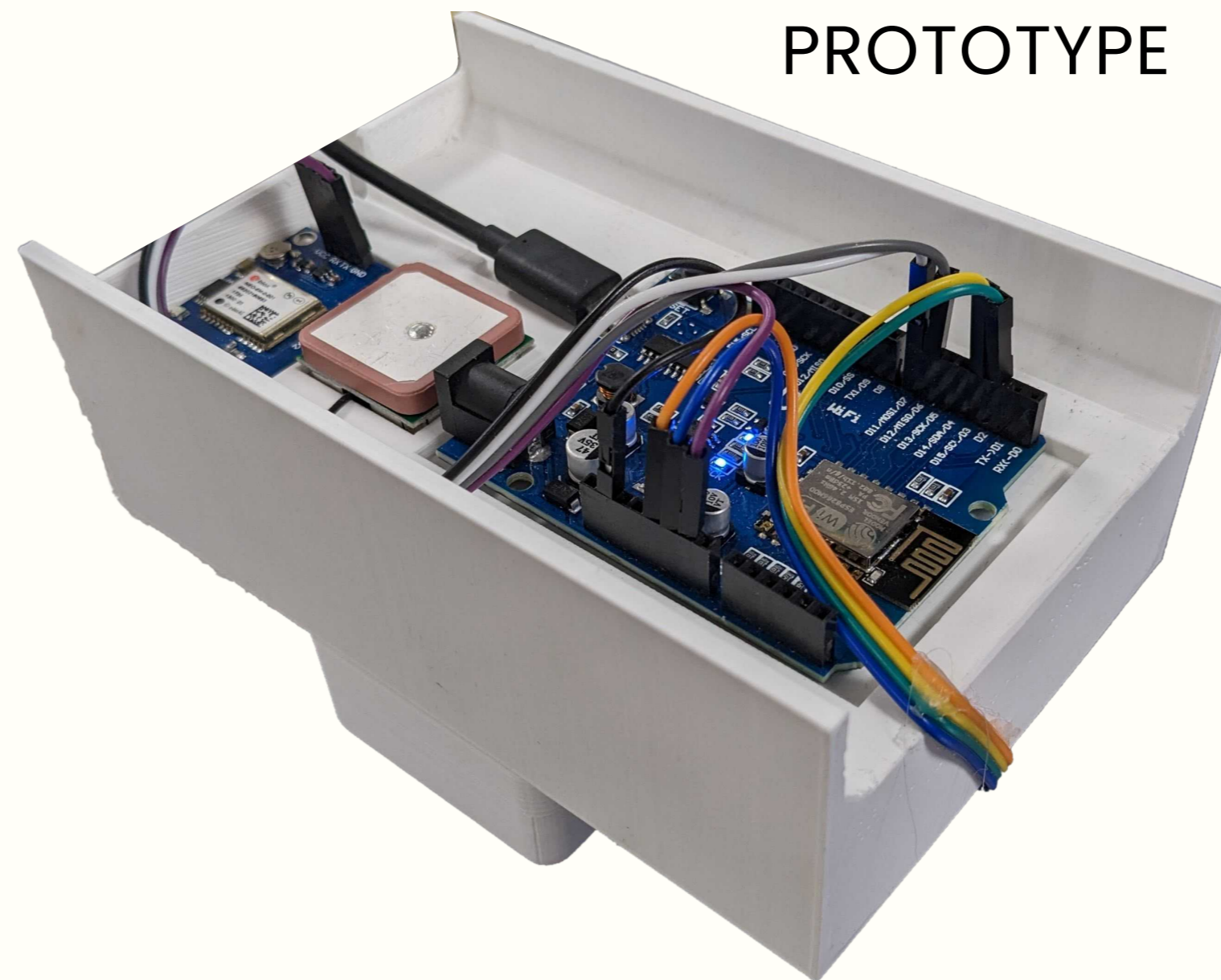
## PUBLIC APP

Public user app developed and iterated upon with potential app users.



