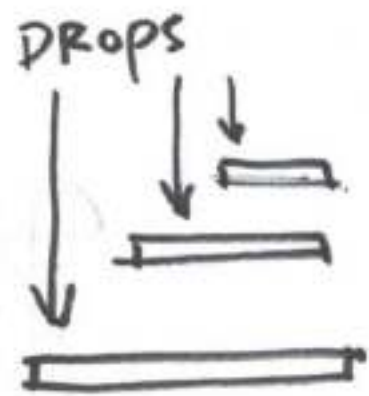
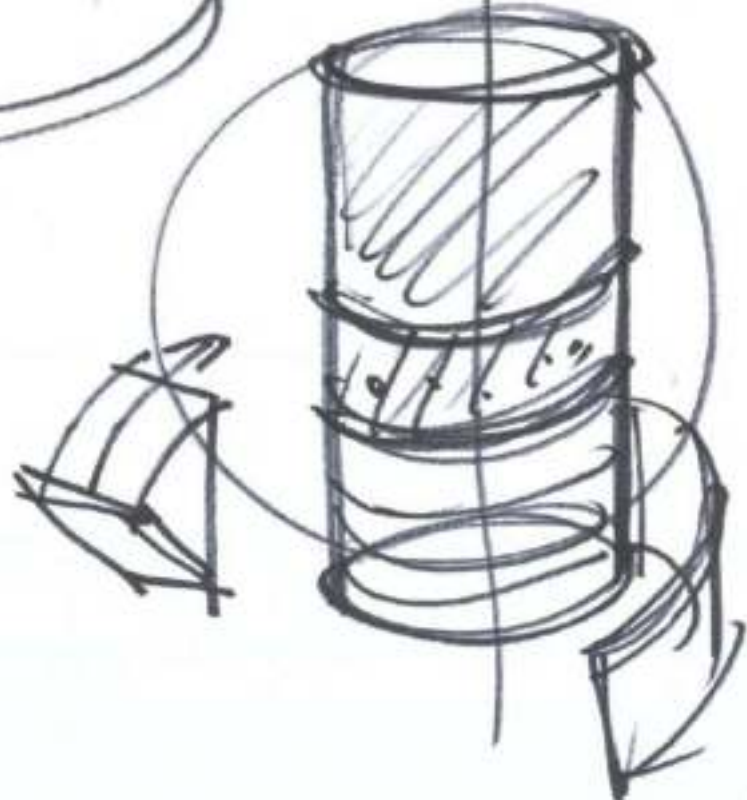
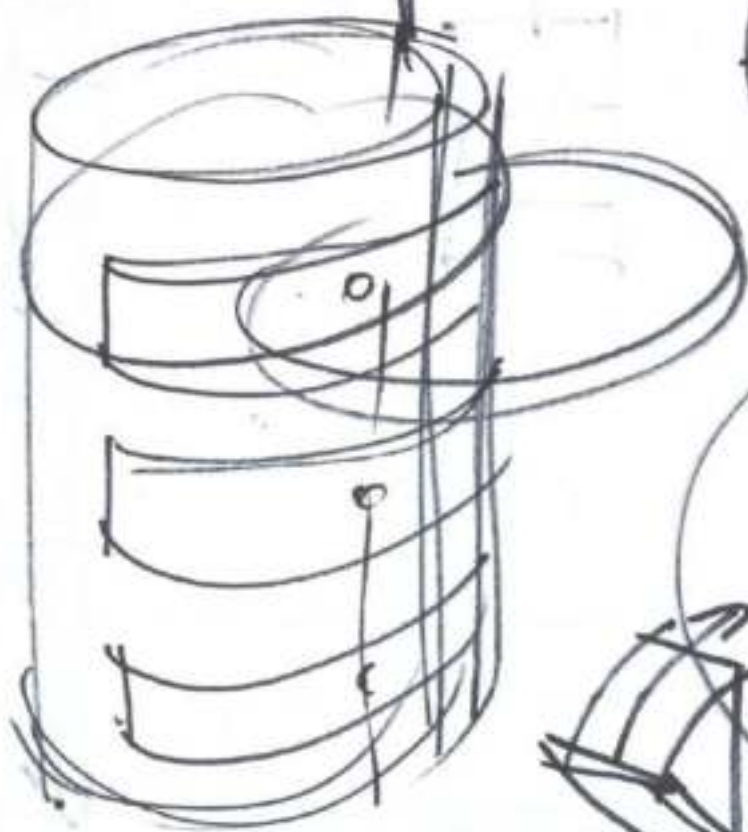
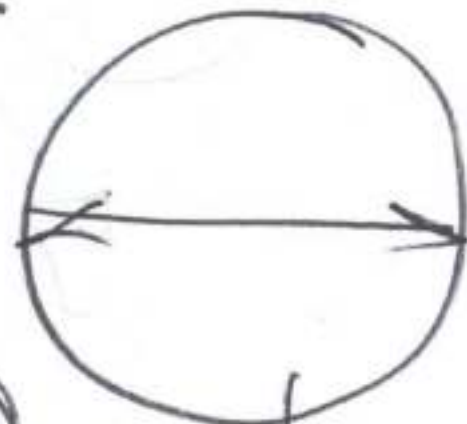
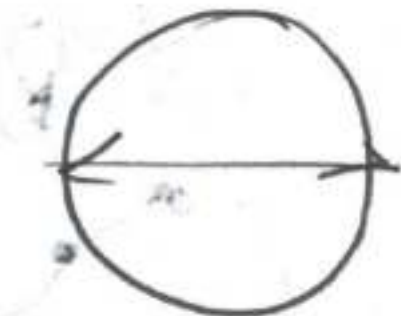
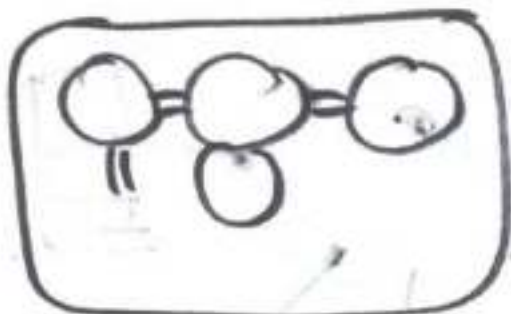


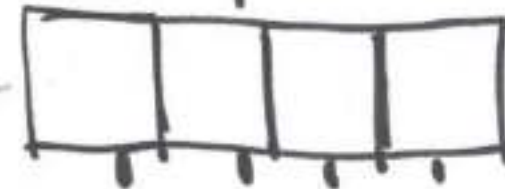


FRONT
DOOR

INTERFACE



4 components.



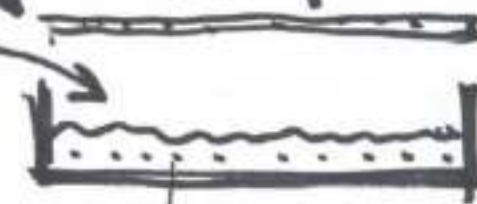
4L

knife/mix

NOTA

FILTER

New
water

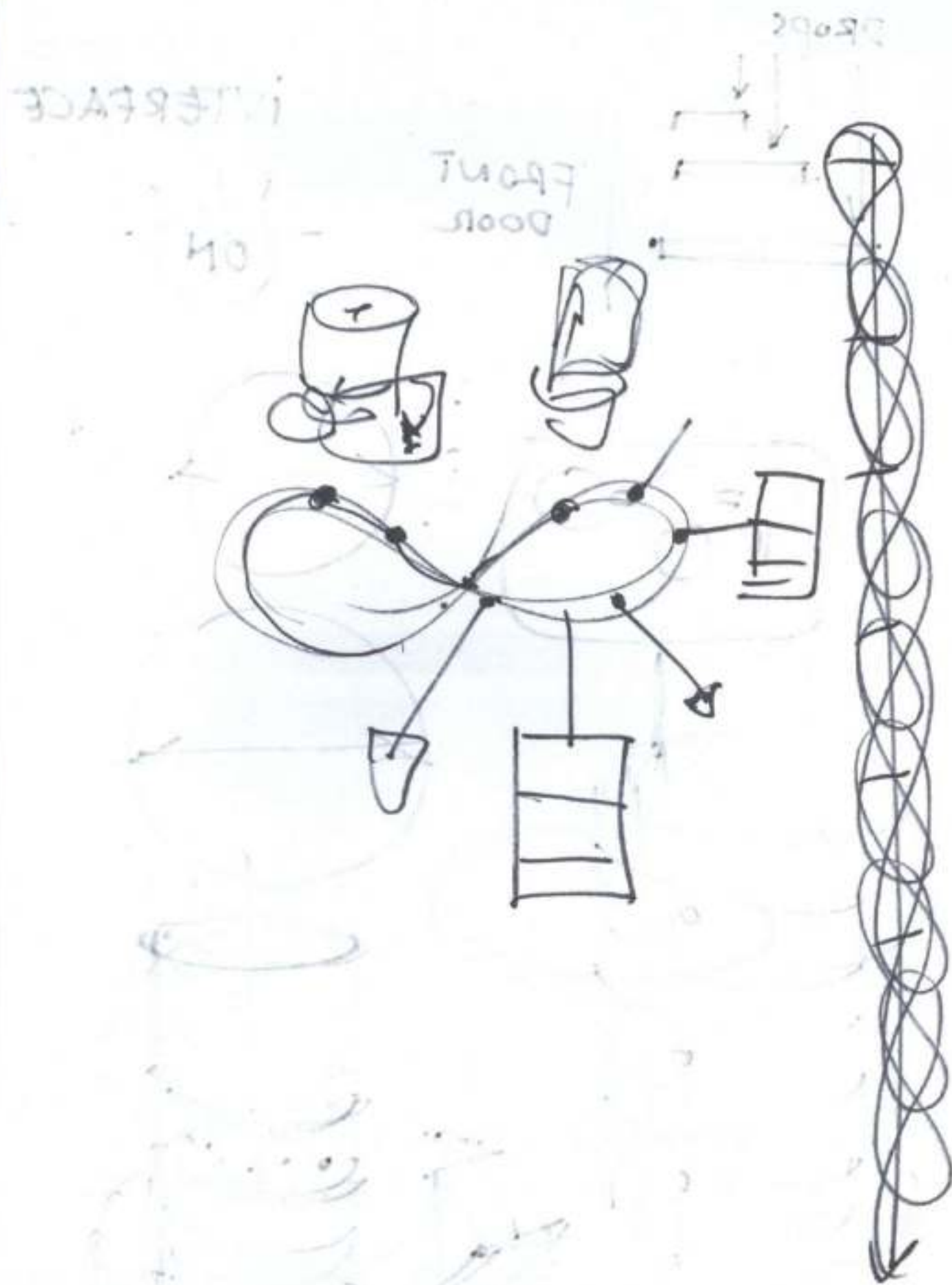
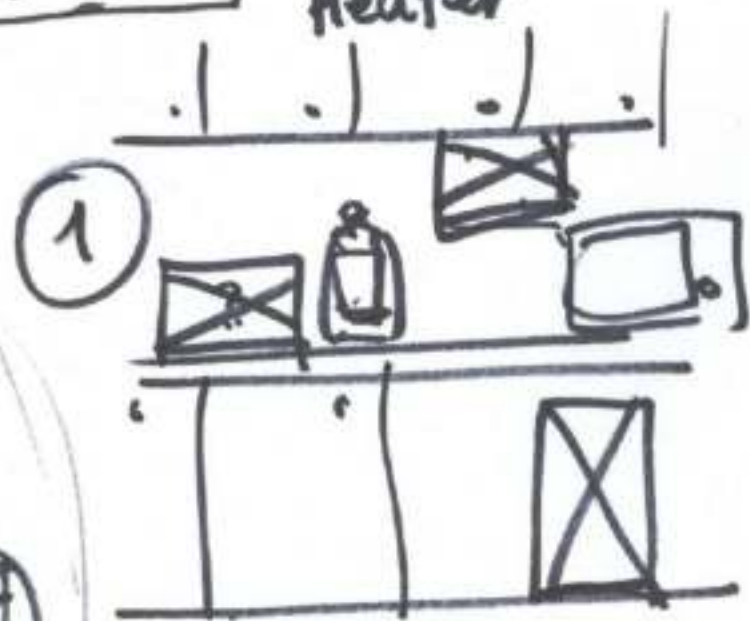
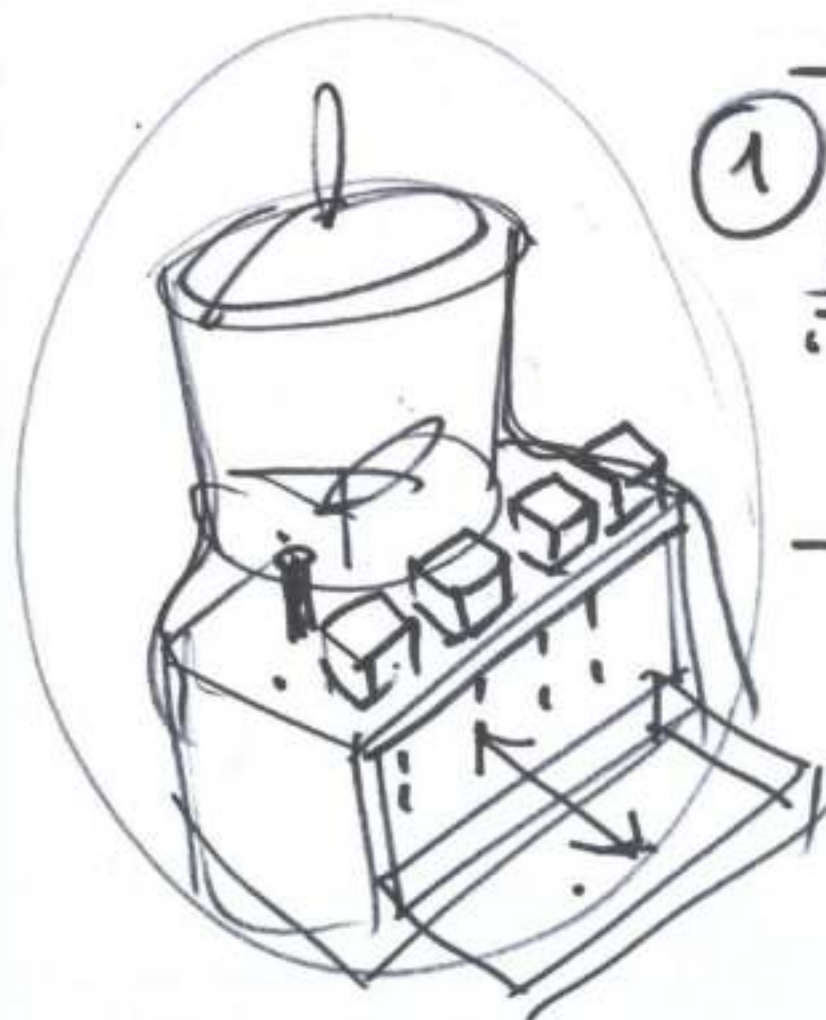
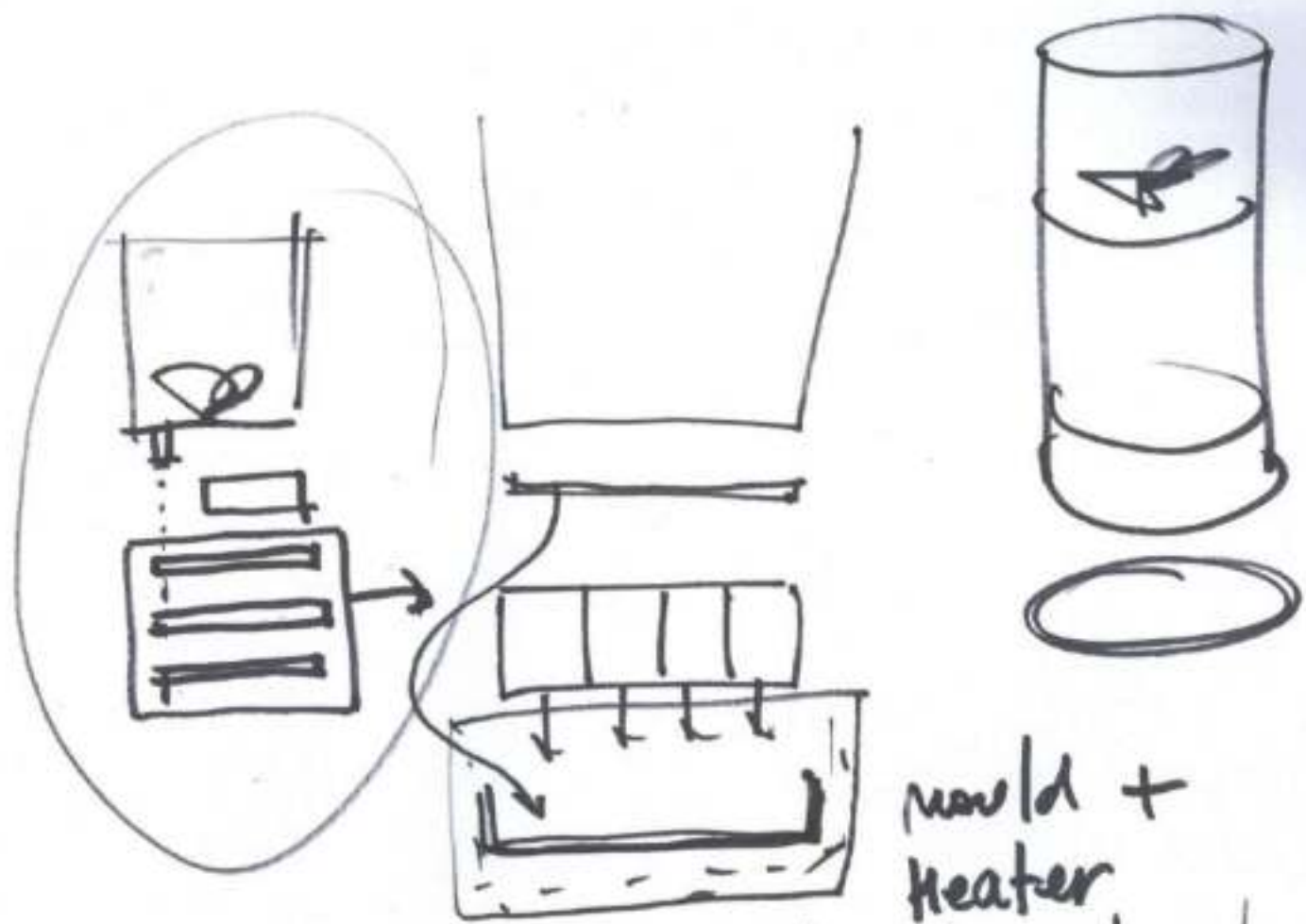


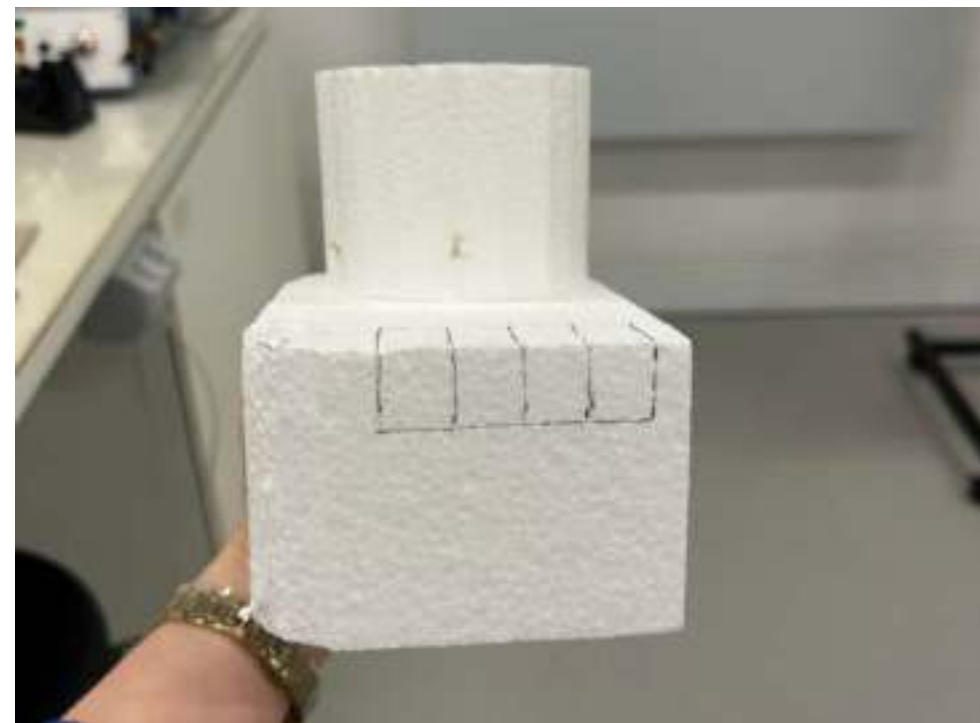
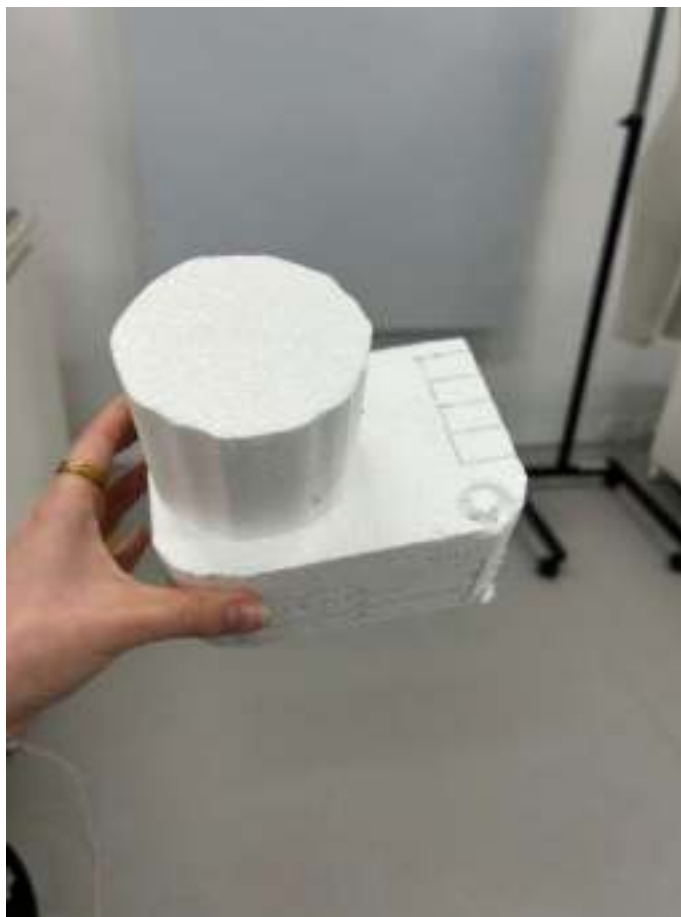
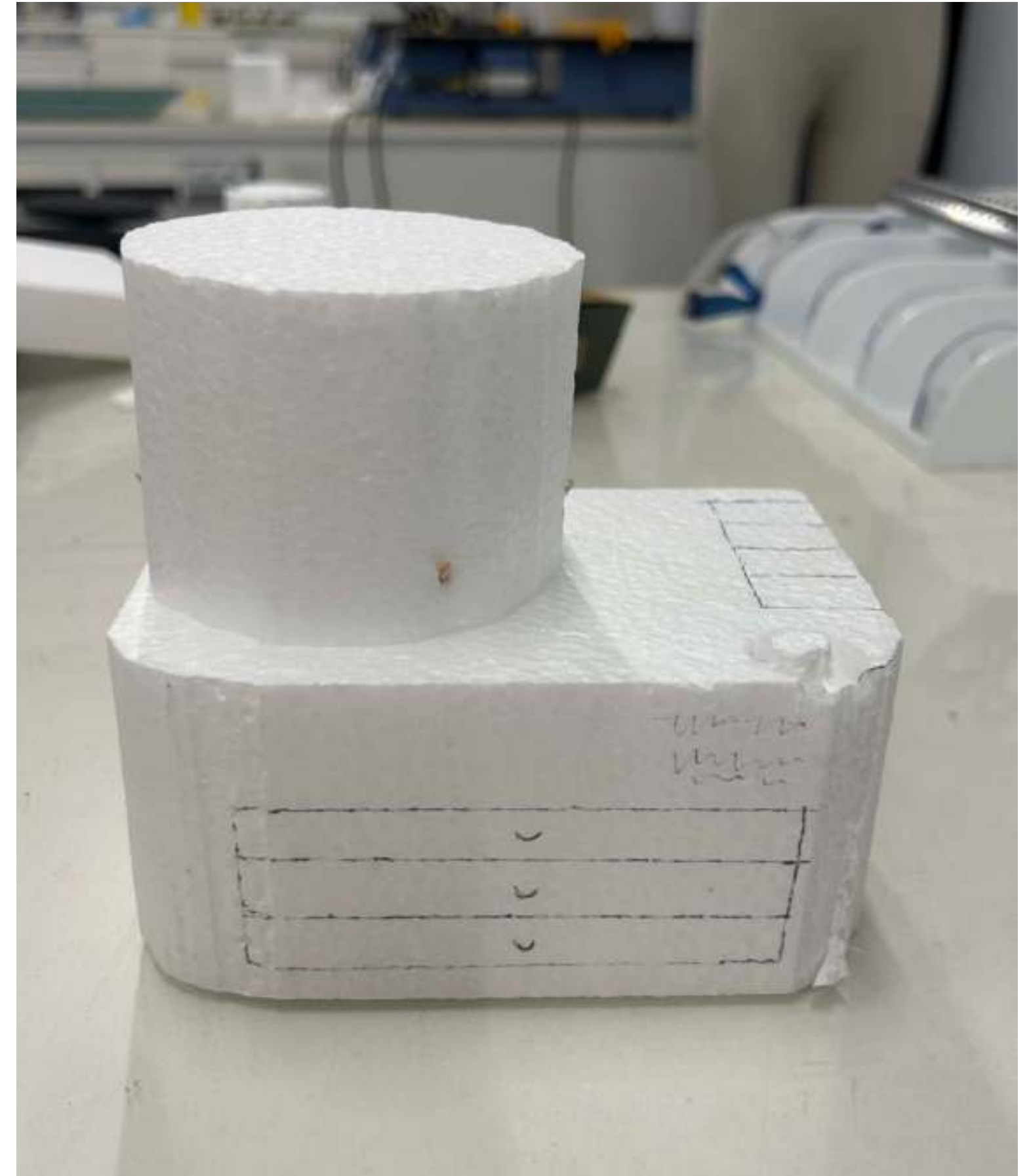
+50°C
up.



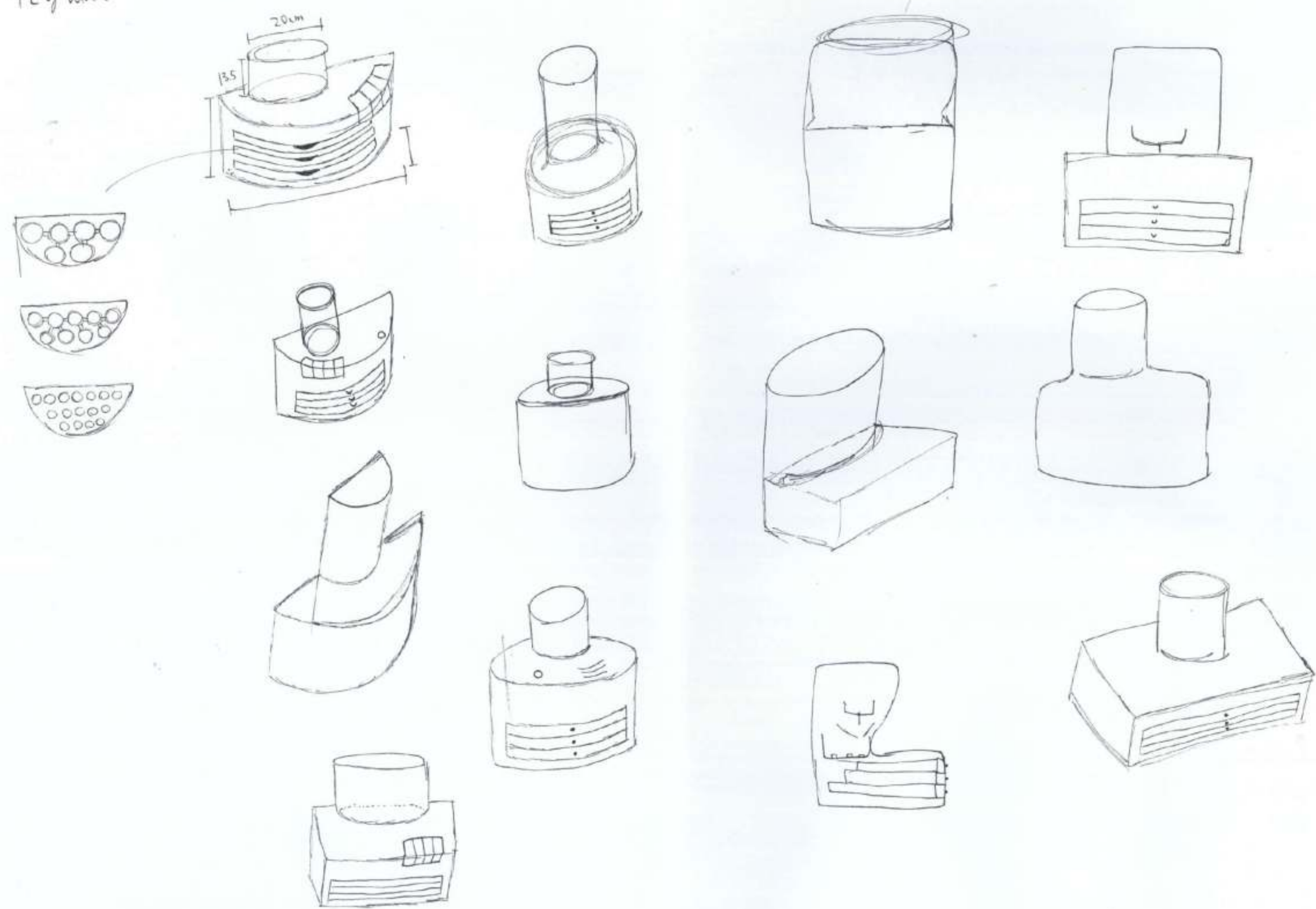
mould

→ out to use





4L of volume.



AFTER CLING WRAP PRODUCTION

to maintain quality → • stretchiness/elasticity/flexibility
• durability

consider:

Temperature: Ideal temp $15^{\circ} \sim 25^{\circ}$ which is usually room temp
(depending on season/weather/placement in the house)

heat = soften gelatin + glycerin based films
↳ sticky / microbial growth

cold = cause brittleness + microcracks, water + glycerin crystallise.

Humidity: ideal humidity: 40~60%

too dry → brittle & less stretchable

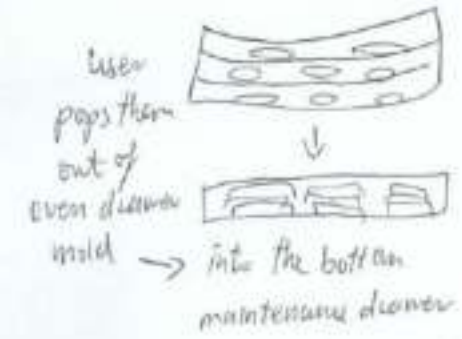
too humid → sticky, soft + support microbial growth

solution → seal in airtight container with silica gel/desiccant packs
to maintain equilibrium moisture.

Light exposure: prolonged direct sunlight/UV exposure → degrade gelatin or glycerin

↳ cause yellowing, oxidation, loss of elasticity.

↳ melt the beeswax component



just be
if it has to
be plugged in
all the time,
it would not
be sustainable.
(defeats sustainability
purpose)

↓
- financially
- electricity

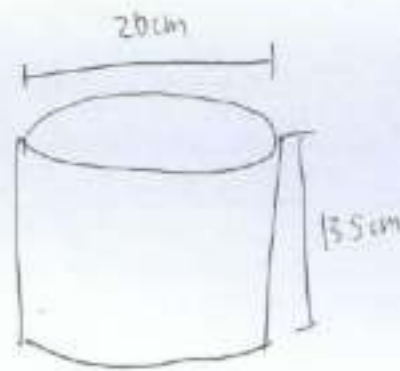
IDEA

To maintain the cling wrap's
shape, elasticity, durability
+ overall quality. a small
solar powered battery pack will
be implemented (or rechargeable
batteries to not overcomplicate design)

↓
- insulation
- desiccant (silica gel/zeolite)
cartridges
- good sealing on lid
- small fan → air circulation.

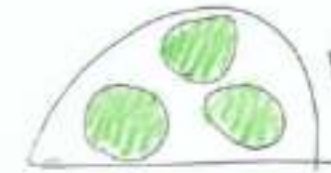
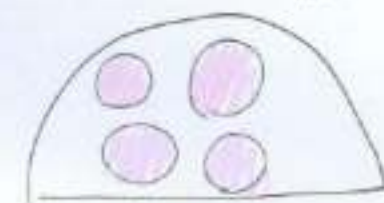
↓
Simple ✓

not much power required ✓
can run on a small solar battery system ✓

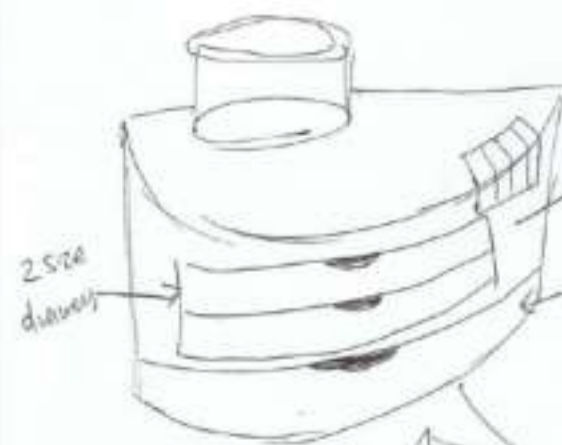


Oven Tray 1

10cm diameter



13cm diameter



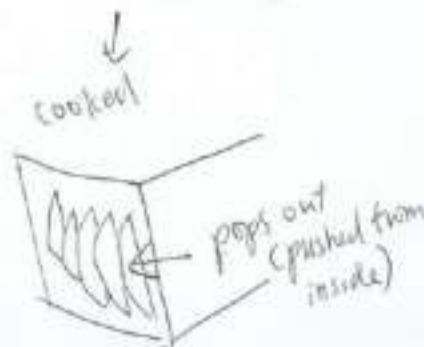
2 size drawers

OK instead of drawers →

drawers to keep clay map stored & properly maintained.

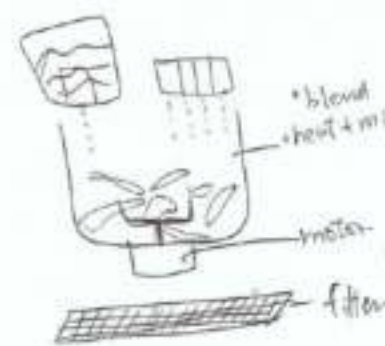


how could they be nicely stored ???

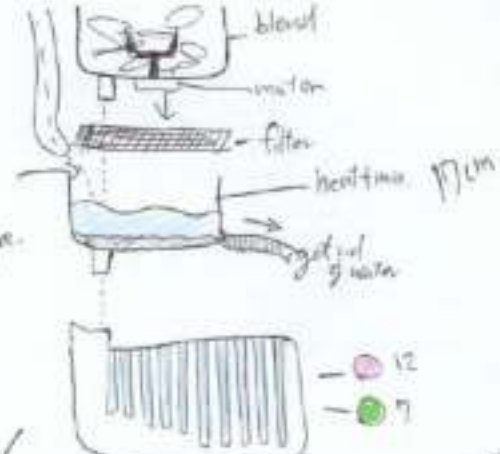


4.25L capacity for potato peels

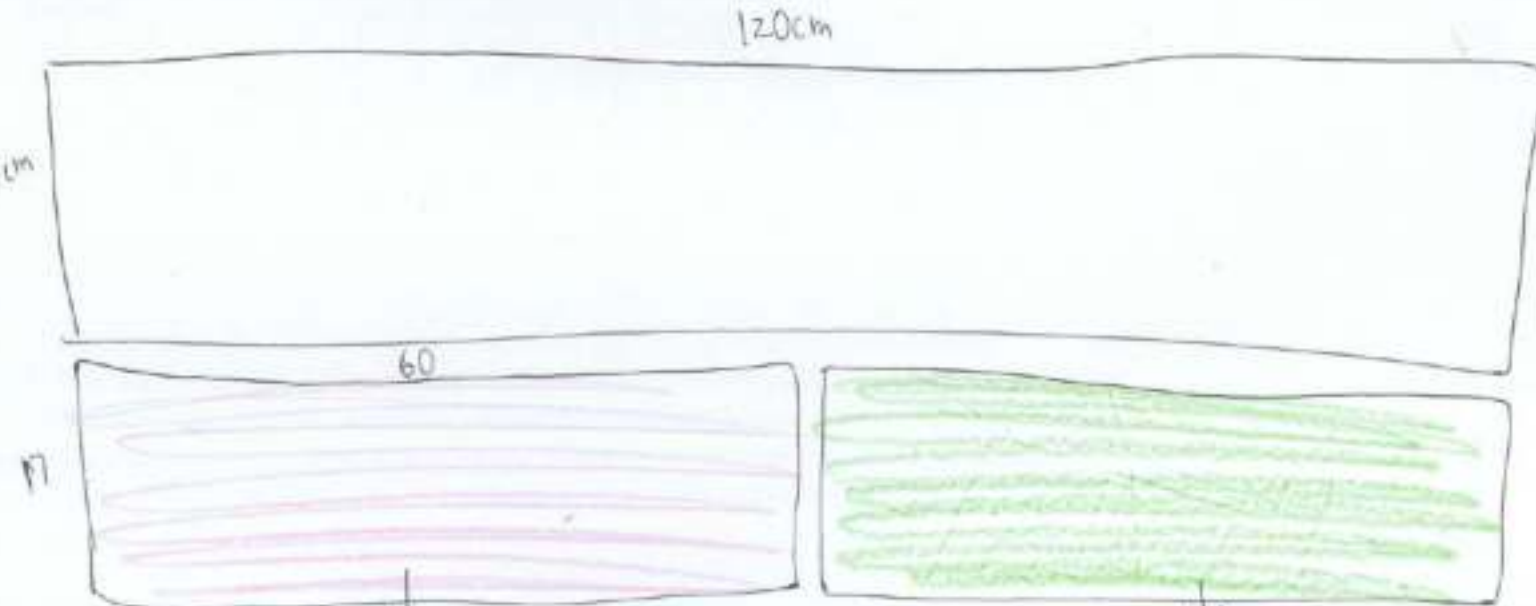
↓
÷2



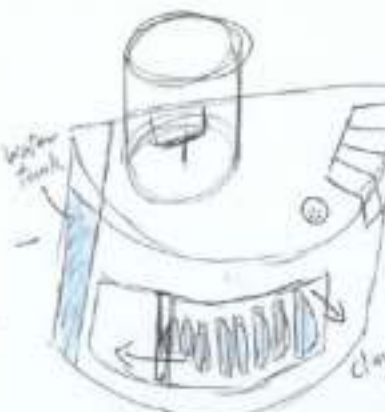
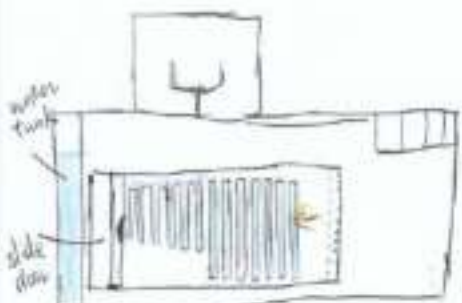
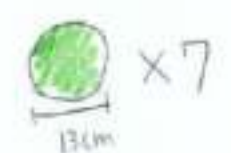
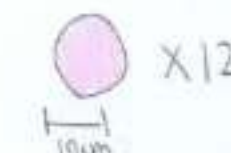
* blend water + all 4 ingredients



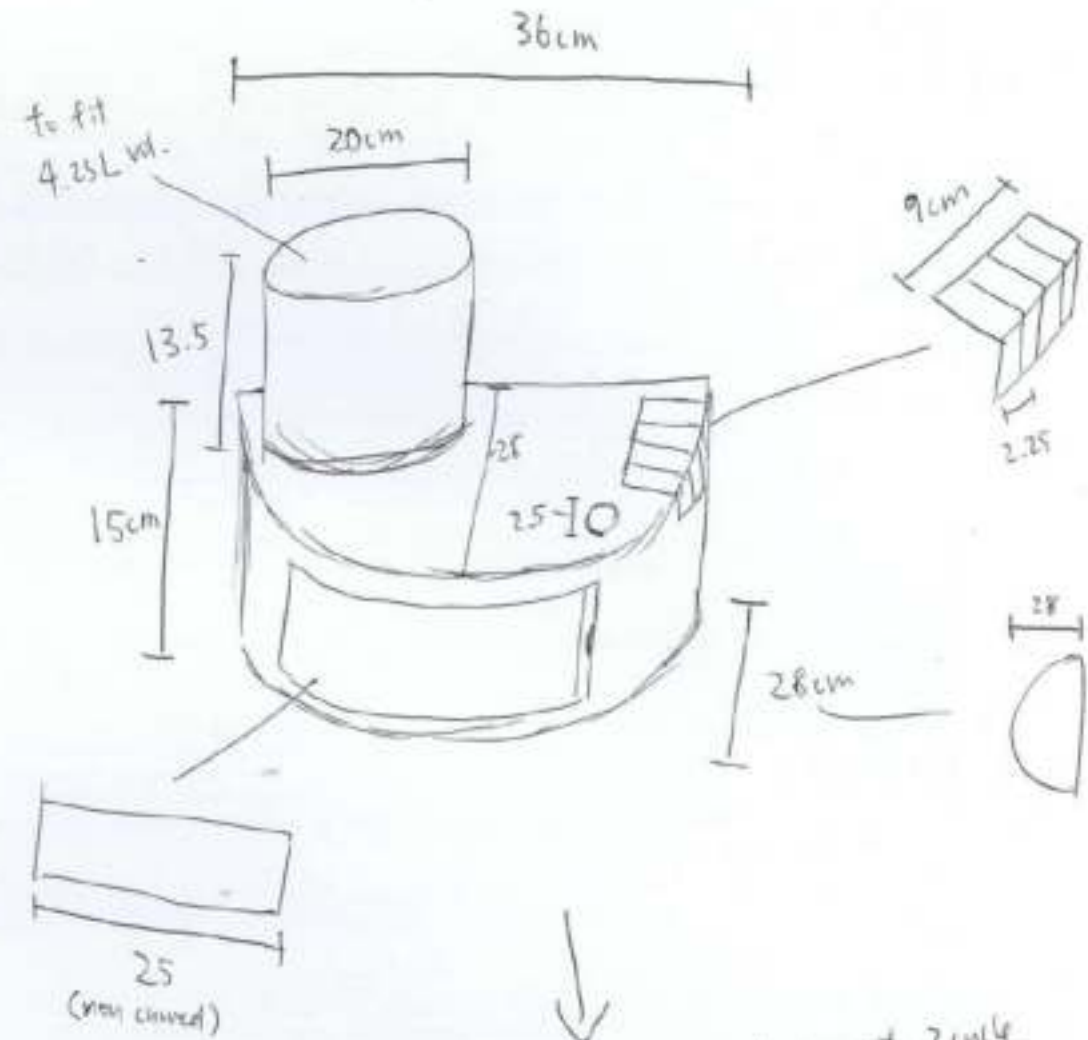
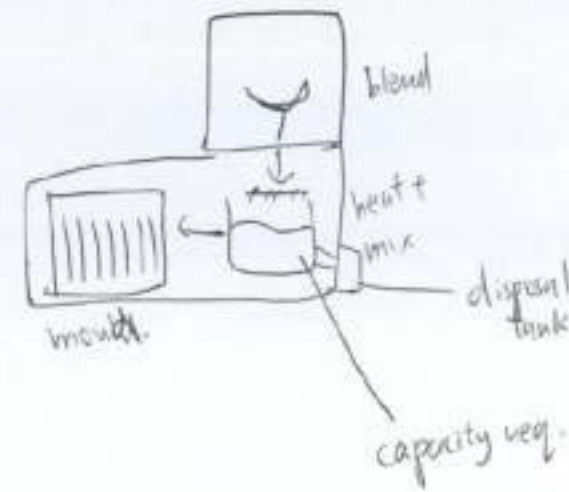
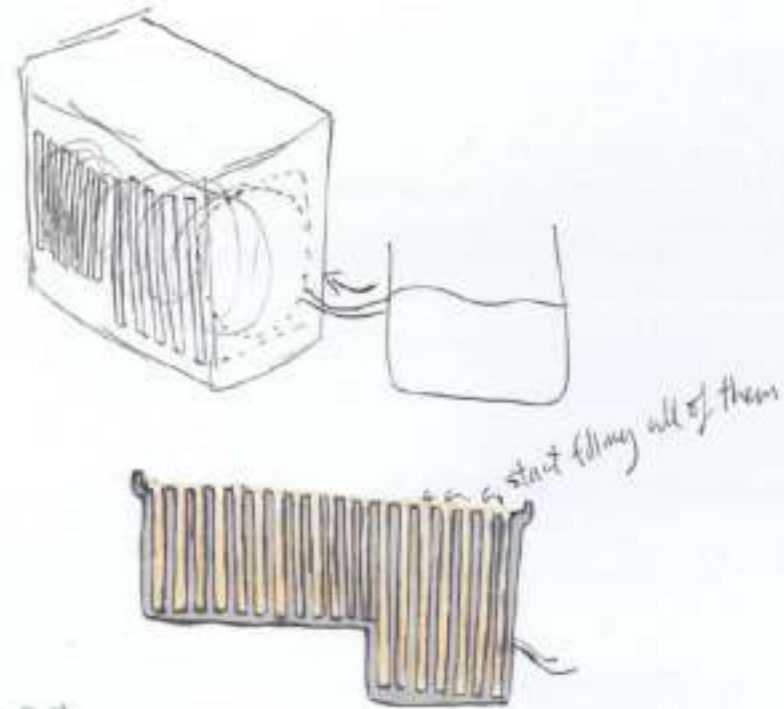
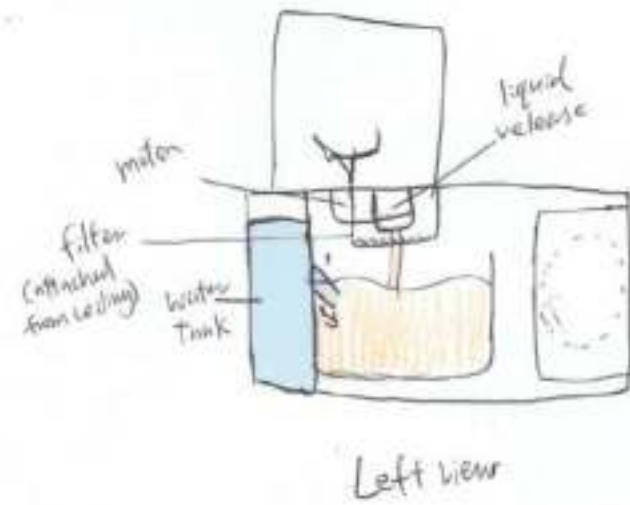
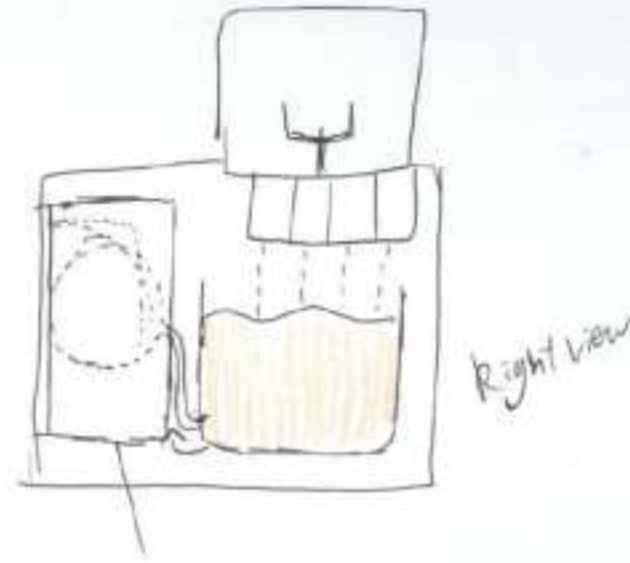
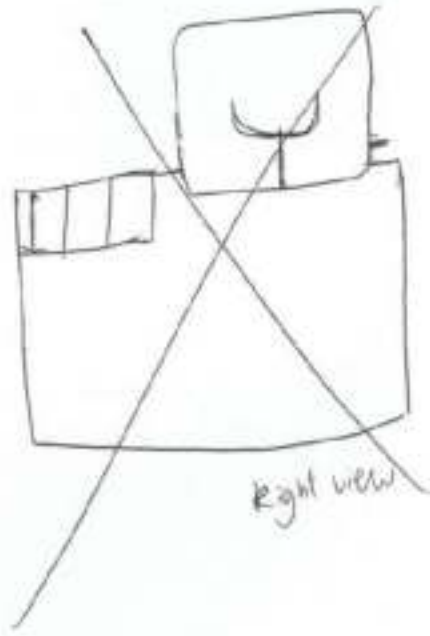
12
7



1 cycle can produce →



← final procedure inside tech.



