

RECYCLE ECO

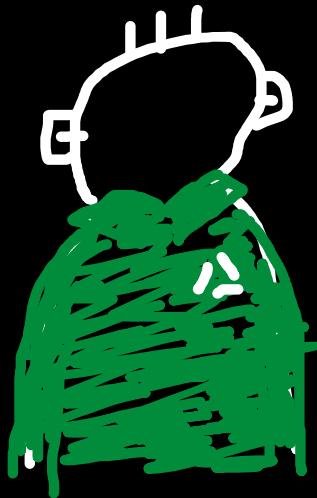


The bin that sorts your rubbish for you.

by SDP Group 13



Meet Our Speakers



Siddharth Sakriya
Hardware team



Julie Hong
Software team



1

Introduction

What RecyclED?
Where did we get the idea
from?

2

Market Research

Stakeholders
User interaction

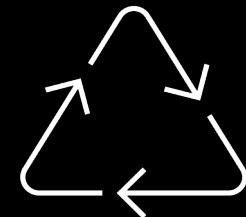
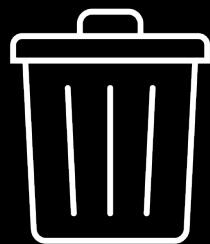
3

Deployment

Marketing Strategy
Scalability



Have you ever felt confused
about whether an item is
recyclable?



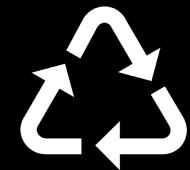
recycling contamination: when too many non-recyclable materials are mixed into a recycling bin, meaning that its contents can no longer be recycled¹

"84% of UK households are unintentionally contaminating their recycling bins"¹



"Only 30% of Brits look up whether an item is recyclable if they are unsure"²

"27% of Brits aged 18-34 take less care with recycling at work than they do at home"²



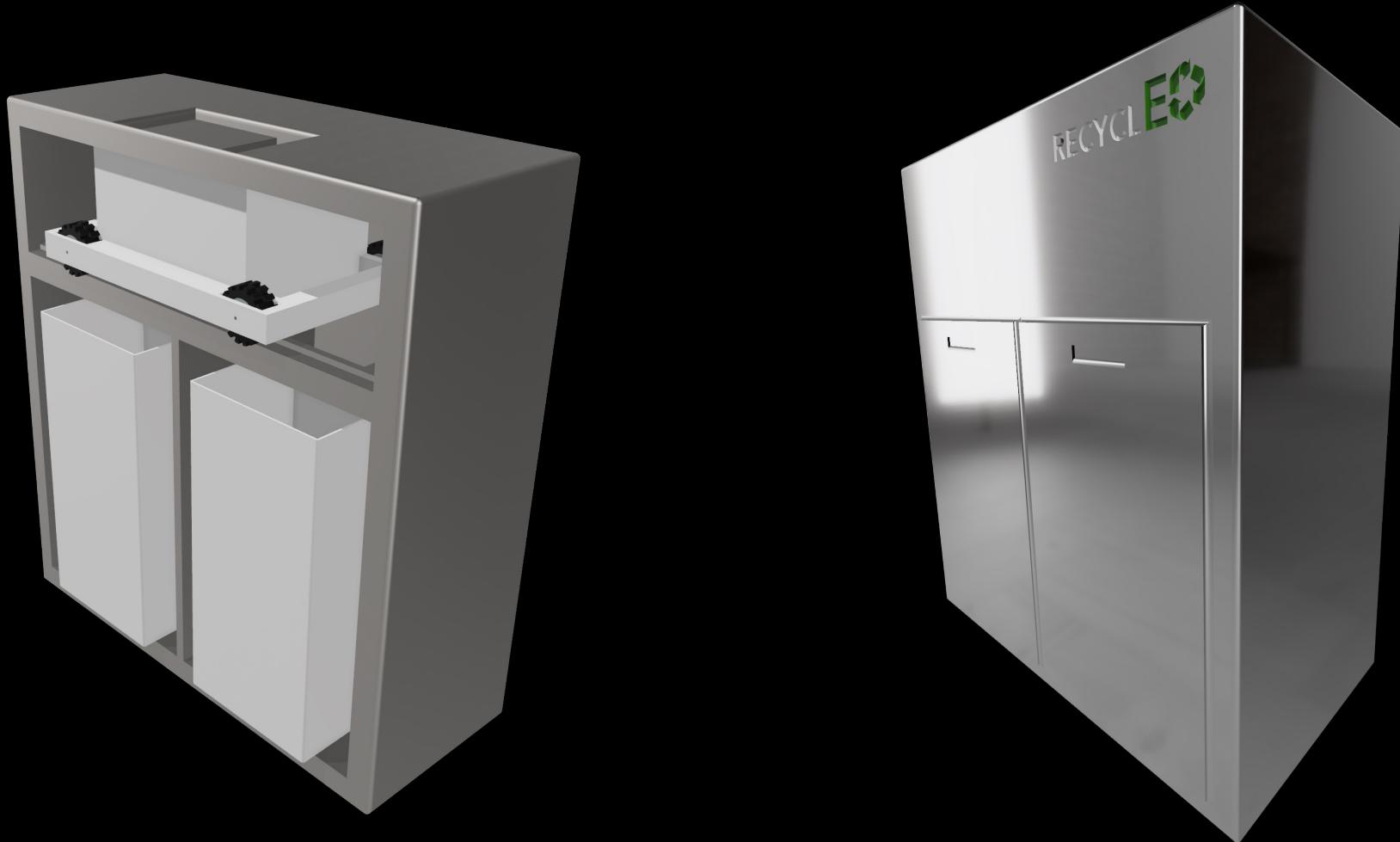
1: <https://wrap.org.uk/media-centre/press-releases/84-uk-households-are-unintentionally-contaminating-their-recycling-bins>