# PHYSICAL PROTOTYPE

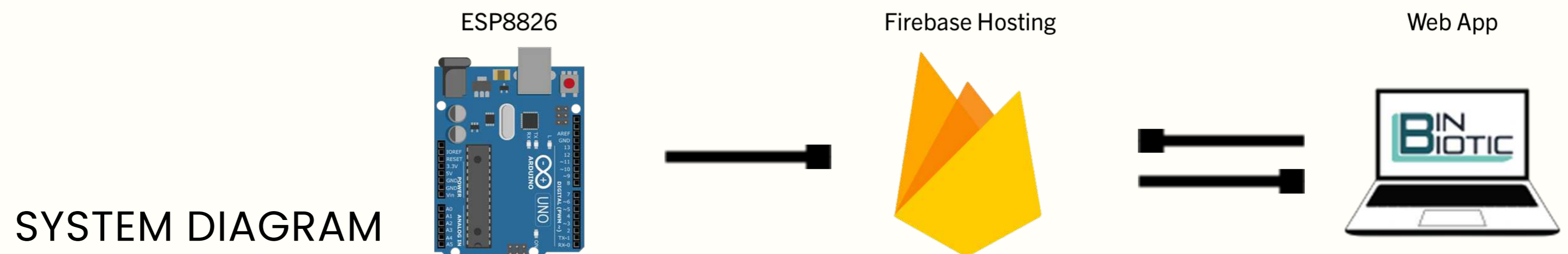
Using a **GPS antenna and an ultrasonic sensor**,  
**I created the works like prototype.** This  
connected over GSM to a Firebase server which  
processed the data and displayed it our app.