How would the blends separate 2 cycle worth of potato peels?

$$\div 2 \text{ the } 4.25\text{L} = \text{cylinder with height } 7\text{cm and radius } 20$$

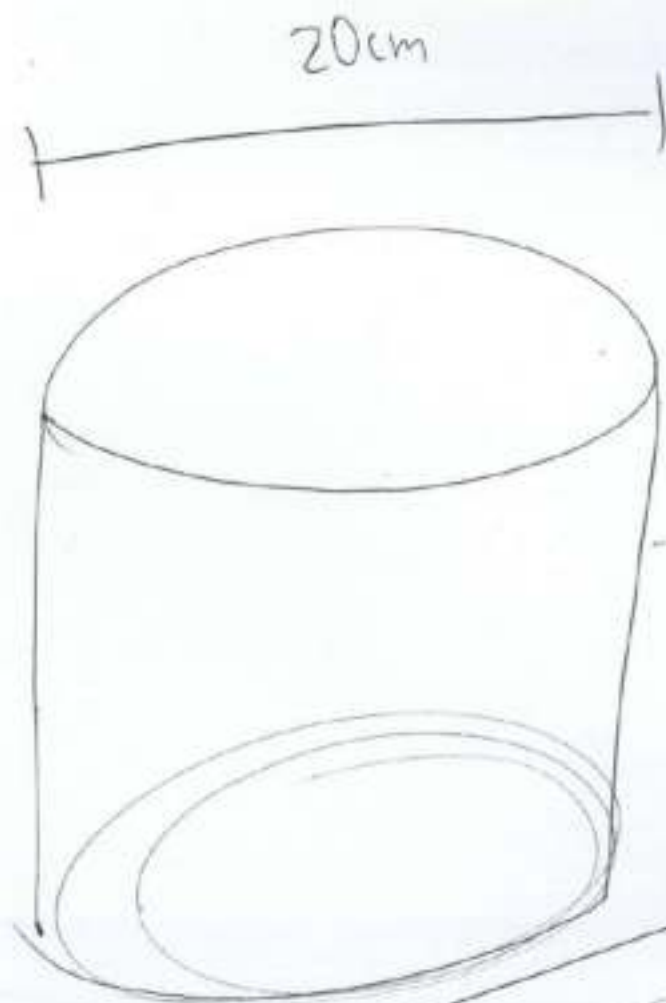
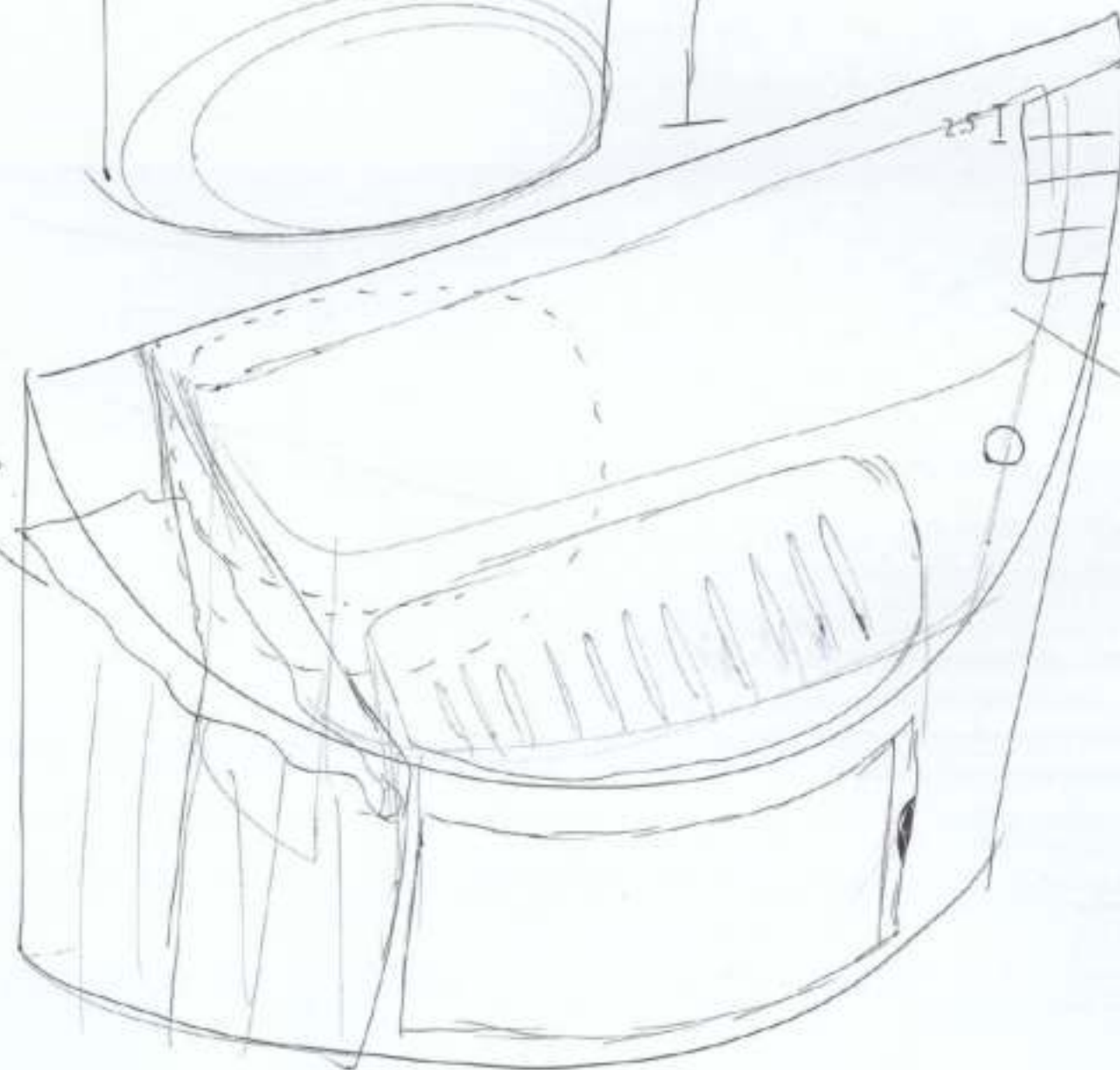
$$\begin{aligned} \text{experiment } 110\text{g of peels} &= 300\text{ml} + 20\text{ml} \\ &+ 220\text{ml} = 540\text{ml} \\ &\text{for water tank} \end{aligned}$$



500g of peels = 2L volume

15cm

transparent
water
tank
capacity
2.5L

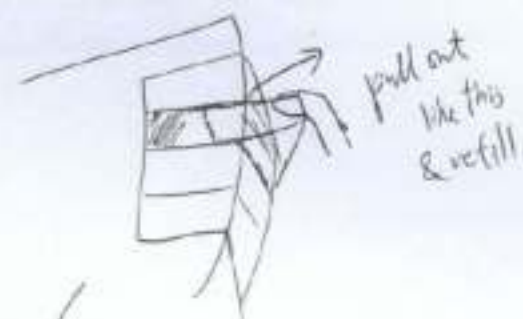


8cm (500g of pad
+ water capacity) - 1.36L

2.5

110g - 220ml x 4.5
= 990ml
round it up to = 1L capacity

weight sensor
at the bottom.



pull out
like this
& refill.



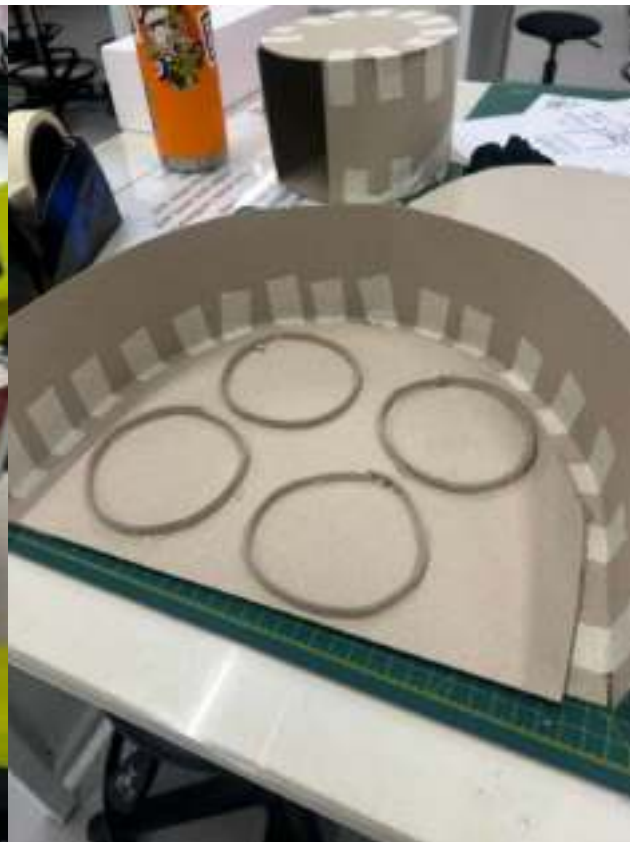
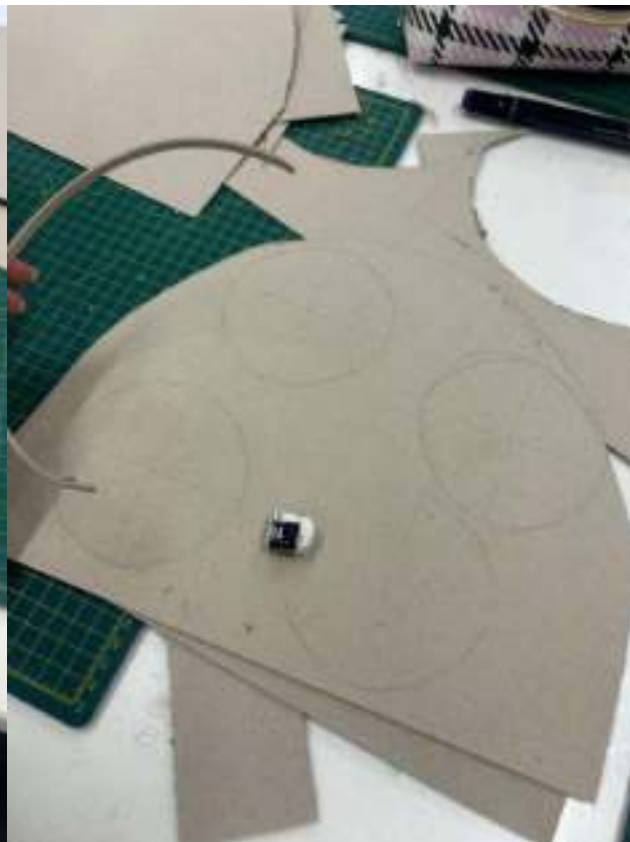
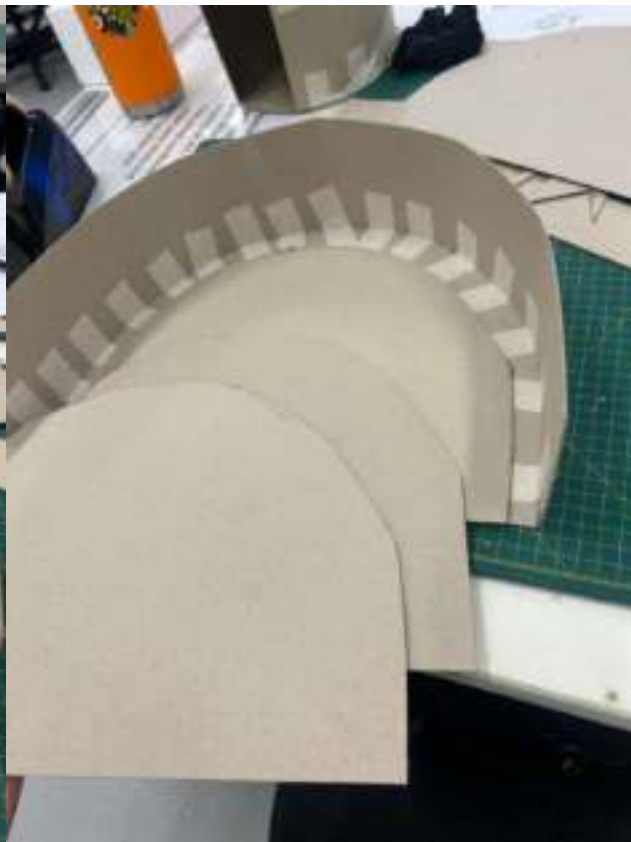
9.5cm

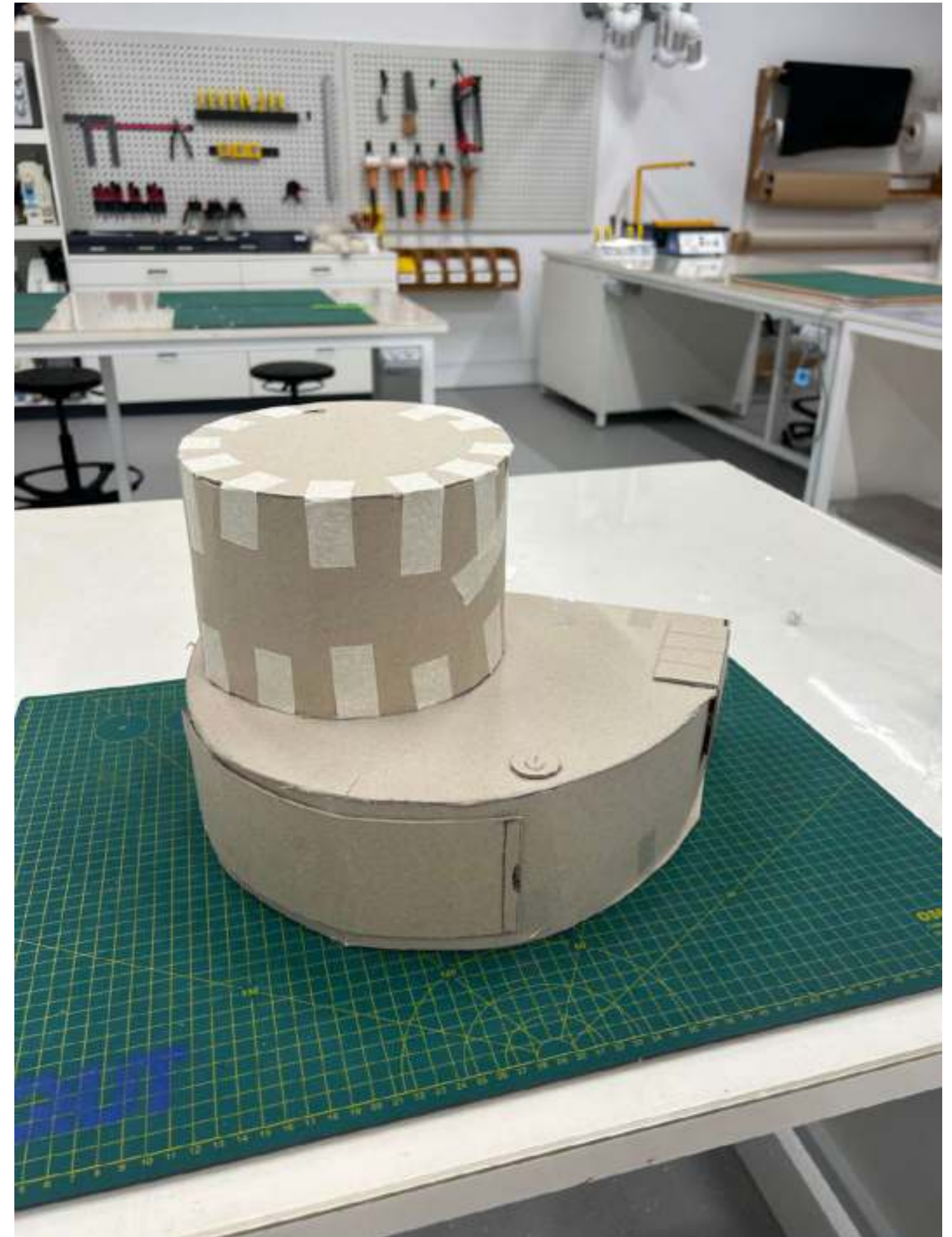
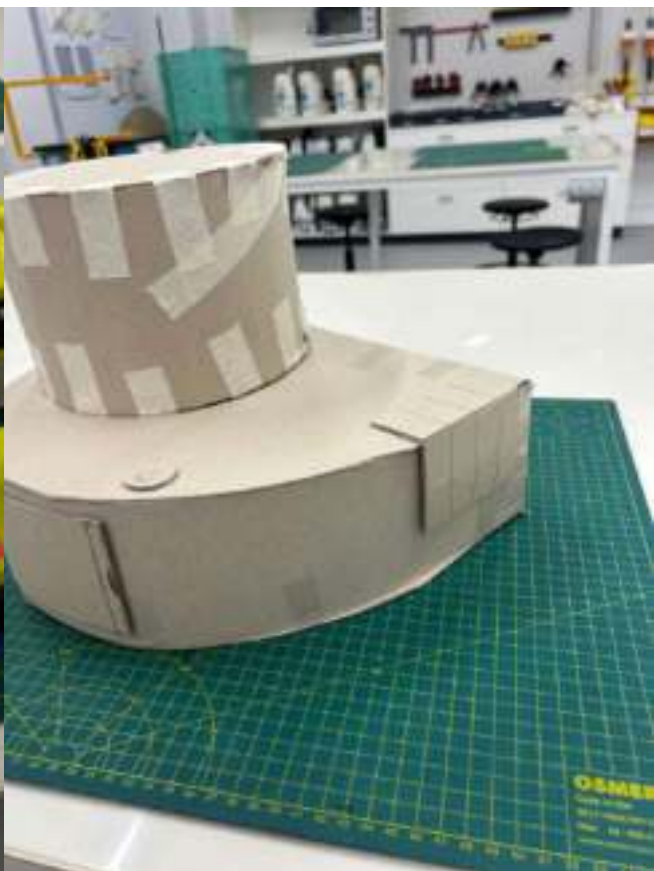
(to fit the 31.5g
of cornstarch)

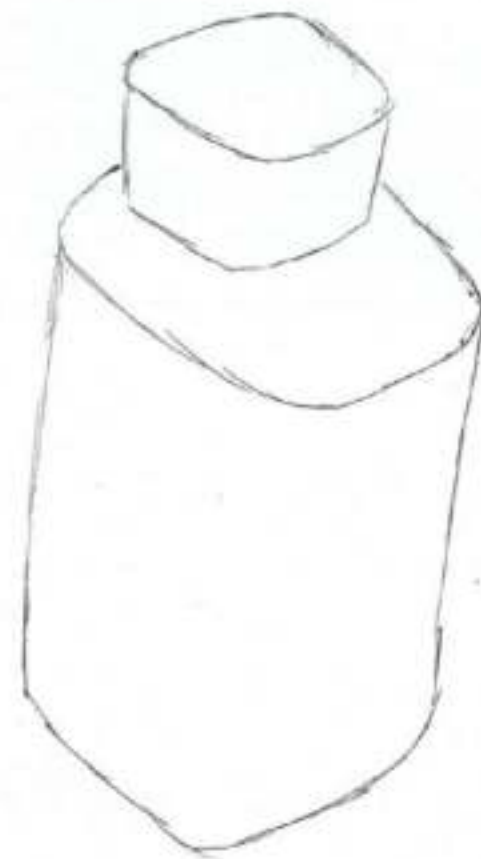
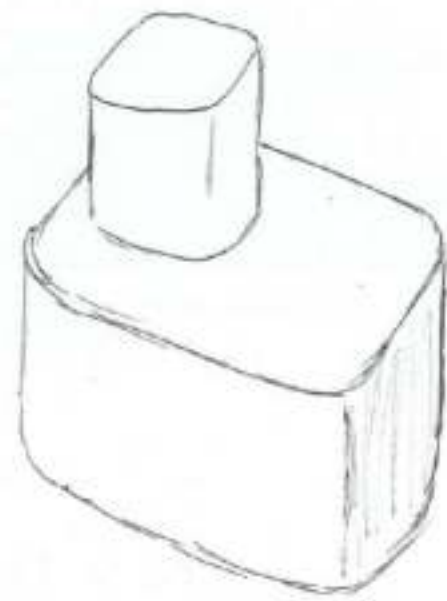
110g req - gelatin - 2.8g
glycerin - 4.1g
corn starch - 9g X 4.5
beeswax - 2g

= gelatin - 12.6g
glycerin - 18.45g
corn starch - 31.5g
beeswax - 9g

- oven parts



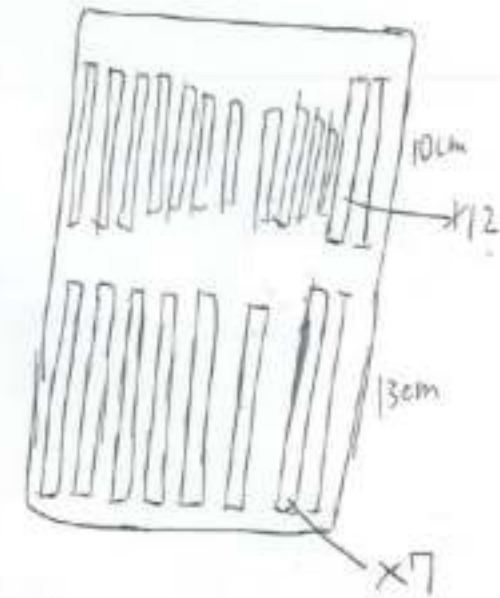




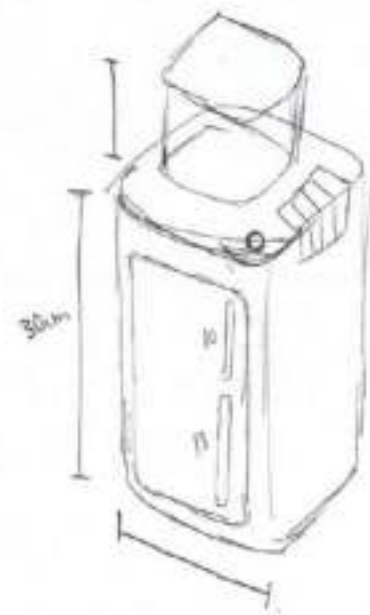
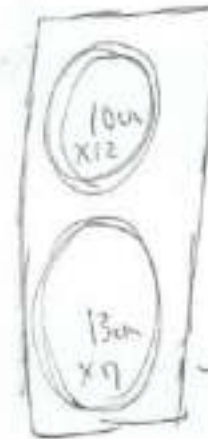
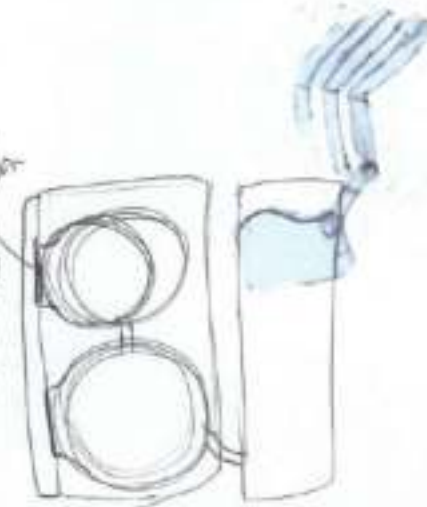
13cm



10cm diameter

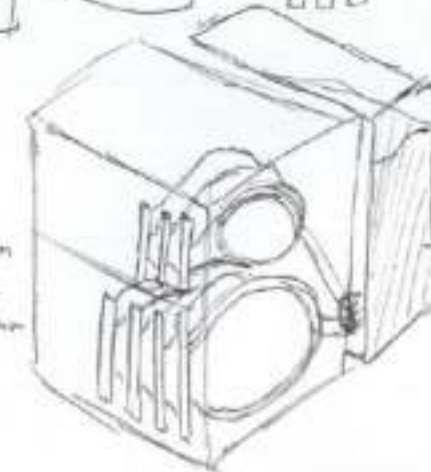
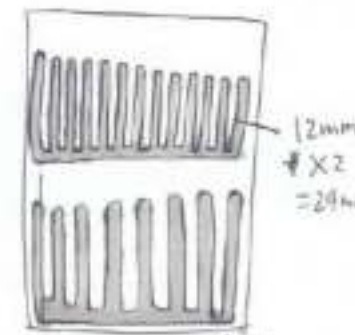
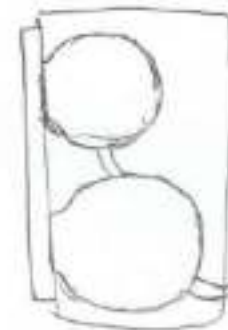


sliding door
is one
part blocking
/ completing
the mid.

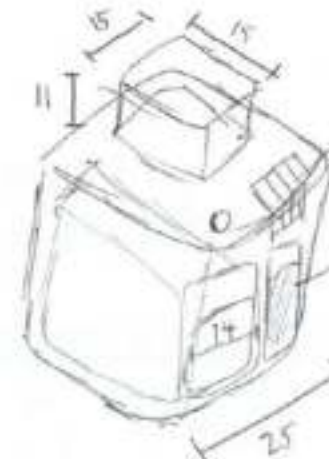


has water tank
water release

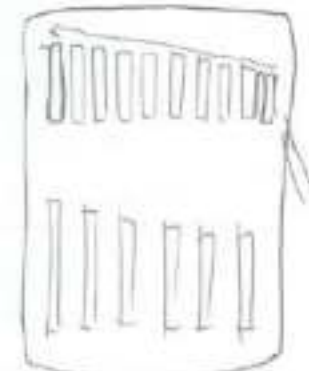
220ml



water tank
required capacity
for 1 cycle
=



10cm² & 13cm²
from a sheet of 17 x 20cm
↓ ↓
10 6



CAPACITY + volume of ingredients

1 cycle = 500g of potato peels

+ 1.4L water



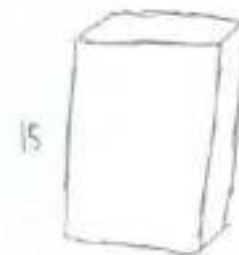
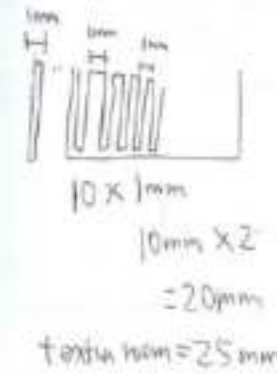
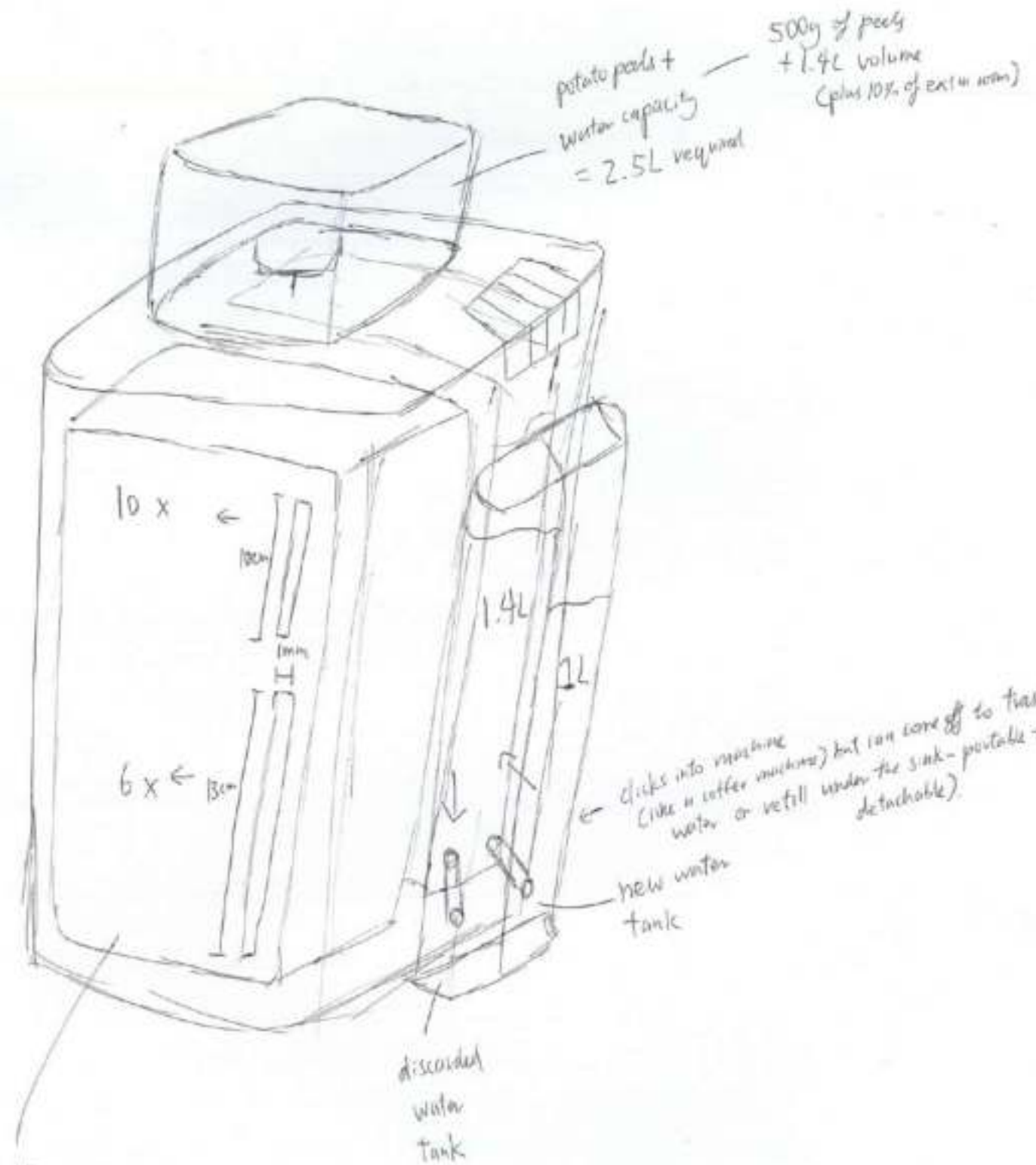
filter + discard 1.4L (2.5L altogether)

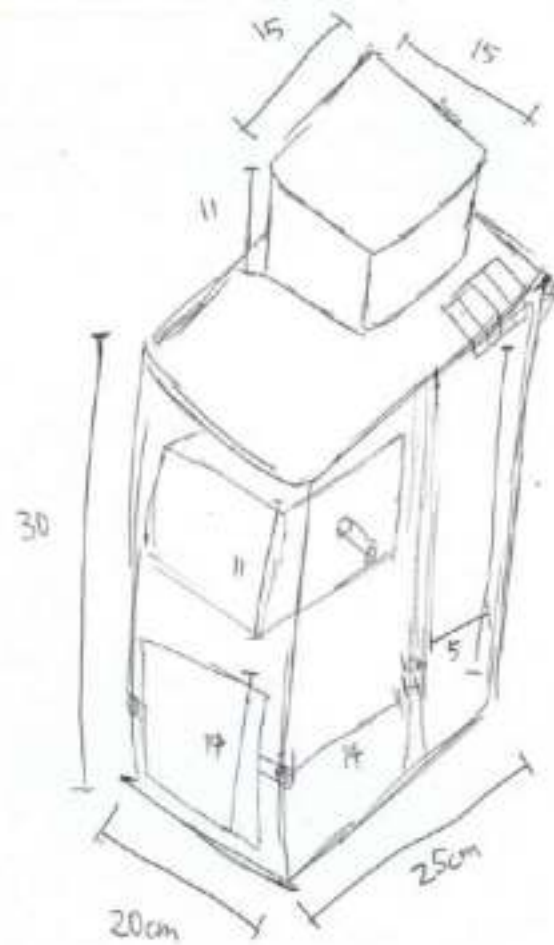


Add 1L of water



Cool mixture → mold + dry

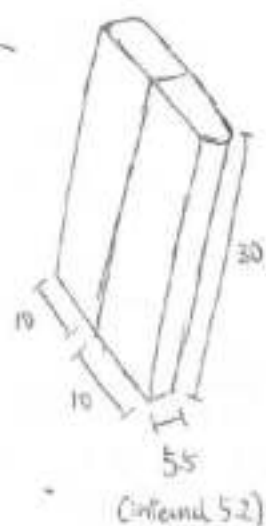
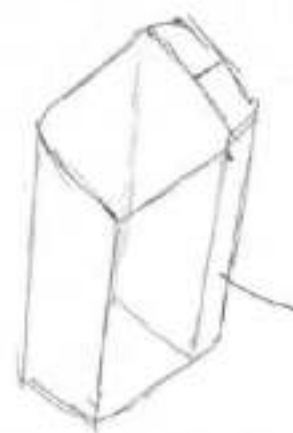
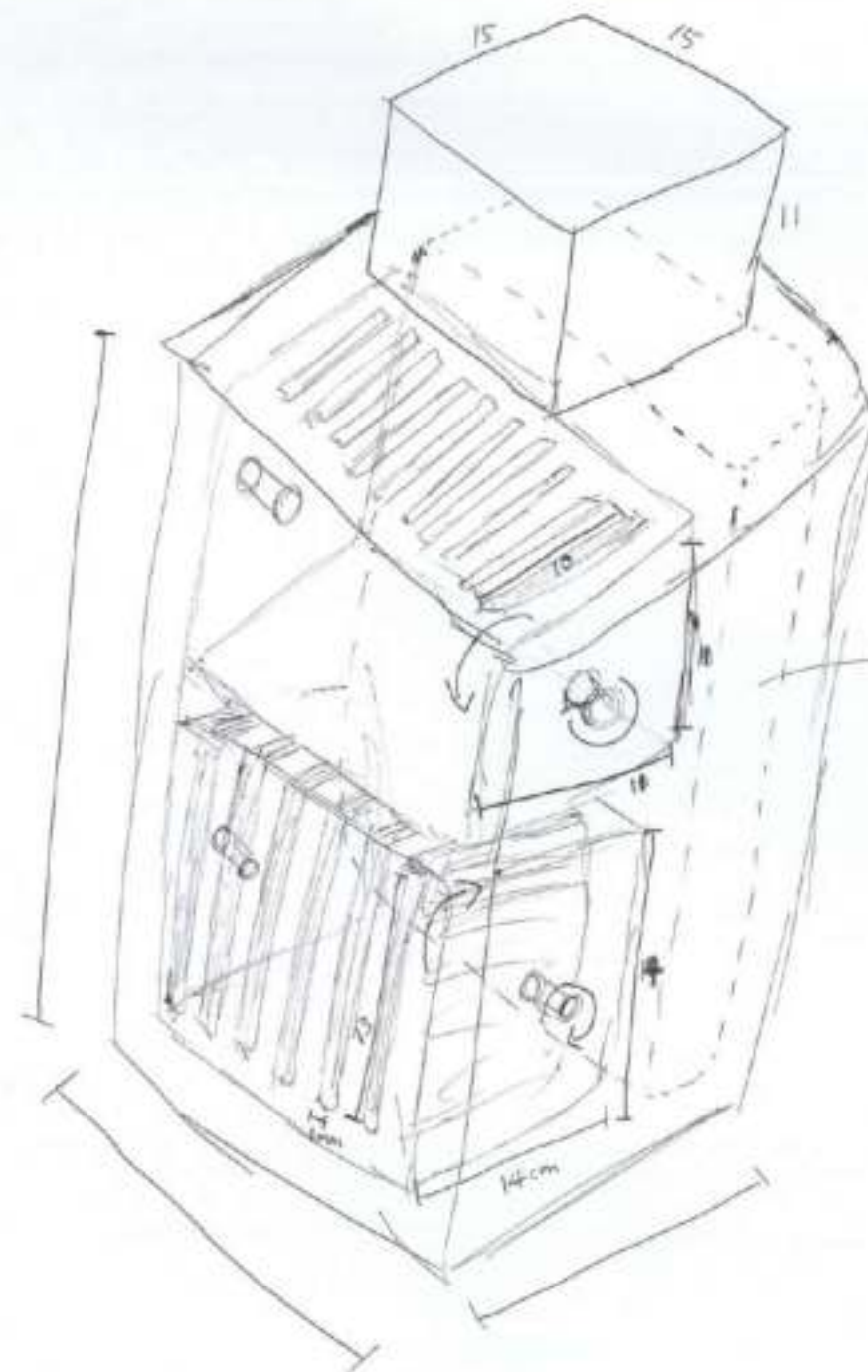
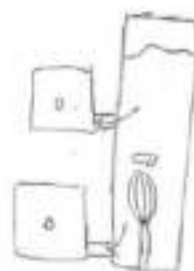
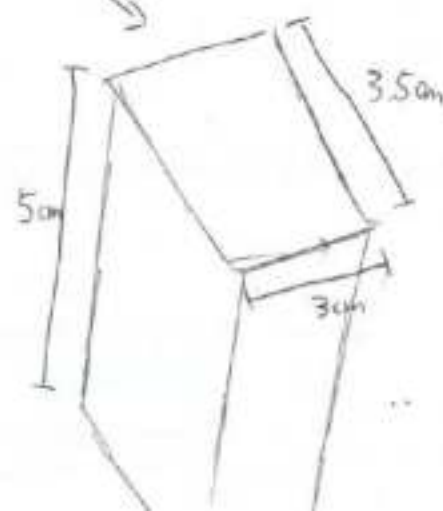




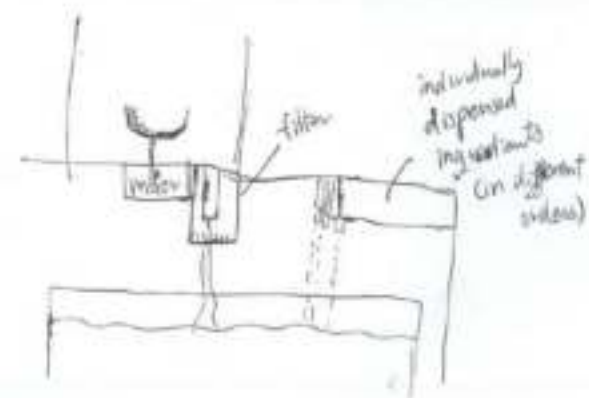
more slim
design
(+ more
effective) ←

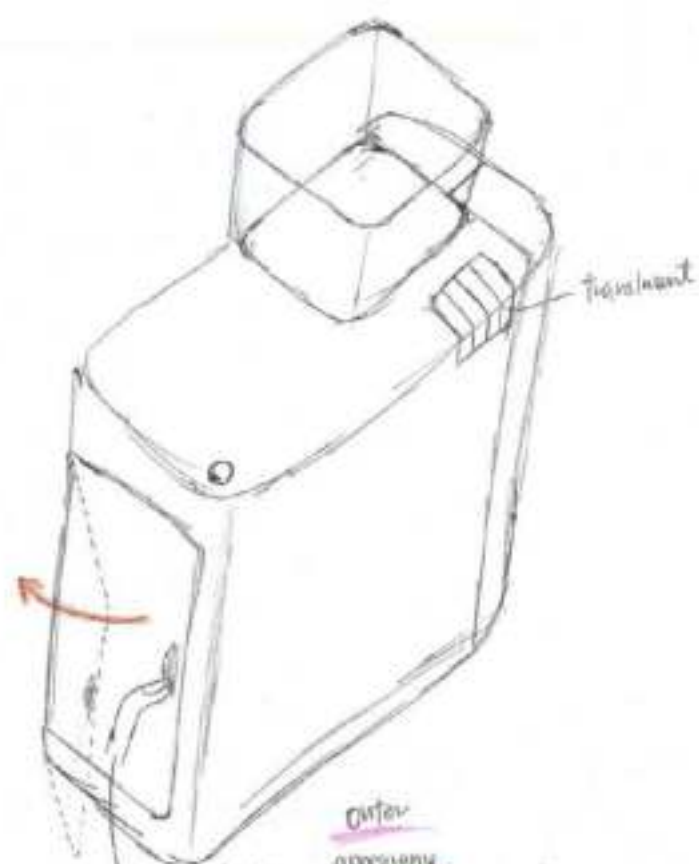


(other
volume
measurements)

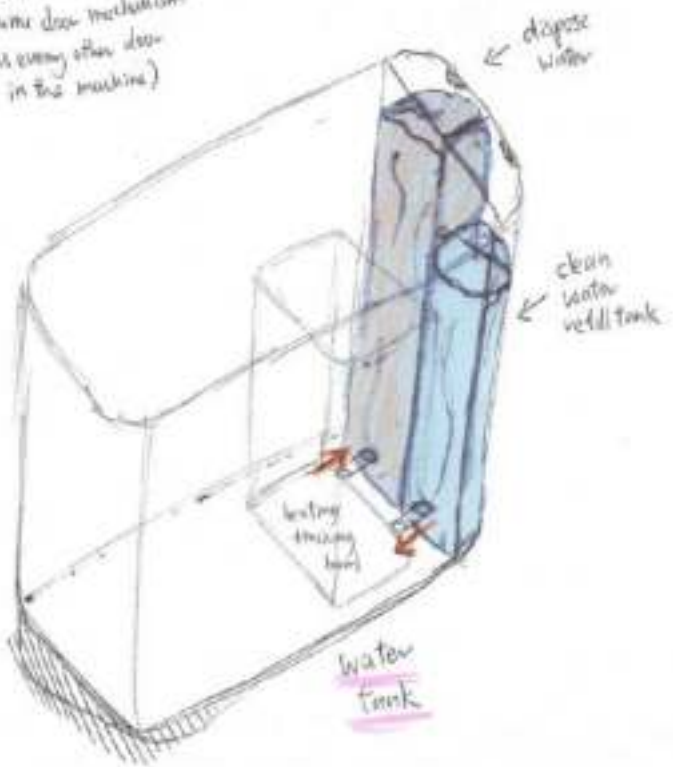


(internal 5.2)

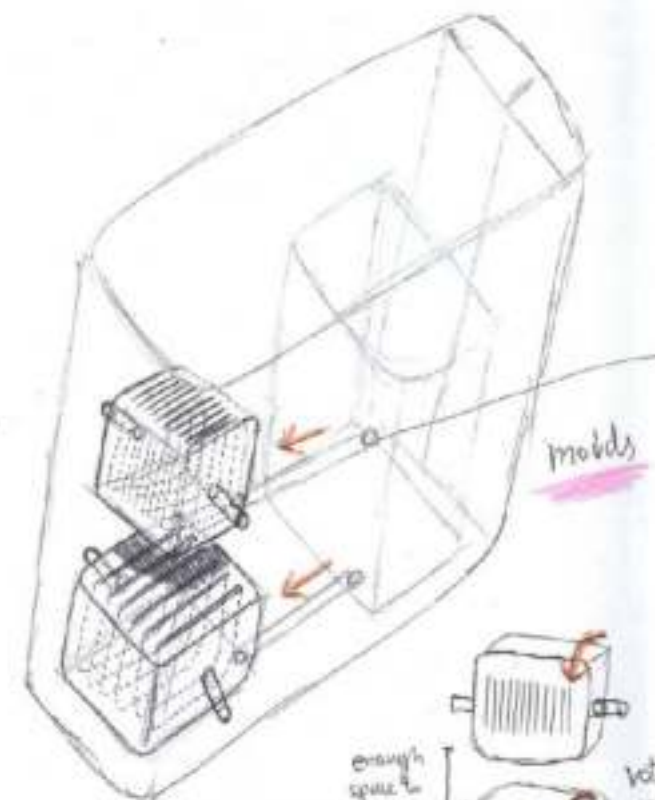




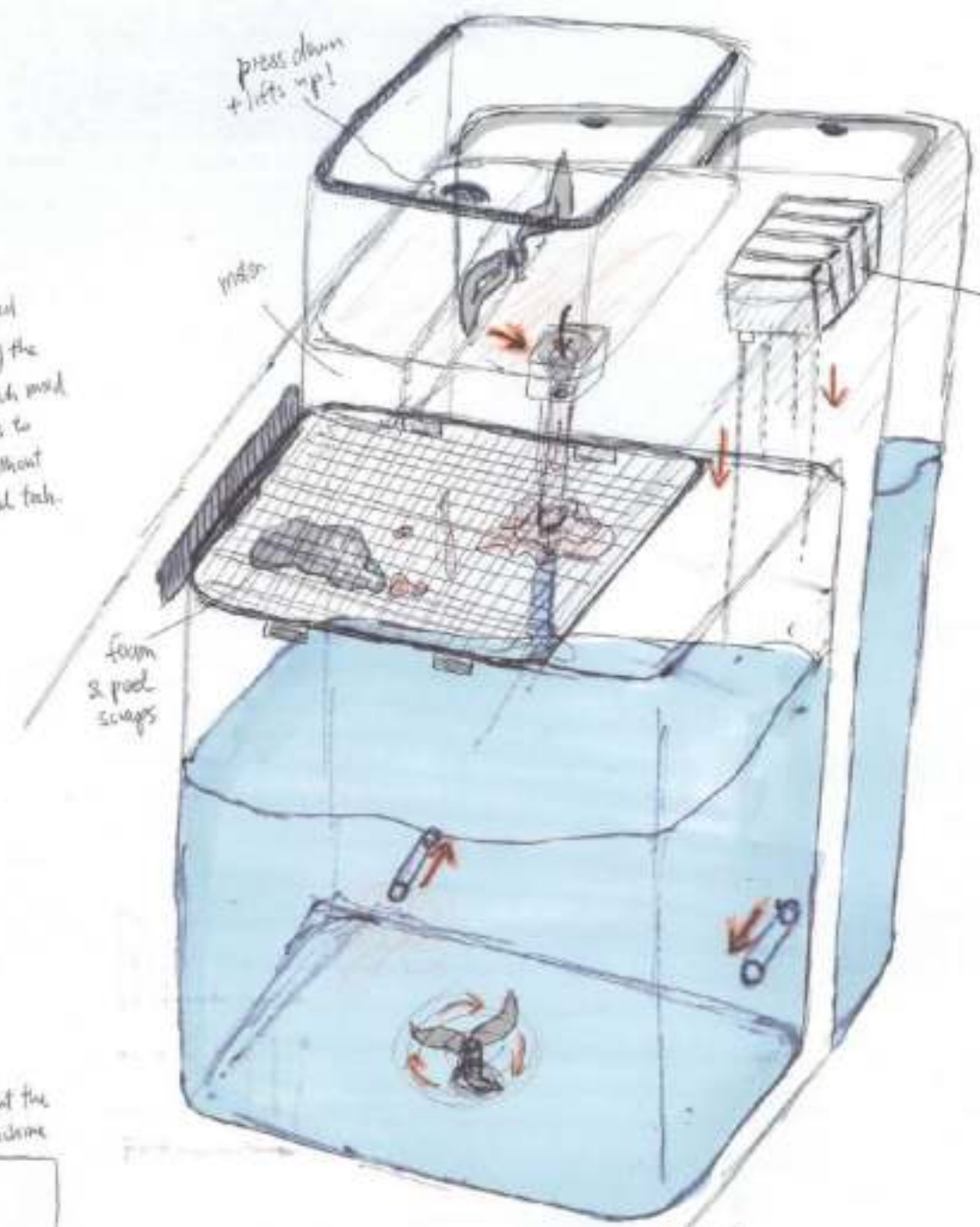
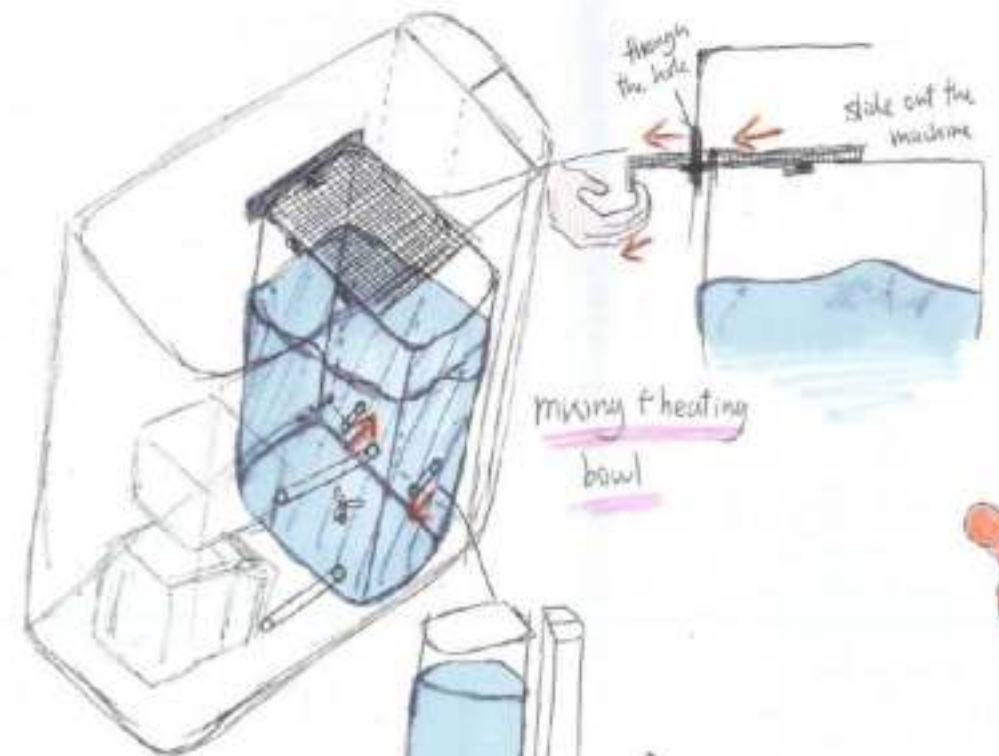
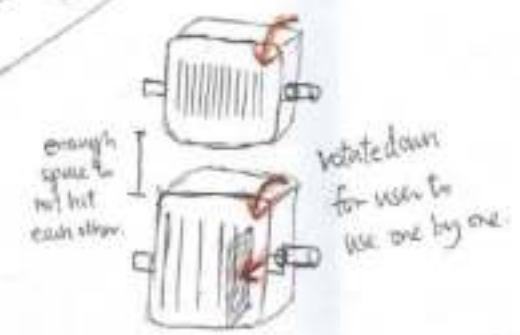
push down til you hear a click to close. (same door mechanism as every other door in the machine)



both compartments have enough for 1.4L volume space



top travel way/path is placed right at the mid-point of the bowl to ensure the each mold compartments gets access to half each perfectly without requiring extra/special tab.



translucent boxes & easy identification of whether it needs refilling!