2: <https://www.britishscienceassociation.org/news/british-science-week-lifts-the-lid-on-recycling-misconceptions>

introducing
RECYCLE

The bin that sorts your rubbish for you.

RECYCLE ECO



How does it work?



How does it work?



How does it work?



How does it work?



Aim: Reduce recycling
contamination

Aim: Reduce recycling
contamination

=

more items recycled

more items recycled

helps to...

reduce waste in landfills

prevent the spread of microplastics

reduce pollution

conserve natural resources

reduce greenhouse emissions

fight global warming

By humans,
only 7.5% of
recyclable office
waste is properly
recycled



RecyclED
is 10x
better than
humans

Using RecyclED,
75% of waste will be
sorted into the
correct recycling
category

Market Research

Key Stakeholders



companies with
offices



office workers

companies with
offices

Target Market

- Saves money: landfill tax is £103.70 per tonne
- Reduces carbon footprint



A dark, atmospheric photograph of several modern skyscrapers with glass and steel facades. The buildings are set against a sky filled with dramatic, white and grey clouds. The perspective is from a low angle, looking up at the towering structures.

companies with
offices

Target Market



80% of companies surveyed
plan to increase their
investments in sustainability¹

A dark, atmospheric photograph of several modern skyscrapers with glass and steel facades. The buildings are set against a background of dark, heavy clouds, creating a dramatic and professional look.