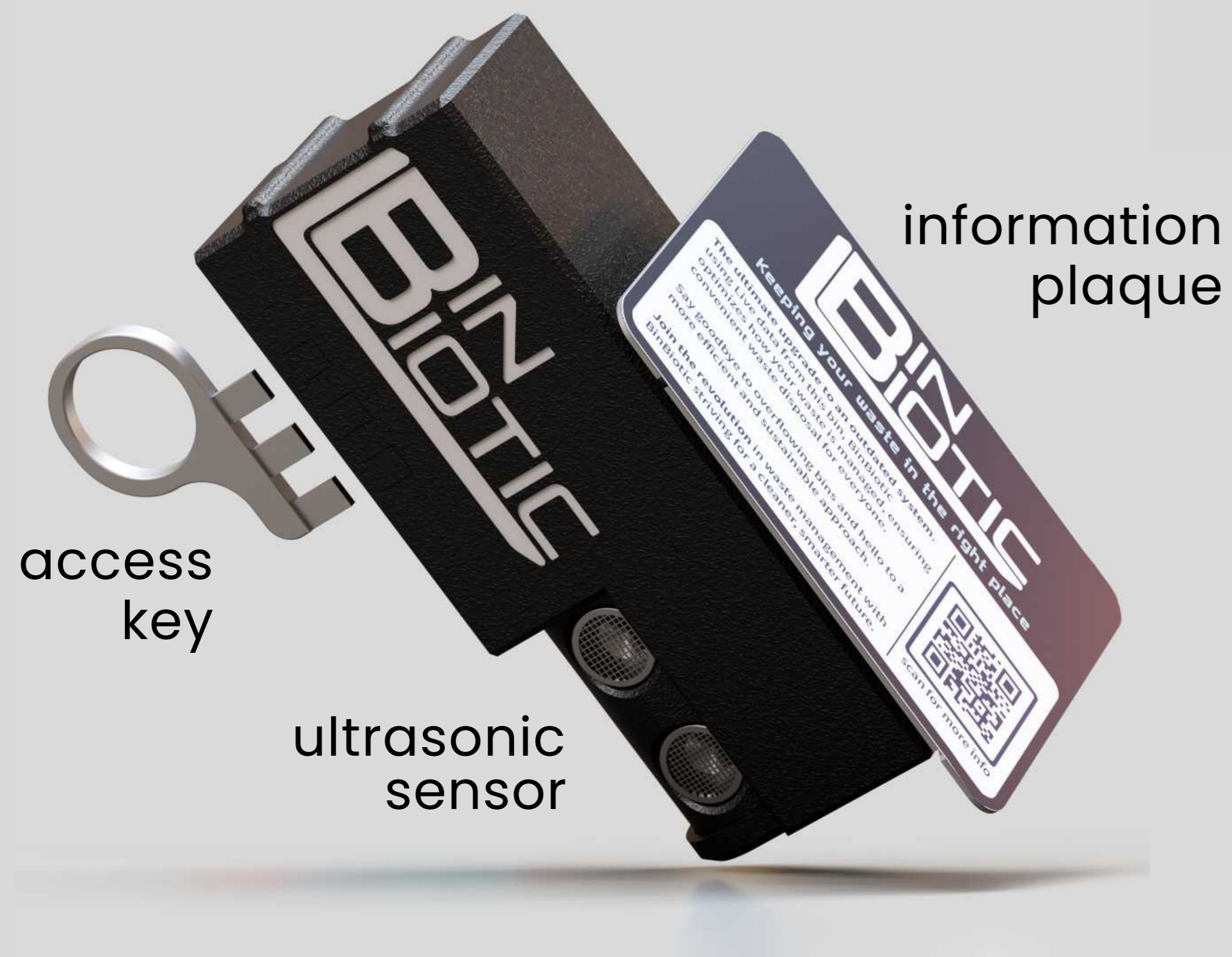


WORKS-LIKE  
PROTOTYPE

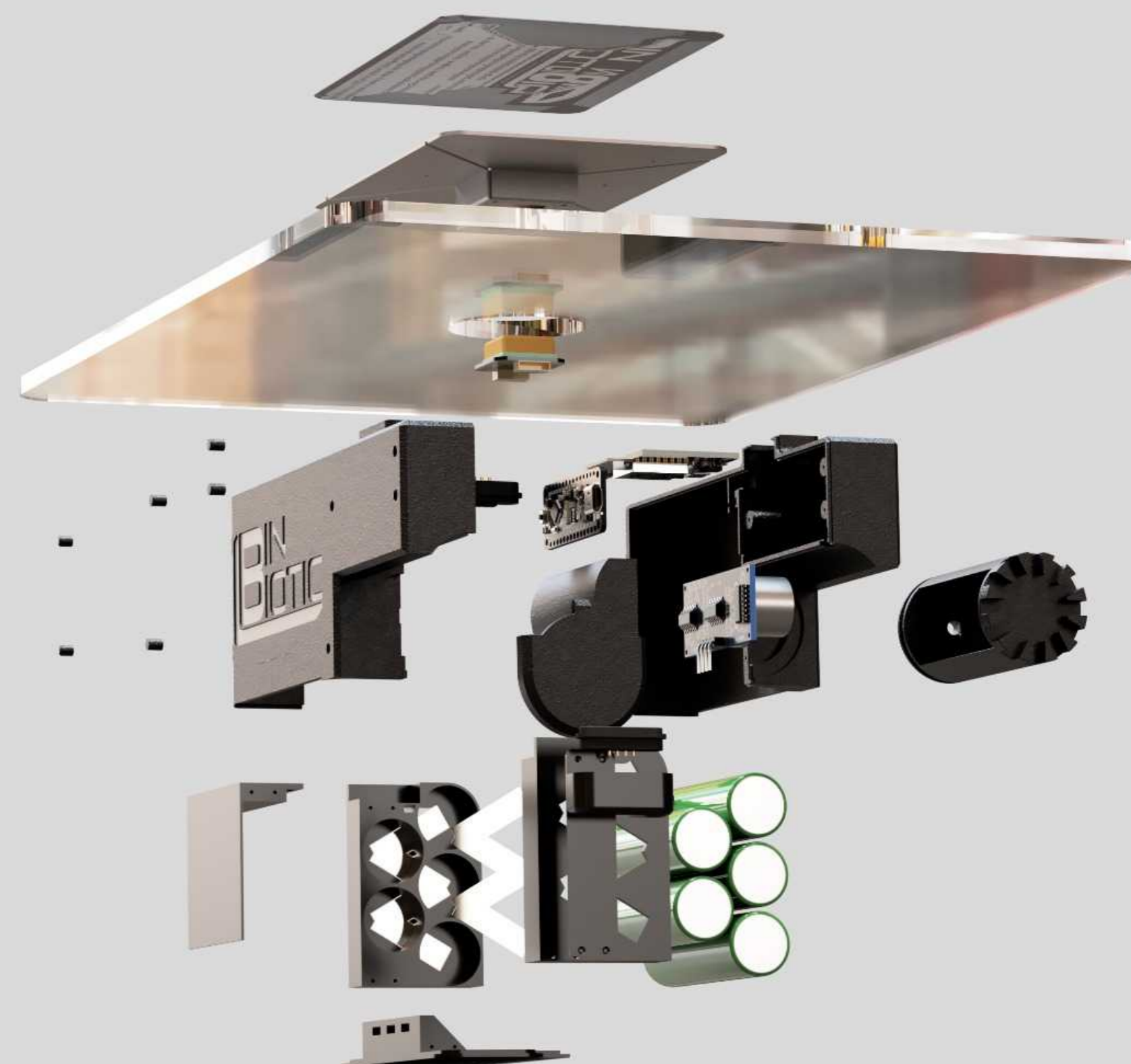


TESTING





DESIGN FOR  
MANUFACTURE AND  
ASSEMBLY



3.