All compartment base (bottom) has a weight sensor integrated to know exactly how much to dispense for each cycle

all compartments just regular storage boxes except the beeswax box

heads up for just long enough to melt 9g of wax & release down



1 cycle requirement

added in this order

- 12.6g - gelatin
- 18.5g - glycerin
- 31.5g - corn starch
- 9g - beeswax

weight sensor

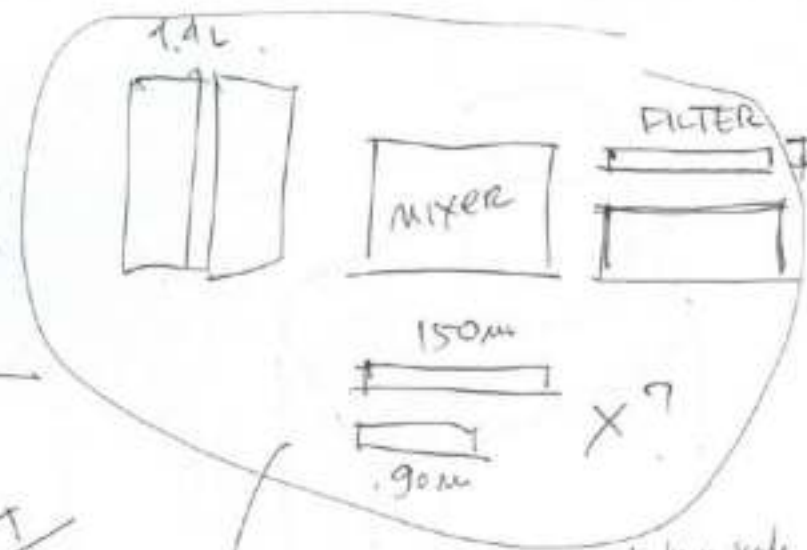
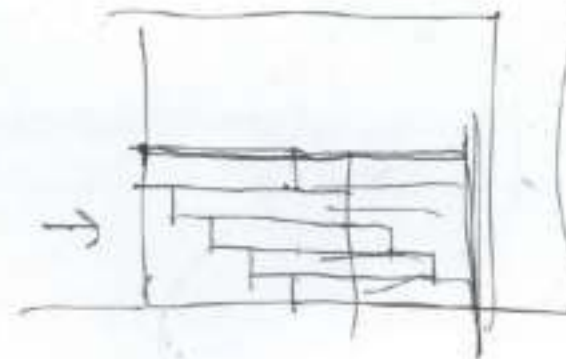
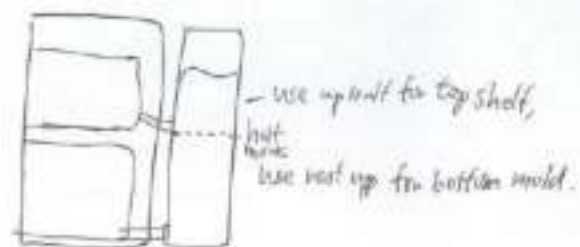
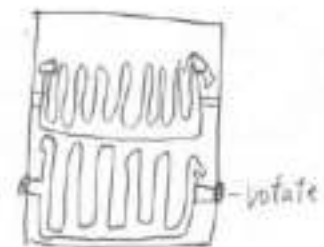
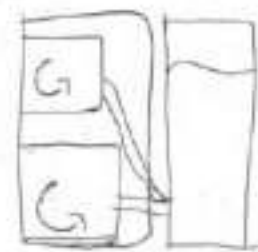
bottom view

4 tiny compartments - how does the door open

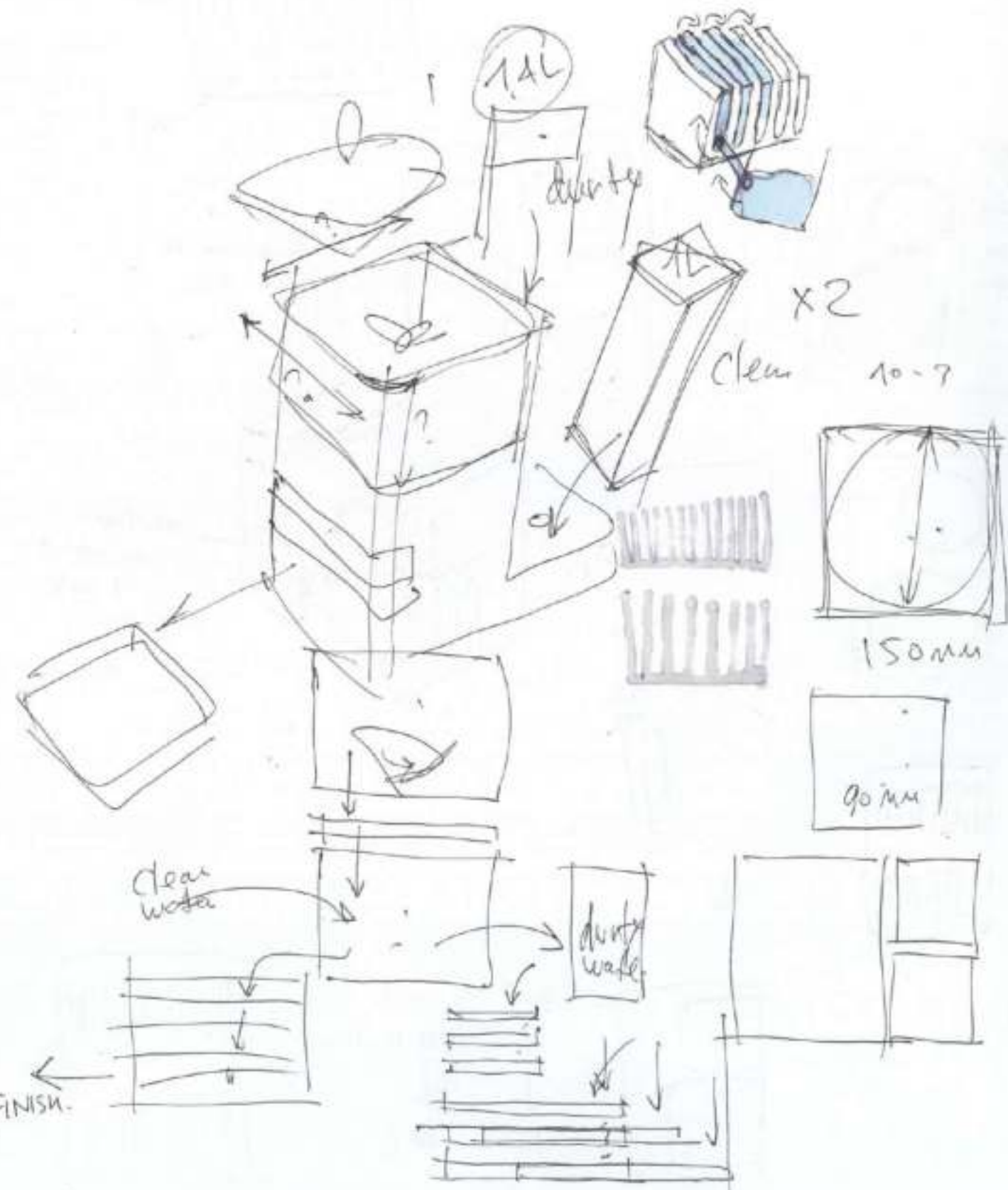
3cm

3.5cm

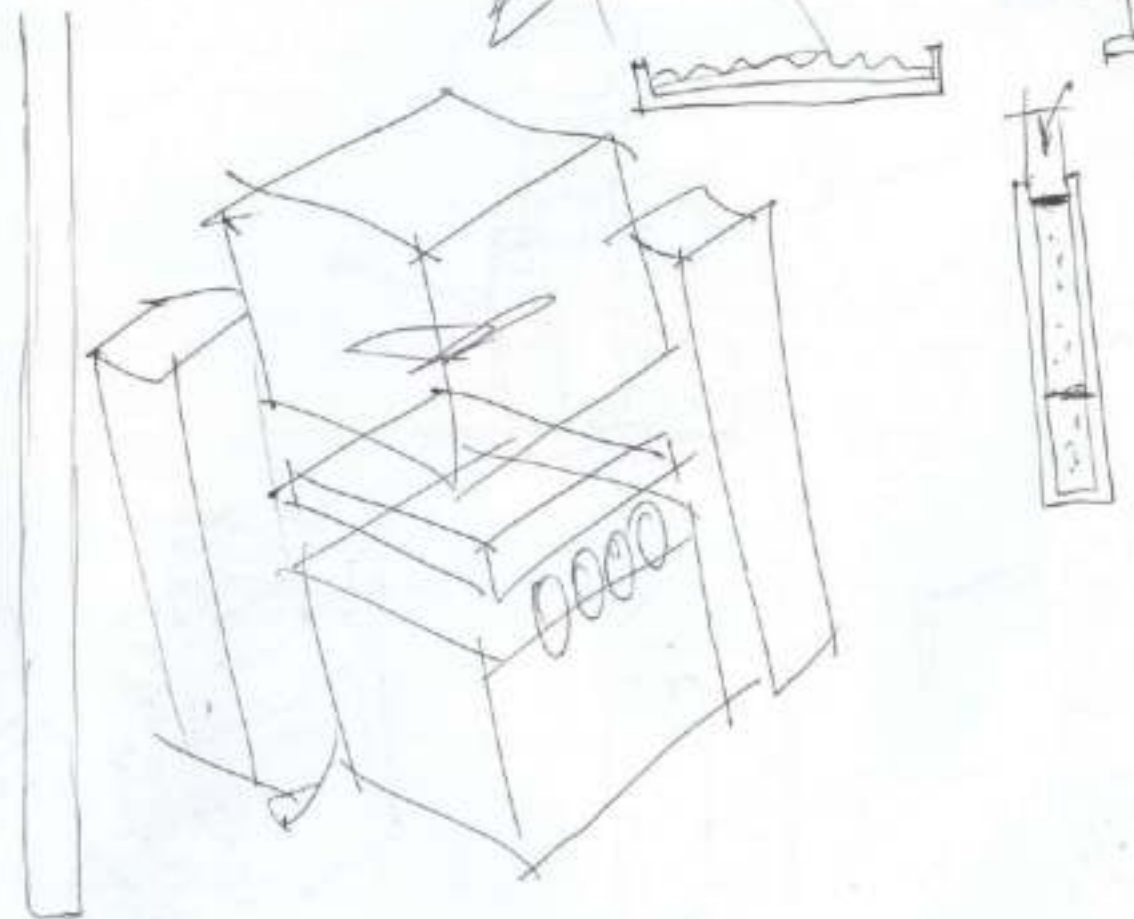
5cm

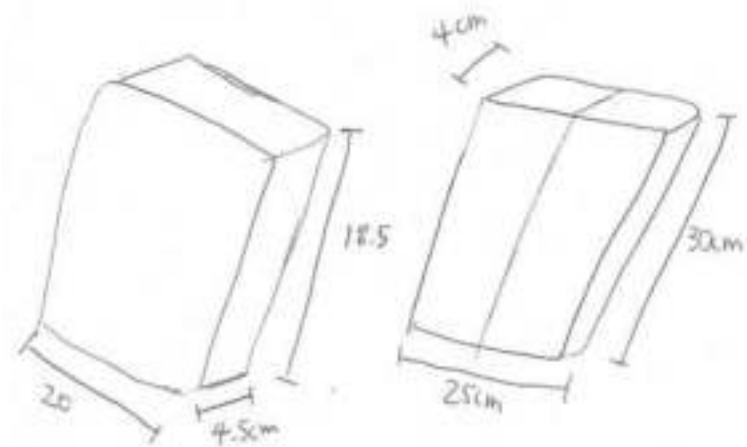
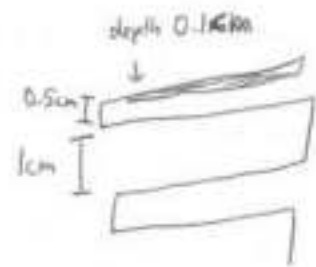
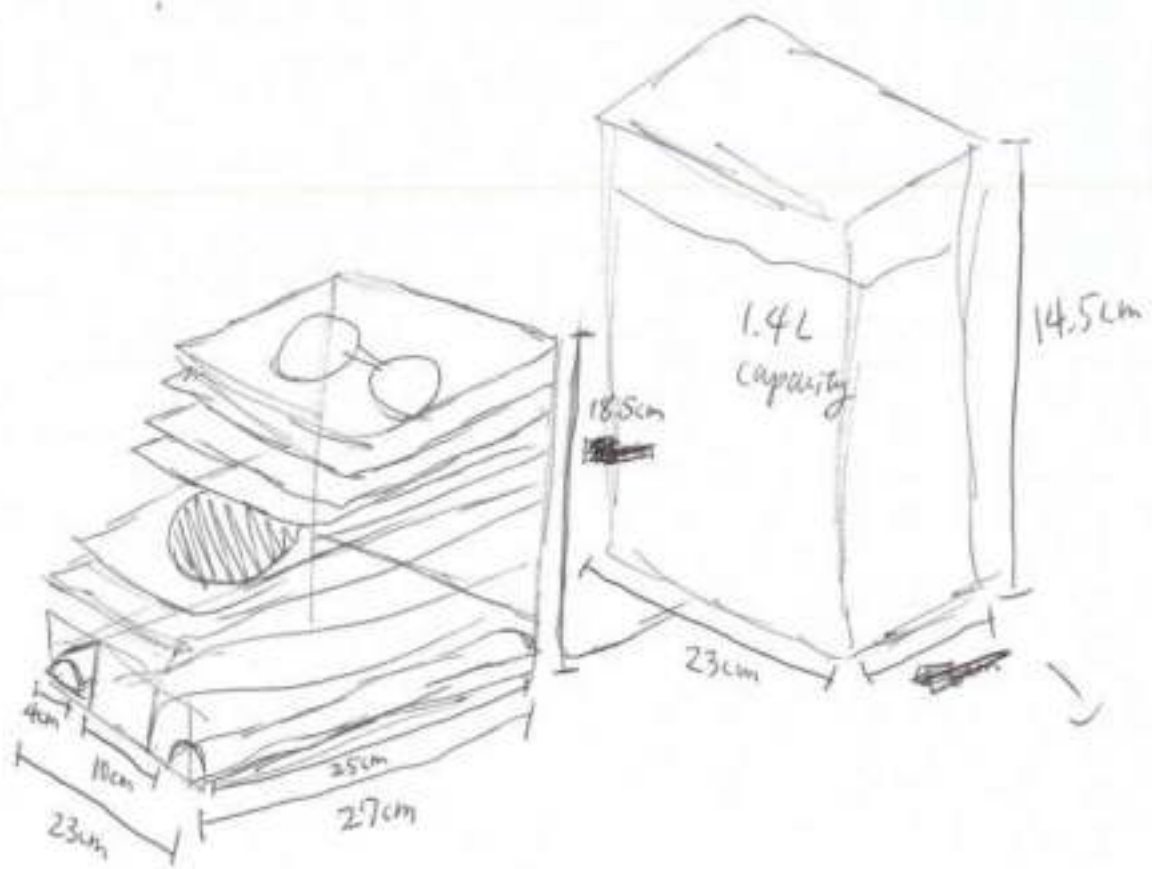


make a scale
prototype model
↓
show size,
measurements,
interaction &
overall harmony

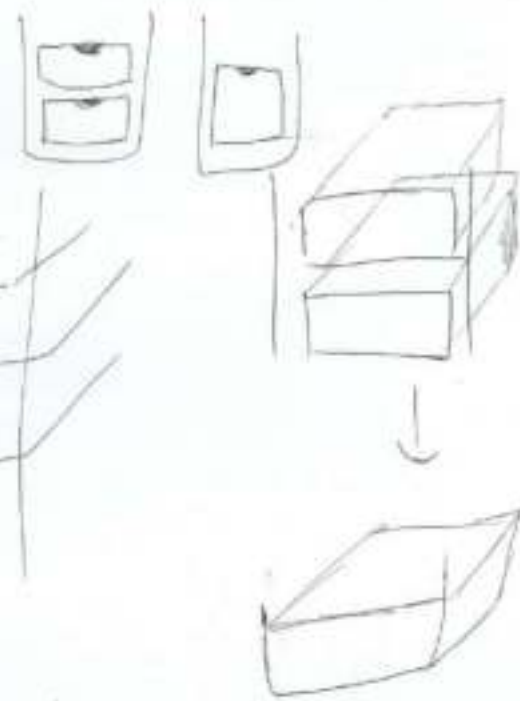
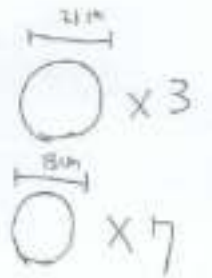
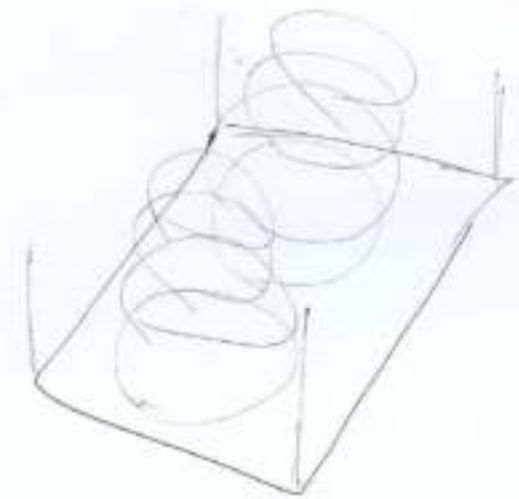
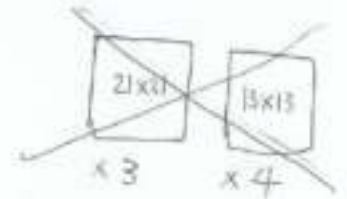
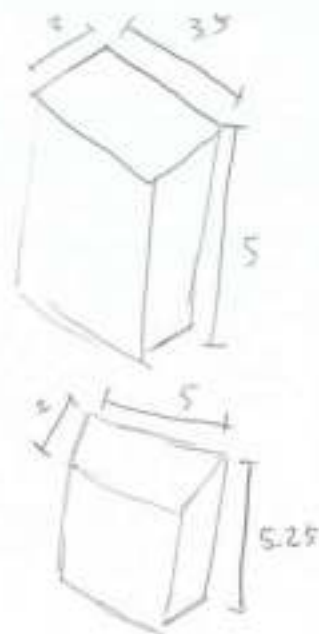
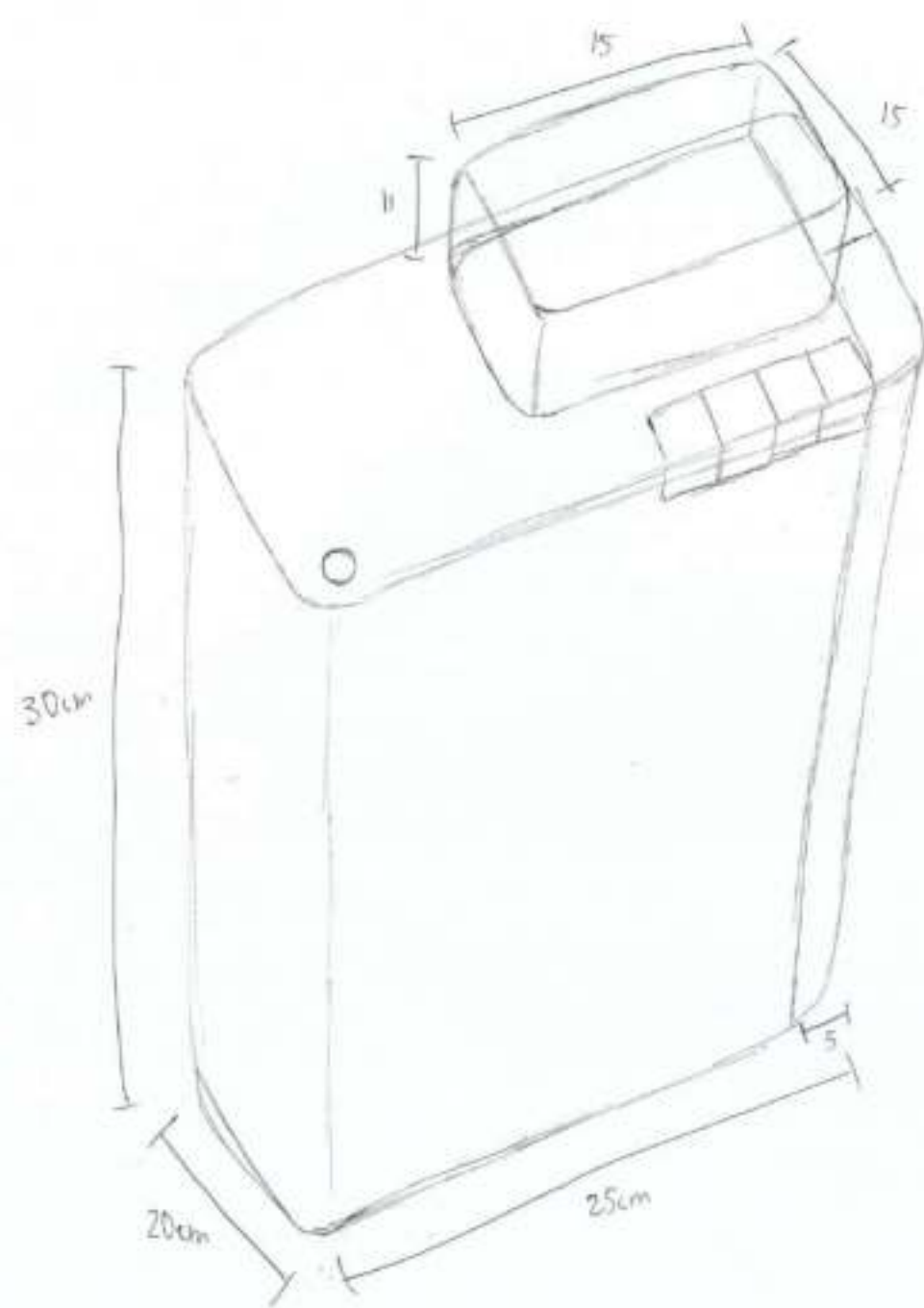


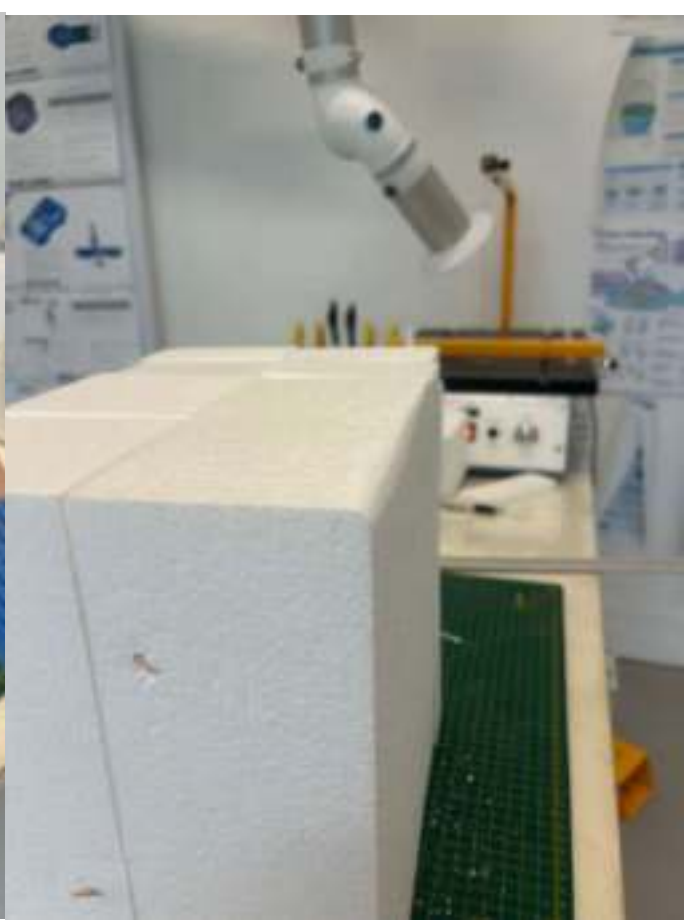
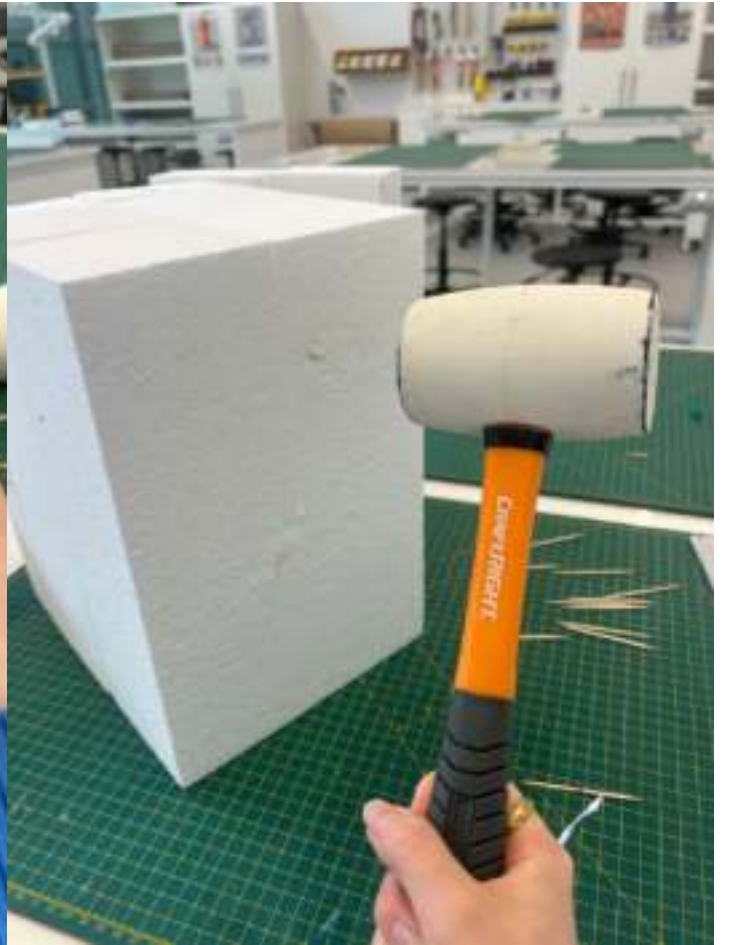
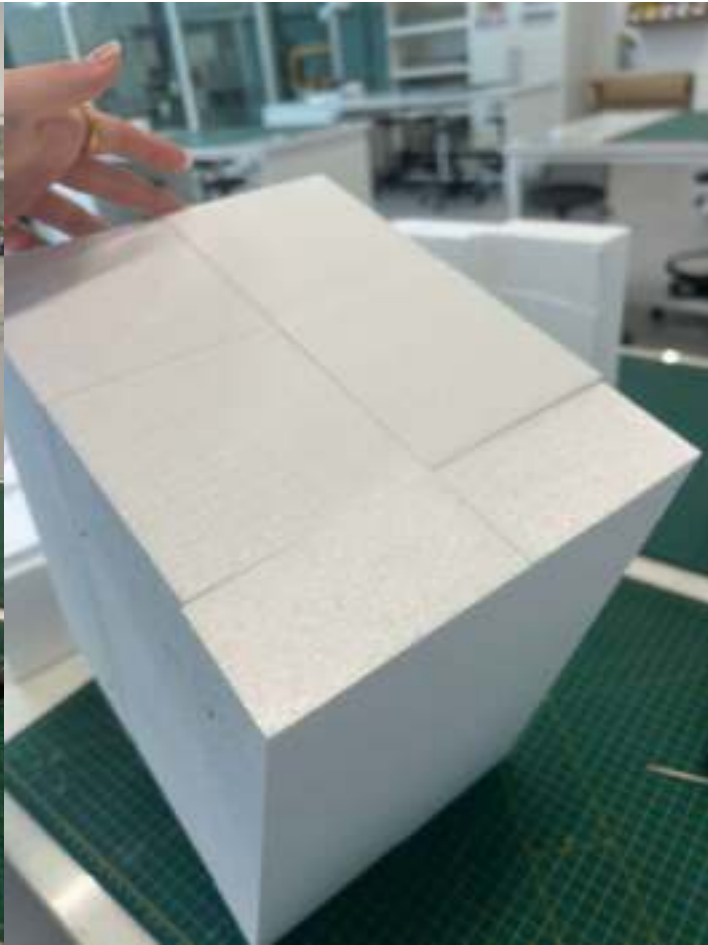
UX

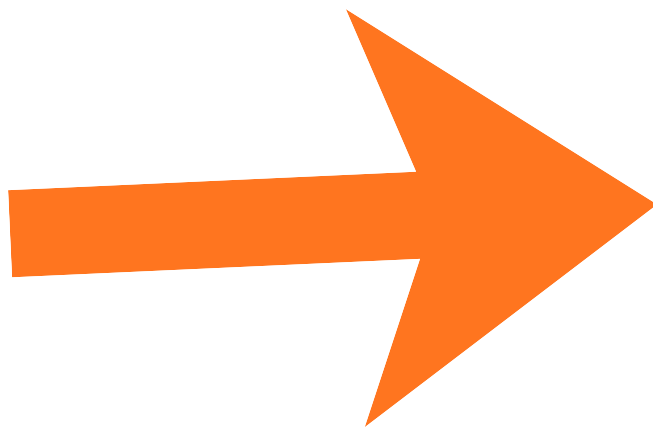
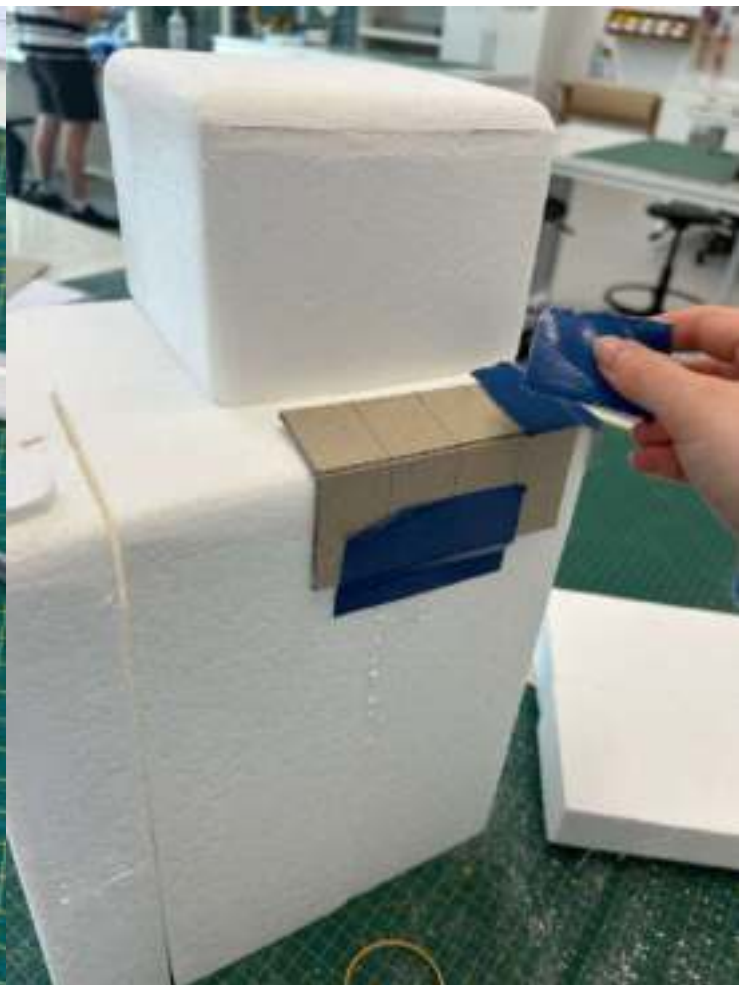


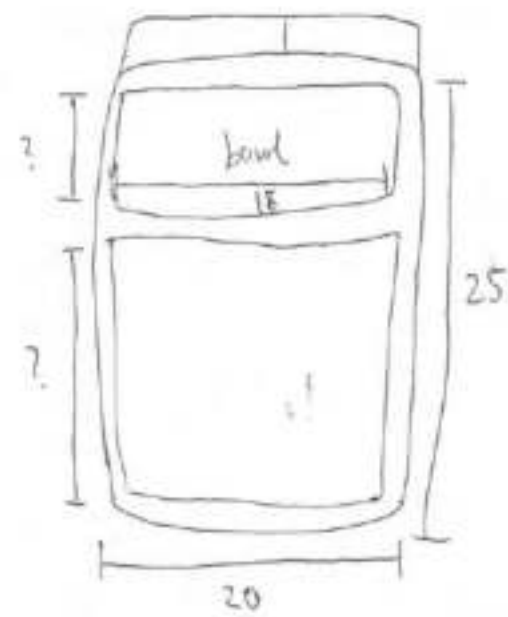


- water bowl mixing rod
- water tank attach/detachment
- filter swinging door
- holes of filter
- pathway of mixture to enter
- nozzles coming from motor
- fan
- blender blades

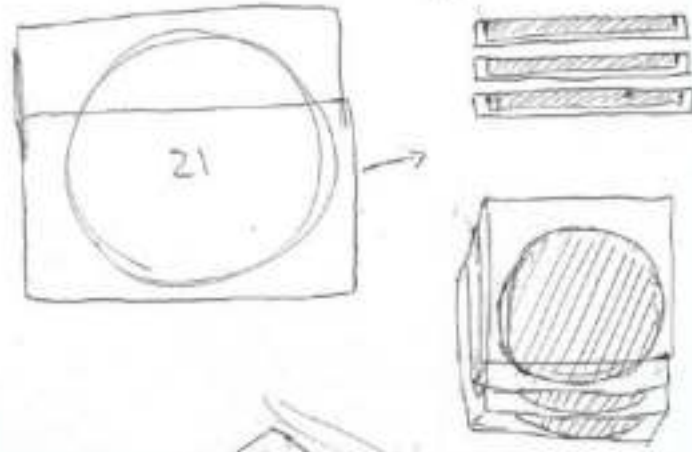






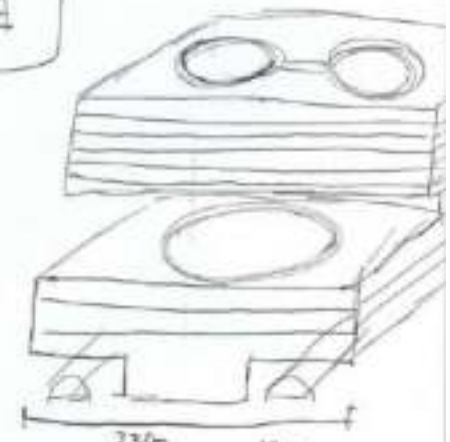
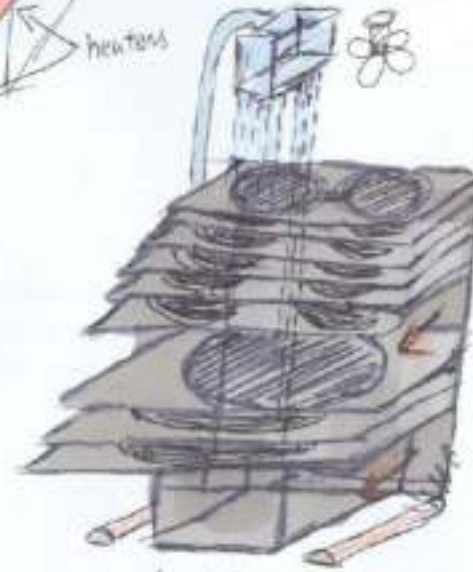
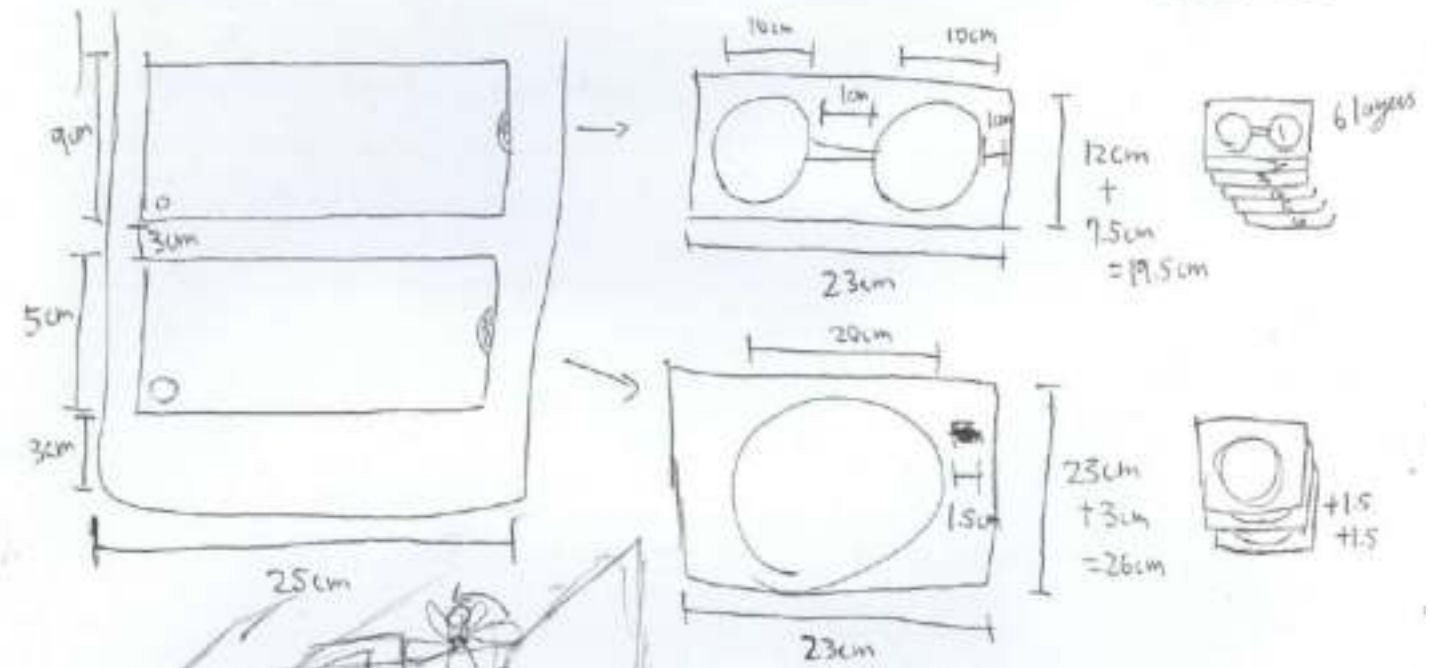
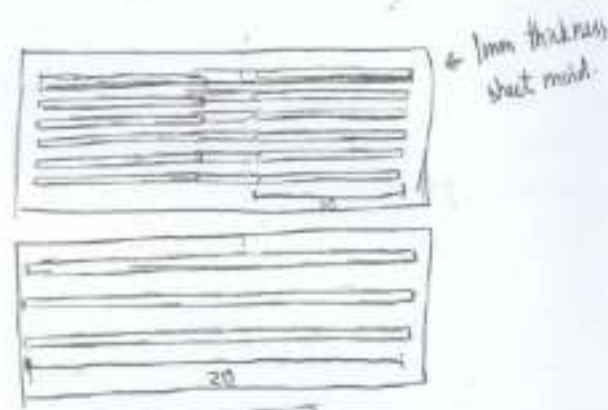
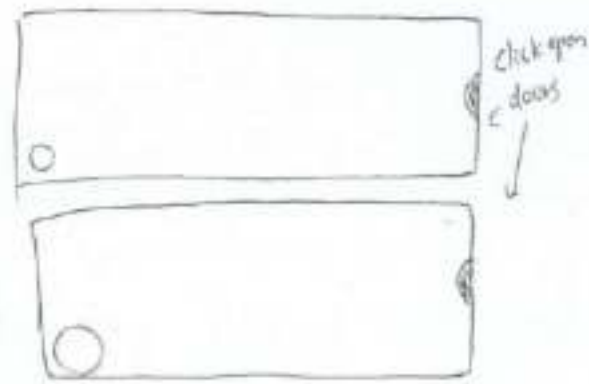


~~21cm X 3~~
~~12.6 X 8~~

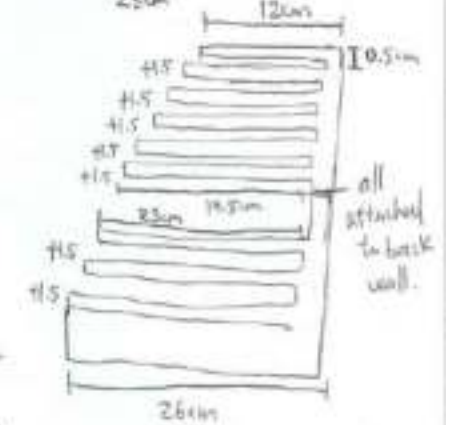
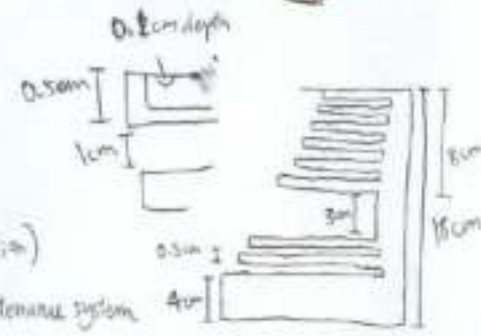