companies with
offices

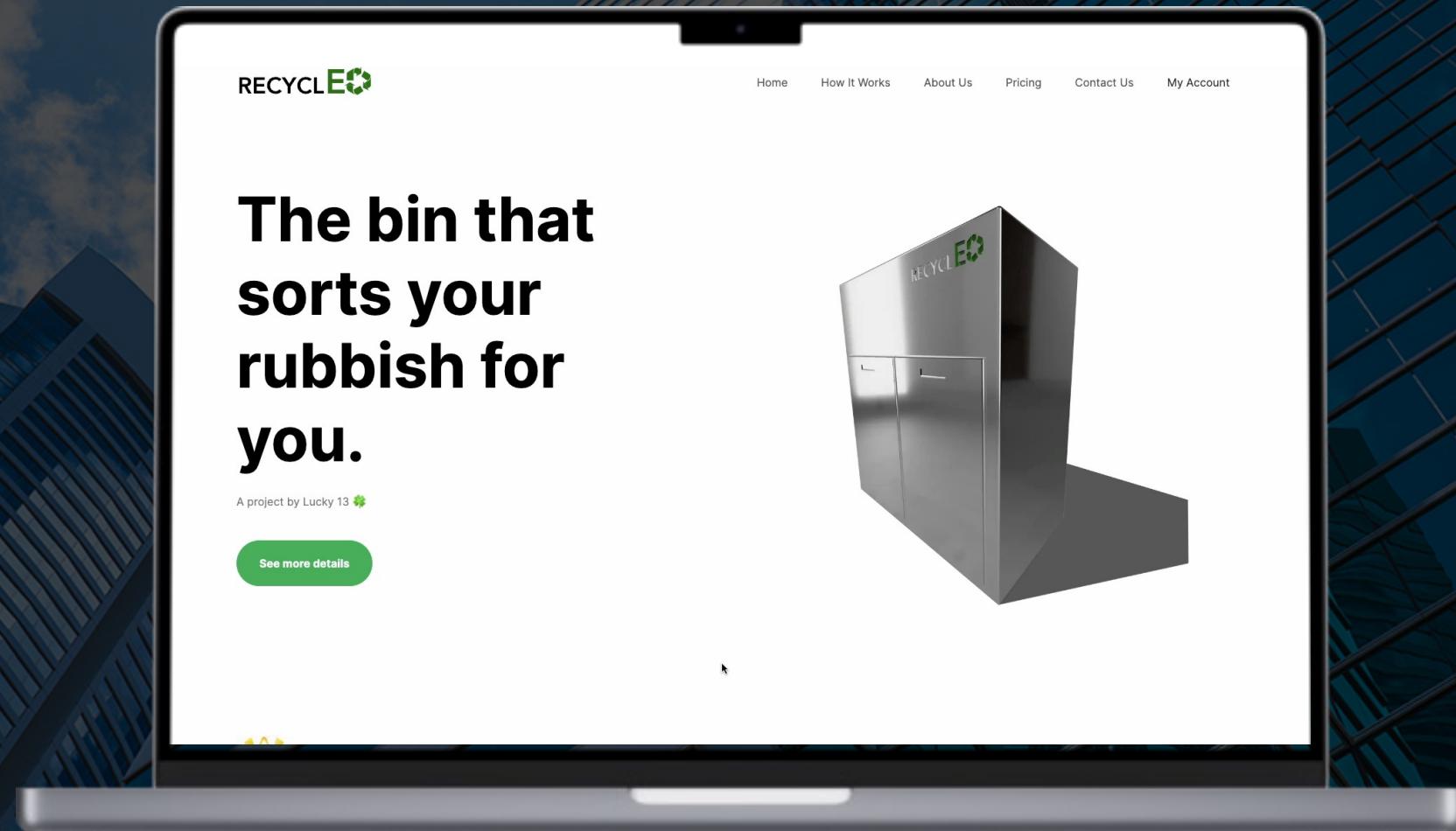
Target Market

66% of consumers say that
they consider sustainability
when making a purchase²



companies with
offices

Target Market



The image shows a laptop screen centered against a dark, slightly blurred background of modern skyscrapers under a cloudy sky. The laptop displays a website for 'RECYCLEO'. The header features the word 'RECYCLE' in a bold, black, sans-serif font, with a green recycling symbol integrated into the letter 'E'. Below the header is a navigation bar with links: Home, How It Works, About Us, Pricing, Contact Us, and My Account. The main content area contains a large, bold, black text block that reads: 'The bin that sorts your rubbish for you.' Below this text is a smaller line: 'A project by Lucky 13' followed by a small green recycling icon. At the bottom of this section is a green button with white text that says 'See more details'. To the right of this text block is a 3D rendering of a dark grey, rectangular trash bin with a silver base. The bin has 'RECYCLEO' printed on its side. A cursor arrow is visible at the bottom center of the laptop screen.