1/2 term  
Computational Fluid Dynamics  
solo project



# TRUCK **CFD**

CFD analysis of a self-designed pick-up



3D SURFACE  
MODELING

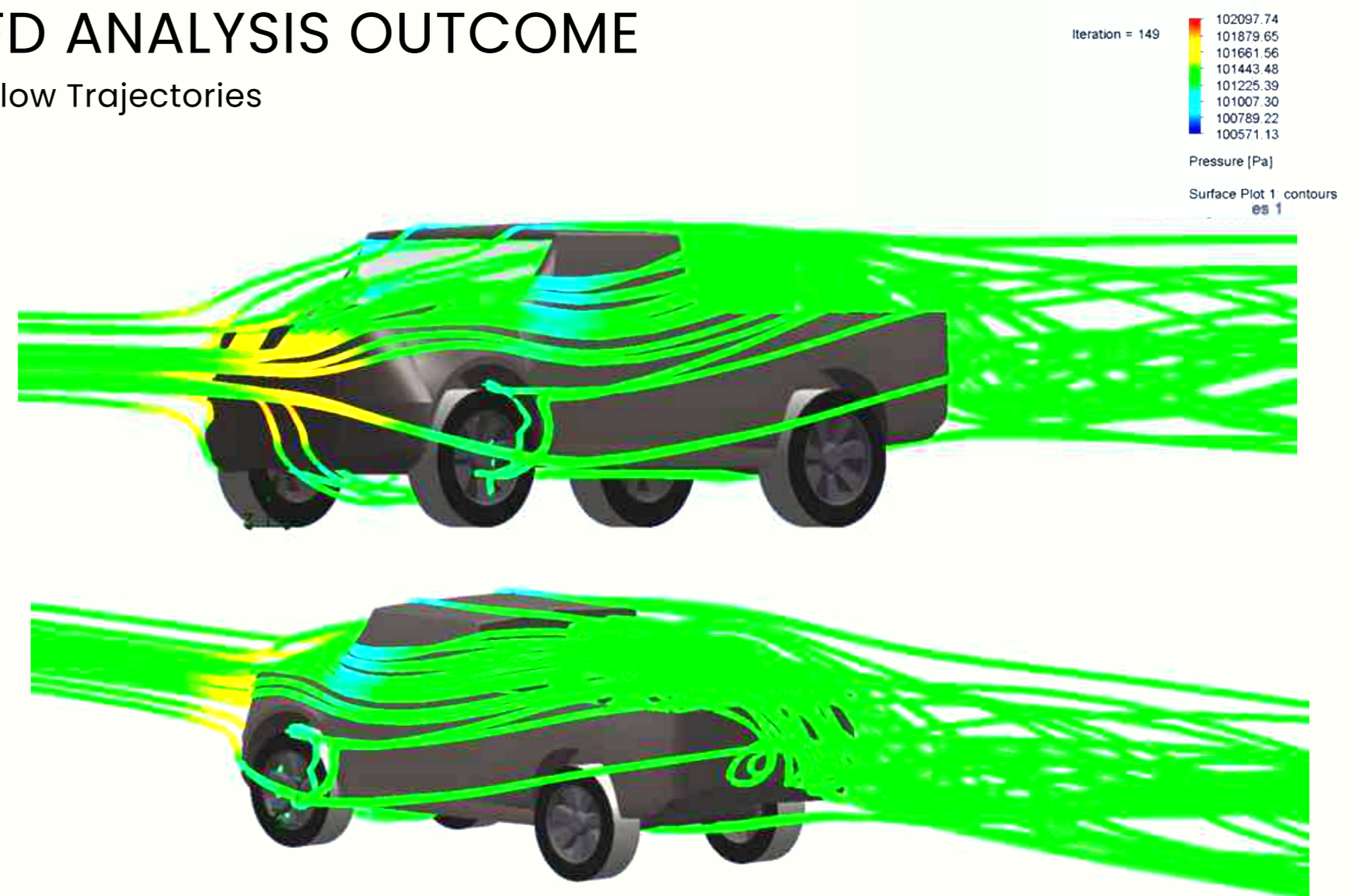


Brief: Select a **vehicle archetype to explore, research and undertake outline modelling in order to assess the aerodynamic performance** of a new product for launch in the market and present your arising concept.