20cm X 3

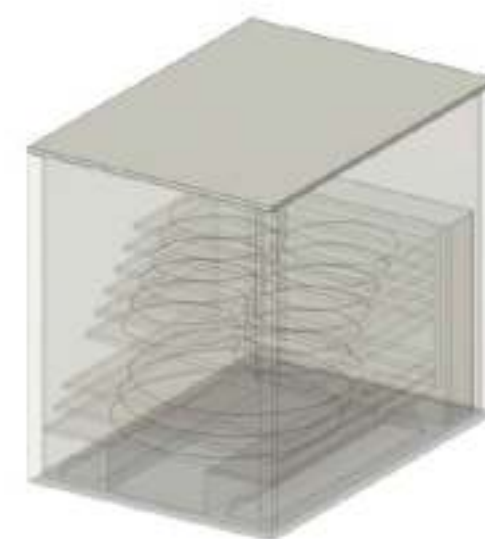
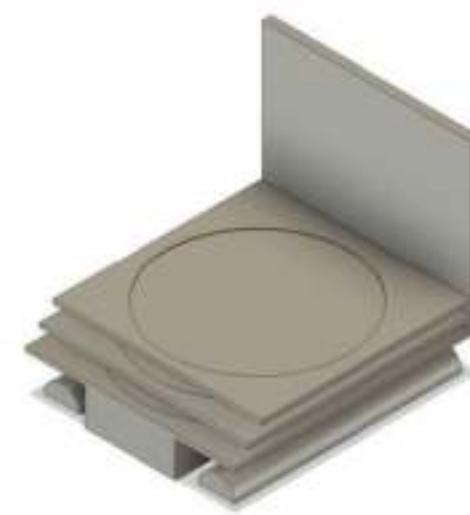
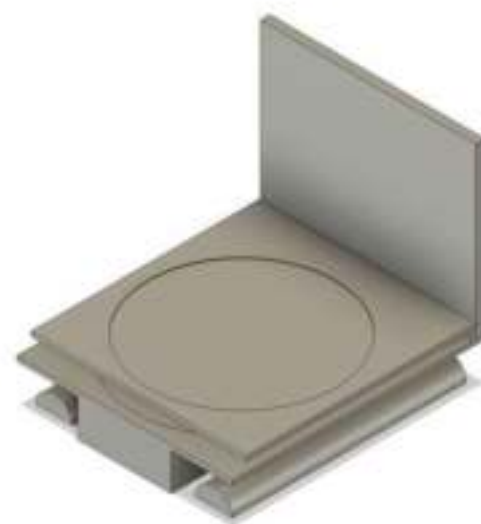
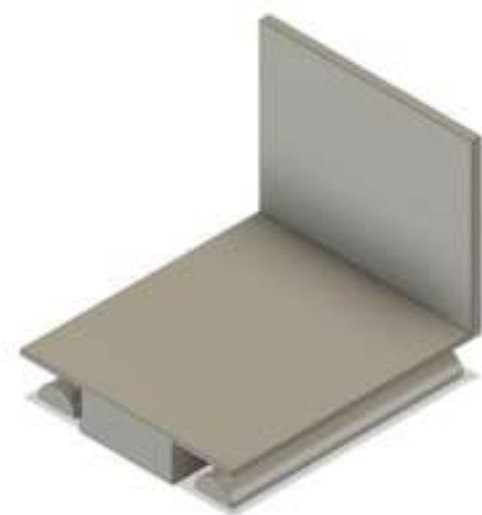
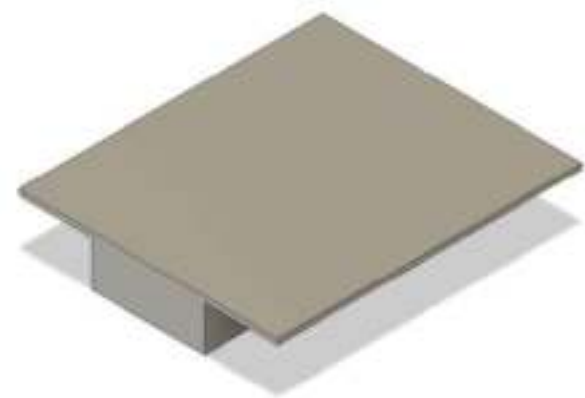
10cm X 182

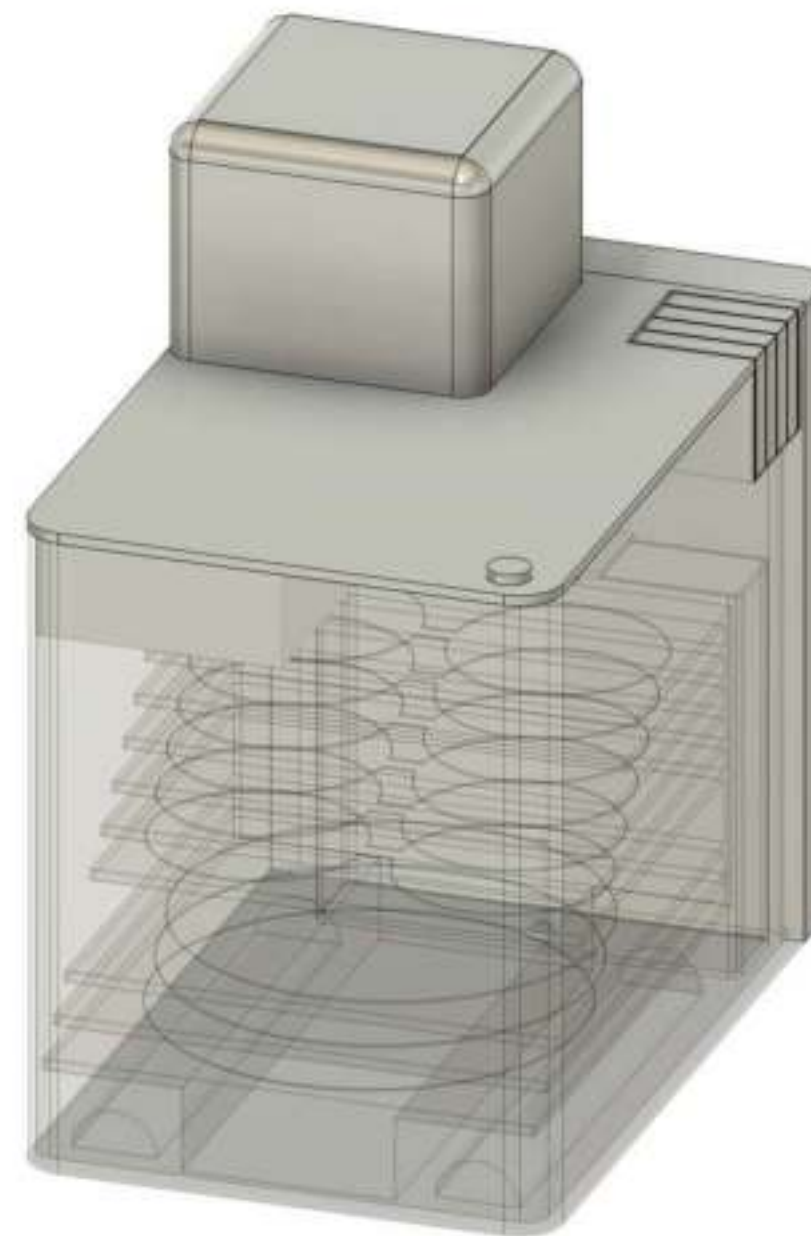
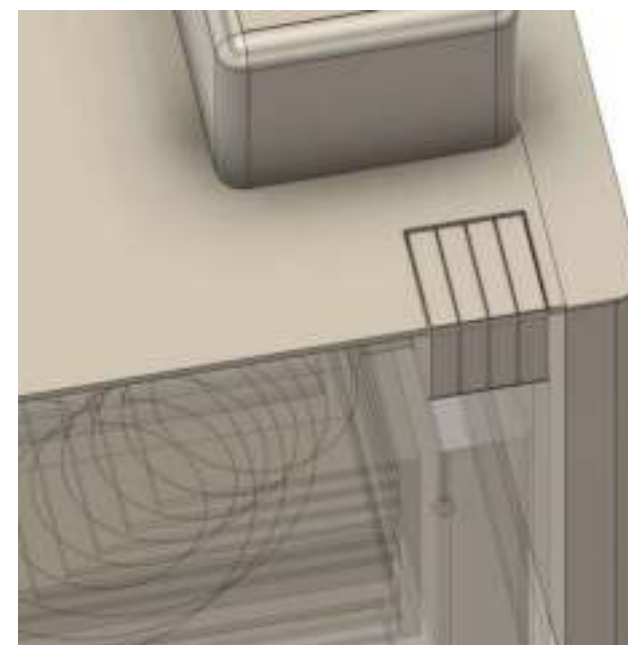
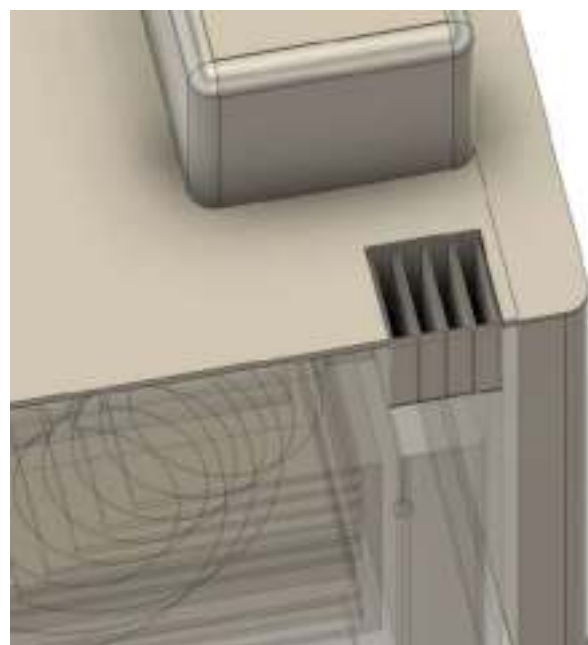
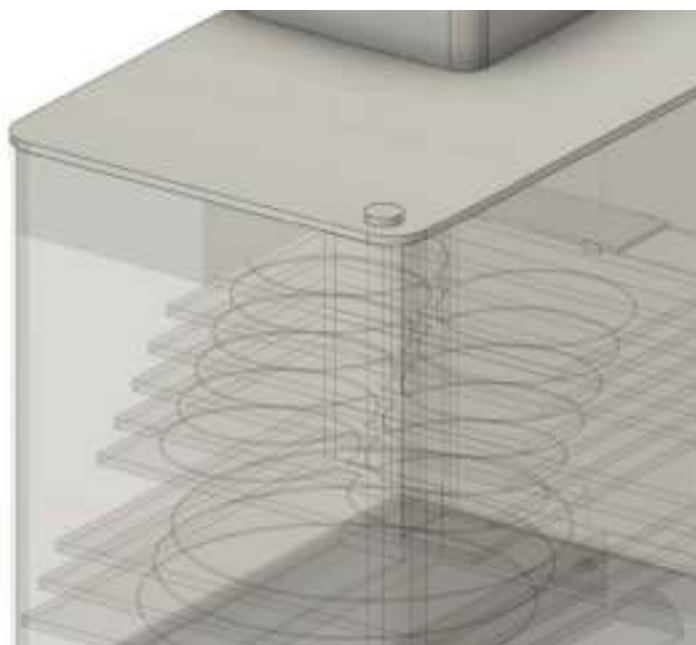
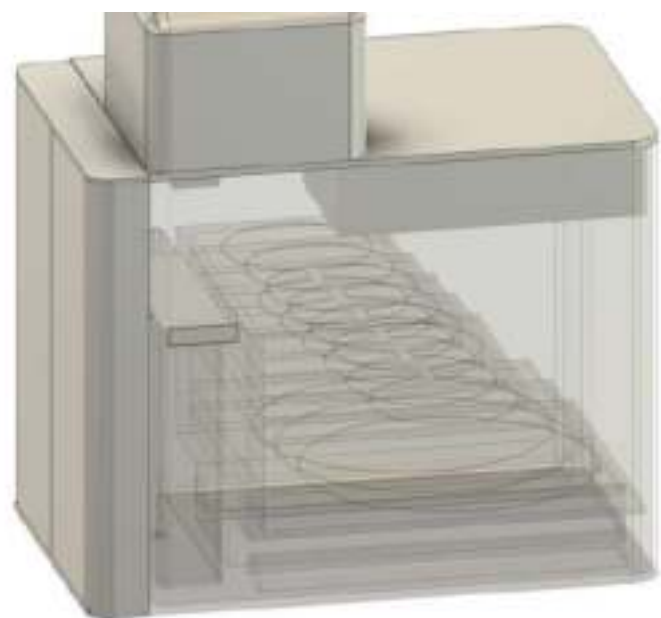
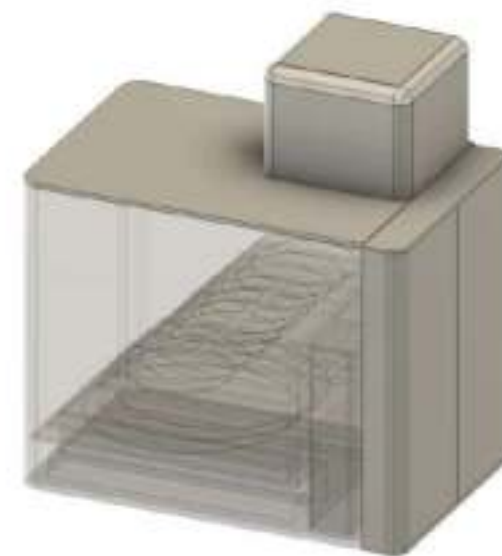
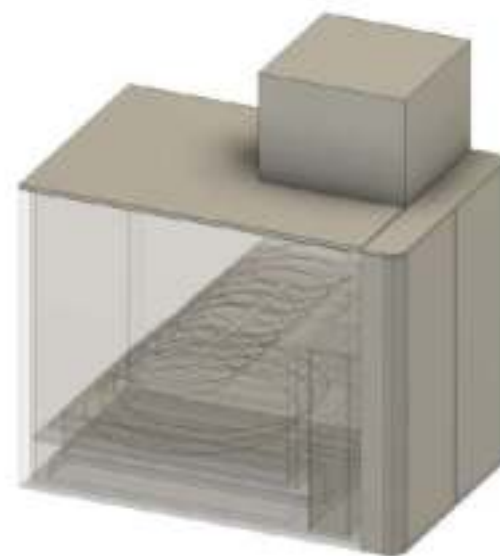
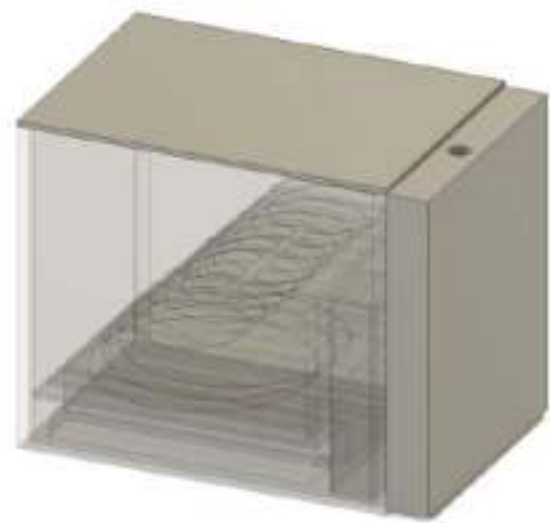
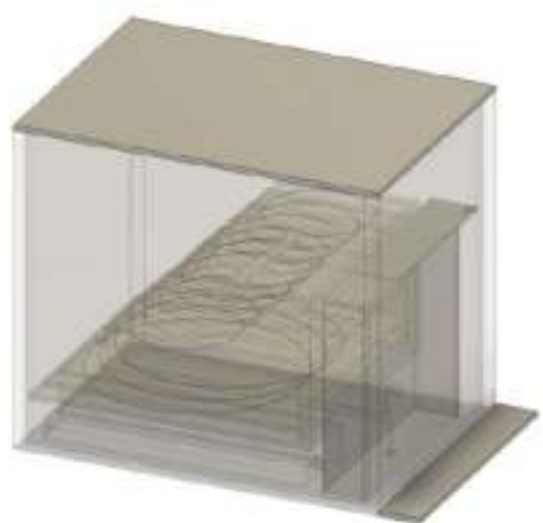


Oven → heater
→ fan (for even heat distribution)
+ clay wrap maintenance system



machine CAD process





FRIDGE TRACKER CAM

inspos of fridge application (and observing shapes, sizes, fridge placement etc.)

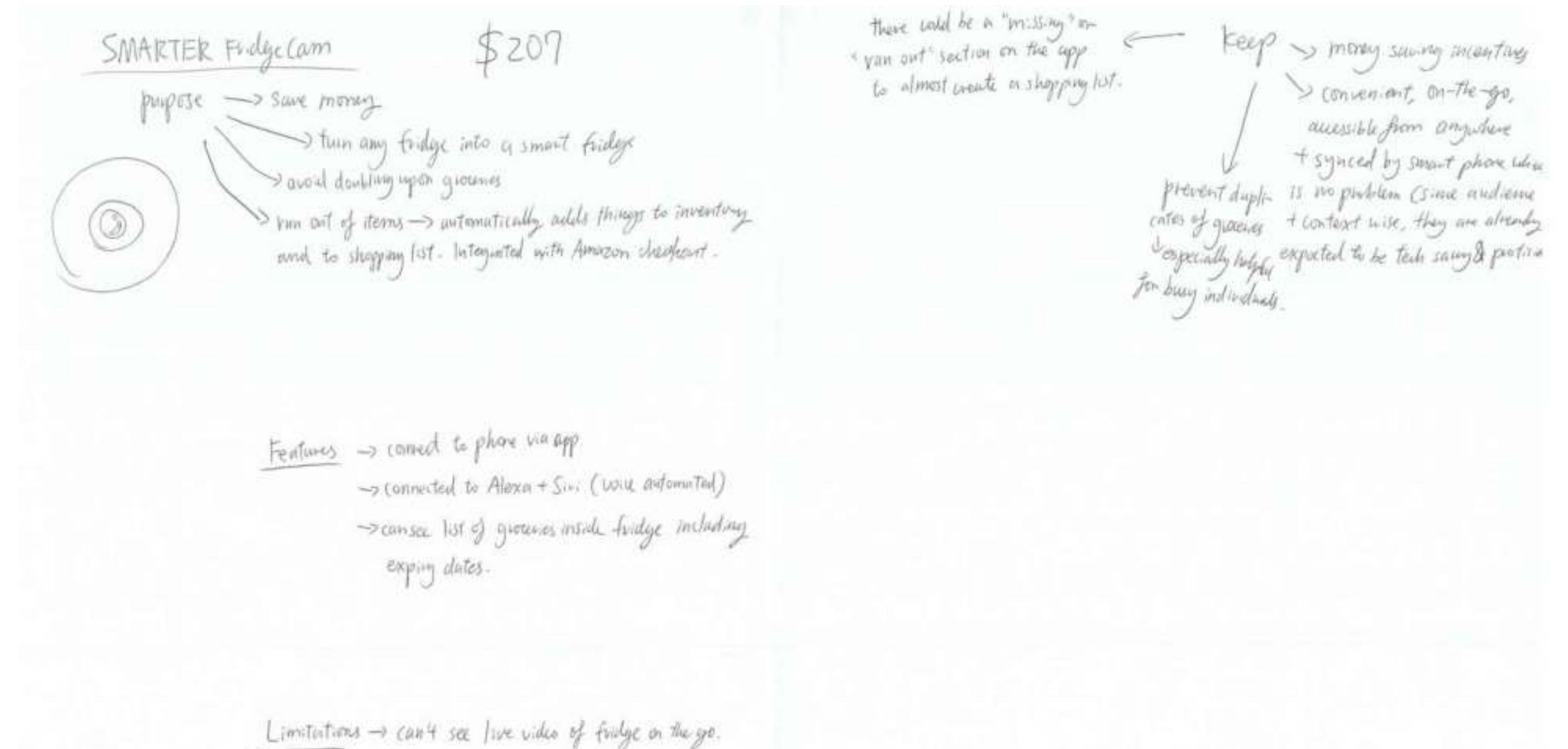


Closest competition/benchmarking



Smarter fridgeCam (inspired by Henry ford)

“FridgeCam is our money-saving solution, which turns any fridge into a smart fridge. It’s a powerful shopping list tool, which is designed to help you avoid doubling up on groceries. FridgeCam does all the work for you, by adding items from your inventory to the shopping list when you run out of them. Integrate with Amazon Fresh for one-click checkouts”



Smarter FridgeCam NEGATIVE REVIEW comments

“**Poor view** from the camera, very very **blurry** and useless”

“**Took 2 hours for the camera to connect** and sync to the smart phone “

“You **have to open the fridge door to activate the camera** and get a picture – which means for people living alone, unless someone is home available to open your fridge door, it is useless...”

“The **food items and barcodes are scanned by your phone app camera** and not the fridge cam itself so I am unsure what the whole point of this fridge camera is. On top of this, the camera is **blurry**”

“The app only recognises and **scans food products from a certain supermarket** (Tesco). I cannot scan the products because I don’t shop at Tesco. I am very annoyed since the advertisements did not mention this and there’s no use for me”

“I can only see a blurry picture when someone opens the door... Therefore I **cannot get any info about expiring products or really anything that was advertised.**”

“We spent an hour trying to pry the camera off the fridge door with a butter knife so we don’t **damage the fridge, which leaves behind a black glob** no matter what you do”

“The **battery of the camera only lasted 48 hours** so I had to recharge already. After this charge, the device lasted less than 2 days which is very disappointing. Also **quite big so it’s a huge waste of space**”

“The internals somehow moved about so that the **USB port and reset slot weren’t quite lined up right with the holes, forcing a bit of shoving** and yanking to either charge or reset the device each time”

“It doesn’t help that even in a pretty average-size fridge the camera **couldn’t actually get everything in shot – it misses the contents** of the door obviously, but also cut off the top shelf and the vegetable drawer. Plus, it’s quite clear one minute and the next it’s blurry”

KEY TAKEAWAY PROBLEMS/

OPPORTUNITIES TO IMPROVE

- blurry camera (either fogging from the cold or low quality camera)
- complicated and difficult user interaction on app?
- Having to open the door to activate the camera defeats the purpose of this design purpose (unless the app clearly states what is there in the food list)
- food items and barcode should all be scanned through the camera itself so its less time consuming for user - either implement ai or train camera to recognise everything
- barcodes and food recognition must not discriminate with having to force users to purchase from a certain store
- easy application/attachment and end of life detachment + mess free + no damage
- poor battery life/design
- big, bulky and waste of space in the already crammed fridge
- low quality battery cord slot in design, not aligned properly
- No full vision of the fridge, only partial, plus the camera allocation is all dependent on you



Expert Reviews

<https://www.expertreviews.co.uk> › ... › Large Appliances

Smarter FridgeCam review: Make your fridge less dumb ...

19 July 2018 — It has a fisheye lens to help it see top to bottom and an LED flash to ensure the images are bright and clear enough that you can see everything ...

Pros and cons: Can't see into all areas of your fridge · Completely blind to items in the door · [View full list](#)

2.0 ★★☆☆☆ · Review by Jonathan Bray



Galaxus.de

<https://www.galaxus.de> › ... › Fridge accessories

Reviews for smarter FridgeCam SFC01

worst phone app ever · not able to connect to 2.4 GHz wifi (the only one supported) once the fridge door is closed · wasn't even able to make it work once.

1.0 ★☆☆☆☆ (1)



Amazon.com.au

<https://www.amazon.com.au> › FridgeCam-Smarter-Foo...

Smarter FridgeCam by with Food Tracking - Wi-Fi Fridge ...

Smarter. Customer Reviews, 3.2 out of 5 stars 6reviews. ASIN, B096CDV4LV. Item Type Name, Smart Fridge. Item height, 6.5 centimetres. Additional Features, Live ...

3.2 ★★☆☆☆ (6)



Tech Advisor

<https://www.techadvisor.com> › ... › Home Tech Reviews

Smarter FridgeCam Review: Not So Smart

6 Aug 2018 — The Smarter FridgeCam hopes to give your dumb fridge an IQ boost for a fraction of the price of a new smart fridge - but right now it's a fiddly, unreliable ...

Pros and cons: Looks great · Fiddly setup · Connection problems · [View full list](#)

2.0 ★★☆☆☆ · Review by Dominic Preston



Climbing Moss

<https://climbing-moss.com> › 2018/08/23 › the-not-so-s...

The Not So 'Smarter FridgeCam'

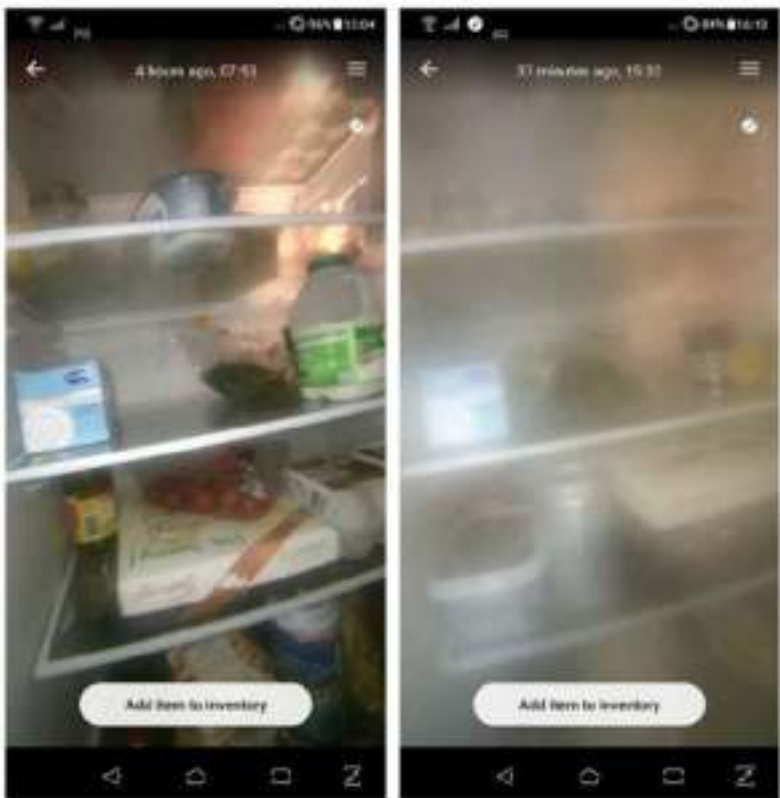
23 Aug 2018 — A camera you put in your fridge that helps you cut down on your waste and in turn helps you save some money in the long run.

Pros and cons: Helps you save some money in the long run · Battery lasts less than 48 hours ·

[View full list](#)



The camera attachment design was very bad and did not allow easy attachment and detachment. I understand it should be very sticy so that it doesn't fall off but the end of life cycle needs to be designed to be more smooth and stress free as well. (And to not damage the fridge that it sticks on of course)



User mentioned the camera going blurry even though it was clear earlier. - possibly the cold fogging the surface of the camera? How can I prevent this?



The image as advertised and the real experience by the user is evidently very different and disappointig - blurry camera, and the vision area seems to be more narrow therefore not being able to fit that much in the image.

At a Glance

Expert's Rating

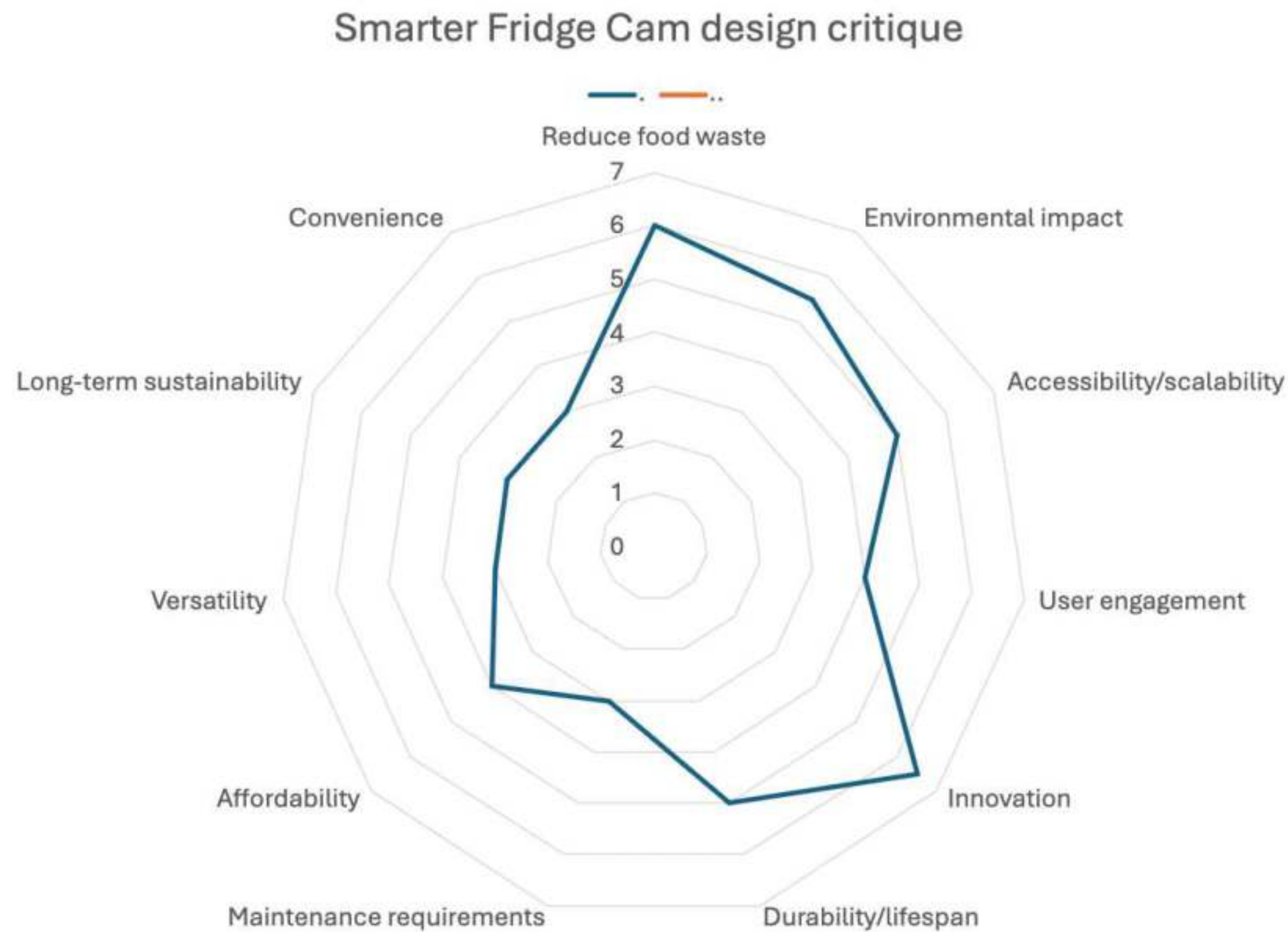
★★☆☆☆

Our Verdict

The best connected devices make our lives easier and smoother, solving problems and simplifying our daily routines. Right now, the FridgeCam does the opposite: it gives you more things to track, and manage, and worry about. If it worked better as a camera we'd just say you should skip the object tracking and use it as an easy way to peek into your fridge while you're in the shops, but since it only takes sporadic photos of some of your shelves, it's hard to even recommend on that basis.

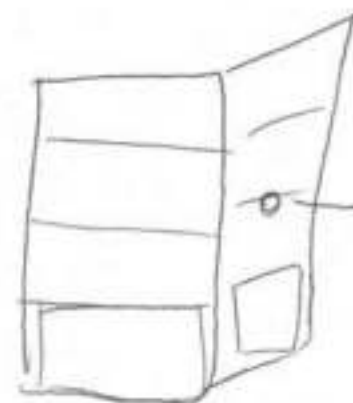
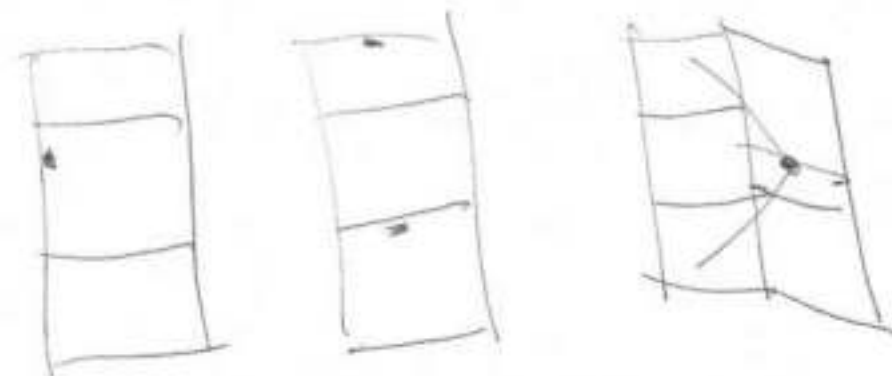
The fridge camera device should OBVIOUSLY be providing users with more convenience and an easy solution to their needs to track their food items in the fridge - not creatre more work and then do a consistently poor job.

Spider graph critiquing the product design



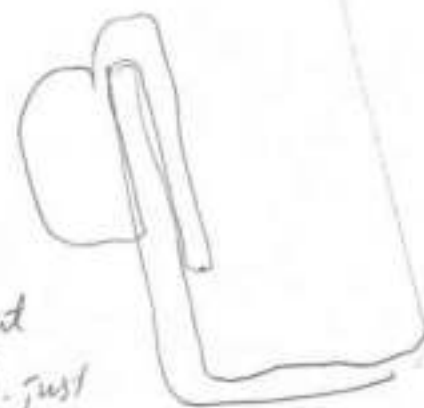


- keeps track of what went in + out (removed from list if out of the fridge for over an hour) — using camera.
- tracks HOW LONG items have been inside + notifies user
- use AI to determine shelf life of all these foods.
- sleeping but kept turned on until it senses fridge light + motion & then is on stand by



360° vision
on 2 cameras?

(no need to be very specific what camera model. just size, performance + cost-features)

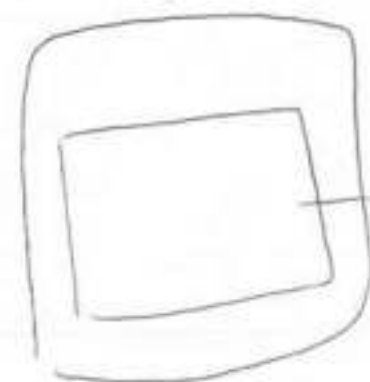


• how would it know if one item is new or old if there's multiple?

• how to input expiring date — on the app? could the AI tell?

↓ if AI is unsure — based on time + subtle appearance differences, the app could ask — "did you swap with a new product? or is it the same one?"

user has to make sure camera is getting the date labels + AI can recognise even subtle appearance differences if required.



design around the required size for a circuit board! (re: resp. battery)

Am I designing for discreet?
decoration/nice design?

3 battery options



1000 mAh
Li-Po

(USB rechargeable battery)

how long would it take to recharge?

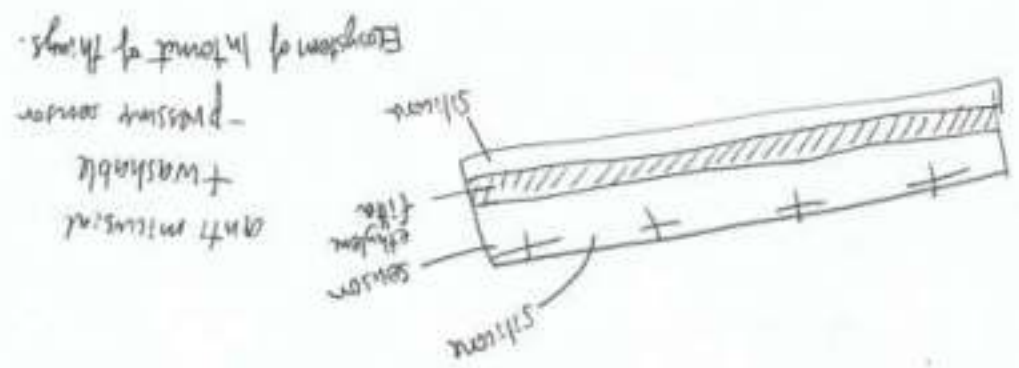
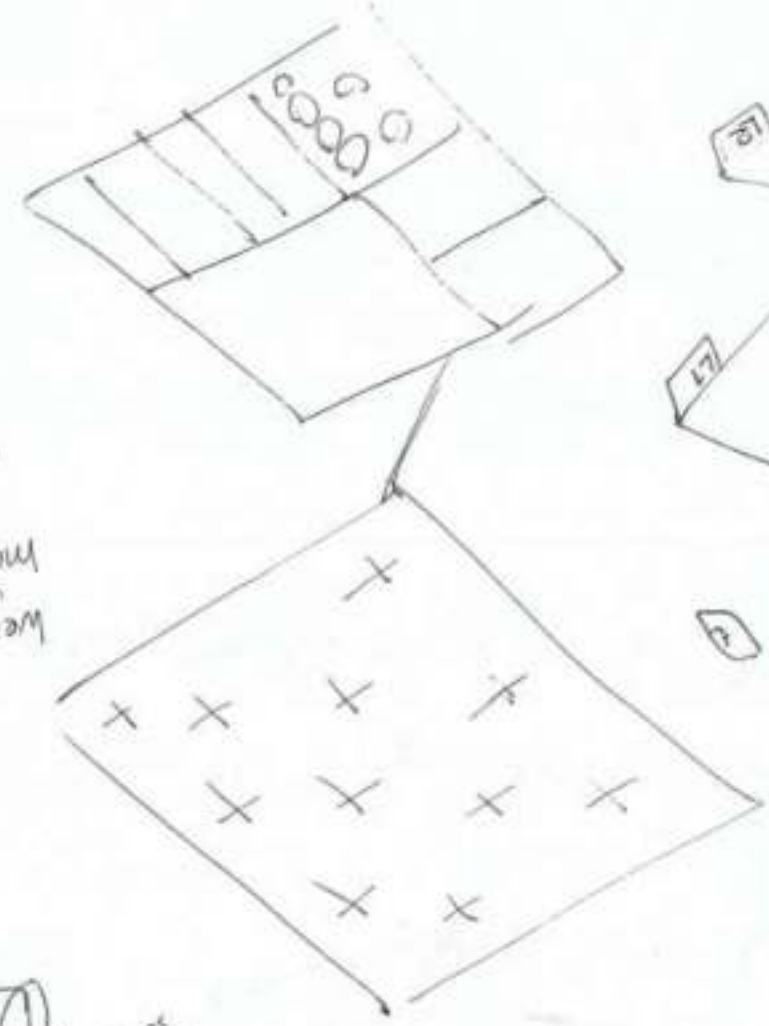
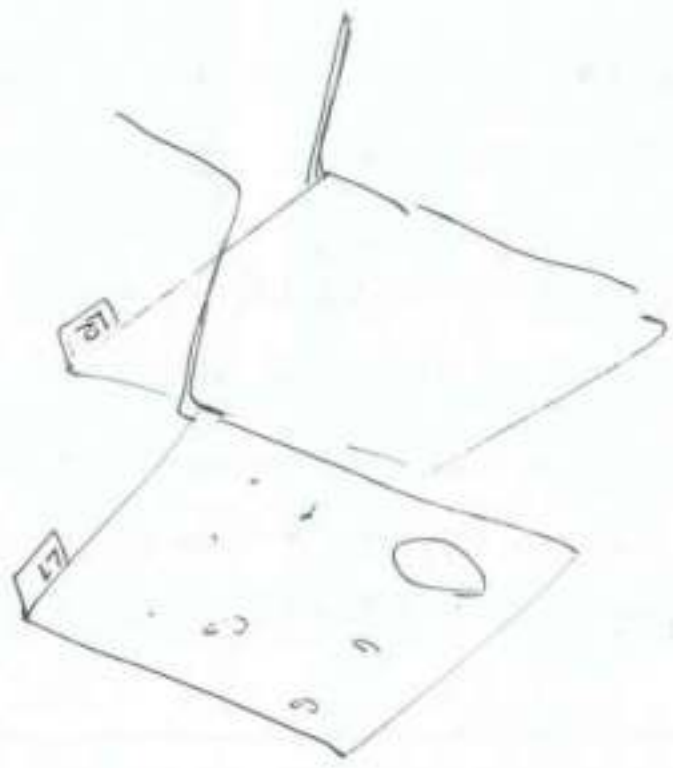
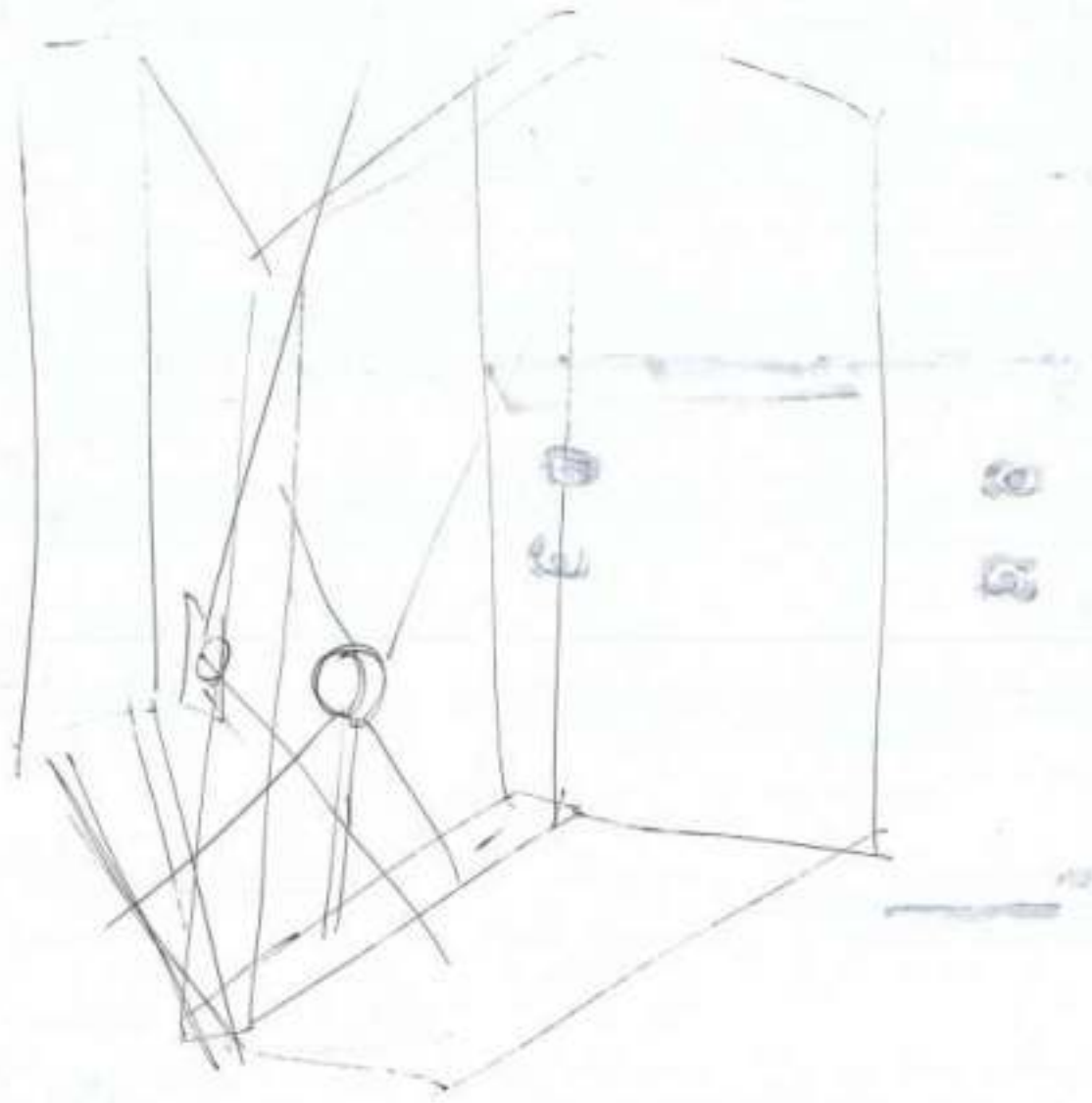
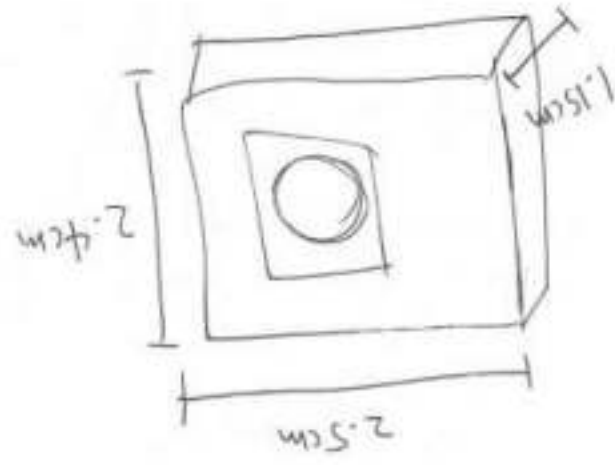


basic
AA

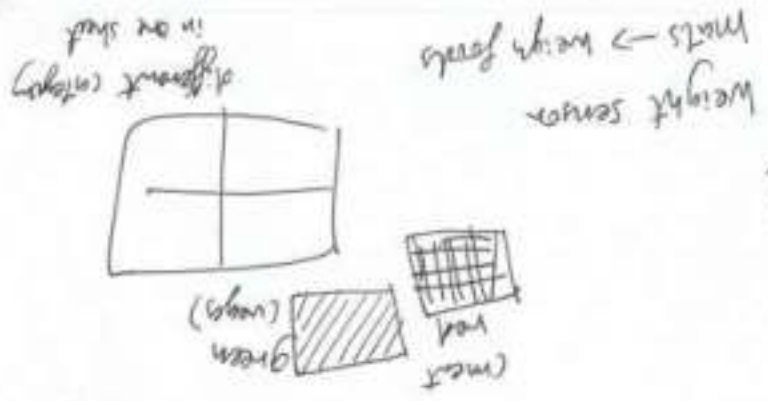
batteries
(preferably rechargeable ones for sustainability)

FRIDGE WEIGHT SENSOR MAT

(FINAL FINAL chosen concept)



- recognise if some foods haven't been moved in a while
- weight to see how much you got stored in your fridge.
- they all sync to each other? or just straight to the app?