RECYCLEO

Home How It Works About Us Pricing Contact Us My Account

**The bin that
sorts your
rubbish for
you.**

A project by Lucky 13

See more details

Key Stakeholders



companies with
offices



office workers

A photograph of three office workers in a modern office setting. A man in the foreground is writing in a notebook. Behind him, another man looks down at his work, and a woman sits to the right, resting her chin on her hand. In the bottom right corner, there is a white line-art icon of a person's head and shoulders, consisting of a circle for the head and a rounded rectangle for the body.

office workers

Main User

- They interact with it like a normal bin
- No time spent wondering whether item is recyclable
- Dispose of waste without thought

Market Size

4,308 office buildings (UK)

In the future, could expand worldwide

Market Entry

- Budget-friendly alternative to high-end options already on the market



competitors cost
~\$1,500 - \$5,000



Market Entry



competitors cost
~\$1,500 - \$5,000

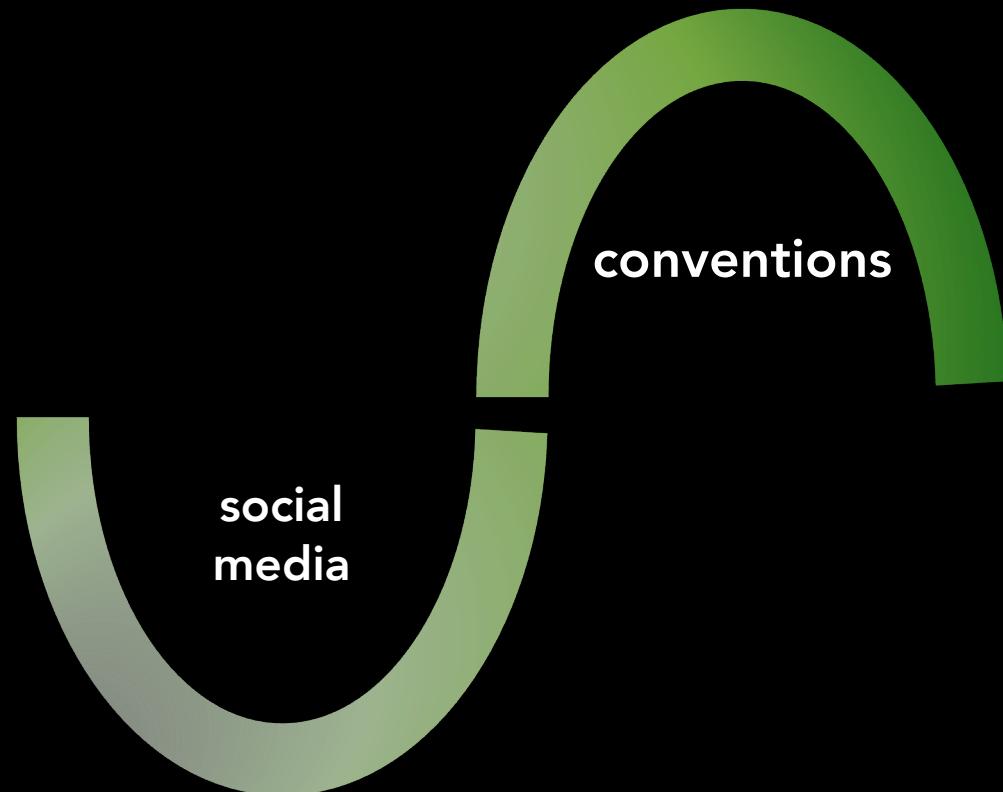


RecyclED Price: £500 ~



Deployment & Scalability

Marketing Strategies



Customisable Design

Offices are just the beginning. We could expand to

schools

councils

fast food
restaurants

airports

RecyclED is customizable
for different environments



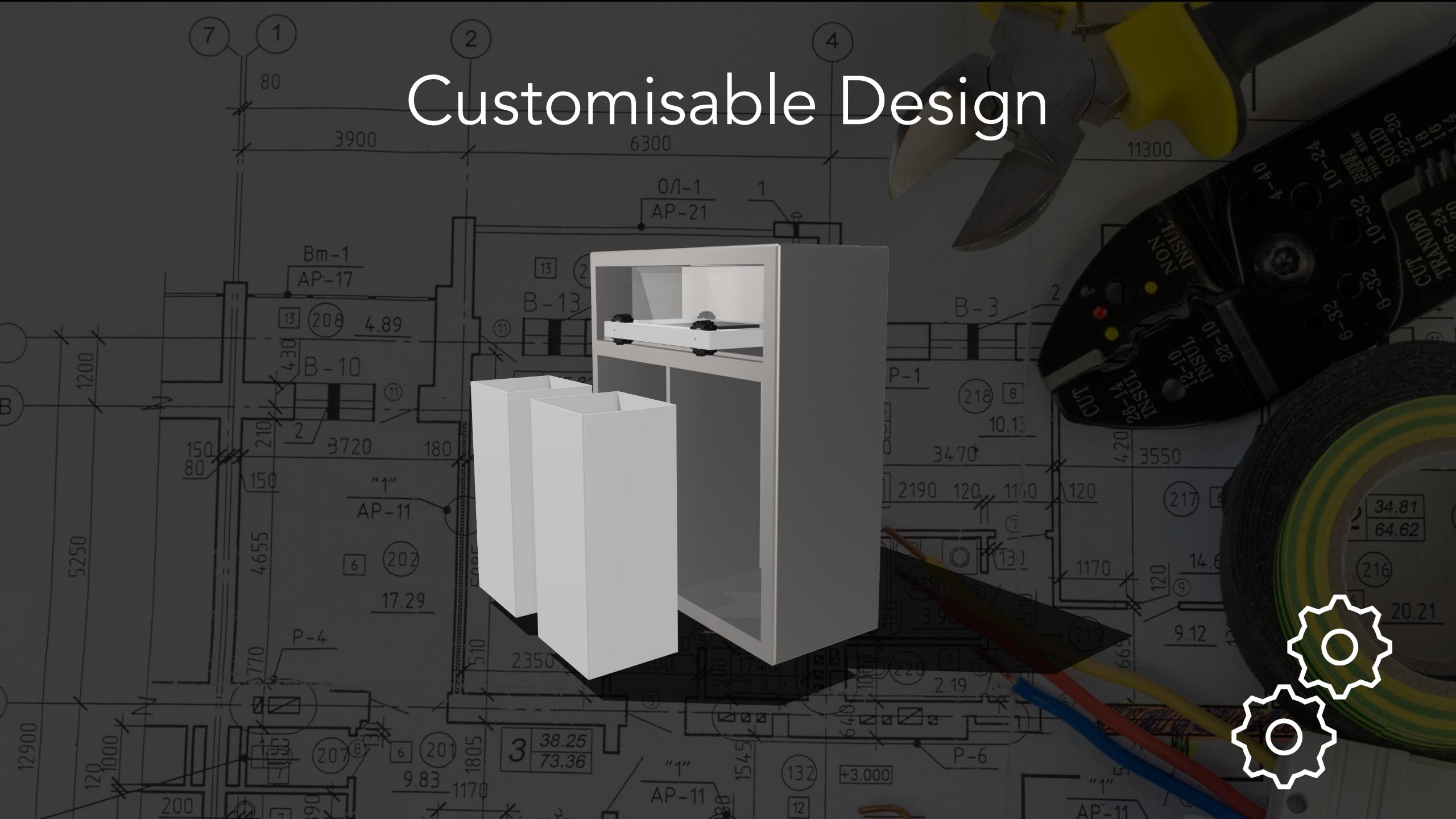
Customisable Design

We could customise:

- The recycling categories
- The look of the bin (company branding)
- Size of the cabinet (built to fit existing bins)