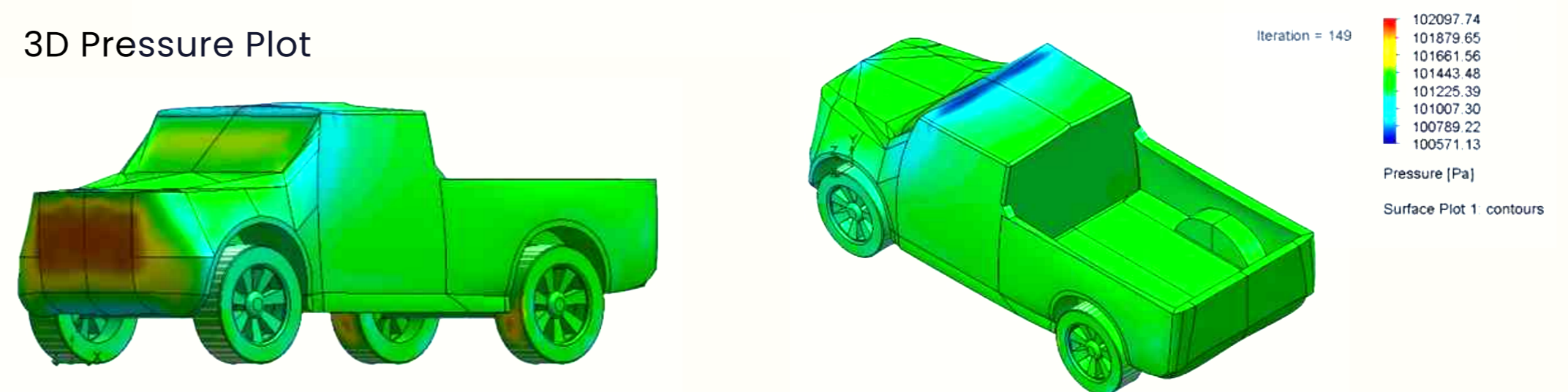
# OUTCOME

## CFD ANALYSIS OUTCOME

### 3D Flow Trajectories



### 3D Pressure Plot



Overall, the analysis showed that my design for the pick-up was comparable to the Ford F150 in terms of aerodynamics.

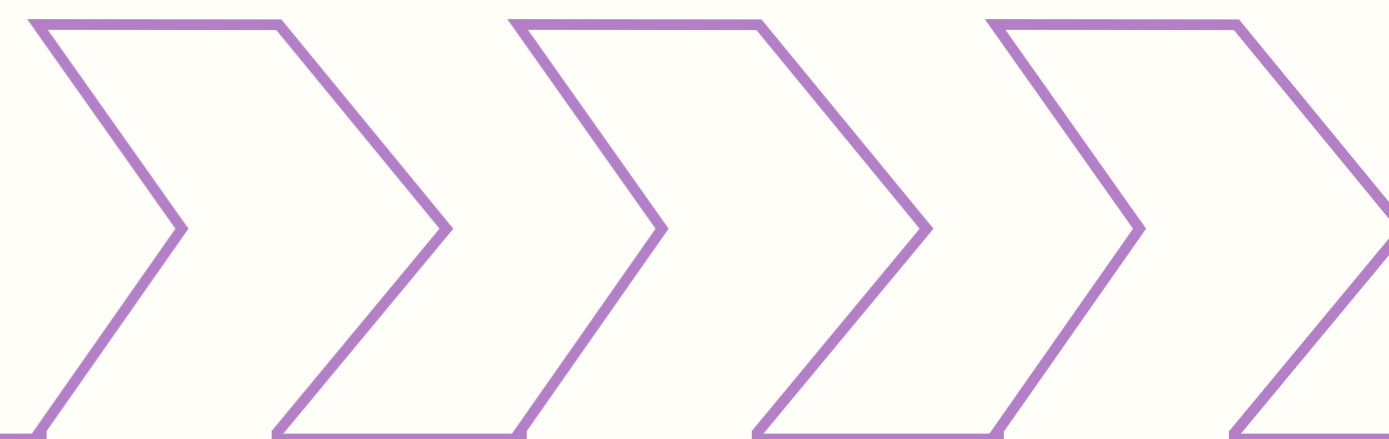
**SolidWorks and Ansys** were used to generate the simulations and hand calculations were later used to verify that these are as expected.