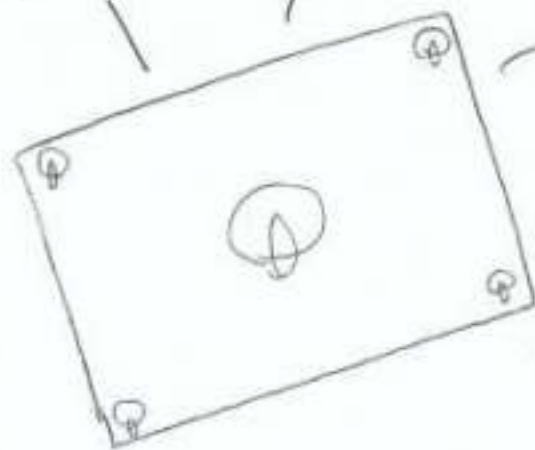
- colour-changing?
- notify app?

how is it perceived?
inside the mat?
or outside the mat?
source?

bluetooth/wifi or both

both bluetooth
+ wifi connection

24 bit ADC
(with lower power +
lower noise)



load cells (weight sensor)
(either on all corners or big one
in the middle)

+ a stiff base plate to distribute the load

user interface

mat → battery indication (unless powered by cord at all times)
app → UX interaction.



rechargeable
battery
• wide but slim
• probably the
cheaper option



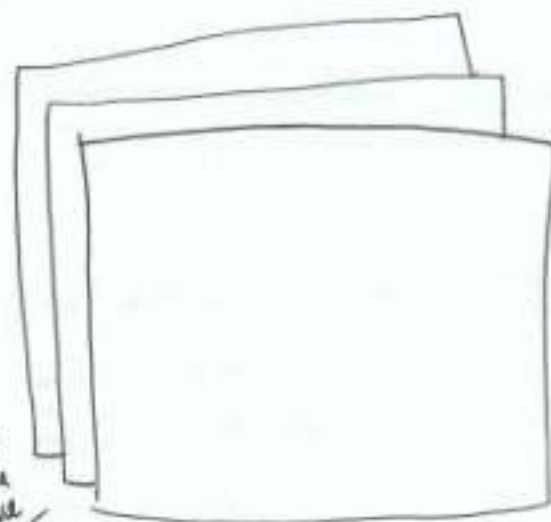
AA batteries
• may take up
more space
• may be less
sustainable UNLESS
user uses rechargeable
AA batteries.



rechargeable
3V batteries
• tiny!
• rechargeable
• may be harder to find
↳ LIR2032 100
rechargeable batteries 3.6V

top layer

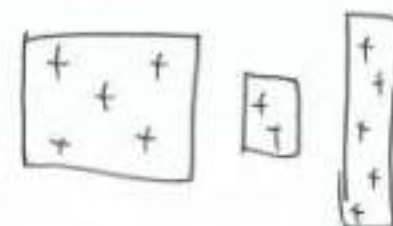
washable, waterproof food grade
silicone
+ anti-slip.
(removable top to wash
or pop in dishwasher?)



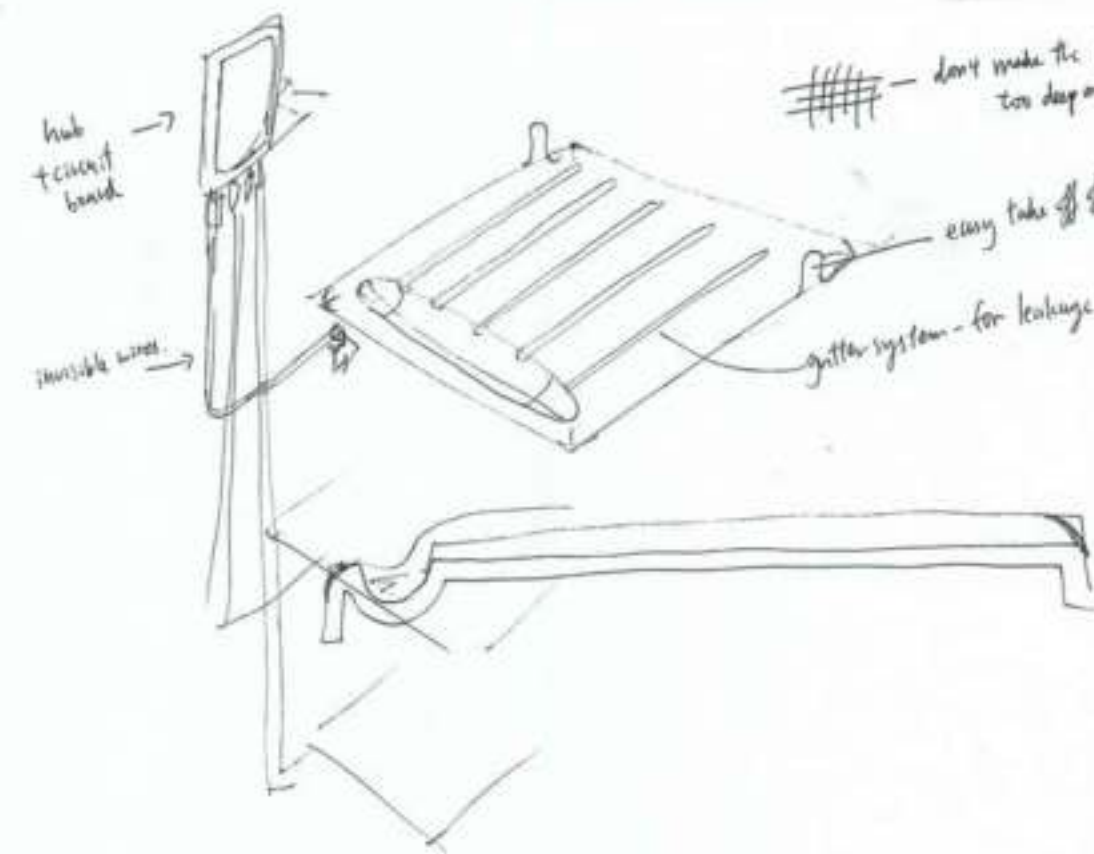
user receives multiple big different coloured sheets.
as well as the weight tech sheets (that go inside?)



+



every size x 1
electronics. up to user
which they want to
use in what colour.



don't make the anti-slip design
too deep or textured → gets accumulates dirt
hard to wash overtime.

easy take off of the top layer
gutter system - for leakage

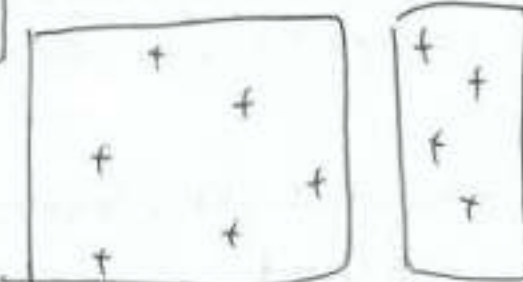
- the physical design is
more important (rather than
the interaction)

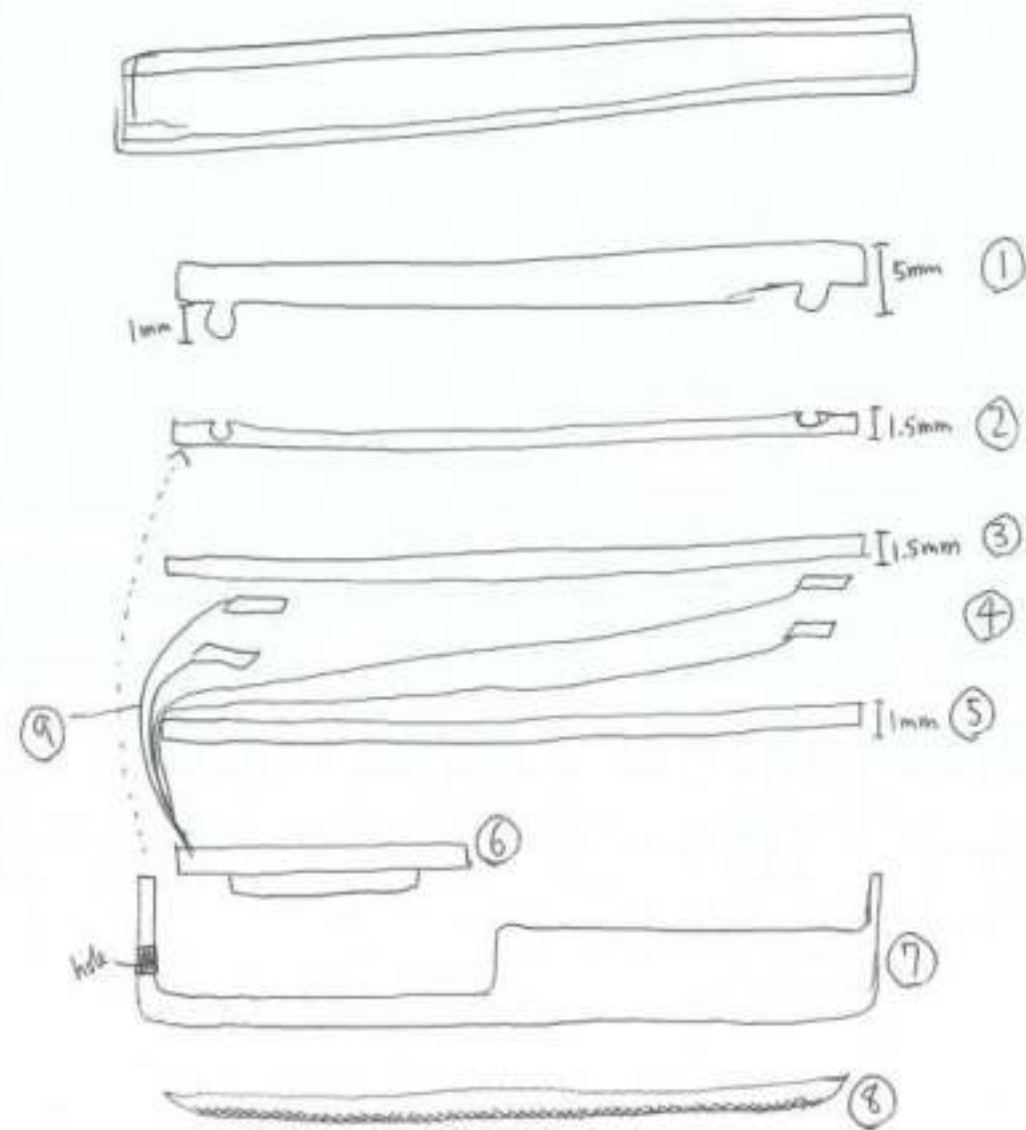
Seals in the
electron is in the
cold + to wash

pockets layer of
silicone - removable
to wash or replace
colour!



interchangeable?
user can switch
colours if they
change their mind.
- or even cut the sheets
themselves?





1 TOP LAYER

- ↳ silicone - food grade, dishwasher safe & non-slip grip/patterns
- ↳ detachable → to wash/pop in dishwasher + interchangeable/
replace with another colour or food category = personalisable
(organising household things can be a very personal activity/commitment/houtine)



2 LAYER BENEATH THE COLOUR

- ↳ attaches the top layer with a hole
- ↳ acts as a protective barricade cushion + shock absorber right above the flat board - responsible for measuring the weight.
- ↳ basic non food grade silicone as this doesn't touch the fridge surface + is just protecting + surrounding the electronics.



3 FLAT BOARD

- ↳ made out of aluminium → durable and can stay thin - 1.5mm
- ↳ Allows even distribution of weight being measured by the load cells underneath.

4 LOAD CELLS



- ↳ 4 load cells to be placed in every corner of the mat right beneath the flat board to measure weight
- ↳ powered through a very thin & flexible cord that each cell is attached to which each goes straight down to the PCB board.

5 ANOTHER SILICONE LAYER

- ↳ act as a cushion/protection layer in between the load cells and the PCB board.

6 PCB BOARD

- ↳ has all the necessary electronics parts attached = 24 bit ADC, microcontroller, battery charger, MCP6541 and the battery on the bottom.

7 BOTTOM COMPLEX SILICONE LAYER

- ↳ walls on both sides to surround and protect the electronics, all the way up to covering the flat board (as they never need to come out)
- ↳ there's a hole right beside where the PCB board is for plugging in charger cord.

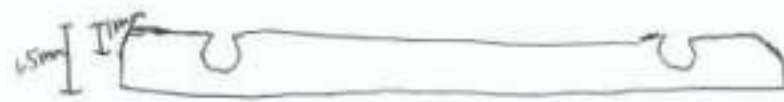
8 BOTTOM BASE

- ↳ same silicone material as the top layer → food grade, dishwasher safe & non-slip grip (patterns)
- ↳ this is also detachable for easy cleaning. (since this part would also go through lots of surface contact & accumulate things that may have silt on it.)





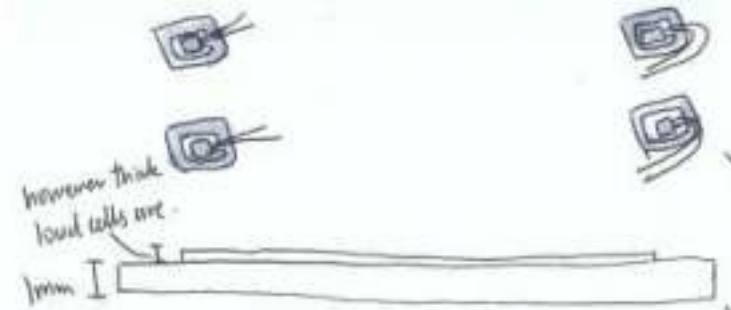
- ① top layer → 3D print CAD with silicone (CAD with the grippy patterns on the surface)
↳ print multiple to paint each with different colours (and to see if I can swap effortlessly)



- ② silicone layer → CAD print with the ~~two~~^{four} holes on each corner.
↳ no need to paint, clear is good!



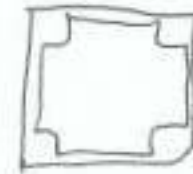
- ③ flat board → slightly less wide than the silicone above to fit inside the walls later.
↳ print 1.5mm sheet in plastic OR laser cut acrylic if they have 1.5mm
↳ then spray paint with metallic silver → aluminium appearance.



- ④ load cells → CAD model a load cell
↳ print 4 + spray paint metallic silver
↳ attach thin metal wires after painting 2 ^{red}_{black} to mimic the cables (super glue or hot glue)



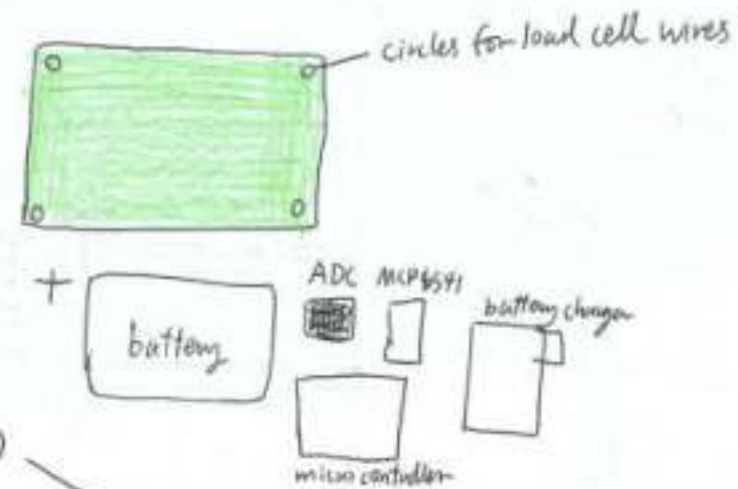
- ⑤ silicone layer → CAD model with a little stage to keep load cells in place + protected
↳ thickness → 1mm with a stage matching the load cell's height.



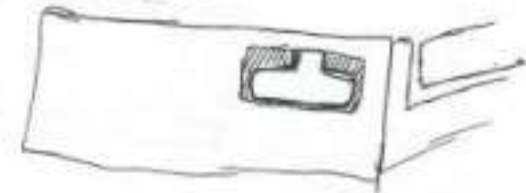
- ⑥ PCB board → either CAD model board, spray paint green & attach all other little parts
OR find a discarded circuit board.
OR print rectangle CAD model + attach sticker of circuit board image.
↳ paint all parts individually + hot glue together



- ⑦ silicone bottom → has walls + surrounds and protects all tech inside.
↳ thicker/taller where the PCB board is not to keep mut even & the PCB board protected.
↳ create hole right beside PCB board → USB port for charging (subject to change what port)
↳ print and keep clear, no need for painting
↳ holes for the bottom base to attach

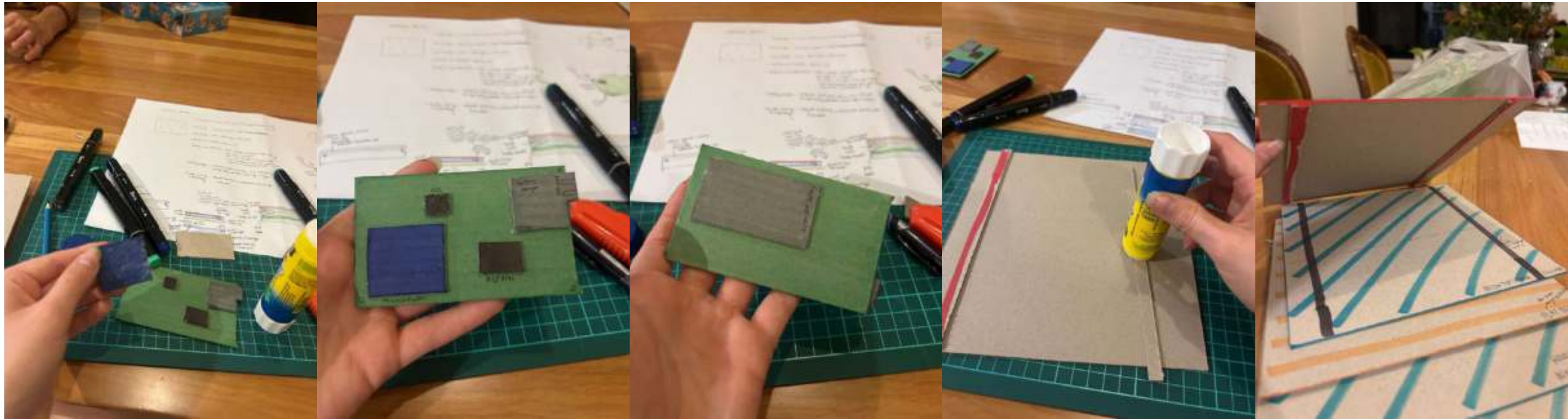


- ⑧ bottom base → CAD with the 4 attachment Σ and the grips patterns on surface
↳ no need for spray painting.



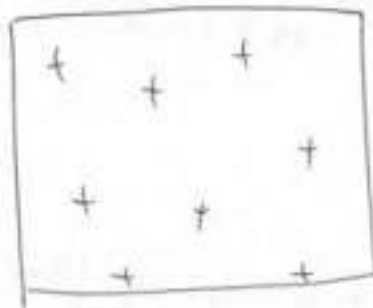
easy port lid (since its flexible silicone) & keeps the charging hole protected from dirt + liquids.

Initial testing prototype of the Fridge mat



Electronics (per mat)

• Load cells → 4 low profile Sleg strain-gauge load cells



• 24 bit ADC - HX711 (common + cheap)

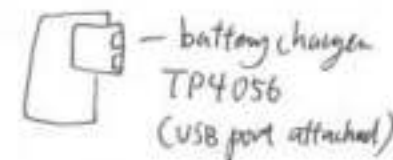
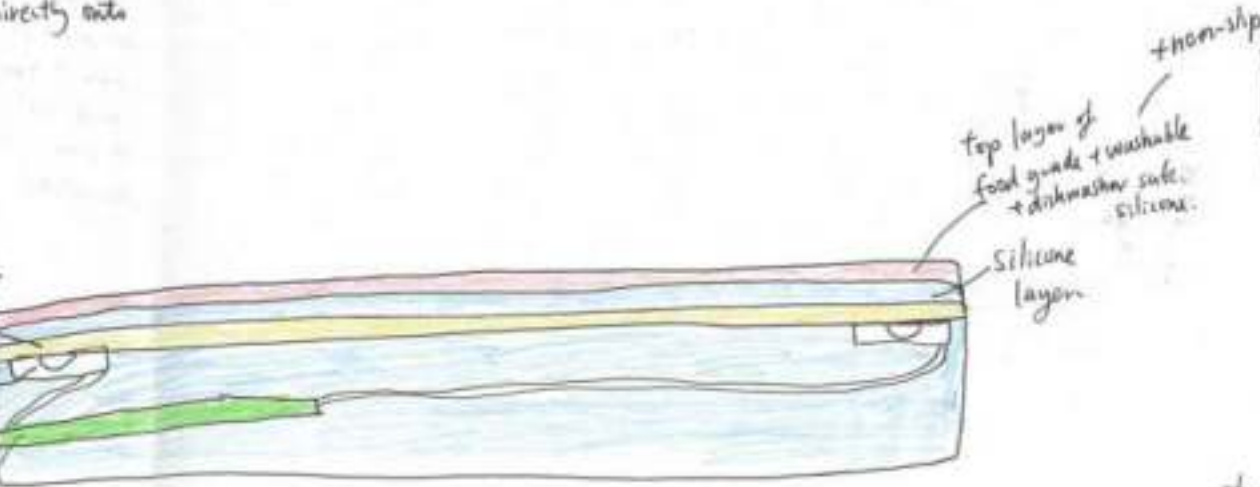
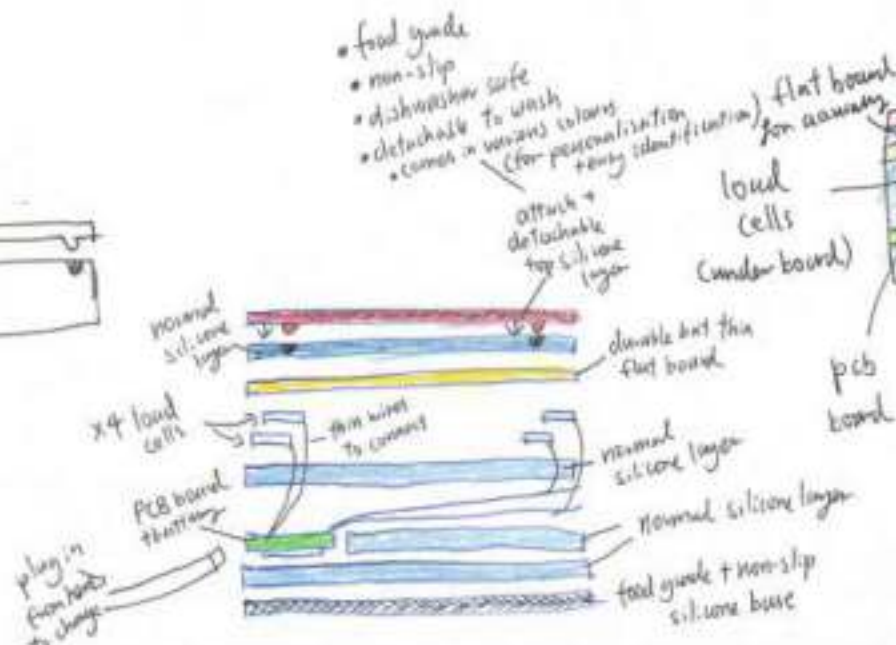
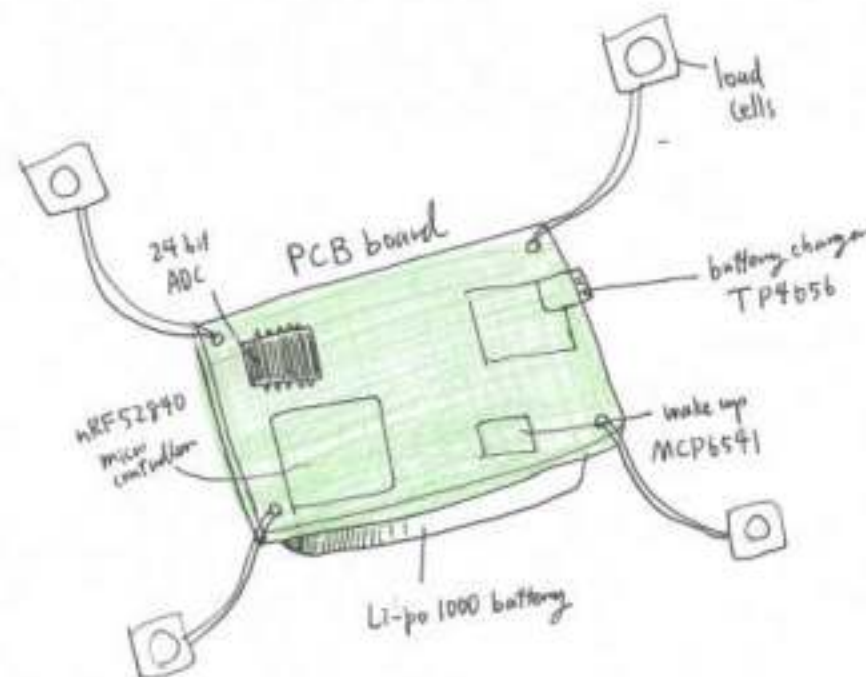
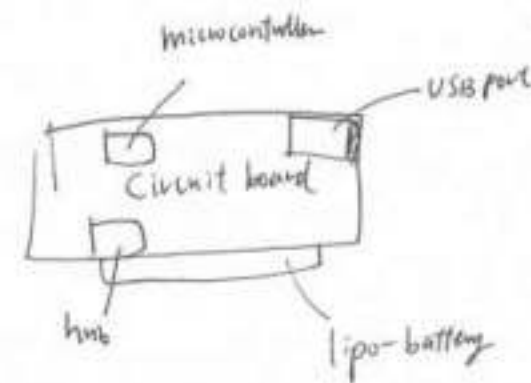
• Microcontroller - Nordic nRF52840 / nRF52833

• Hub (for wifi + bluetooth) - ESP32-S3

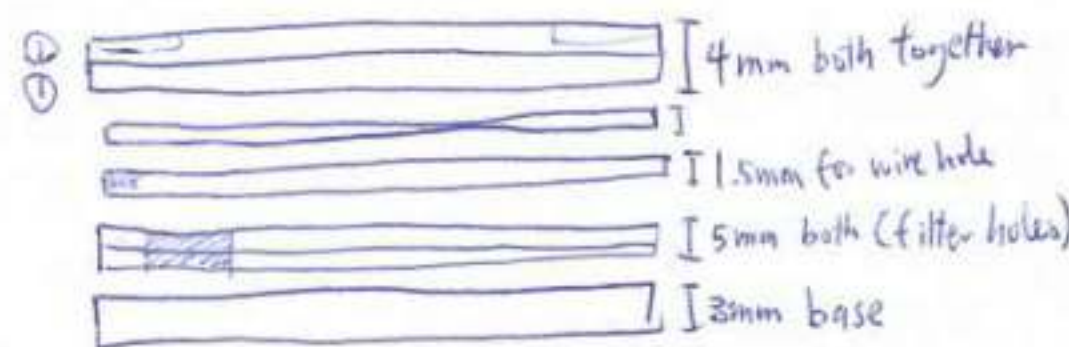
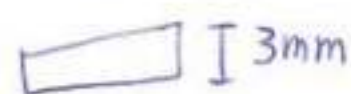
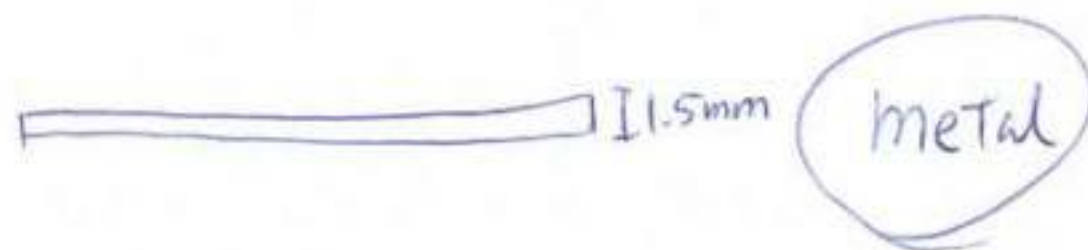
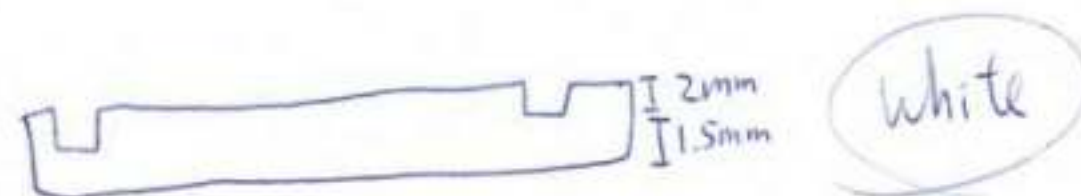
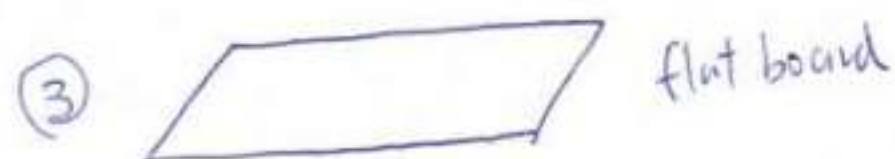
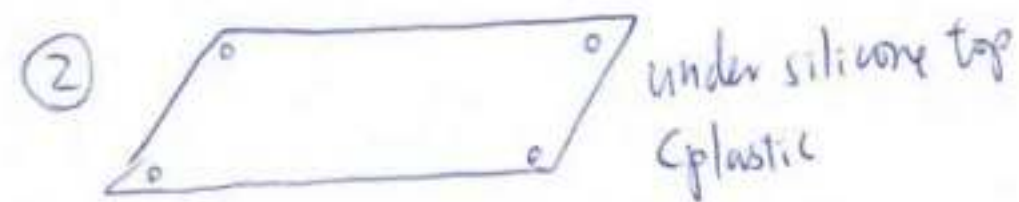
• Battery Li-po 1000 battery - (1000 is enough, assuming the mats wake up 10x a day → 2.5 months 30x a day → 4 weeks last per charge! With deep sleep mode, short wake cycles, low power communication by using BOTH π + λ !

• battery charger - TP4056 small board with a micro USB port. (to keep battery protected + stable + safe to charge)

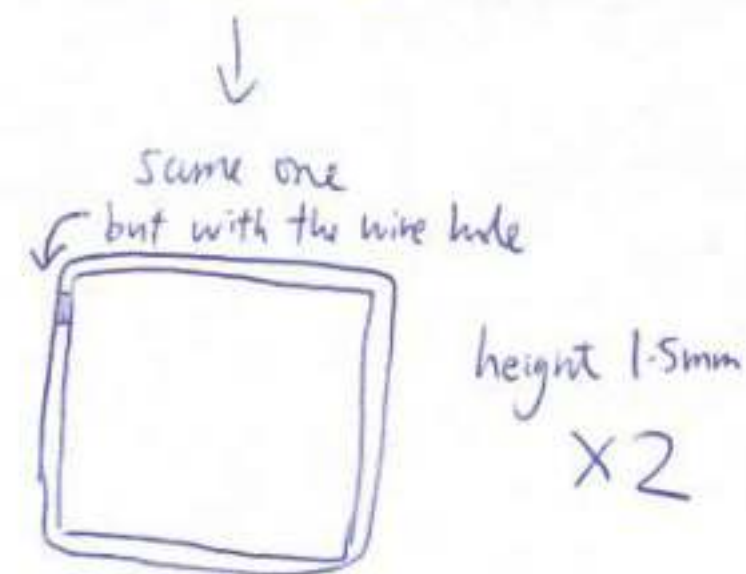
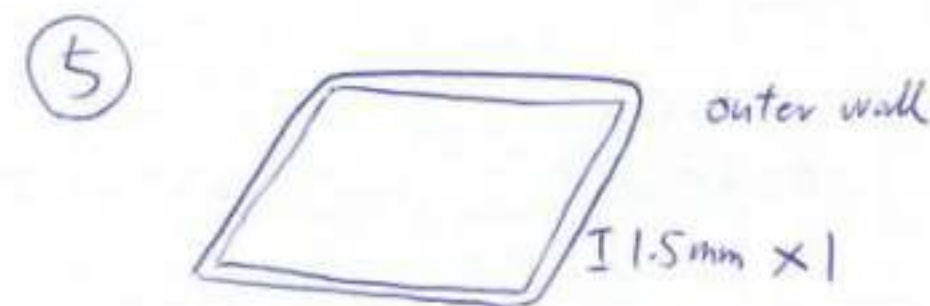
• to wake mat up - integrate MCP6541 + AD3907A directly onto PCB board



+ a flat board in between all load cell corners to distribute weight evenly
 ↳ each load cell measures its portion of the weight correctly
 ↳ ADC reads accurate values
 ↳ microcontroller calculates total weight held
 ↳ data sent to app = true weight



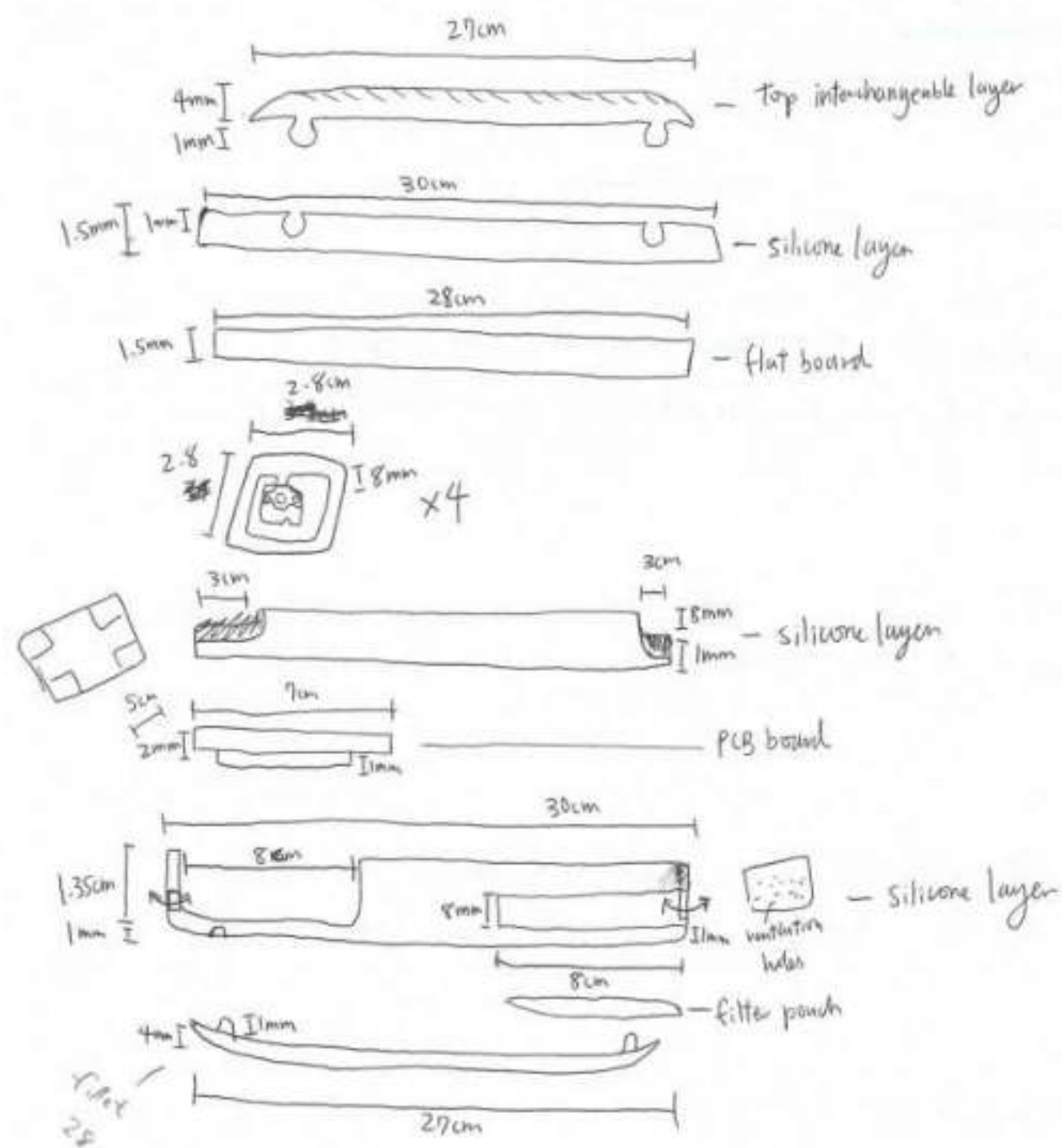
I need



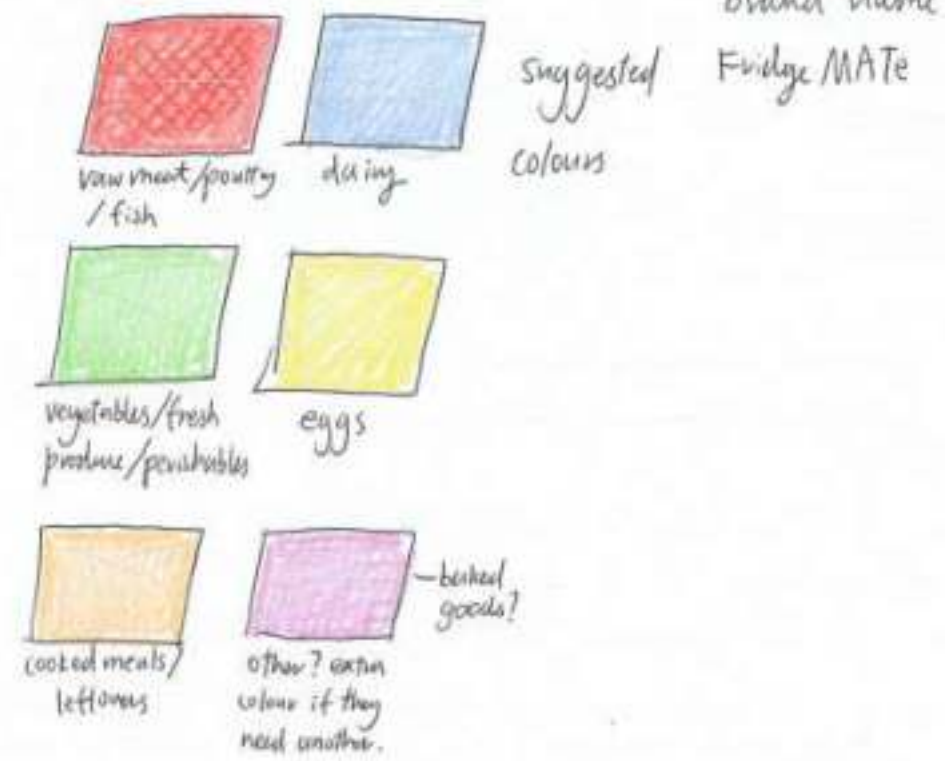
details/info to put in pres.

- load cells can measure up to 5kg
- each mat user purchases, comes with all colours.
- if you have duplicates of the same coloured mat, you can sync them as one or put them next to each other + sync as one on app. (whether or not they're next to each other or separate)
- to know exactly what's on the mat - ~~scan~~ sync flybuys / everyday rewards + make it possible to take pic of receipt & scan as well?

① 30x30 classic shelf mat



- + the non-slip texture on top + bottom
- + close off the 4 lead wires
- + would the top + bottom layer be made thinner?



↓
go back to app - set up the mats individually

BLUETOOTH CONNECTION



→ choose mat
→ choose colour
colour settings popup
↓
set colours → what do you want each colour to be? (show suggestions)
↓
go back to bluetooth screen
↓
select colour for each individual mat.

WIFI CONNECTION

↓
go to wifi settings & connect to your home wifi (on phone)
↓
connect home wifi on the app (put in password)

Mood board/product aesthetics + materials inspo



top layer



silicone (food grade,
dishwasher safe & anti-slip)



plastic layer



polypropylene (durable,
chemical resistant, food safe
plastic) - white



flat board



aluminium flat board
1.5mm



load cells



aluminium load cells
connected to metal wire



supported
plastic



polypropylene - white



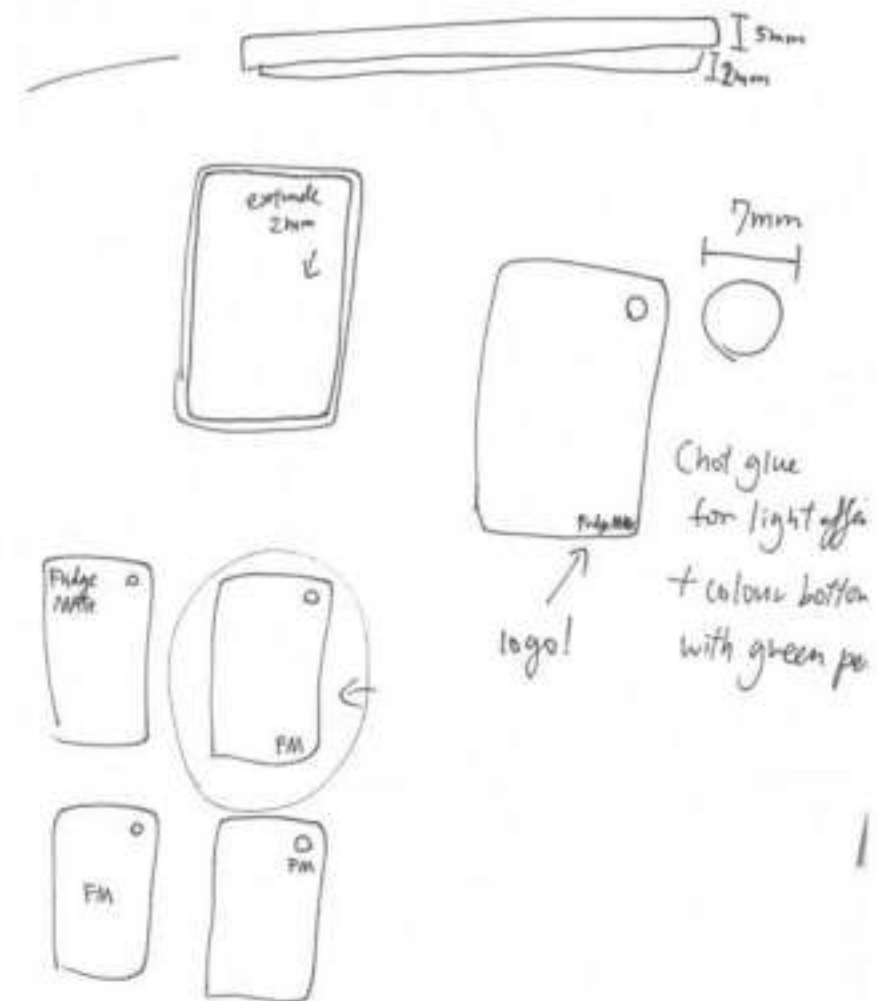
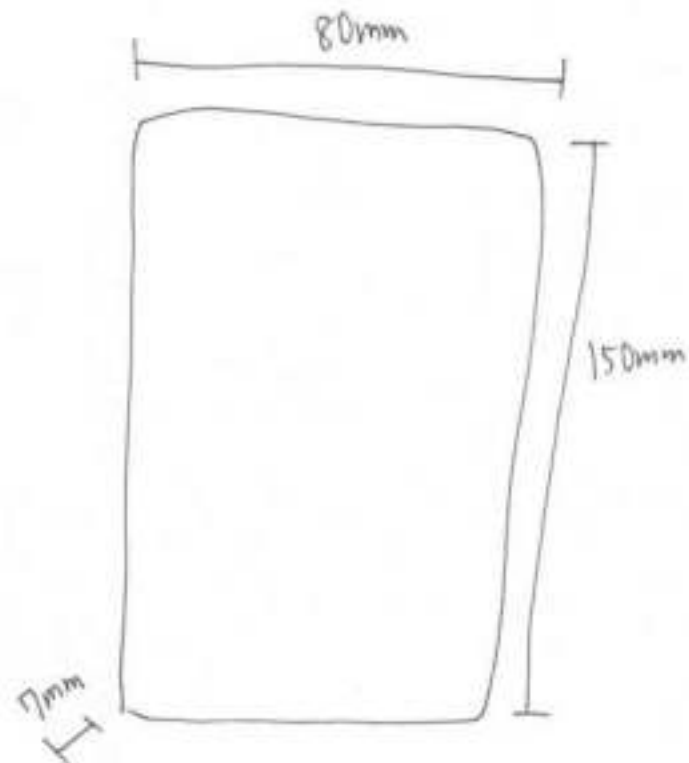
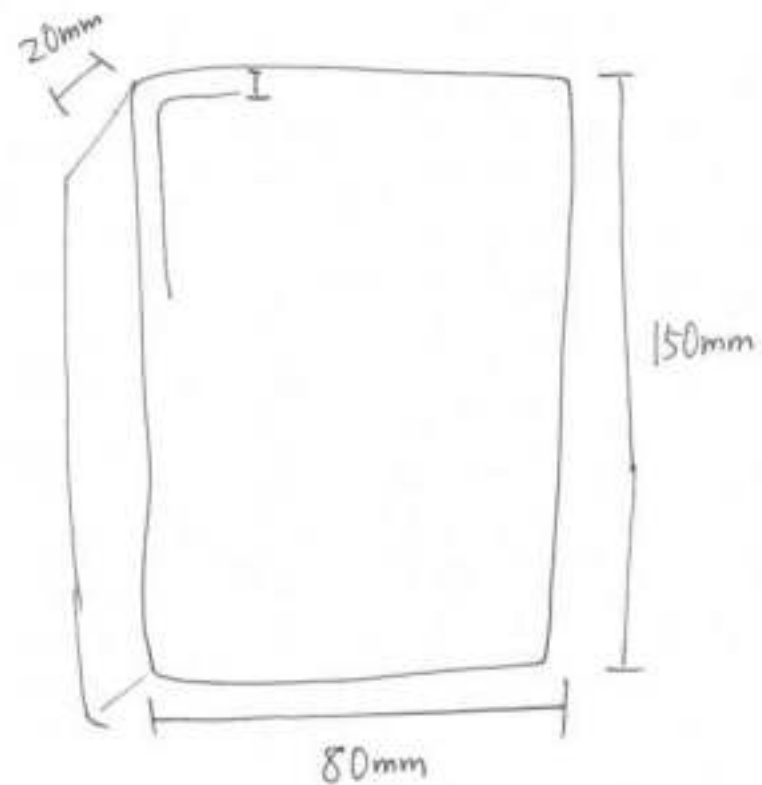
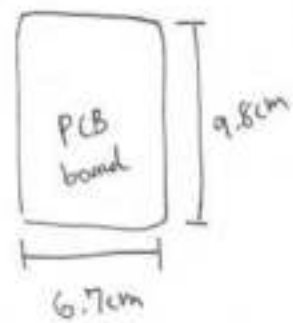
bottom layer



silicone (food grade,
dishwasher safe & anti-slip)