Customisable Design



Customisable Design

- Cart and bins can be removed
- Convenient for cleaning and maintenance





Demo

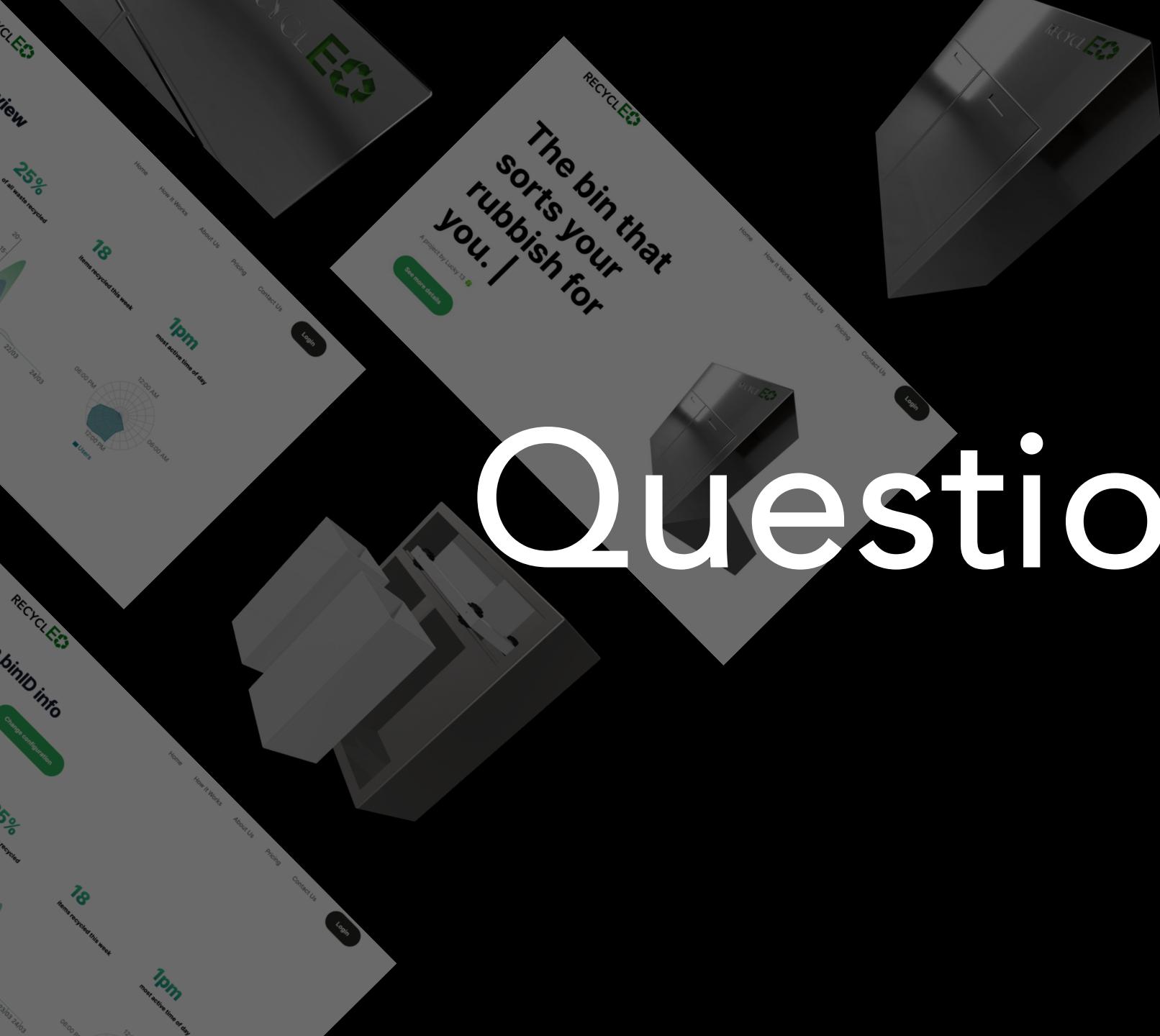
Statistics page

Home page





Questions



What about food and liquid?

- Aim is to reduce recycling contamination
- We can't get rid of it entirely
- So e.g. an unwashed yoghurt pot might get put into recycling

Build cost breakdown

Arduino Uno: £25

Arduino Grove Shield: £5

Raspberry Pi: £30

EV3 Motors: £90

Sensors: £38

Frame and Chassis: £50

Total	£238
-------	------

Size of the product

- We will offer custom cabinet sizes so companies can use their existing recycling bins
- Additionally, we will offer non-custom cabinets for a cheaper price

What if someone has more than one item?