4.



**BLACK JACK+**

a fun, novel way to play cards



# BLACK JACK+



1 term  
Physical Computing  
group project

Brief: Human-machine interaction is about much **more than buttons and screens**. There are many modalities in which to present information, including sound, **touch and movement**, and many ways of sensing human interaction in the physical world.

# BLACK JACK+

# OUTCOME



USER INTERFACE



FINAL PROTOTYPE

audio  
feedback

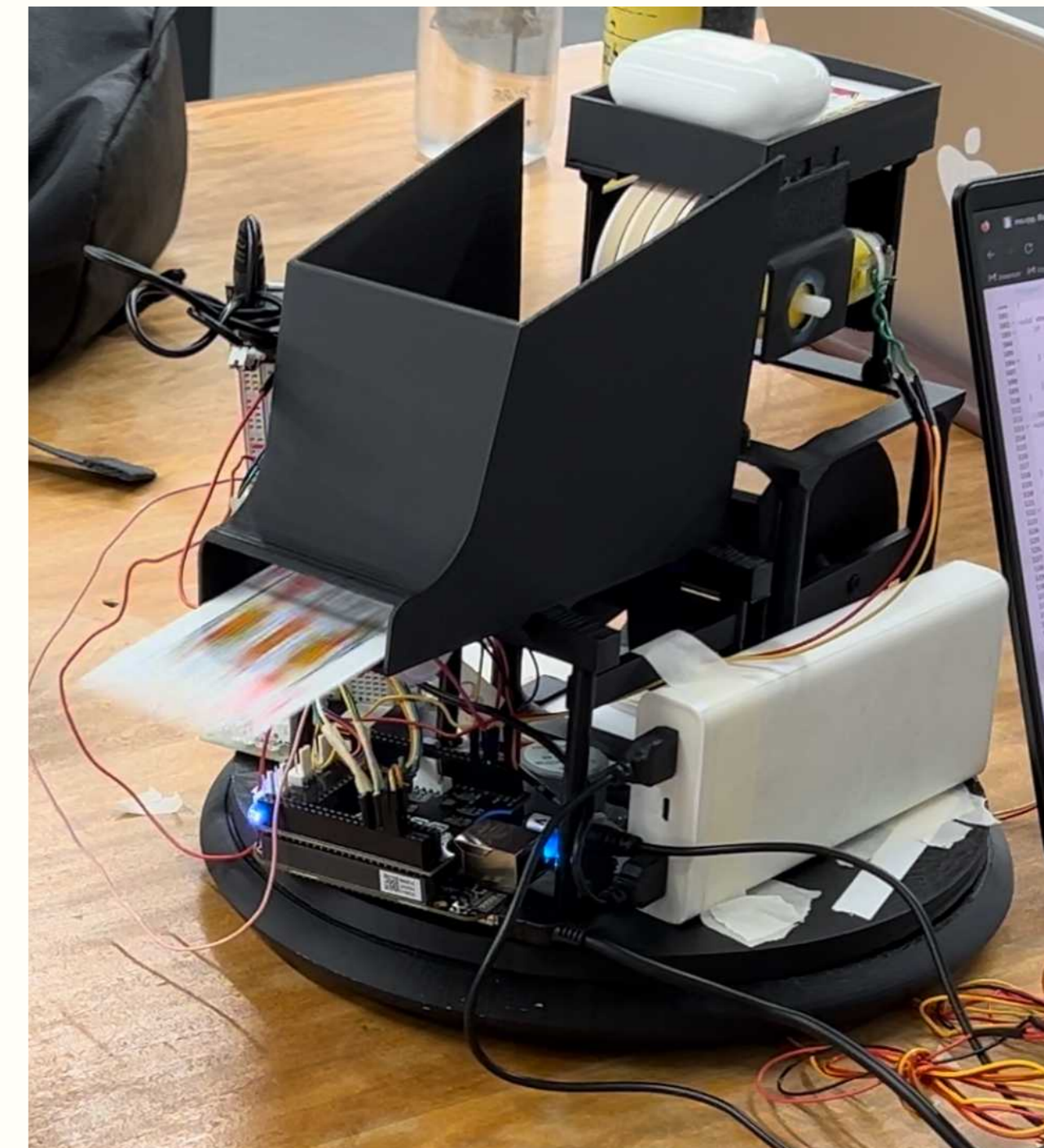