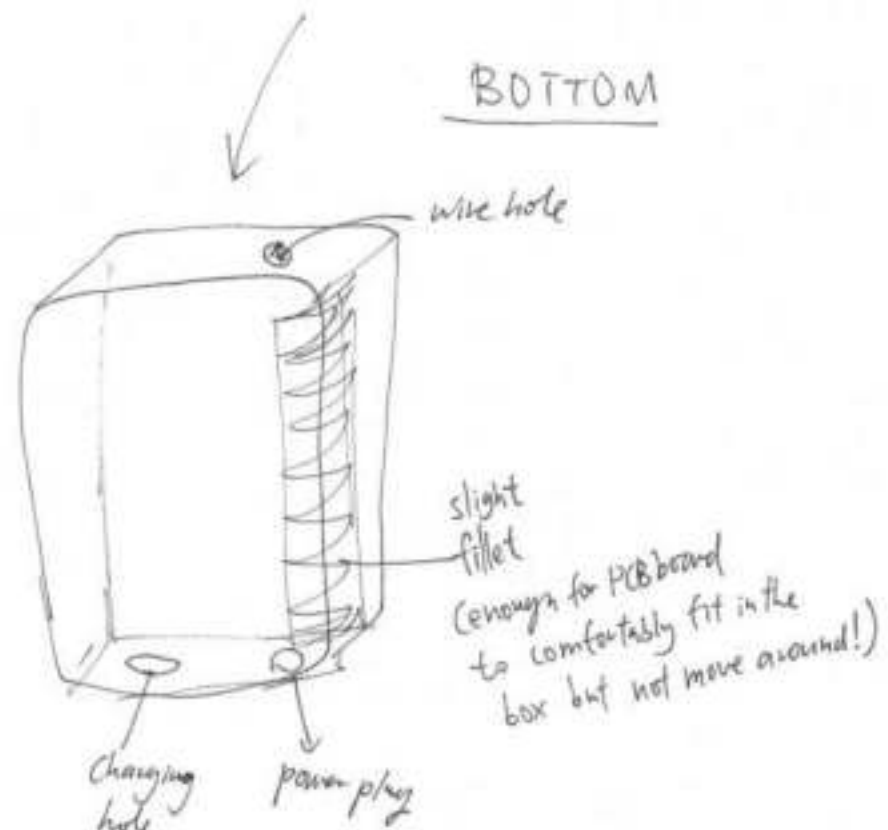


HUB box CAD

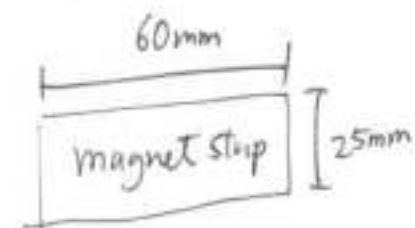
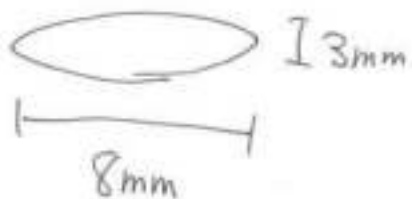


BOTTOM

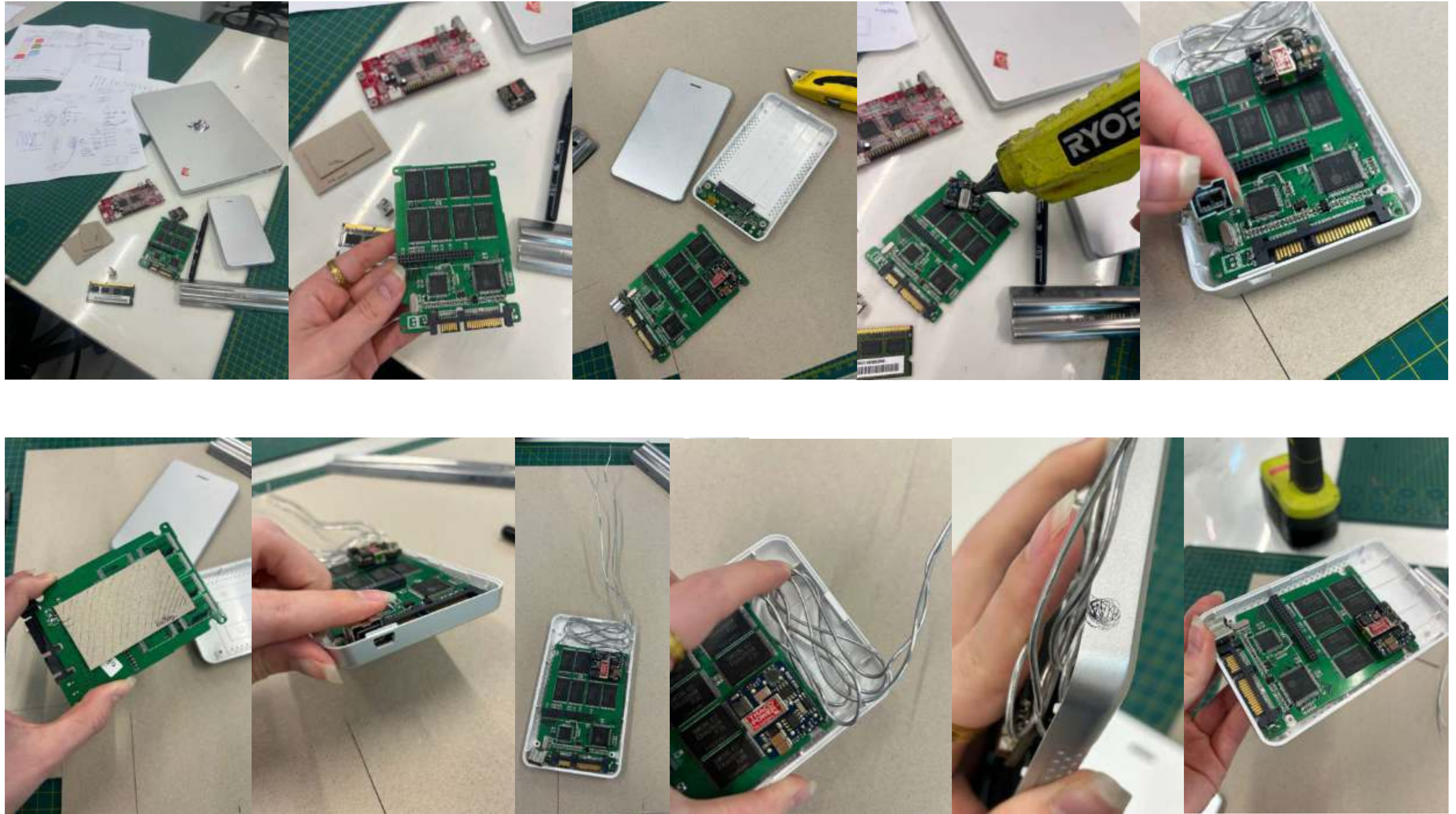
LID

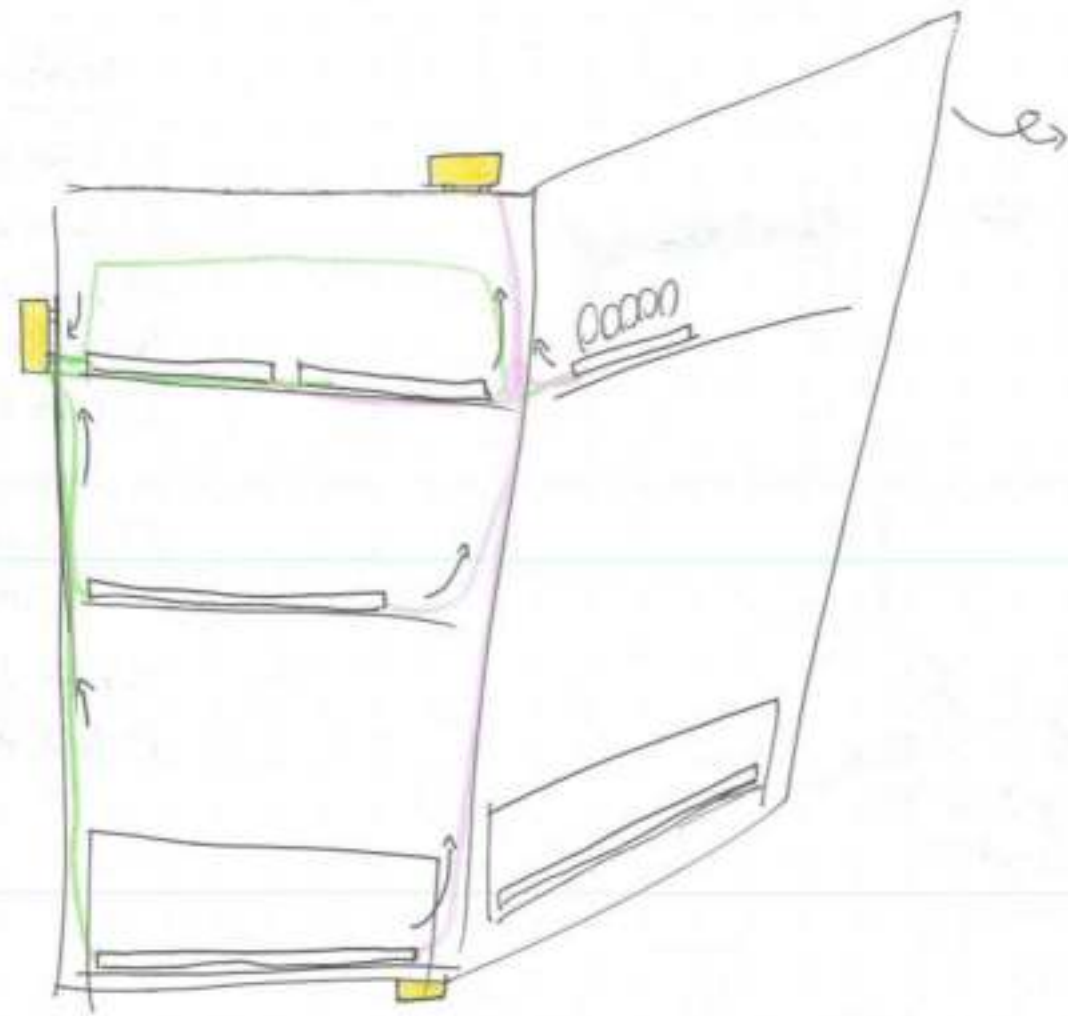


USB C

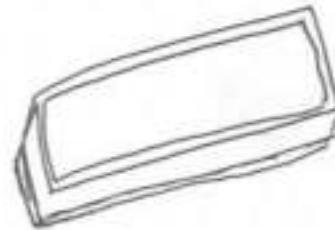
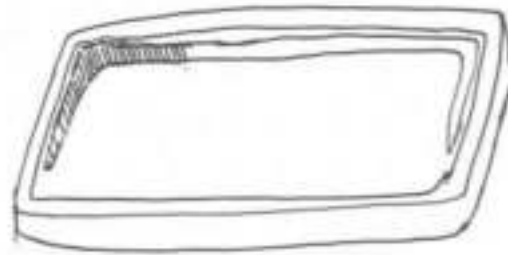
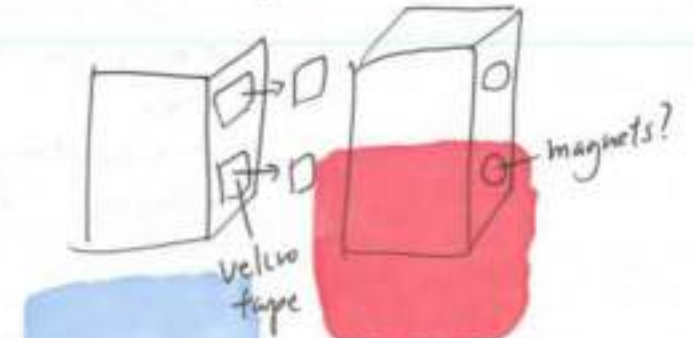
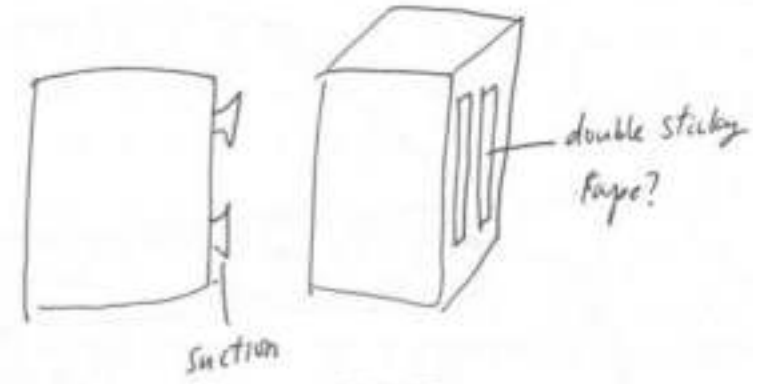


Testing size, thickness and how everything would fit together on the hub box



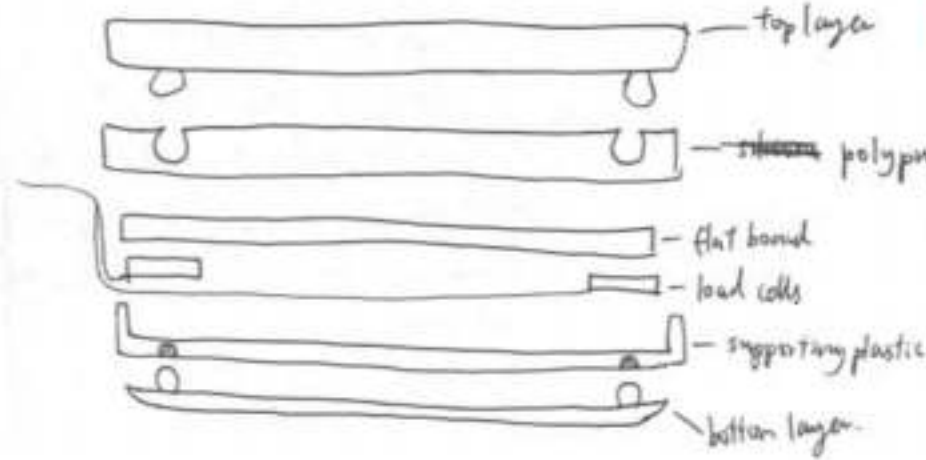
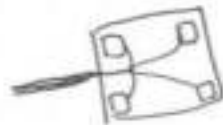
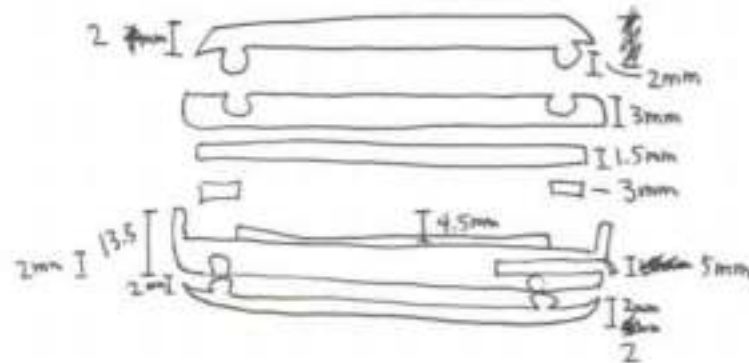
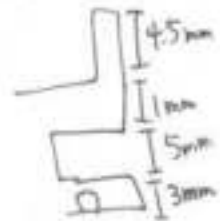


- up to the user?
- just provide suggestions?



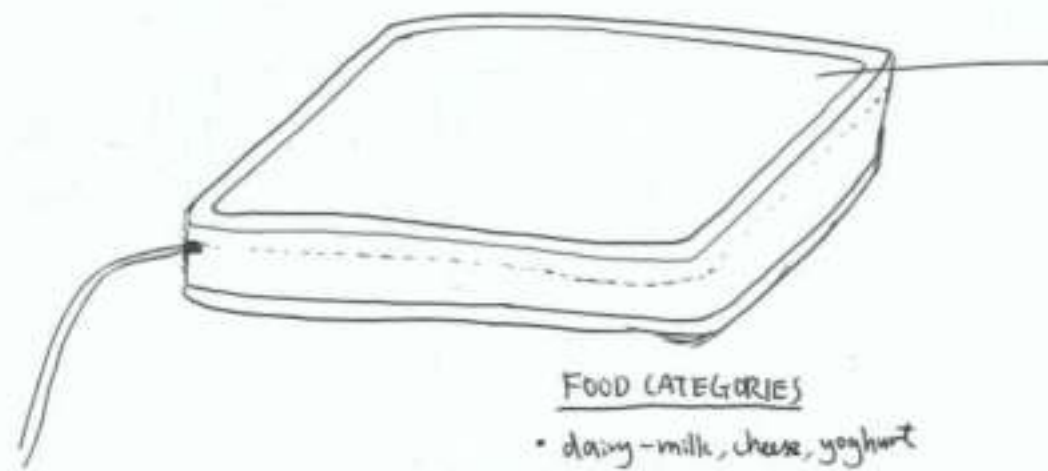
whole product - food grade,
+ dishwasher safe (bottom + top)
+ non-slip (bottom + top)

2
3
13.5
2 = 24.5 = 20.5



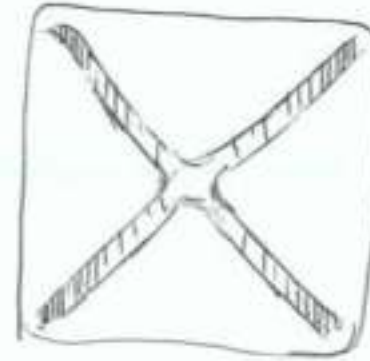
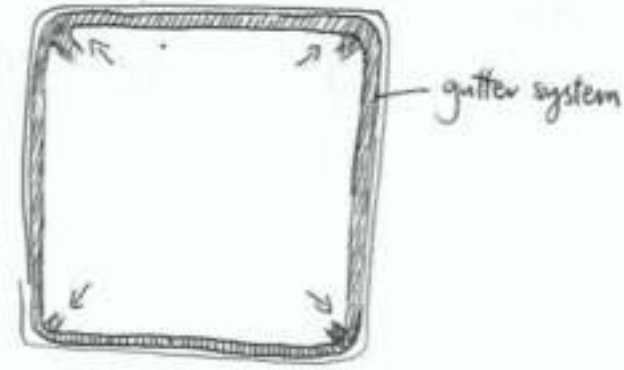
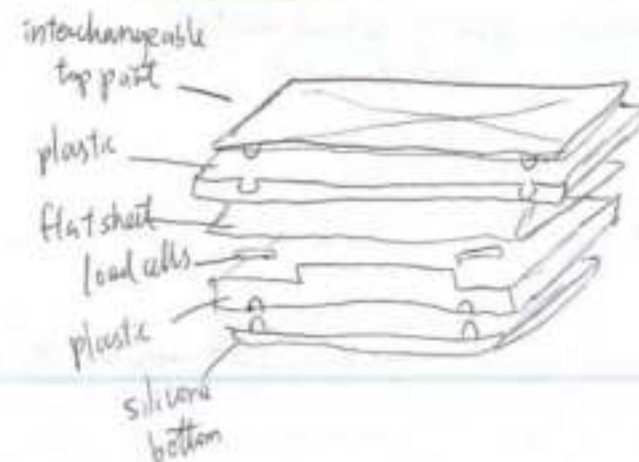
GDAL for today

- ☐ figure out the layers
- ☐ finish CAD and submit
- ☐ figure out form of hub + PCB box + attachment system
- ☒ moodboard for overall aesthetics
- ☐ figure out colours that the top layer will have
- ☐ figure out how many sizes is going to be sold on market.
- ☐ bunch of sketches on final mat form
- ☐ think of logo (stick on design)



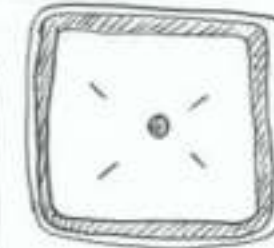
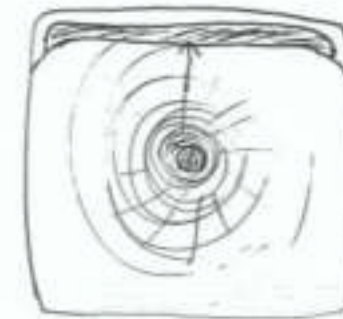
FOOD CATEGORIES

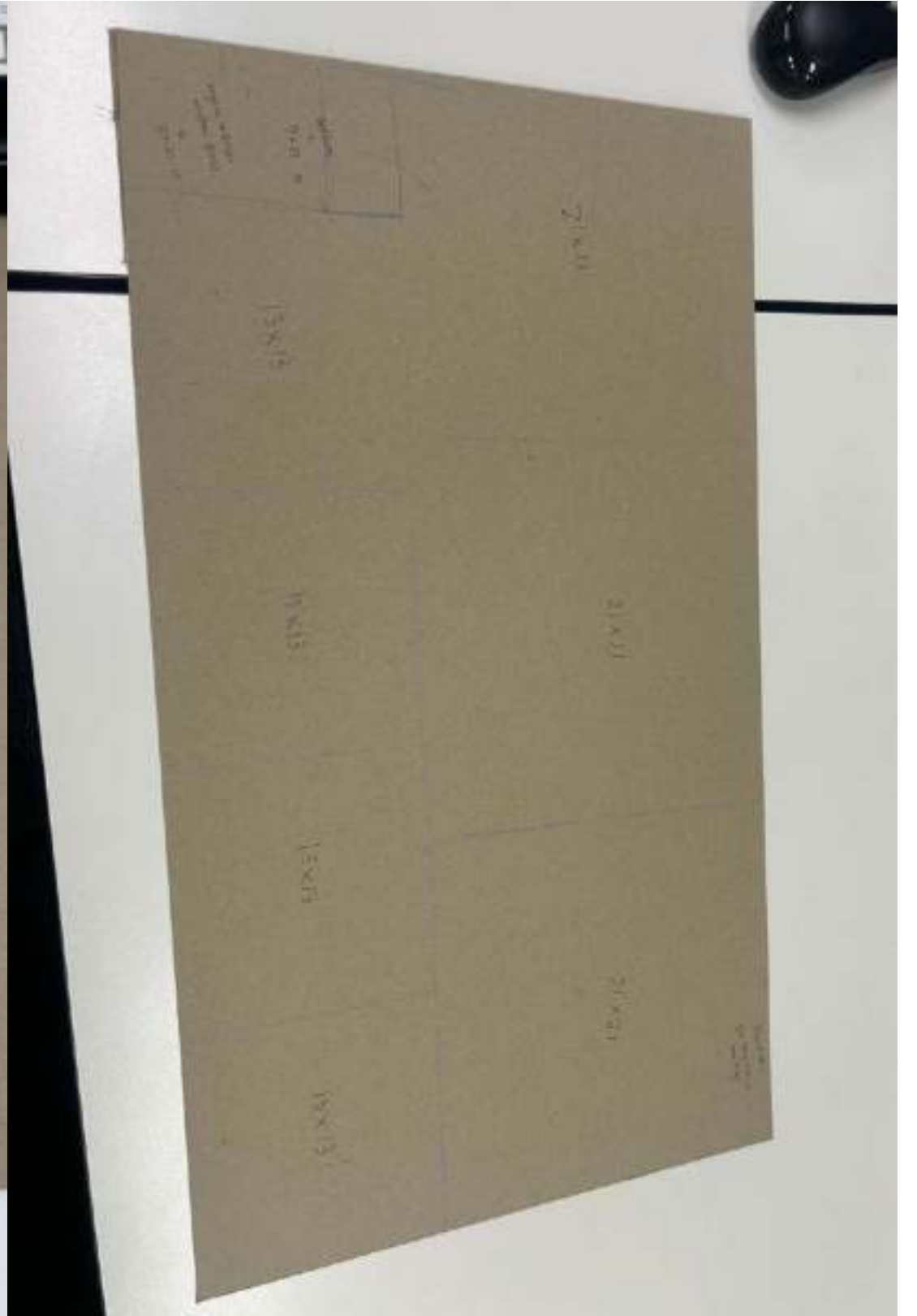
- dairy - milk, cheese, yoghurt
- eggs
- raw meats, poultry + fish
- fresh veg
- fruits
- leftovers / cooked meats

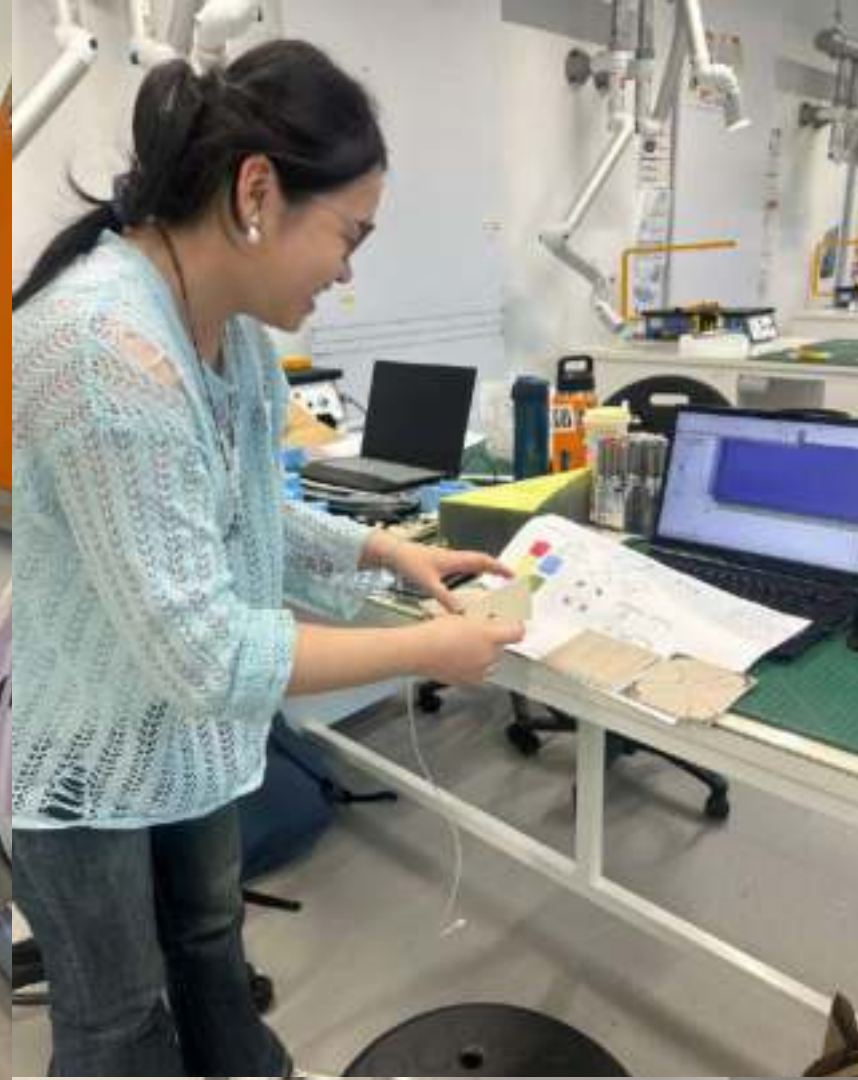


feedback

user can see the dirt / liquid accumulating which may seem gross & unhygienic in the fridge, it actually reminds (visually) the user to clean it ASAP before it accumulates even more → keep it clean at all times.







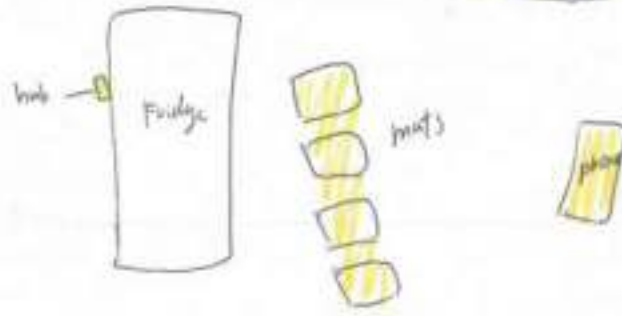
USER TESTING

Stella's feedback and preferences

- likes the one with the holes on each corner
- likes the idea of the one with the hole on one side of the square and suggested maybe I can make the hold clearly visible so that it suggests to the user the mat needs a clean, even though it may look dirty and gross when you open the fridge. its a good way to not let users forget about keeping the system hygienic and maintained long term.

To set it up

Ecosystem of IoT



Since this is designed for younger people, they should be proficient in tech enough to find this process effortless + guide.

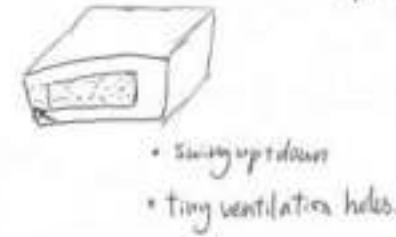
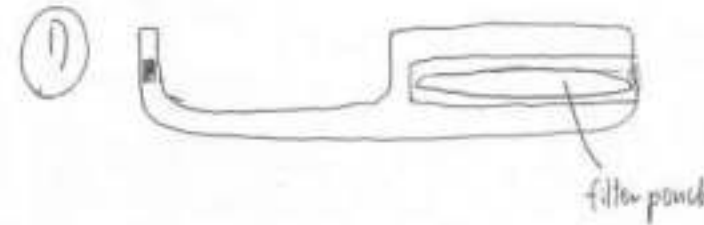
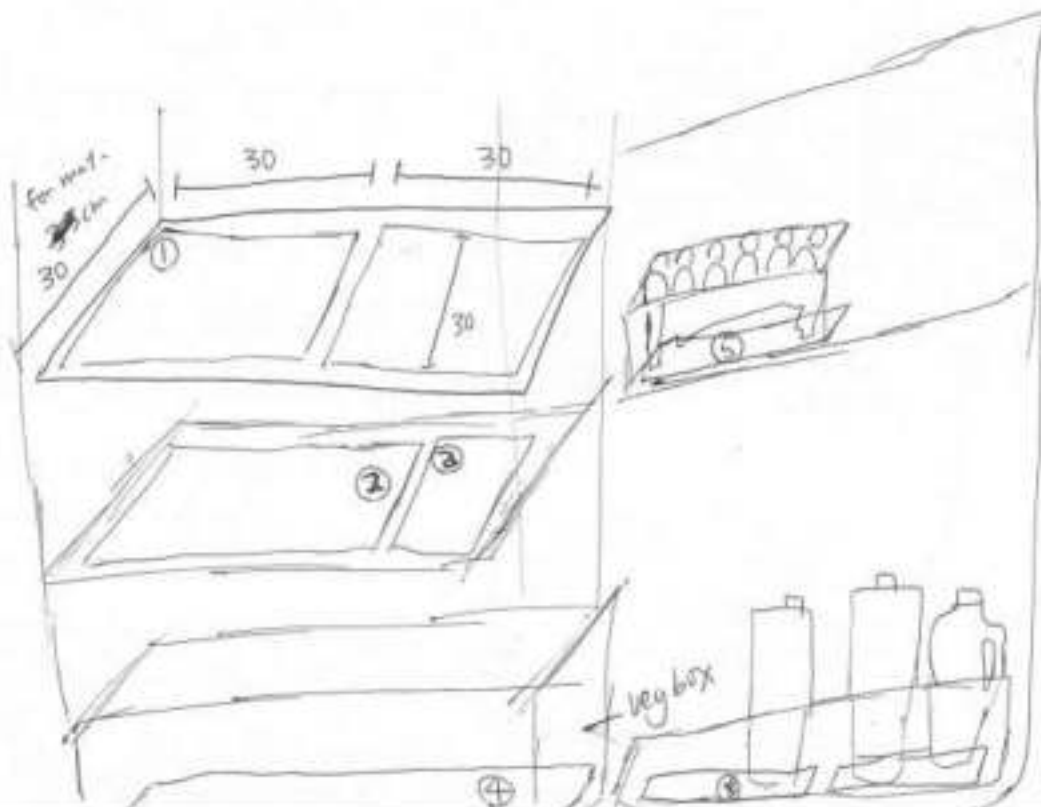
set one mat by plugging in charger to charge & wake it up initially

turn on bluetooth on phone & sync (and turn on wifi)

label this particular one 'meat' on the app & colour code on app

to maintain easy colour-coding + consistency, put the red silicone layer on the mat and good to go!

repeat for every mat & all prepped!

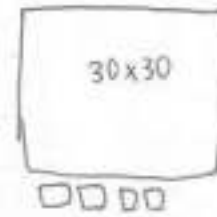


by having users pick + choose different sizes individually, the system is able to work for any fridge size/requirements.

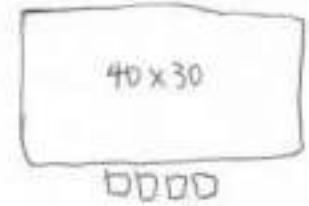
- versatile
- accessible
- personalisable.

each purchased mat comes with all colours to interchange to (top layer)

physical mat
- fridge background picture?
- app interaction display (either stonyhollow or physical ipad interaction)
- think about what model + context backgrounds or interactions would need for exhibition?



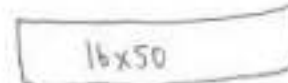
① basic fridge shelf mats
↳ versatile, usually can fit two right next to each other on one shelf



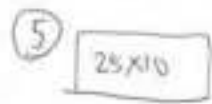
② longer length maxi shelf mat
↳ slightly wider than basic mat
↳ fits in perfectly with ③



③ mini shelf mat
↳ half the size of ②
↳ fits perfectly on shelf with ②



④ veg drawer mat



⑤ Eggs / drinks mat
↳ same measurements with egg compartment + drinks on the fridge door -> versatile
↳ 2 perfectly fits in the drinks section.



11 x 55
16 x 55 veg
25 x 10 egg

Thursday

- what does it actually achieve?
- is it really that useful + convenient?
how can I make it so?
- any waving features?
- focus on personalisation, versatility + accessibility, usefulness, aesthetics.
- CAD modelling and submit to print by Fv.
- finish stonyhollow / UX interaction process on paper (rough ideas)
- mood board of the mat
- mood board of the app vibe + design + colours.



set the mats onto fridge shelf.
Set → wifi/bluetooth
(make sure each mat is connected & properly synced to the app)

category → up to user?
or we design this.

up to user but recommended this way ↓



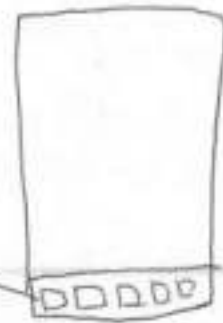
meat/poultry/fish



eggs (will need to be rectangle and fit many fridge egg sections)
↓
versatile, accessible

milk or drinks in general?

- shopping list
- essentials
- untouched / forgotten / must be used soon
- suggested recipes



- could tier user into the mats to their desired size / that fits into their fridge?
- how many size options should I provide?
5? 10?



for every mat size
↓
every colour to switch/use

- what if the size is too big or small?
can they customise?
or

- how do user know that someone else didn't place something that's not milk on the milk mat?

this system doesn't allow recognition by mat, when things are due to expire or how long it's been forgotten.

Scenario 1



show item, percentage & what that means
eg. 25% milk remaining
↓
may make shopping more fun like taking off a game challenge.

could have different tabs → essentials
→ snacks
→ dairy

Scenario 2

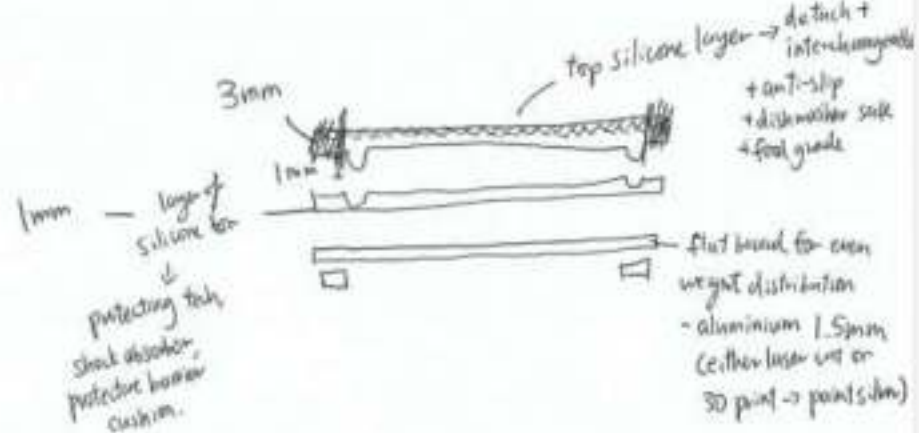


home screen can instantly show shopping list anyway (in order of what's at their lowest) or an easy identification image

easy identification of what needs restock/replenish in order of urgency.

whenever restocked it, they can make it known via the synced app amongst everyone?

filter can be colour changing so that user can see when to change physically & in the app.



MAIN PURPOSE

→ measure contents on mat

↓
communicate this to app

↓
user can see what category has — g therefore approx — items/bottles (with assistance by AI)

↓
they can keep track & be updated anywhere
= prevent buying duplicates or more than they need!

other features currently

↓
• personalisation → user can pick their own colour coding system & can change their mind (interchangeably)

• continuous 24/7 tracking + updates on the go anywhere on your on-the-phone app. wireless.

• Sleeping most of the time + uses wifi to use less power.

• AI assistance → determine / convert g into tangible number + overtime, collect data and start making trends & pattern assumptions

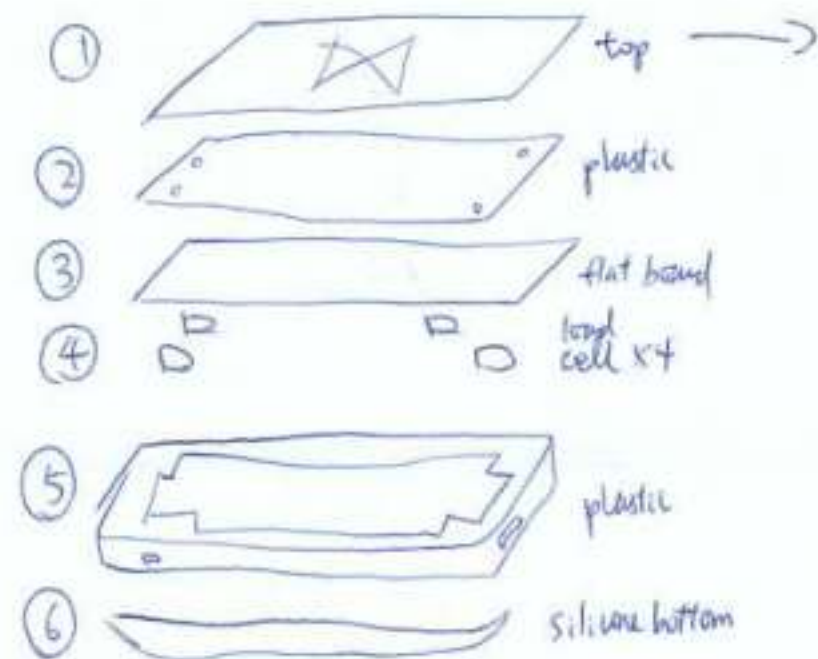
• uncharged weight for long (depending on how urgent / food shelf life determined by AI) → notifications.
→ recipe suggestions.

• implementation of ethylene gas absorbing filter → app can display how each food category is going & when to replace.

CREATING THE FINAL PROTOTYPE MODEL



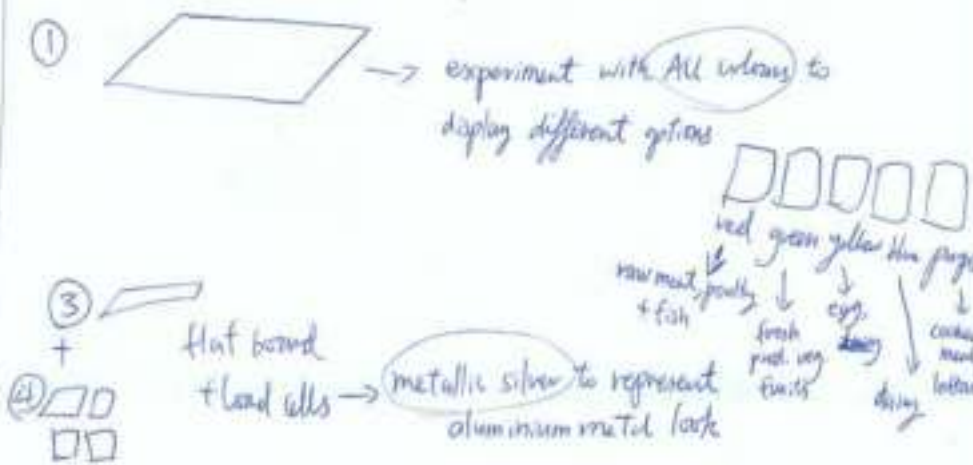
3D printing components



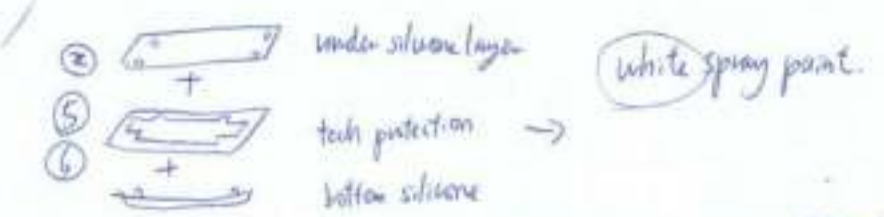
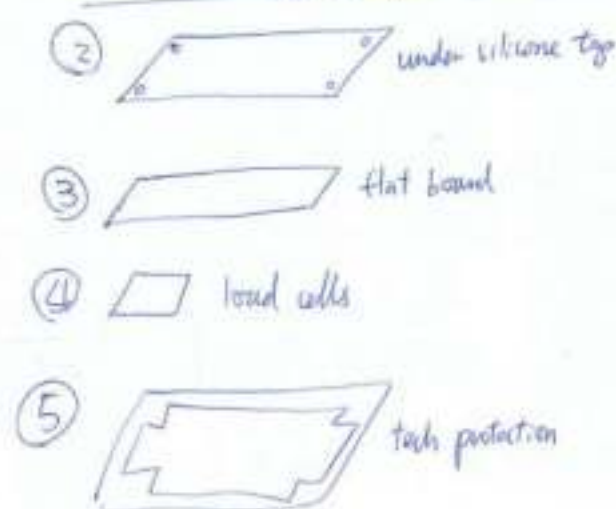
Silicone parts (clear resin)