- Items must be placed one at a time to be recycled properly
- Classification will be fast
- Office setting – unlikely to be many items at once
- Environmental benefit outweighs wait time
- Can recognise when multiple items have been put in
 - all must be put in general waste to avoid contamination

Safety

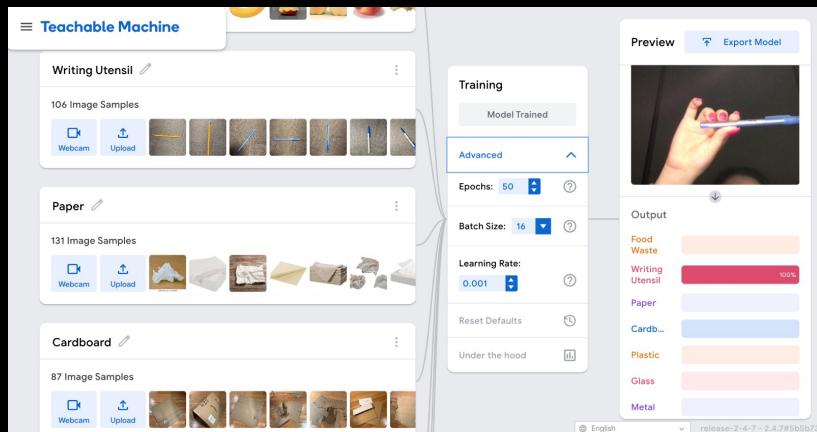
- Sliding door
 - User presses button to activate sliding door over bin
 - Door covers pushing mechanism while item is being processed

Object Recognition & Classification

- Google Teachable Machine
- Trained using images of the 20 most common office waste
- Accuracy of 74.7%

Model Evaluation Metrics	
Accuracy	74.7%
Precision	75.7%
Recall	74.7%
F1 Score	74.5%

Object Recognition & Classification



Model Evaluation Metrics	
Accuracy	74.7 %
Precision	75.7 %
Recall	74.7 %
F1 score	74.5 %