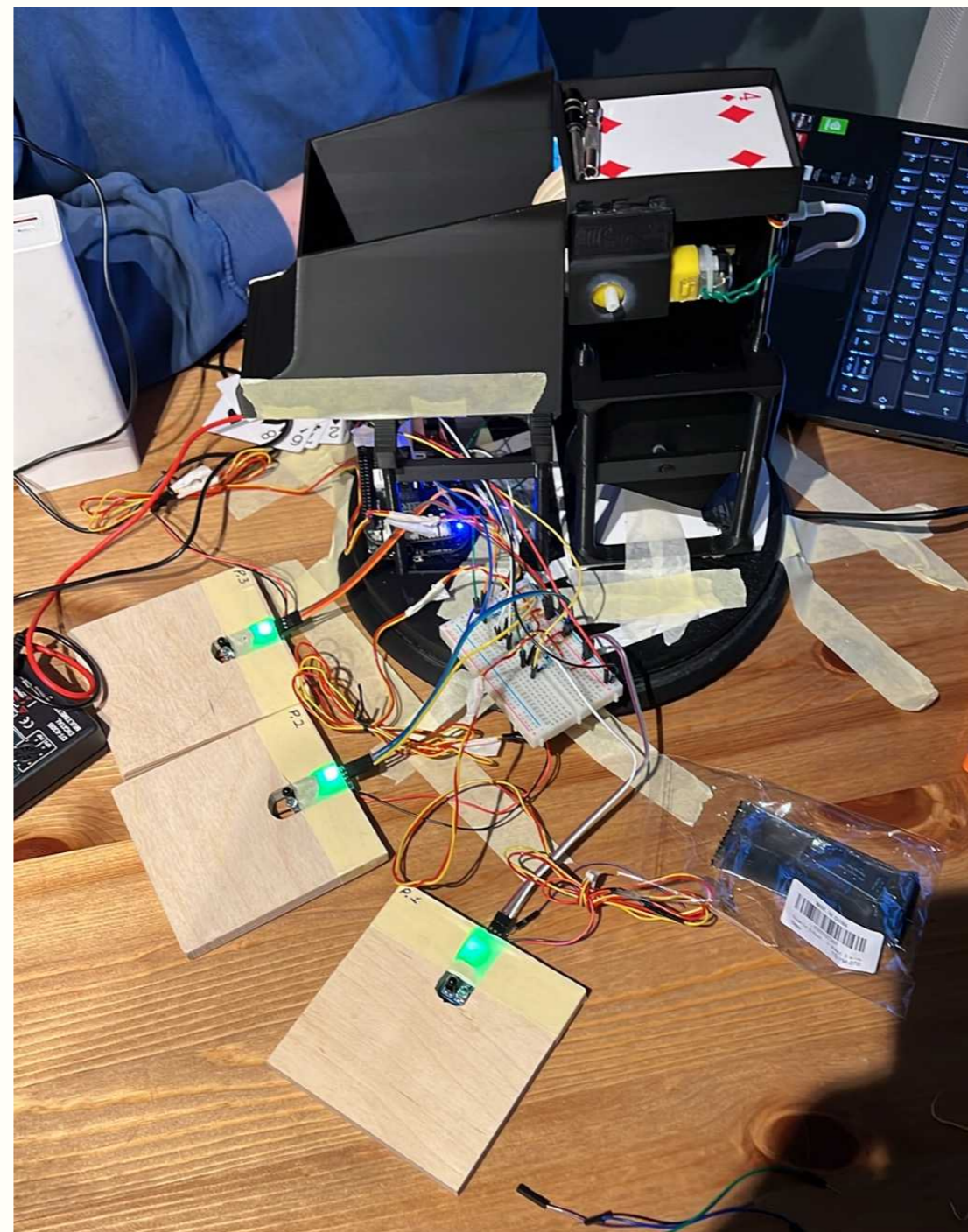
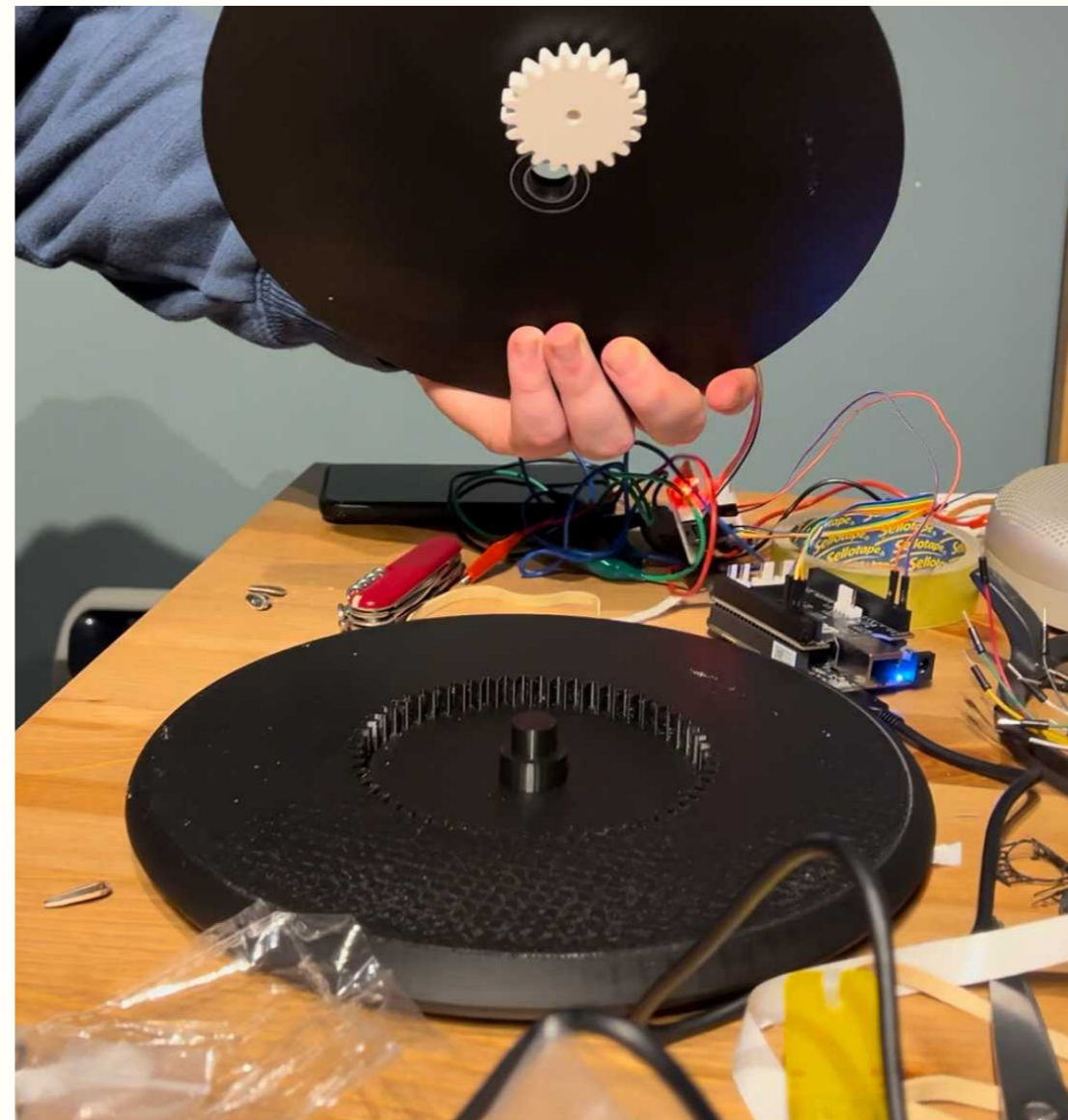
card  
dispenser

360 degree  
rotation



A **fun, interactive and fully working robot** was developed which allowed users to play Black Jack, **without the need for a human dealer**, while still using physical cards.

# PROCESS



The design challenges included **managing external cables that get entangled in the rotating assembly**, which is addressed by implementing a planetary gear system and center routing. Unreliable one-at-a-time card dispensing is tackled by adding a rollback feature to retract extra cards. For **seamless tracking of blackjack gestures**, **embedded infrared (IR) and piezo sensors are integrated into the table mat**. Power management issues and limited current are resolved by isolating motors and incorporating an additional power supply.

# CONTACT

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