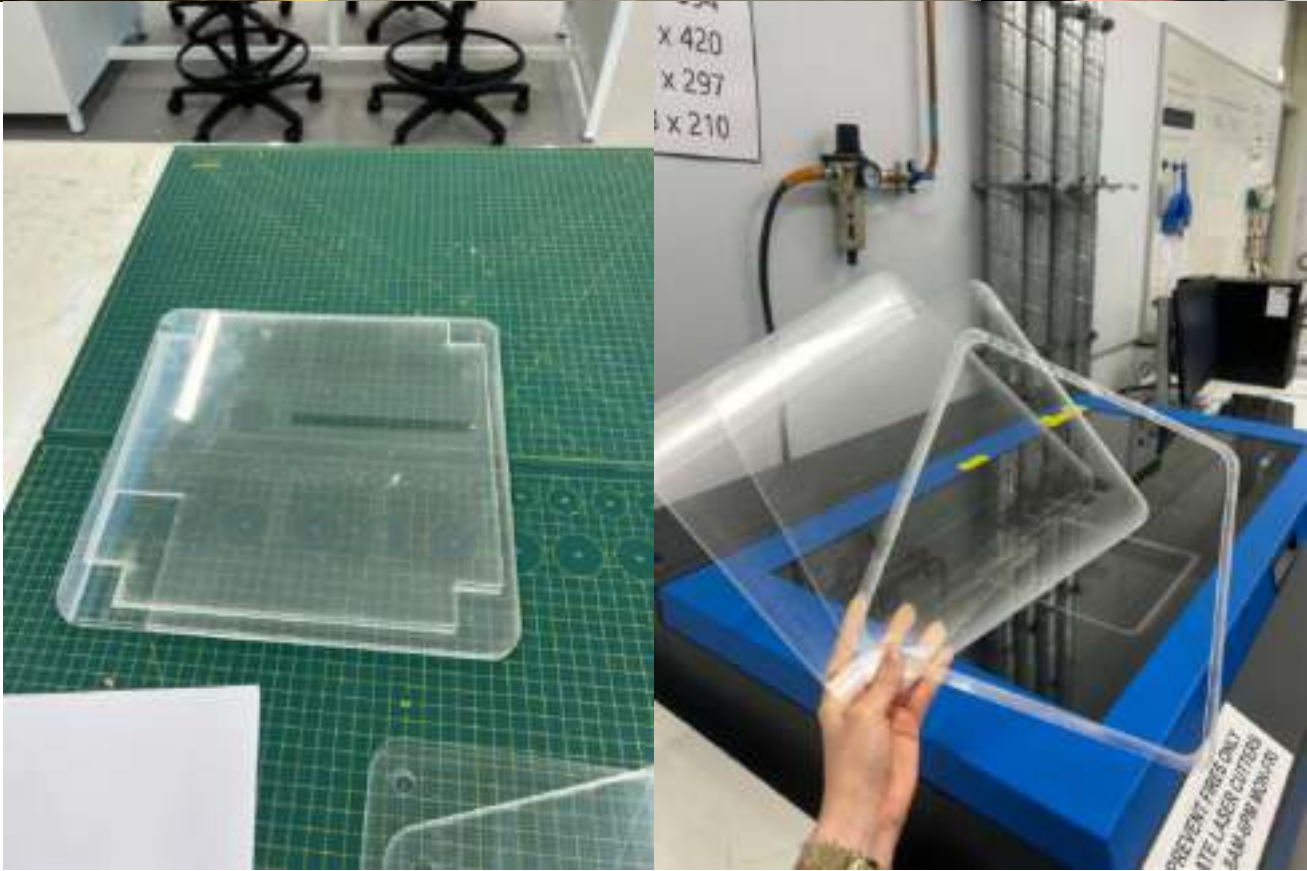
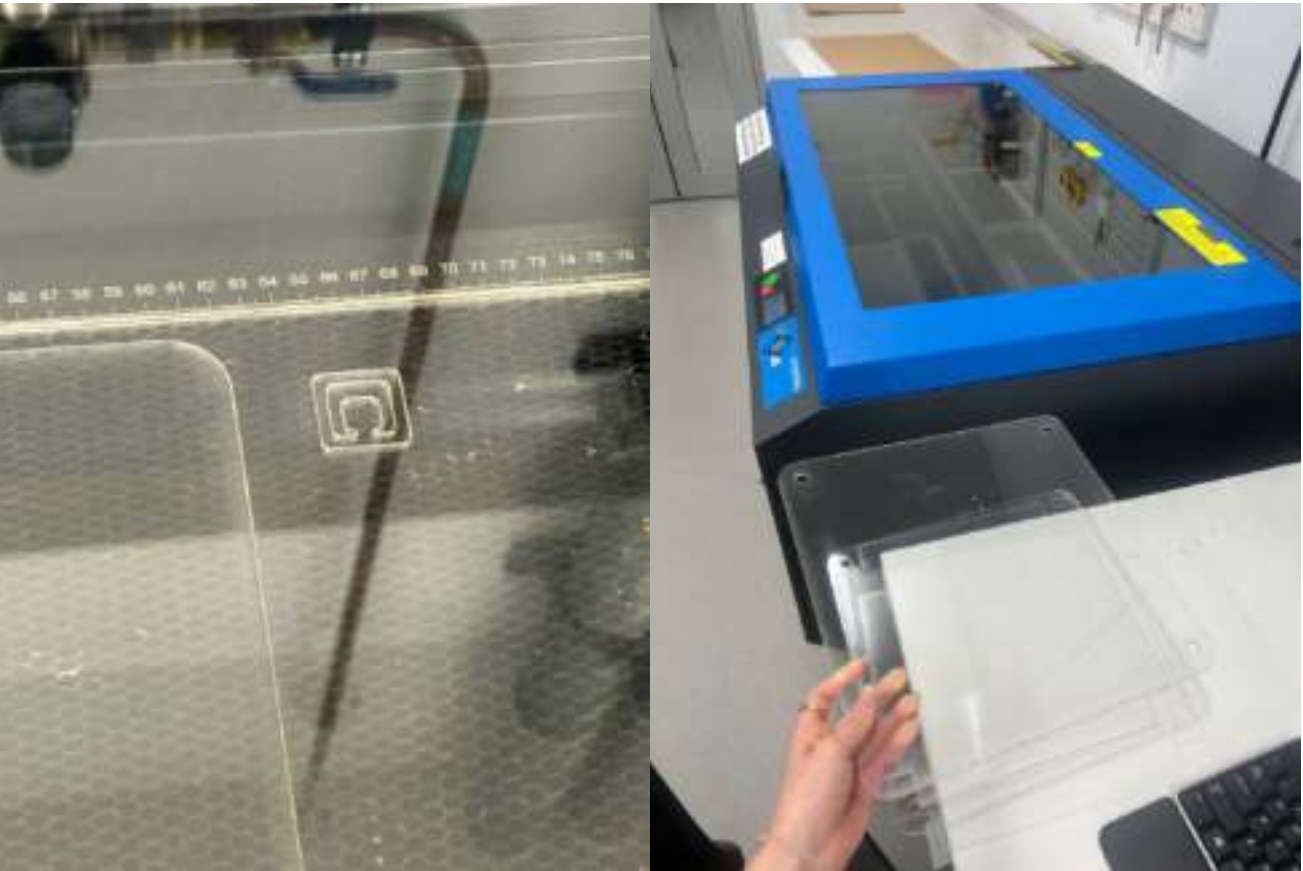
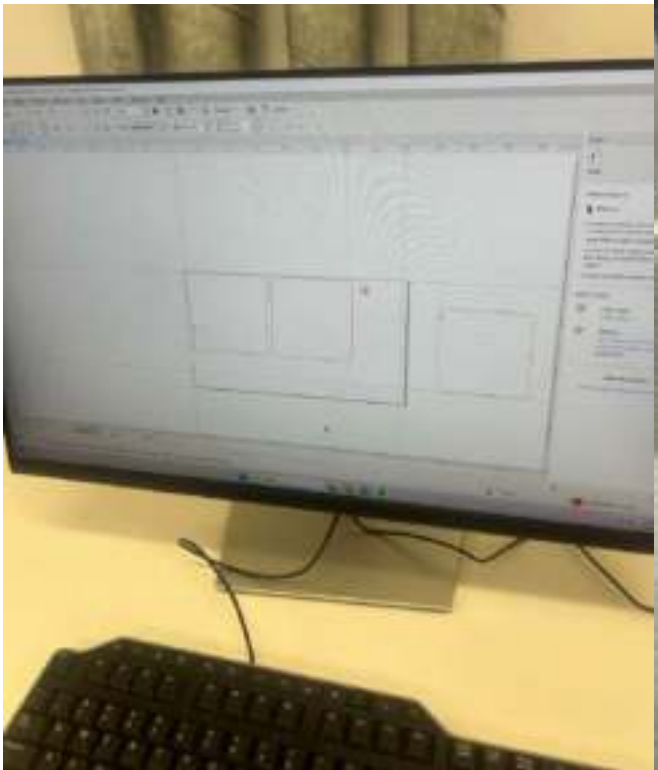
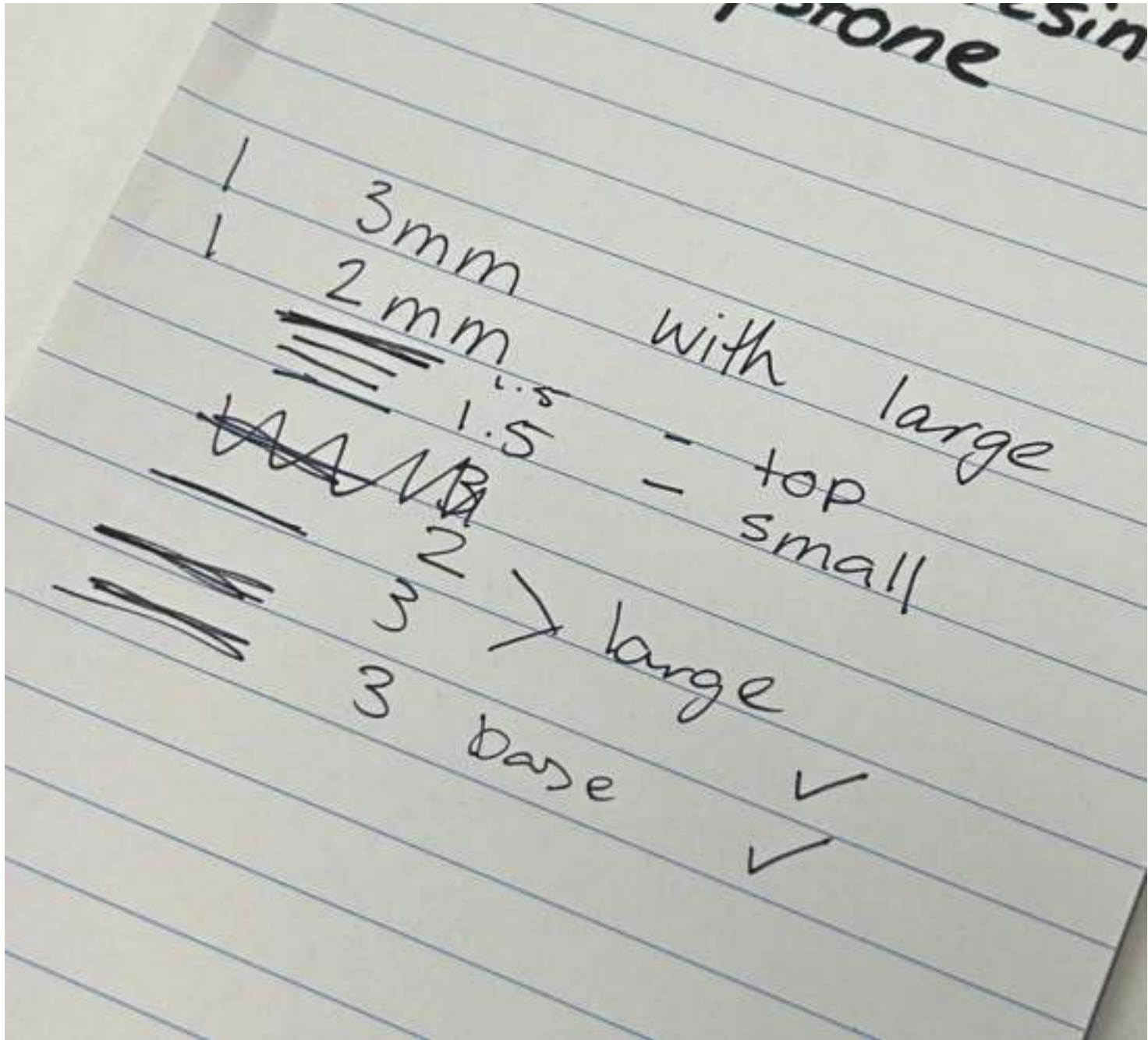
Spray Painting + sanding!



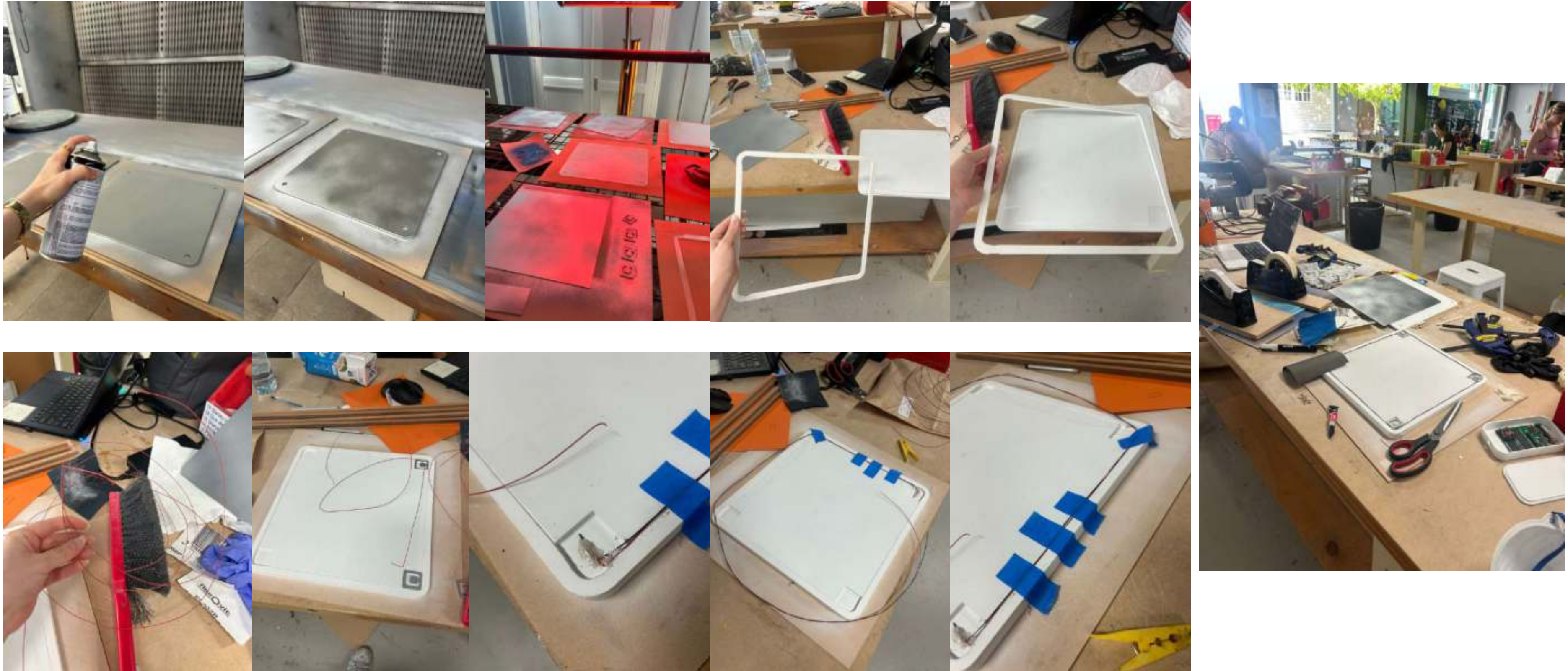
Plastic (polypropylene aesthetic)



Laser cutting final layers of the mat as 3D printing would take too long and wasnt necessary either way



Spray painting parts at the workshop, spray painting fake wires and glueing on load cells as if they come as one but wires are soooooo stubborn!



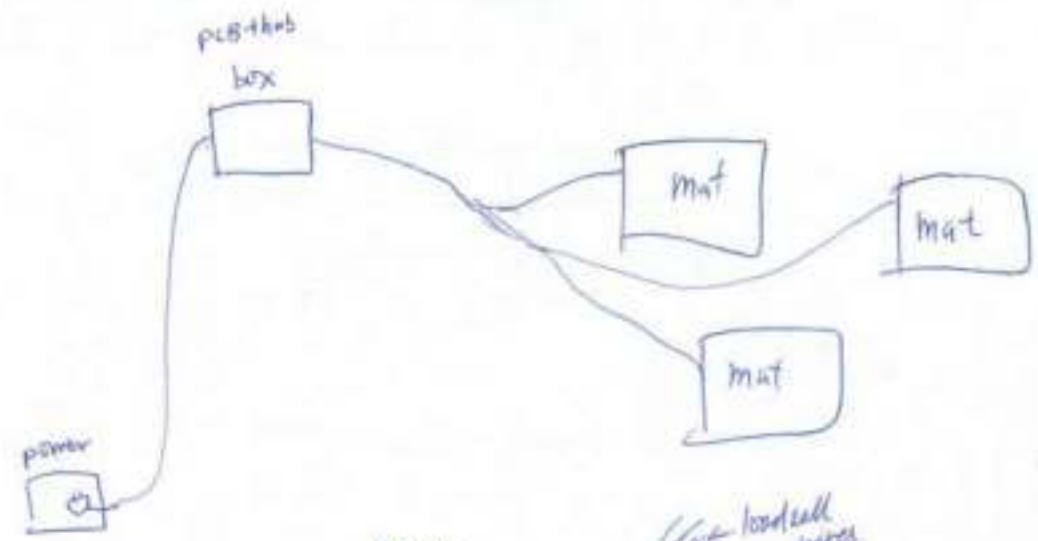
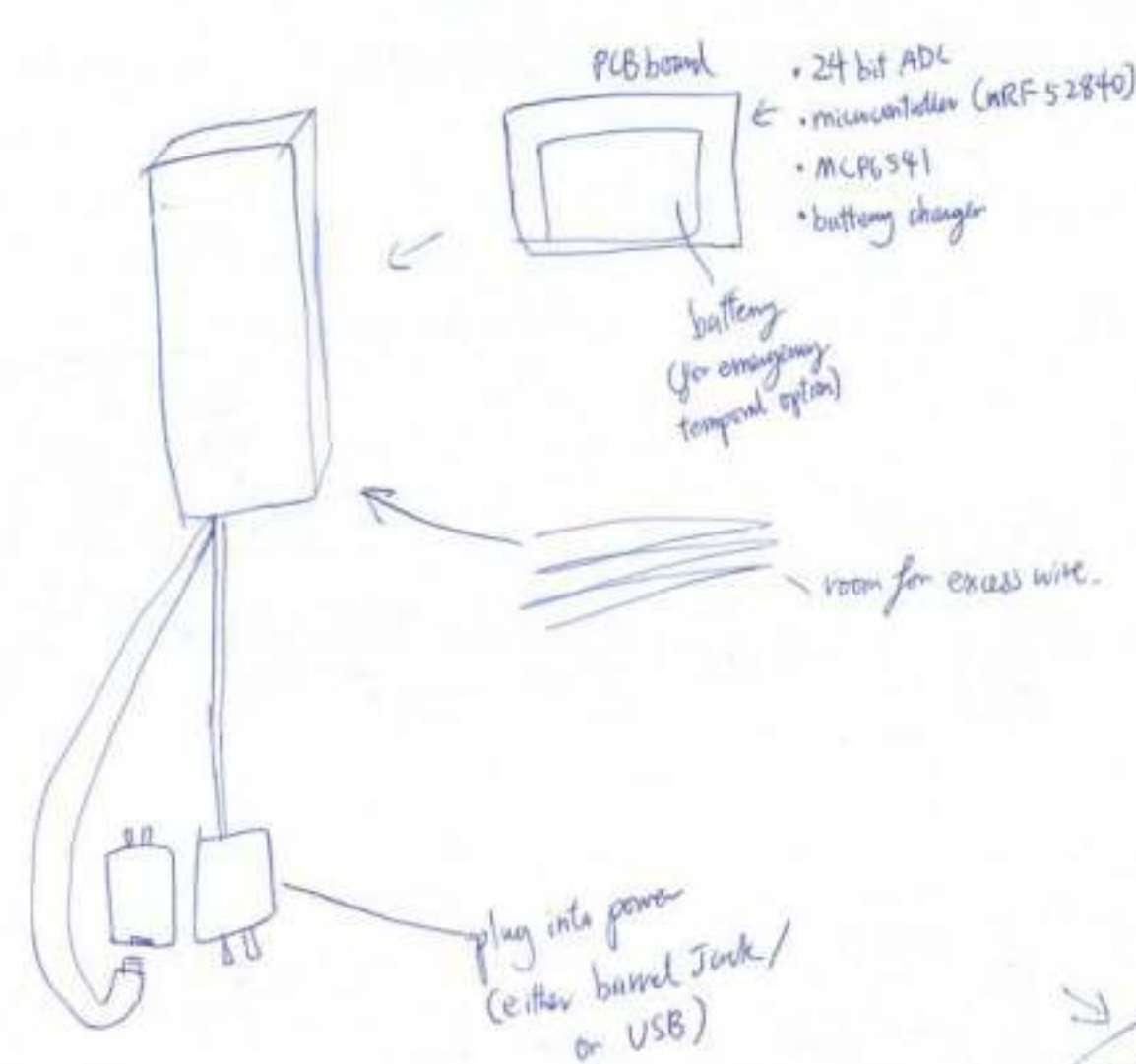
gluing two pieces of the mat together as the 3d printer didnt allow this size to come out as a whole unfortunately. so much extra work - sanding, gluing, waiting



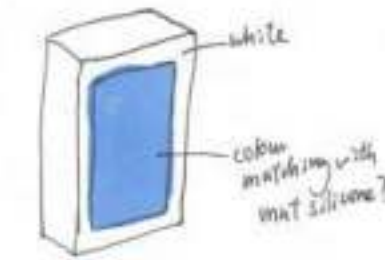
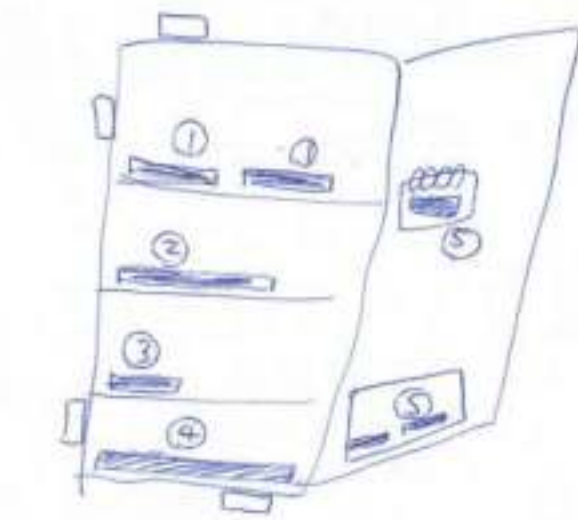
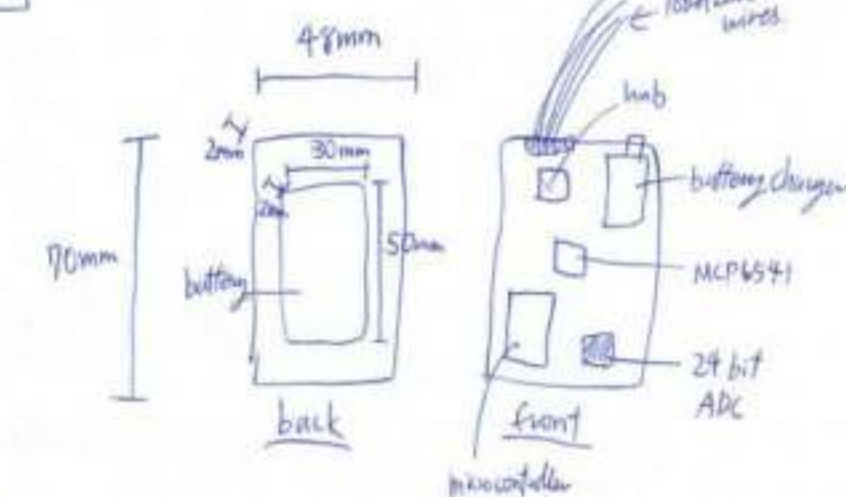
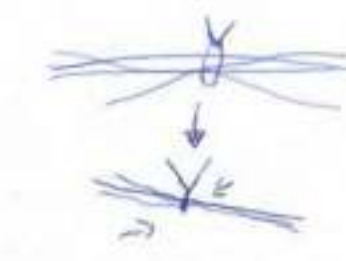
drilling a hole because i used the wrong laser cut laser and were missing holes to fit the silicone bottom layer



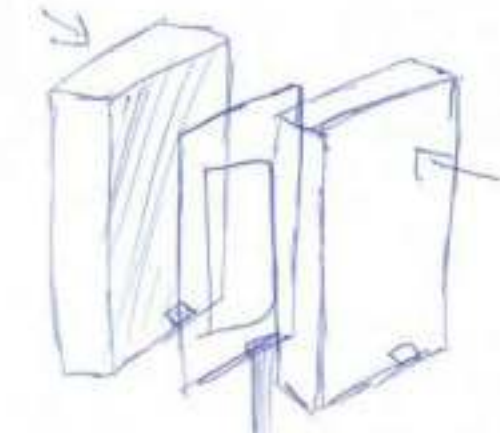
More and more
sanding (slightly
concerned
about breathing
in microplastics)



- tangling wires?
- adjustable length?
- Can something keep the wires together?



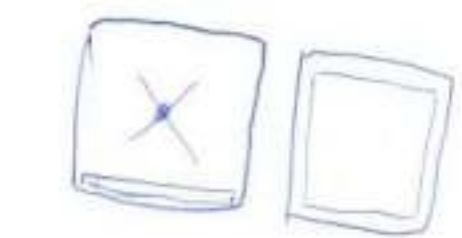
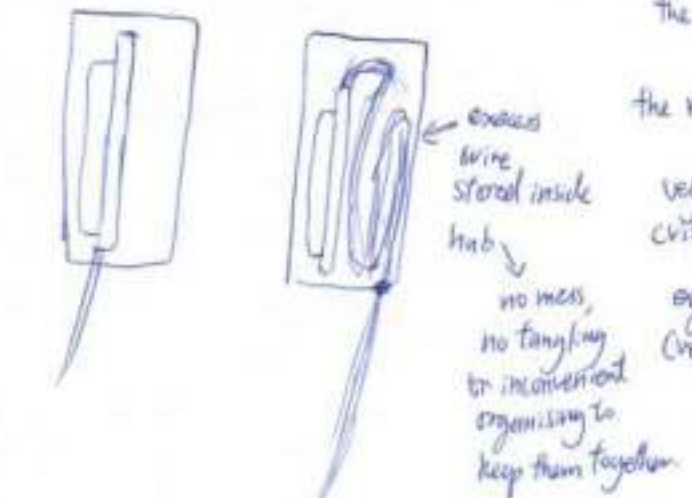
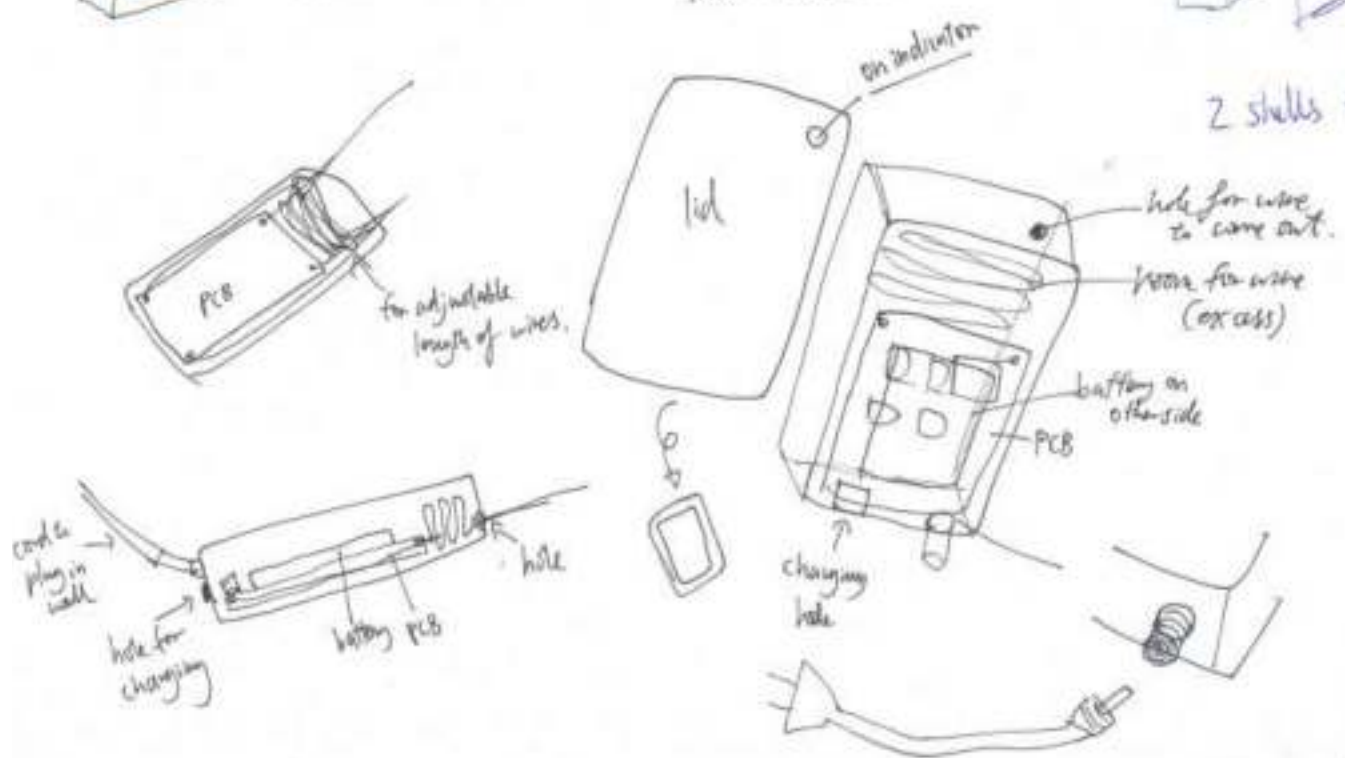
- logo
- shape
- colours
- how to attach?



- the classic mat ① 30x30
- the maxi mat ② 40x30
- the mini mat ③ 20x30
- veg tray / crisp mat ④ 16x50
- egg mat ⑤ 25x10

potential locations for box.

F
fMATE
fridgeMATE



PURPOSE OF MAT (+ features/characteristics)

- **weighs food contents** → tells app → ^{app} ~~user~~ can indicate approx how much of what is in the fridge.
eg. 500ml/cup on blue mat (user decided blue = dairy (milk)) → app + ai indicates they have half a bottle of milk left.
- **filter implementation on the side** → absorbs ethylene gas → increases food lifespan

extend food life

reduce food waste

→ each mat would absorb gas at different speed depending on what the food is

↓
lets app know some mats are absorbing more faster (eg. fruits)

↓
app says → "the fruit mat filter might need to be replaced soon!"

→ shows accurate assumption percentage (how much life the filter has left, making predictions based on history)

- **reminders via app** → mat recognises when the weight has gone unchanged for an alarming period of time (depending on context of food but AI will determine)

save food (prevent forgetting) + keeping up with latest tech, efficiency

- **Continuous 24/7 tracking** + live updates wherever the user is

→ but still sustainability conscious as it's sleeping majority of the time but wakes up + is on standby active mode when the sensor (load cells) senses weight change/movement on top of mat. → saves electricity.

save electricity (sustainability focus)

- **integration of wifi + bluetooth** → no issues with signal or connection with the app & user can be updated on the go, no matter how far, through the use of wifi

effective tech

- **Mess free + convenient** → the top & bottom silicone can easily come off to be washed. → made out of food grade, non-slip & dishwasher safe silicone.

slightly personalisable

→ has a drain system to collect any spilled liquids and if there is any, it is obvious as it can be seen from the front of the mat → indication that the top silicone needs to be washed
→ comes in 5 different colours (the top silicone mat) categorising certain food groups + is suggested to be a certain food group but in the end, it is up to the user what colour is associated with what.
(each mat that is purchased comes with 5 top layers in each colour and can be interchanged any time (and the setting can be changed easily on the app to keep it consistent))

Accessible, versatile for any fridge design

→ FridgeMATE offers 5 different sizes to purchase from → user can mix and match → could be creative about it.
→ can combine 2 mats next to each other as one if they were too small → app would recognise them as one.

Material → food grade, non-slip + dishwasher safe silicone,
+ food grade + durable polypropylene plastic
+ aluminium sheet

- + tech** → load cells
• PCB board
• hub (bluetooth/wifi)
• 1ip-pc 1000 battery
• battery charger
- MSP430
• 24 bit ADC
• microcontroller
• wires connecting LC + PCB board

Colours → (towel down pasted & non-overlapping clean colours)

RED
BLUE
GREEN
YELLOW
ORANGE

suggested food category (but optional)
- meat, poultry & fish
- dairy
- perishables, fresh produce, vegetables / fruits
- eggs
- cooked meats / leftovers

Sizes to choose from & suit your particular fridge

- ① 30x30cm - The classic mat
- ② 40x30cm - The maxi mat
- ③ 20x30cm - The mini mat
- ④ 16x50cm - The cusper mat
- ⑤ 25x10cm - The egg mat

(choose fridge shelves, shall suit majority)
(cover 2/3 of basic shelf)
(cover 1/3 of basic shelf)
(in crisper vegetable drawer)
(very versatile for eg or for the door/drawer compartment)

FridgeMATE is a mat designed for the fridge that acts as an ethylene absorbing, therefore extend food shelf life plus has an implementation of tech that allows users to know food contents inside the fridge on the go to prevent purchasing more groceries they need.

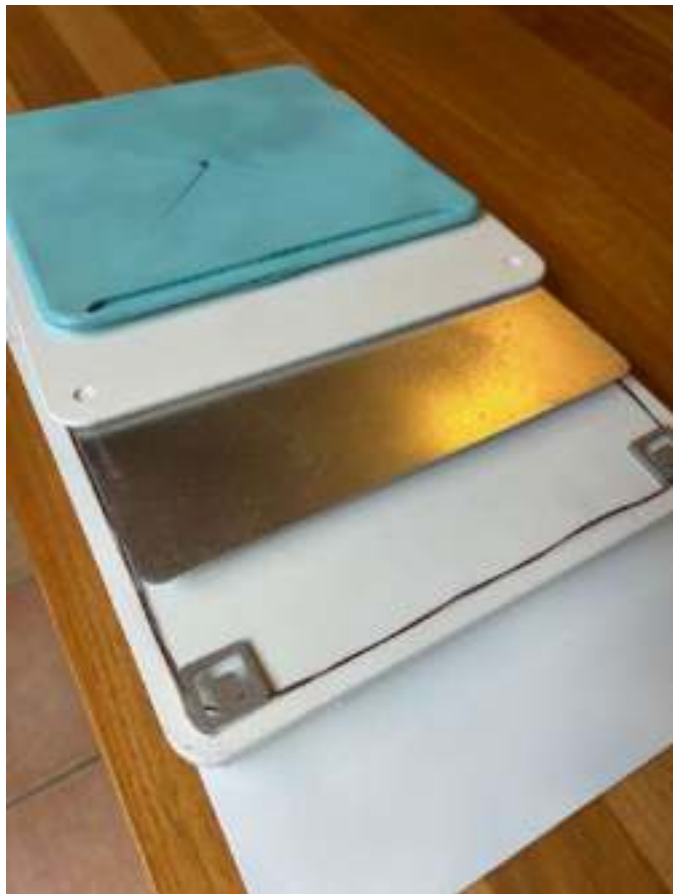
Target audience → busy, young individuals
→ assumed to be proficient in tech, apps on smart phone

certain food item/category = certain amount of time until expiring
eg. milk should be good for about 1 week
therefore app will send notification if untouched or not replaced for a certain amount of time that gets concerning depending on what the food is!

AI will also learn these patterns of this particular user's habits, use grocery list, reasons that lead to waste in this household → collect data & start making accurate & helpful assumptions or update tips.

motivates user to maintain physical cleanliness + hygiene.





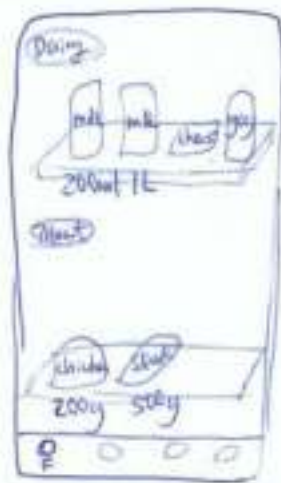




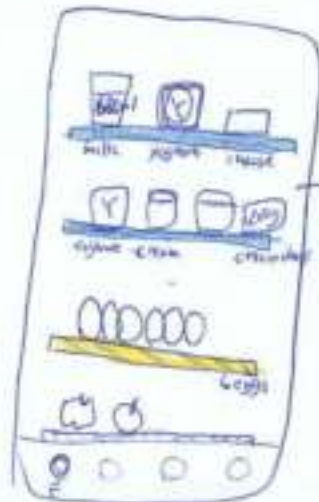
UX Design

Food at home

Blue dairy Red meat Yellow eggs Green veg



Display



like a fridge shelf visual design but you can scroll up & down. must different colours (matching the food category)



all the mat + visuals of each food category shown here.

tap on dairy ->



order of expiry date?

or

order in category

etc. - drink, cooking ingredients,

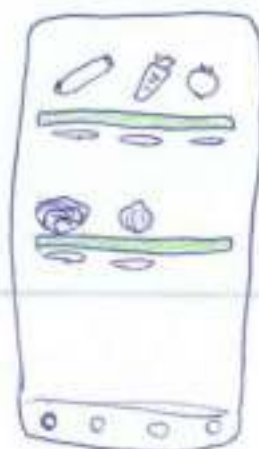
or most commonly used essentials

or - up to user's preferred settings?

percentage is based on the preferences that user sets.

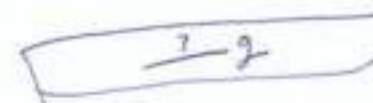
78%

raw meat



How does the mat know/determine expiry dates
 • purchase date on flybys
 ↓
 approx but accurate expiry date based on date of purchase
 + if it's wrong, users can edit on the app.

How do we know what's been lifted off the mat? mat can make an assumption + send user notification to confirm or update the ~~date~~ expiry date.



mat determines weight

based on the details that's been recorded before + what's on the data from flybys sync, mat

(with the support of AI) determines what is on the mat and how much.

+ if the suggestion is wrong, user can edit on the app.

+ based on the weight that is being lifted off and back on, the mat slowly collects data + habits overtime to make more accurate predictions + future suggestions

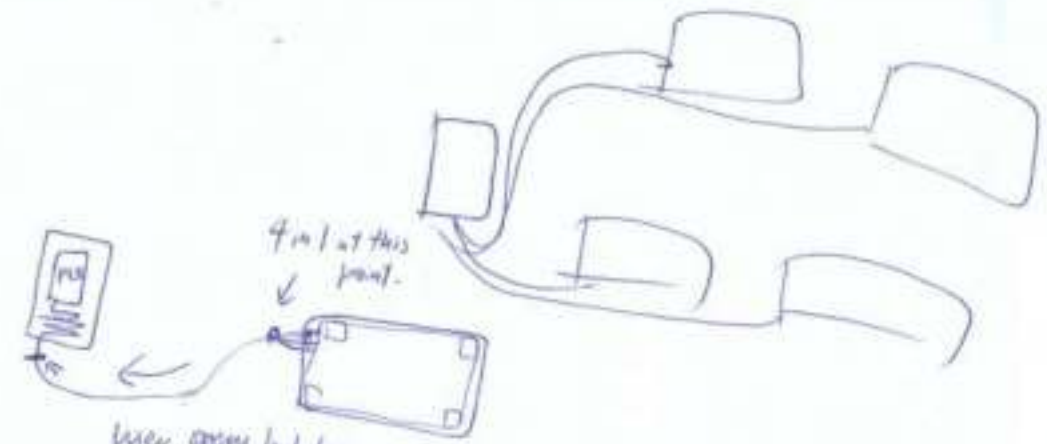
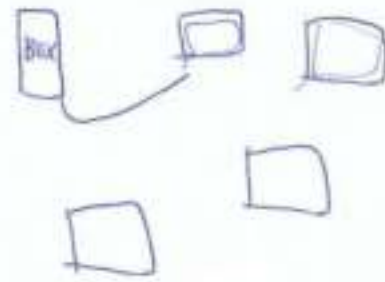
what's been recorded on flybys should match the weight on mat immediately to a few hours later (AI can determine which food item is in which category/what's usually put on top of the mat) -> better prediction. if this doesn't match (weight wise + then purchased groceries -> the app asks user for confirmation) -> anyone in the household is there to the app can press (confirm or edit to share the workload) make convenient





START-UP/SET-UP

- connect app to mats



User opens hub box and plugs in the cords from all their mats to a cord already attached to PCB board that is adjustable

Wake mat → feedback can be seen by it appearing on bluetooth → select it on bluetooth →
"Fridge MATE classic"

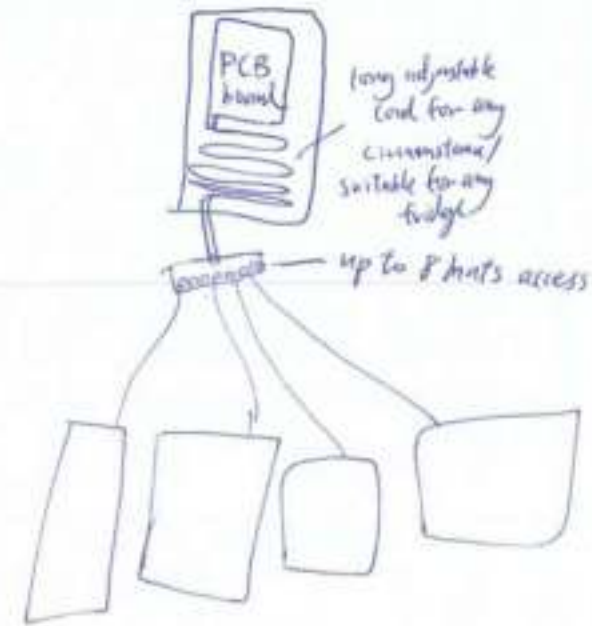
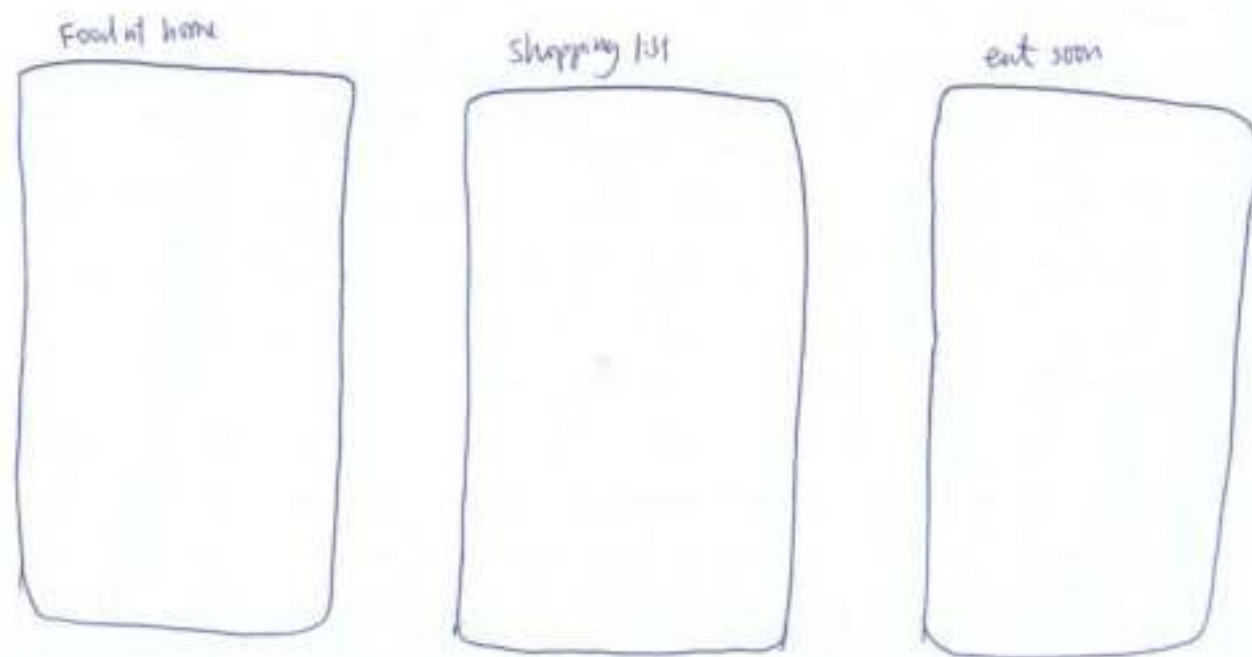
SETTING UP

plug in cord into a mat, repeat for each mat (individual cords)
↓
plug in the other side of the cord into the cord attached to PCB board
when you open the hub box.

↓
~~Turn it~~ Close the hub box and turn it on. A green light should switch on on the front surface

↓
turn on bluetooth on the phone. "Fridge MATE classic" and other mats should all come onto the system list.

↓
hub light turns from green to blue to show that it is not only on but now successfully connected
(Fridge MATE mini
maxi
.....)



RECIPE SUGGESTION / UNTOUCHED FOODS

EAT SOON



- setting/options - using ingredients on hand
- ☐ Using up near expiring items
 - ☐ Using items that's been unused for a while
 - ☐ high protein meals
 - ☐ high fibre meals
 - ☐ breakfast meals
 - ☐ dinner meals
 - ☐ effortless + quick
- tick multiple to set your search.

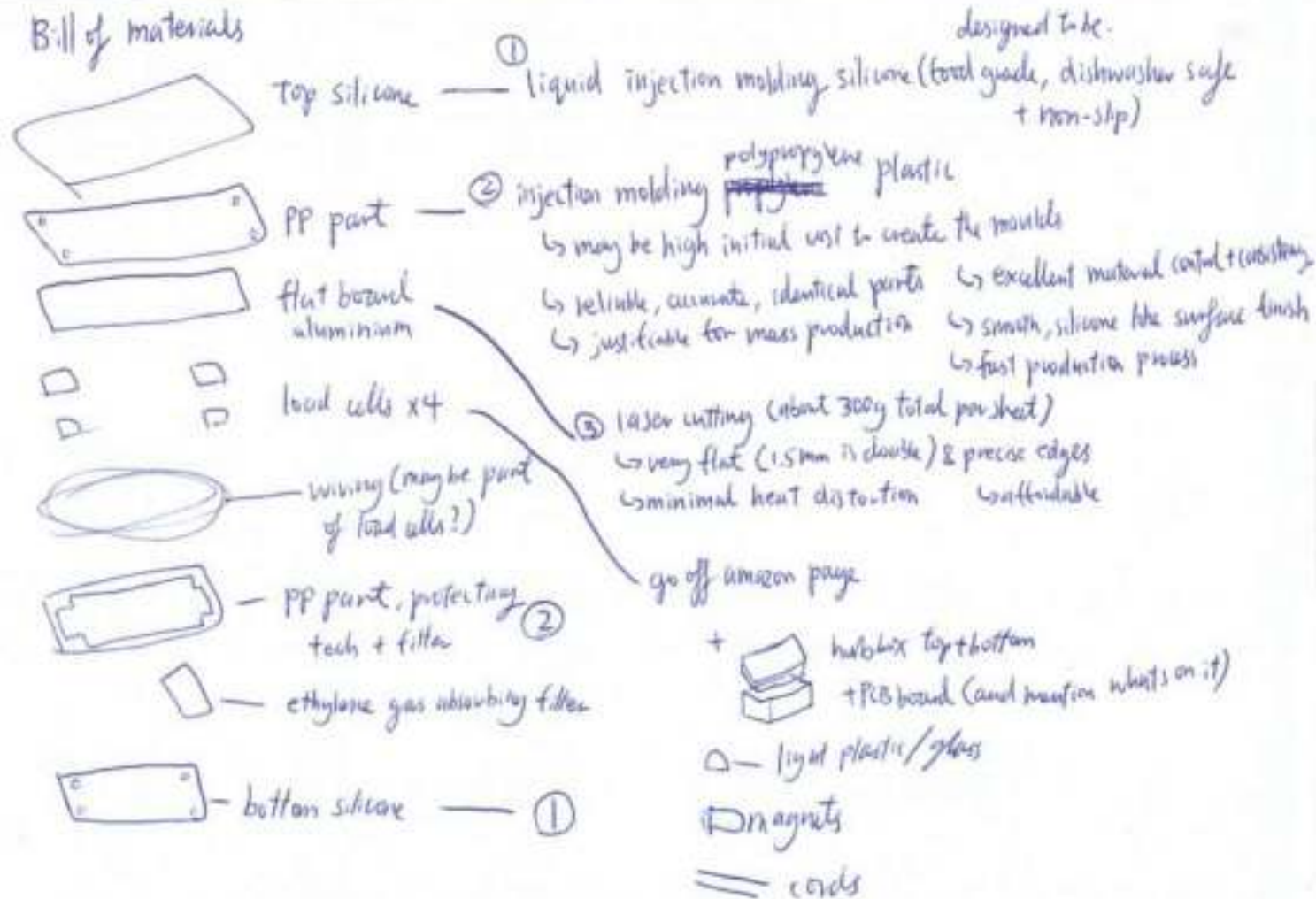
- recognises if any mats lack movement or there's no weight change (even if it's just one item or there's no turnover especially if the expiry date is nearing)
- suggests recipe when → food items are nearing expiry date
 - if some foods may be forgotten because it's been untouched or unmoved for an alarming period of time. → reminder to use up before it goes off.

Think about how users will alter/edit info which may not be accurate (since AI determines a lot of the app info + tracking)

↳ when food is taken off mat

- ↓
- after 30min, mat ~~data~~ decides it's permanently used up and is removed from list.

Bill of materials



CREATING A RENDER ON FUSION360

- go to "render"
- make sure each part is layered w the right colour + material
- Ray Tracing before starting render!

~~Scene settings~~

Custom background

↳ Attach custom env.