Categorise items
and train the model

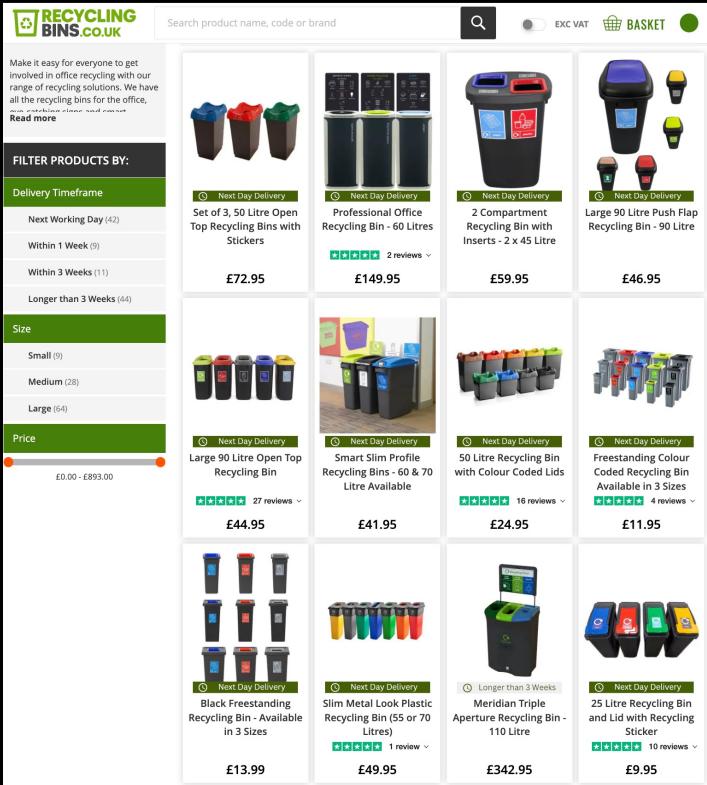


Combine the
model with bin
classification



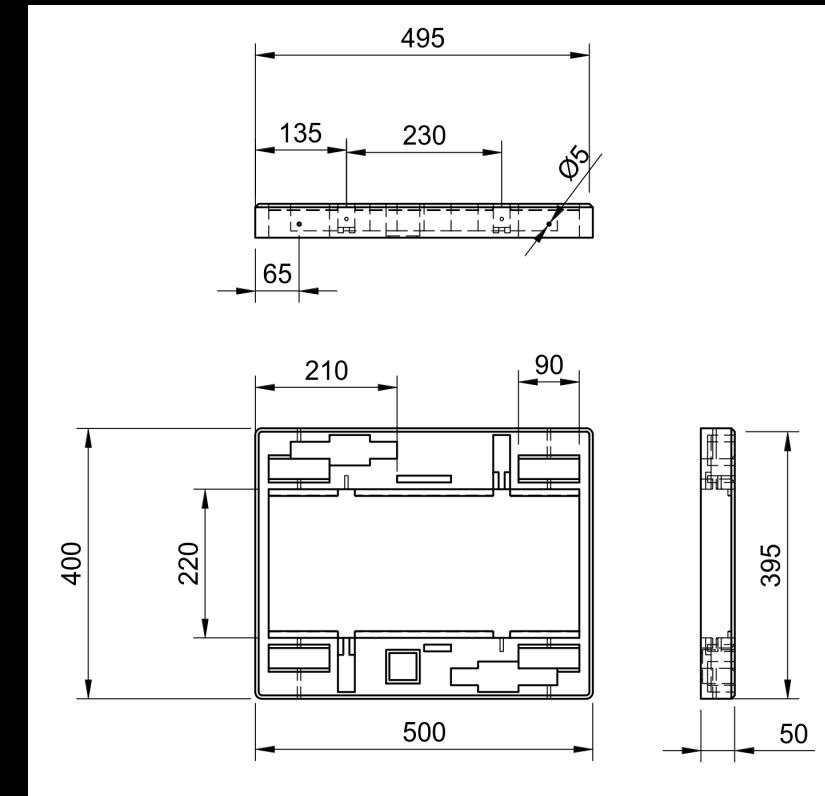
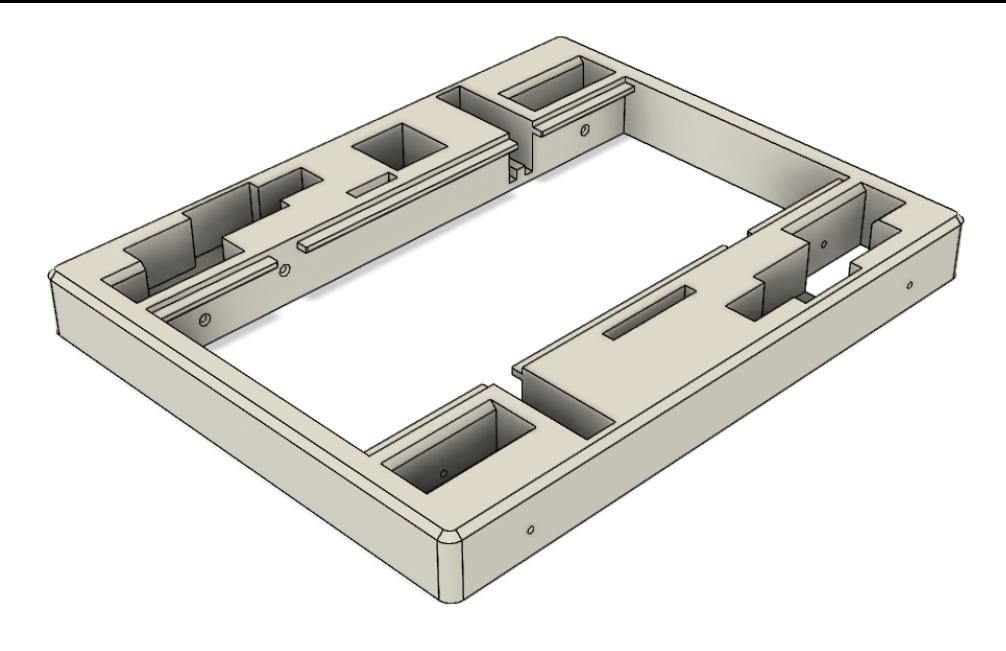
Evaluation
dataset and
performance

Cost of a normal bin



Average cost: £20-30 per 50 litre bin

Moving from Lego



How Google Teachable Machine works?

- Uses Transfer Learning : knowledge from base model + our classification layer
 - Data preprocessing e.g. resizing images
 - Convolutional neural network detects patterns and features in input images
 - Feature maps flatten to vectors and map to classes -> classification
 - Training -> multiple iterations (epochs) on dataset, learns to generalise