↓

havi-haven for free

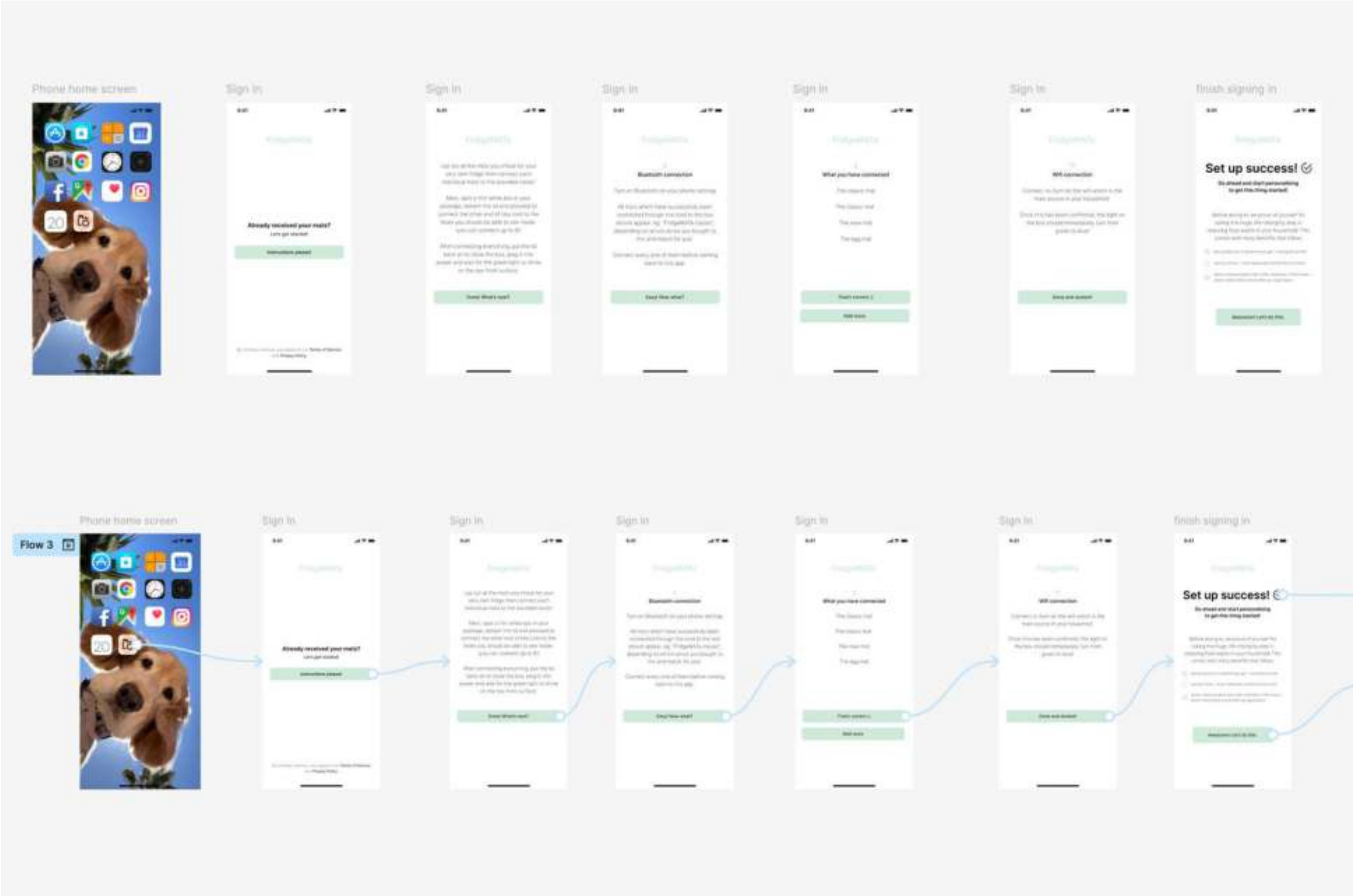
planning my figma design

I have designed a product called a FridgeMATE which is a mat designed for the household fridge. It's main purpose is to weigh food contents that get put on top of it and that data goes straight to the app so the user can see the changes/updates. The main reason for it is so that the user can be aware of whats in their fridge at all times, on the go so that when they go grocery shopping, they don't purchase duplicates and encourage food wasting behaviour. The app can also be synced for multiple people using the same fridge so this prevents any miscommunication between members in the same household and everyone can get updates when change has been made. The mats come in different colours to define different categories which the user can set up and personalise at the start (and they can pick what colours they want with whatever food category they associate with) so the app can send notifications accurately.

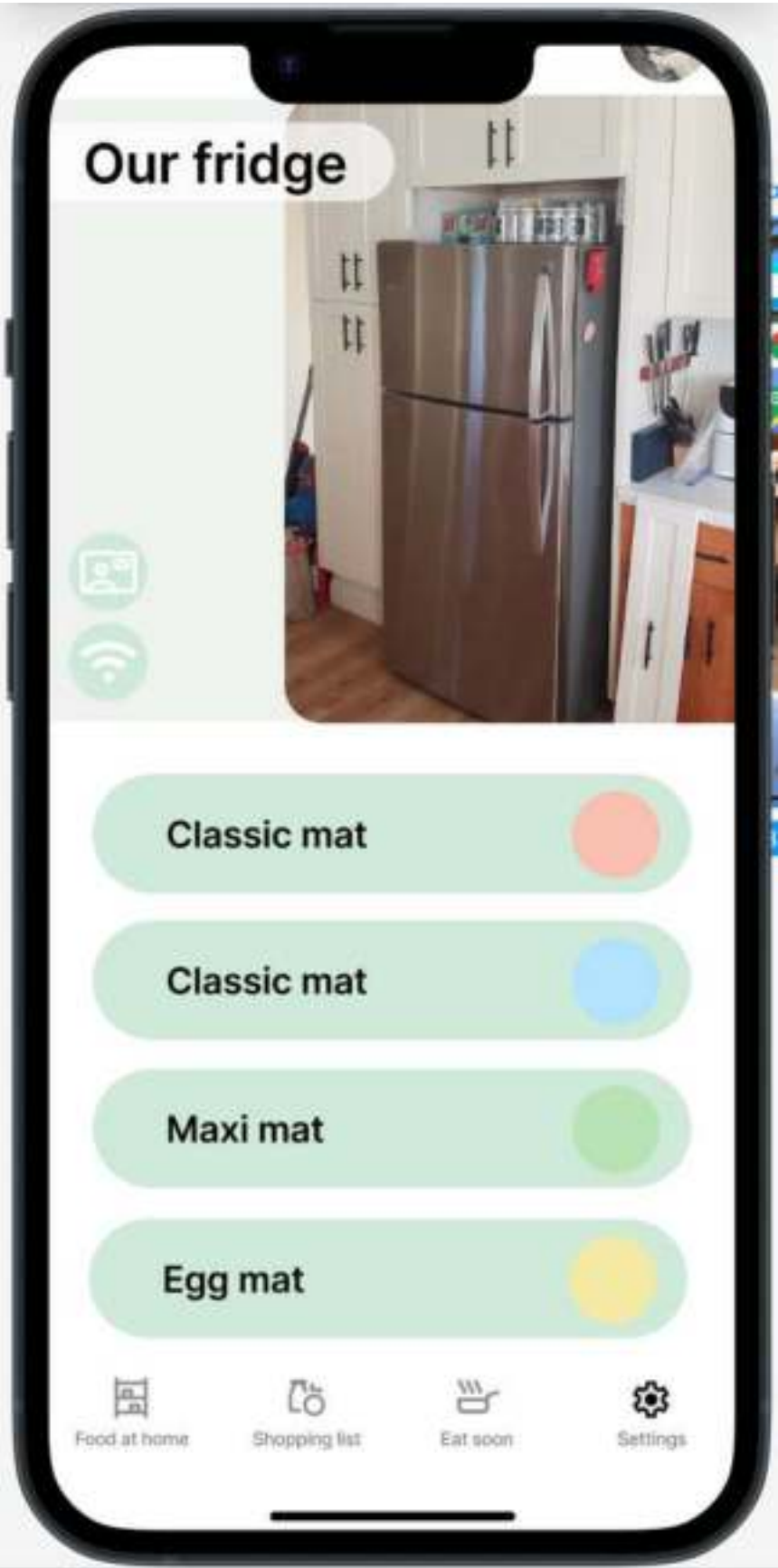
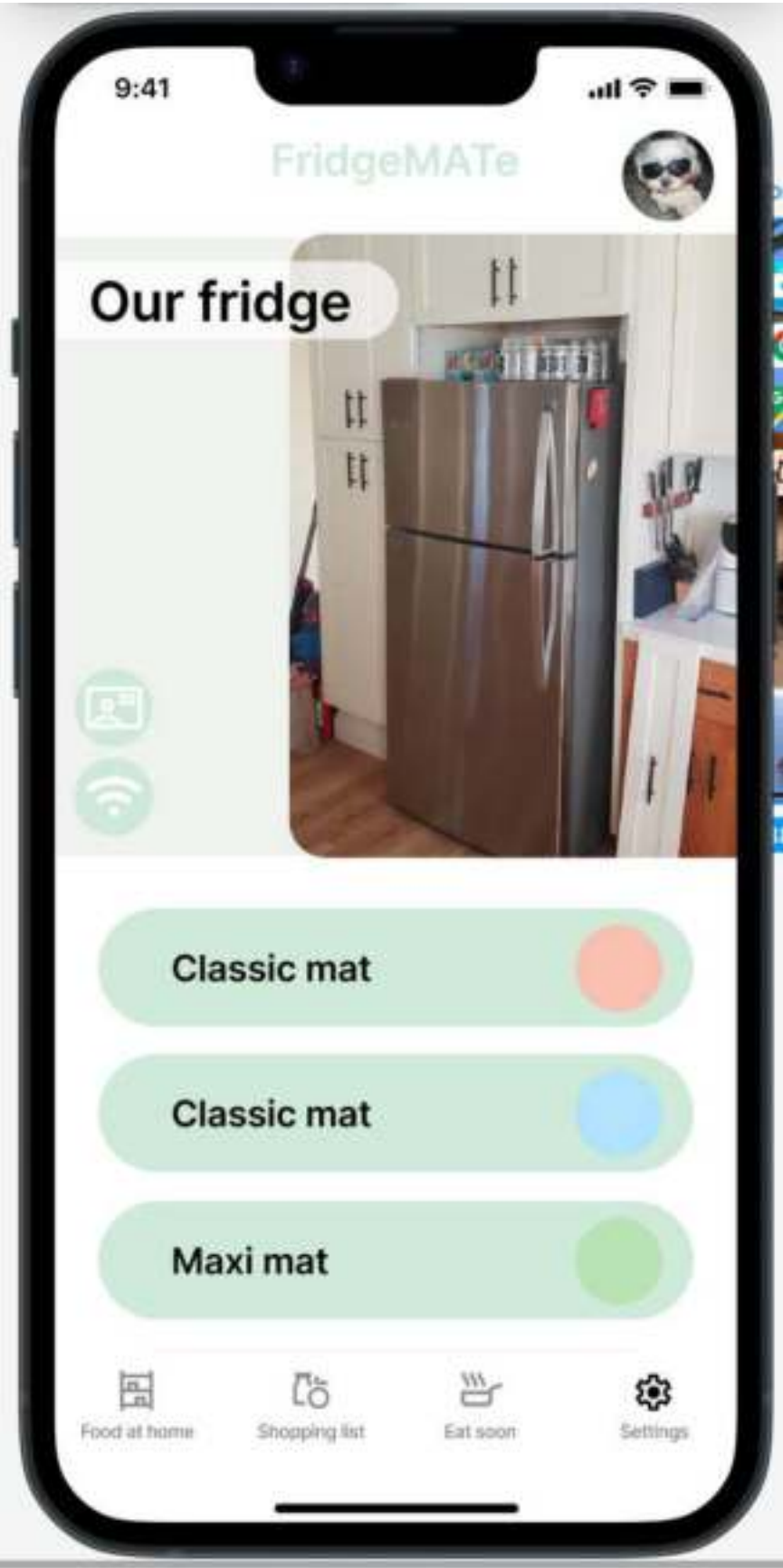
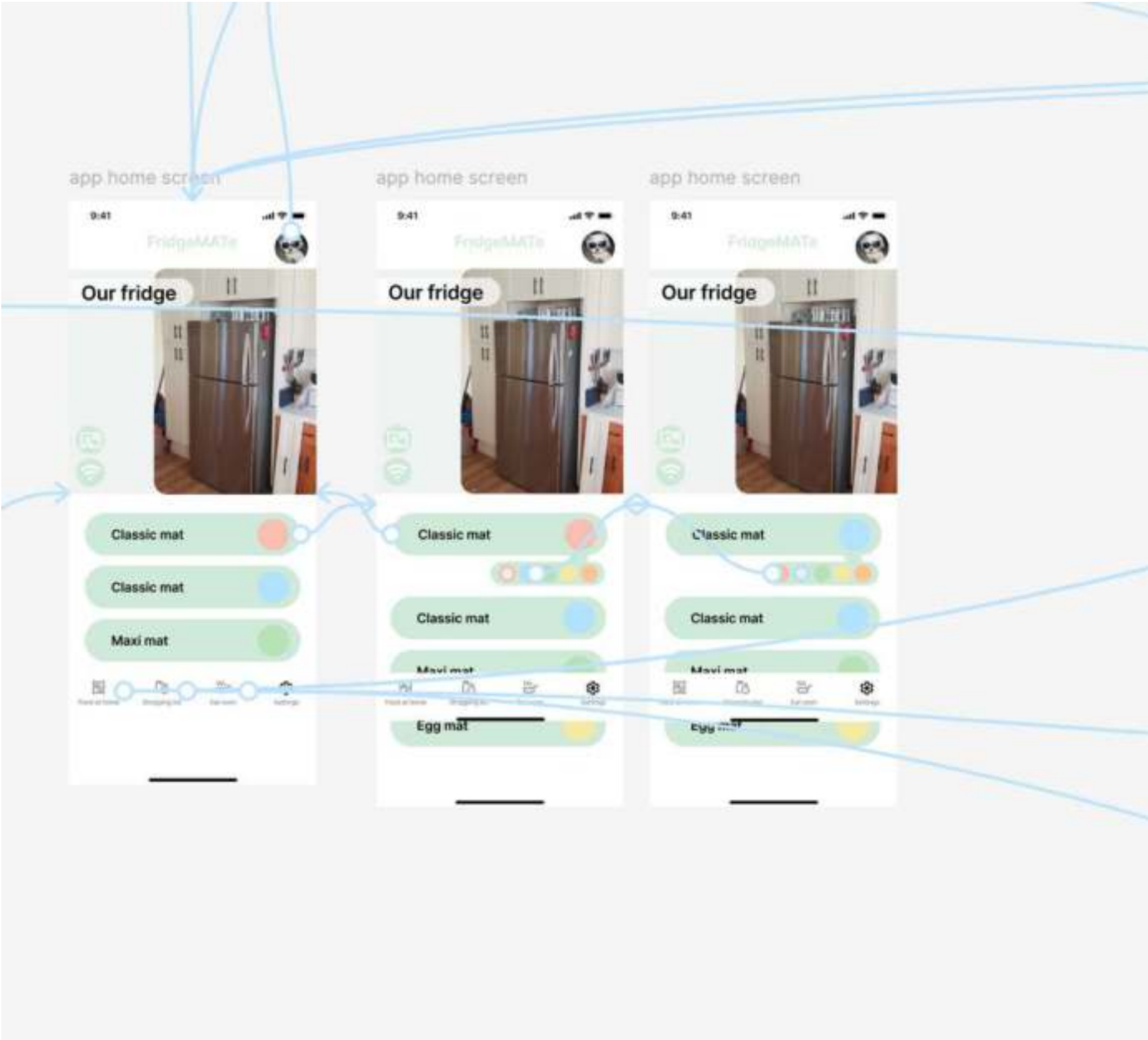
for the home screen options (as in the bar at the bottom to switch screens) - i was thinking:

1. a screen that shows playful drawing/icon images of most common/always required grocery foods on a digital shelf with a small battery under each food that shows a percentage of how much user has left in the fridge. The user can set up how much of what foods they want at all times in their fridge eg. milk 3L at all times, and currently the app says theres only 20%. And the playful screen can encourage users to want to go shopping or to refill with reliable accuracy and not over-purchase, its almost like a game/fun challenge to tick off when its been achieved for some sense of achievement to stay organised and maintain effective communication within household members in terms of food and fridge organisation. This considers the kind of trend nowadays for younger adults (18 to 34) and that they have shorter attention spans and that they are glued to their phone and is very tech savvy which makes this addition actually useful, will be utilised, convenient and realistic and sustainable in the long-run.
2. Either idea 1 AND this, not sure, but a digital shopping list according to what the app has determined/recognised is missing or has been used up
3. Recipe suggestions when the mat is concerned how long foods have been untouched for and needs to be used up quickly

Initial set up stage of the app (wifi, bluetooth, syncing and intro to app)



home page/settings



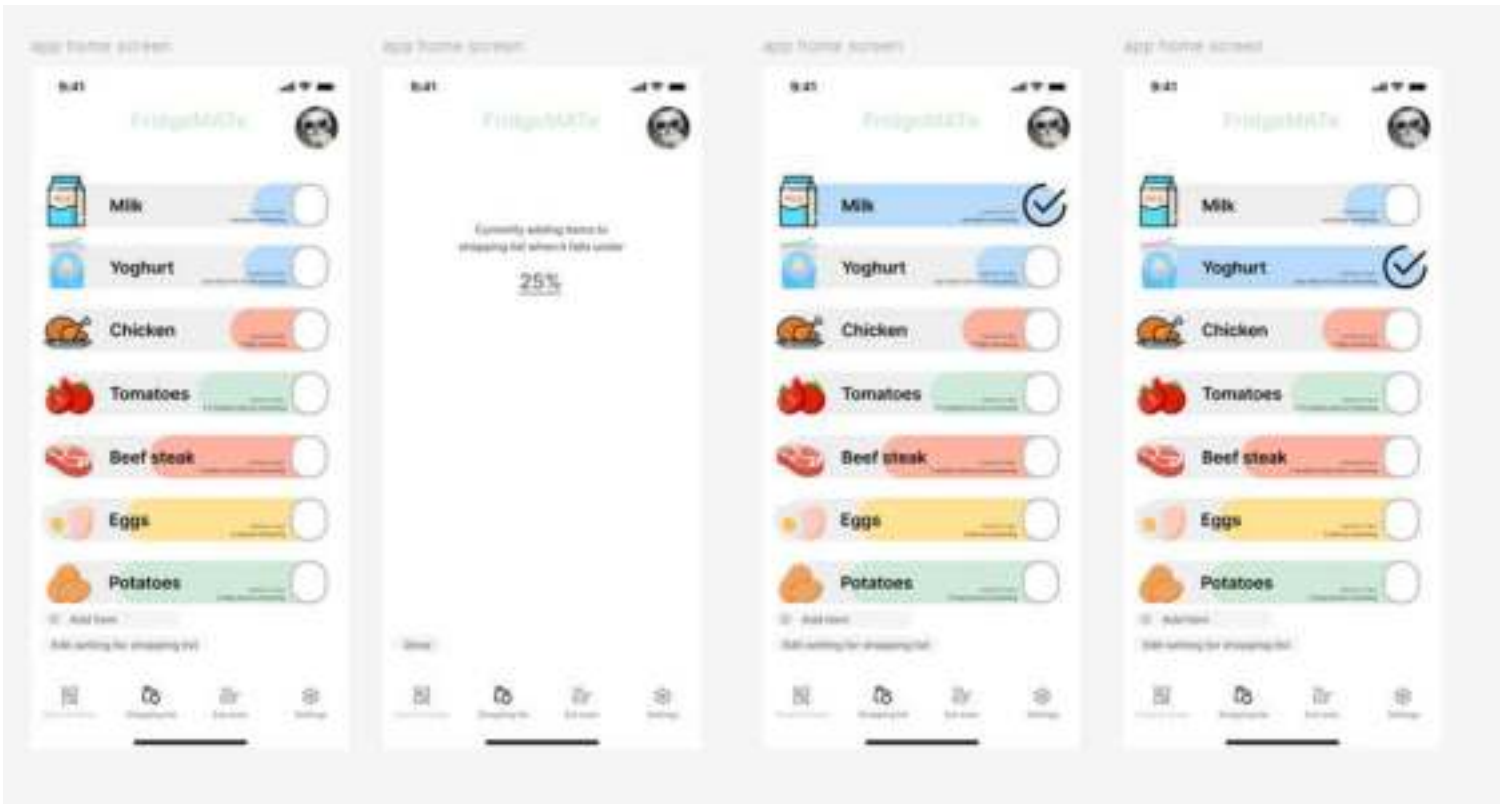
profile picture + adding and syncing other members of the house to see the same details and updates on app



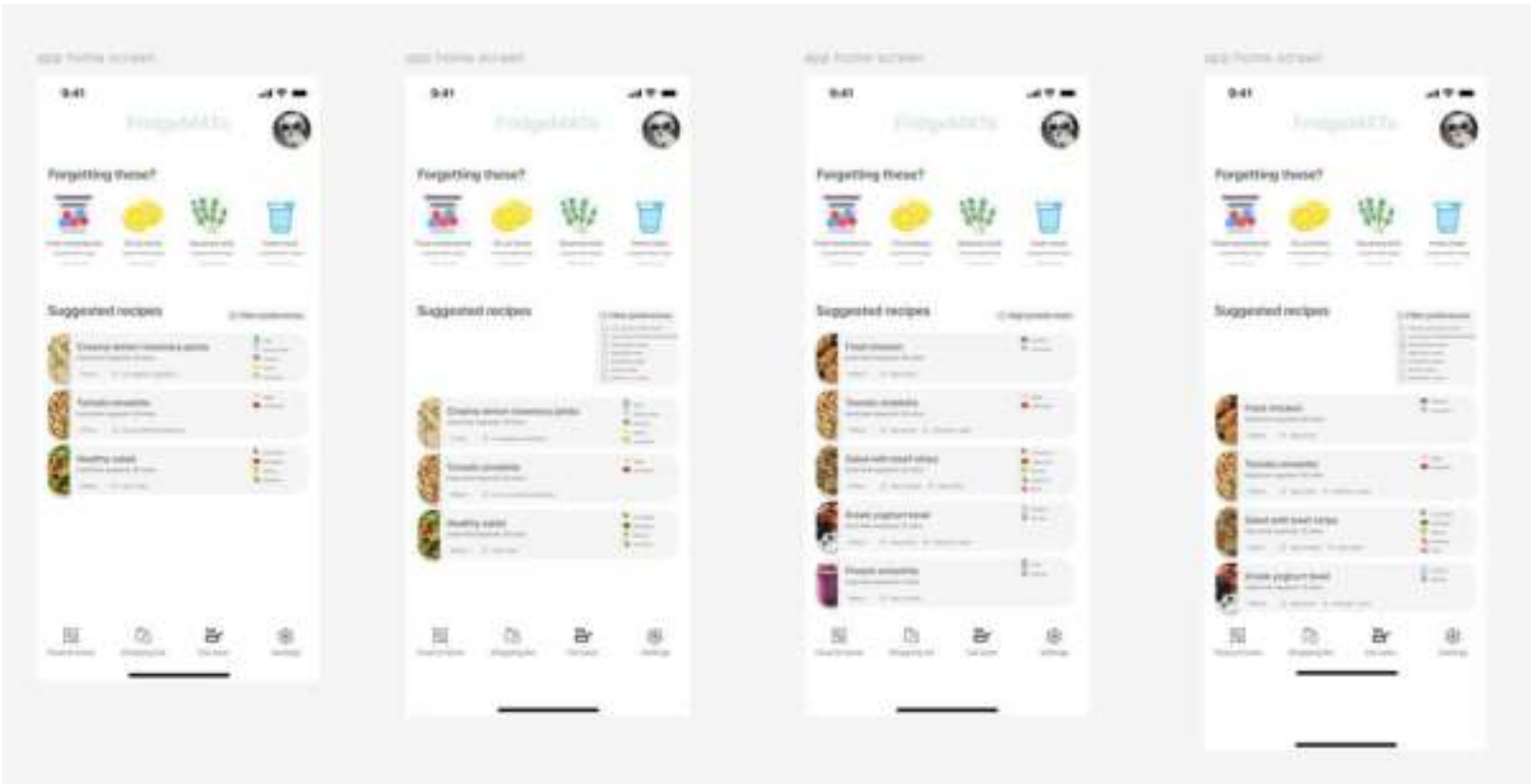
Food contents detail and updates inside your fridge (+ edit)

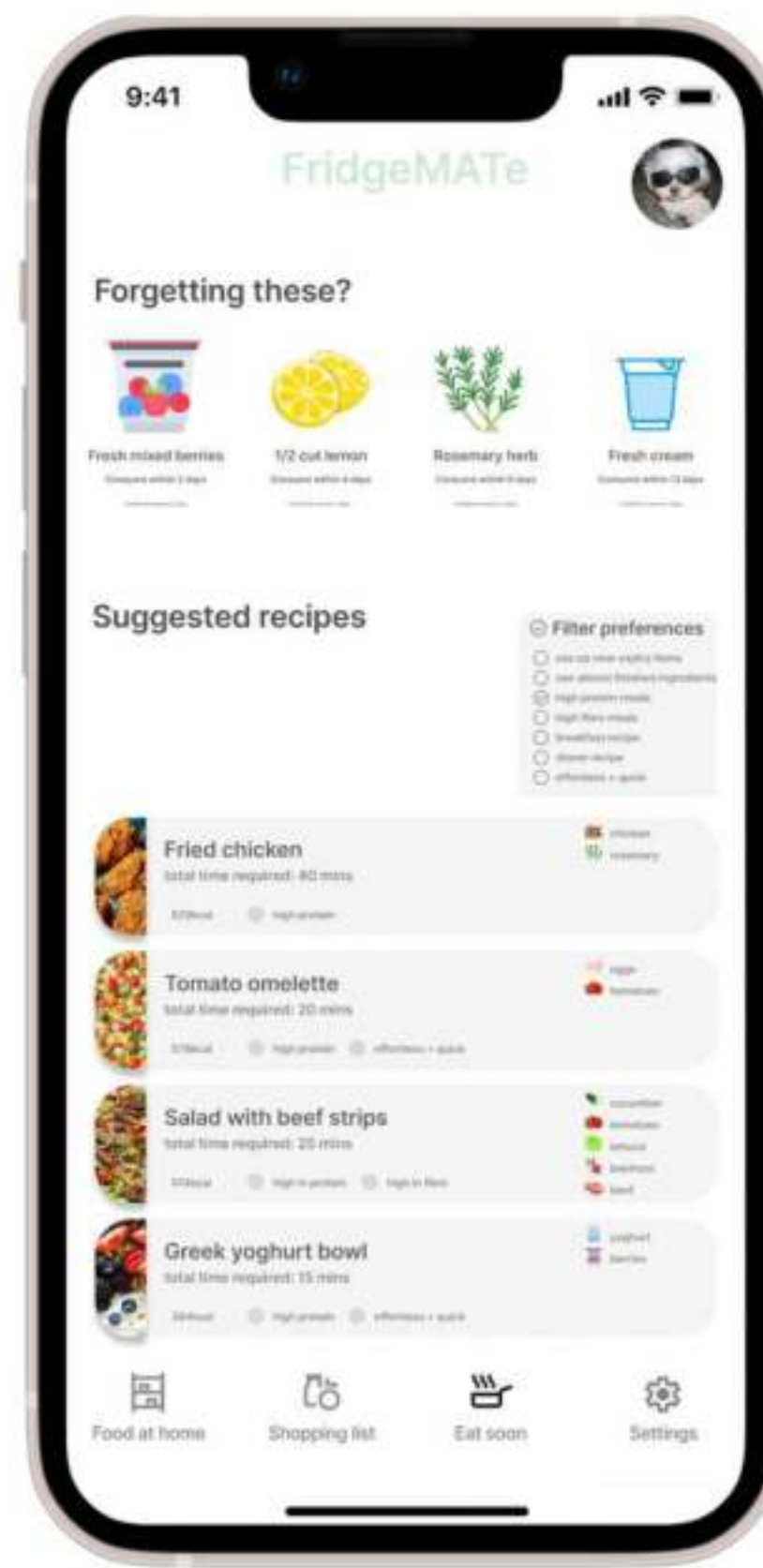


shopping list based on whats in and whats not in your fridge

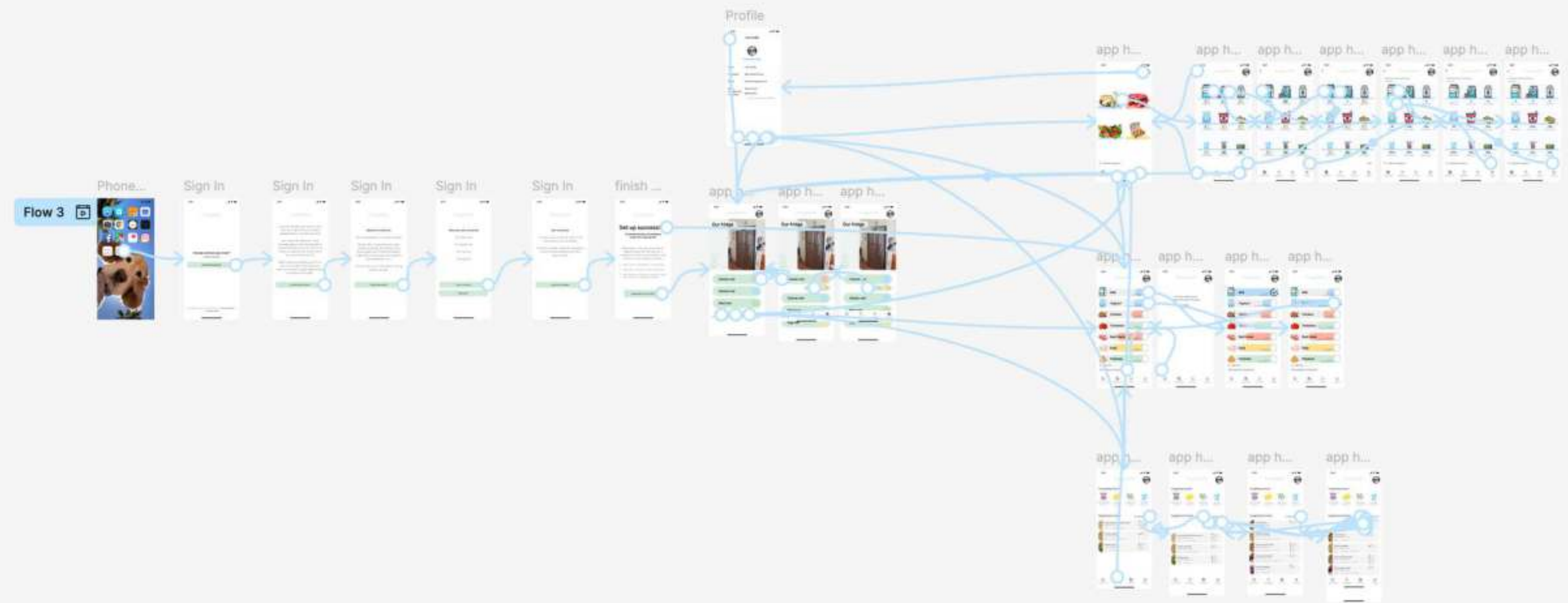


suggested recipes(+ preferences input), reminders for forgotten food items





SCAN ME



VIDEO

BEFORE HAVING FRIDEMATE

- bad habits = food wasting
↓
wasting money
- keeps forgetting, buying too much groceries

DISCOVER FRIDEMATE

- Super cool & in time
- tries to set it up
- slow figure process

AFTER USING

- good review comments
- no longer wasting food
- happy + satisfied in general
↓
eating better
feeling more organised
better communication + relationships w. team mate.

come home w supermarket
pay with new groceries

realise he bought the same
things we already have.
"damn it!"

"I hope I can finish it in time"

putting groceries in fridge & inner
monologue "oh no I bought the
same packet of — too... And
this old one's expired already and we both just
completely forgot about it."

"I need to stop repeating these bad habits
but I'm so busy with uni & work &
hanging out w the boys, what's a few \$
wasted?"

*checks phone - "oh my god... I've spent
on groceries this month & I ~~forget~~
don't even remember what I got or if I even
ate it already..."

Quindi approaches Leon
"I was thinking the same
thing actually so I got
us ~~a few~~ some Fridgemates!"

me showing screenshot
on screen explaining
how the app works
1min

"oh! and I forgot to buy butter!
Quindi told me to get some but
I forgot... I can never remember
what I need to get whenever I'm
at the shops :("

Leon "that's so cool! I'm excited to start using it :)"

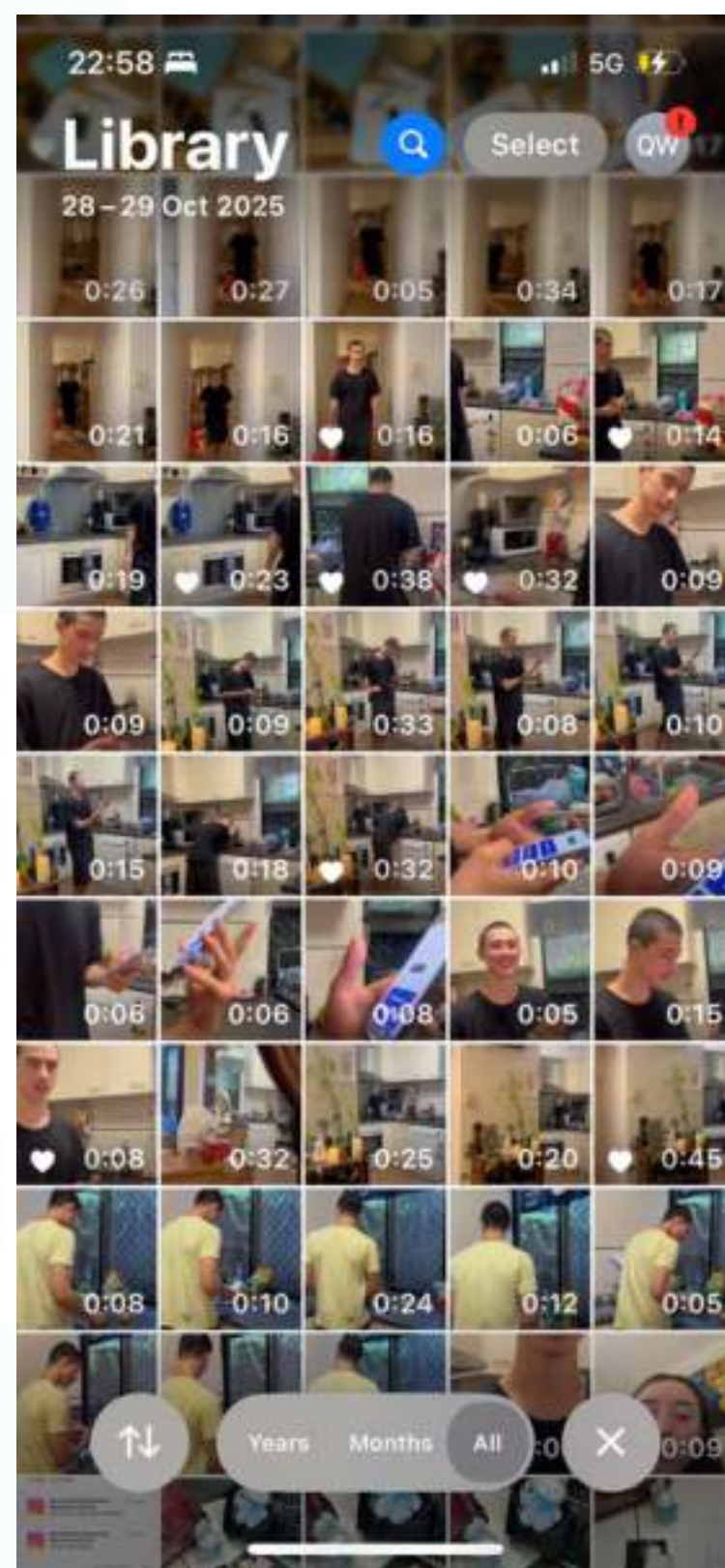
1 week later

Leon is cooking in the kitchen

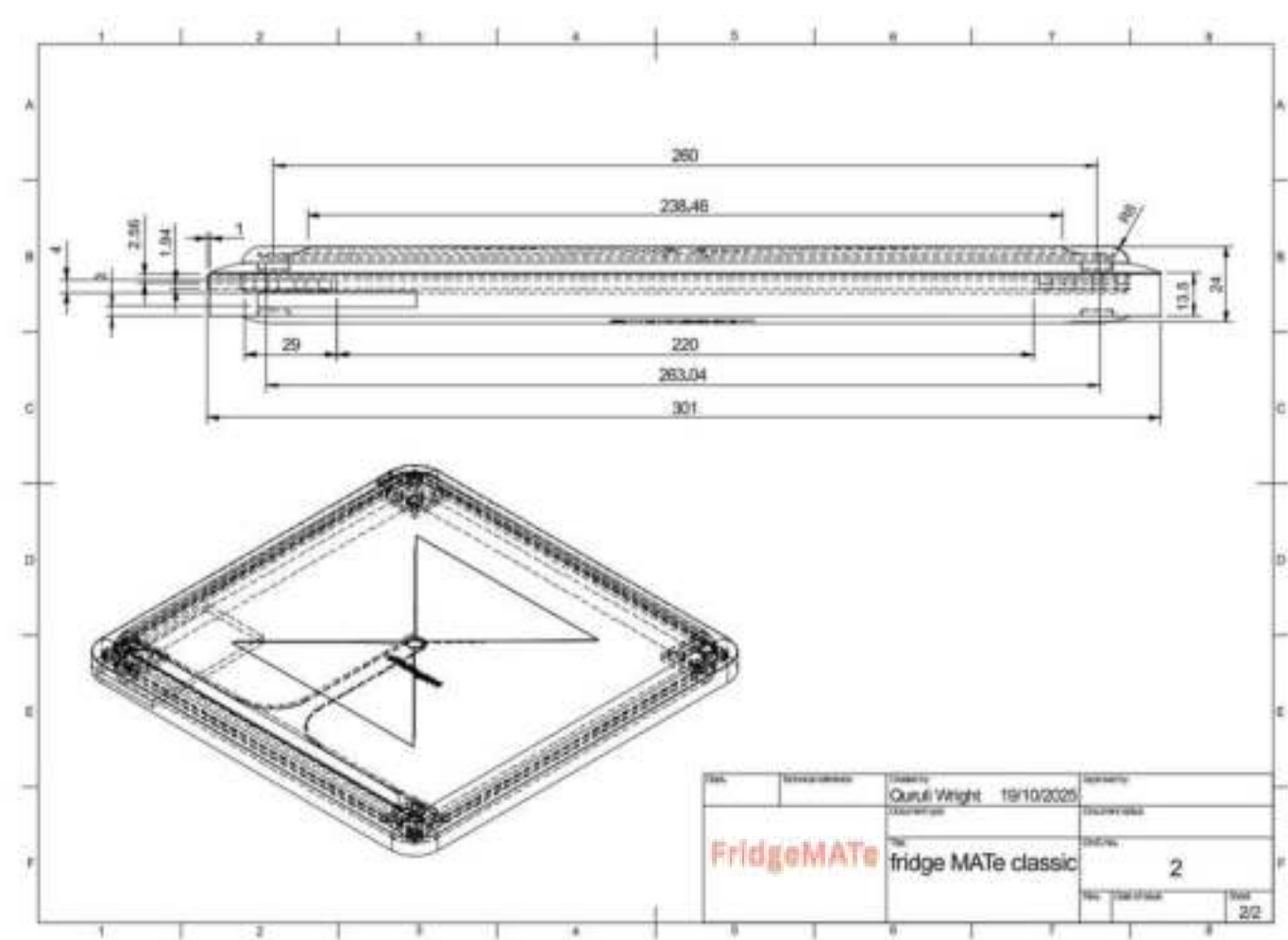
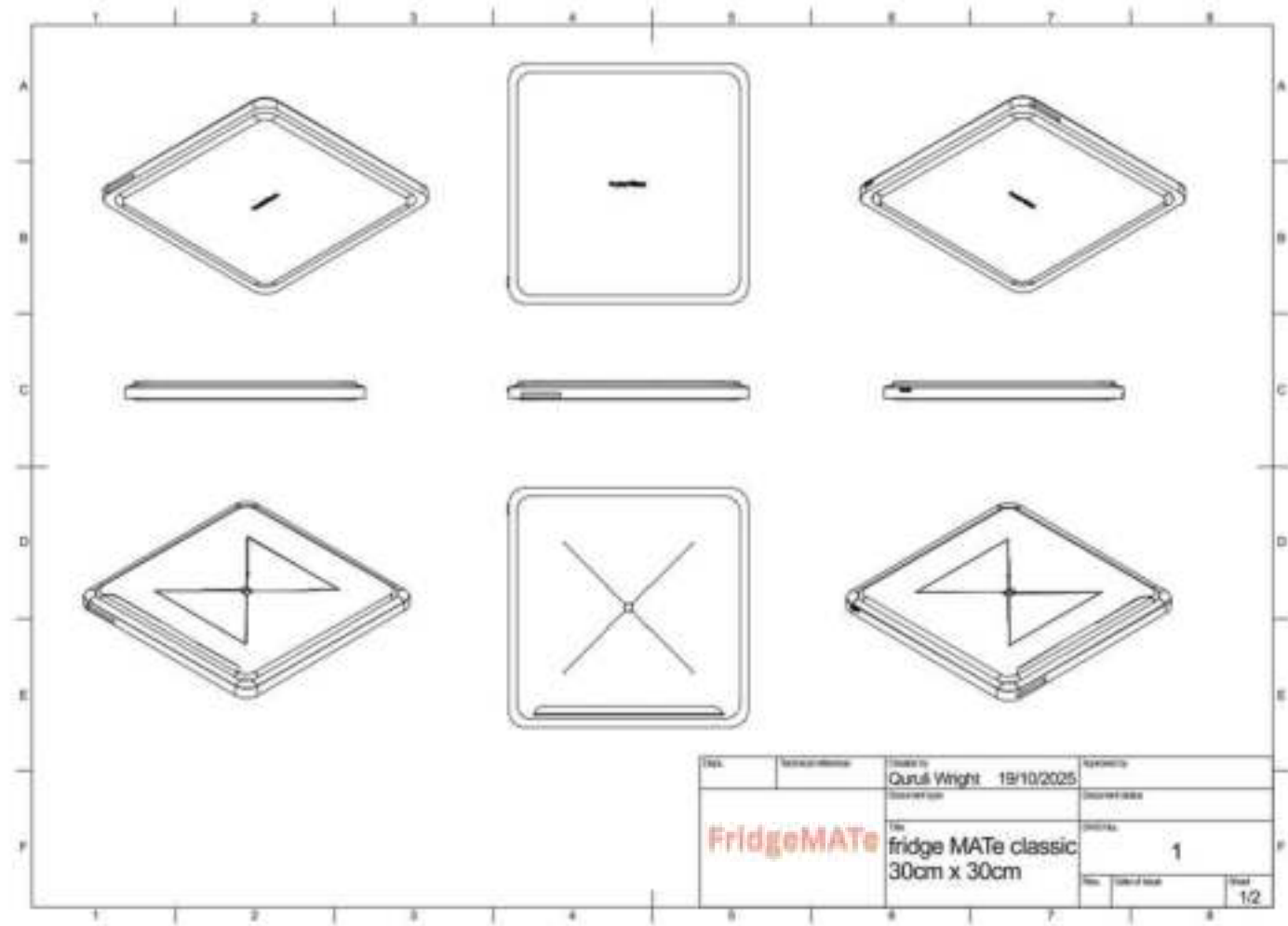
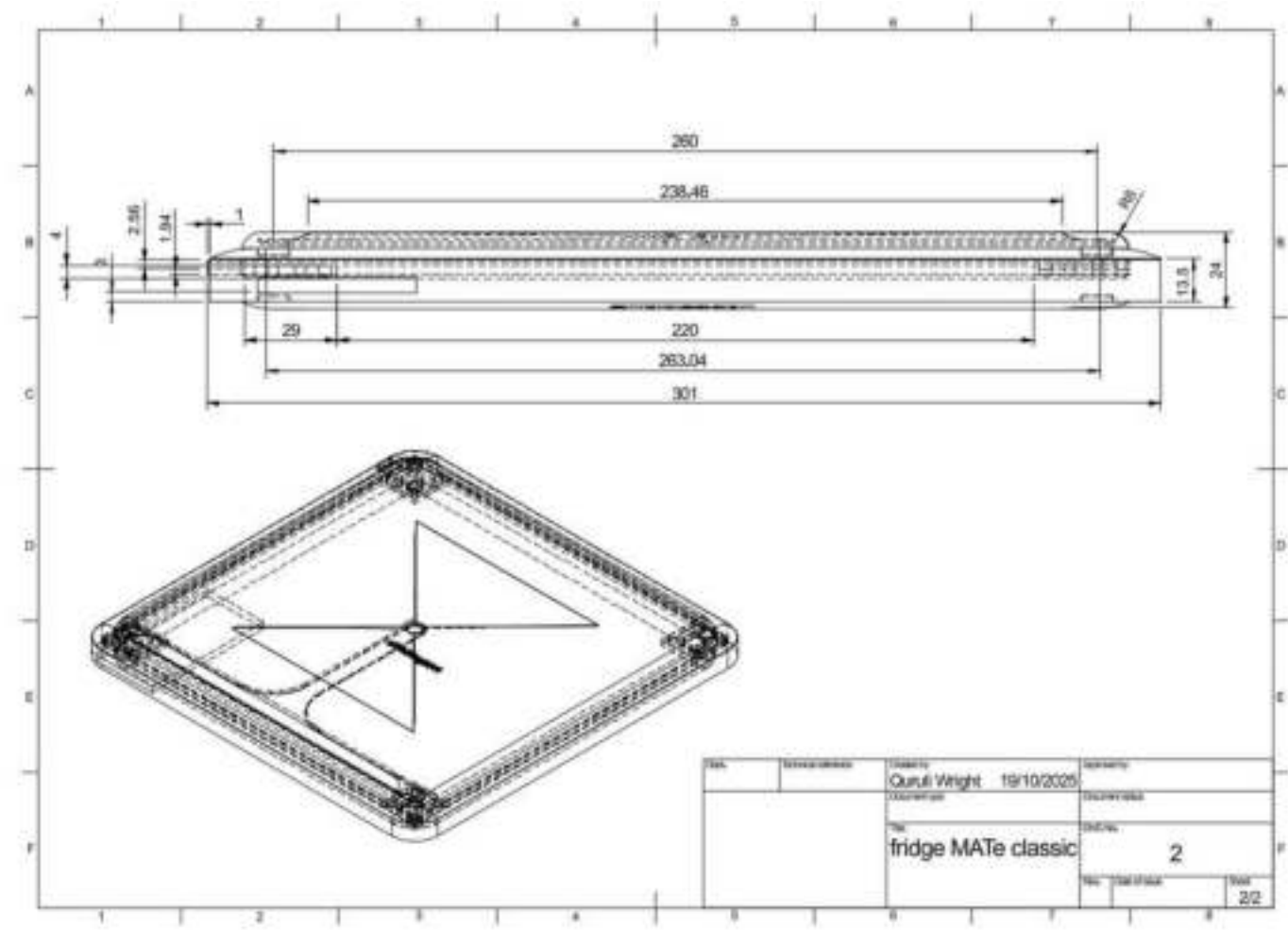
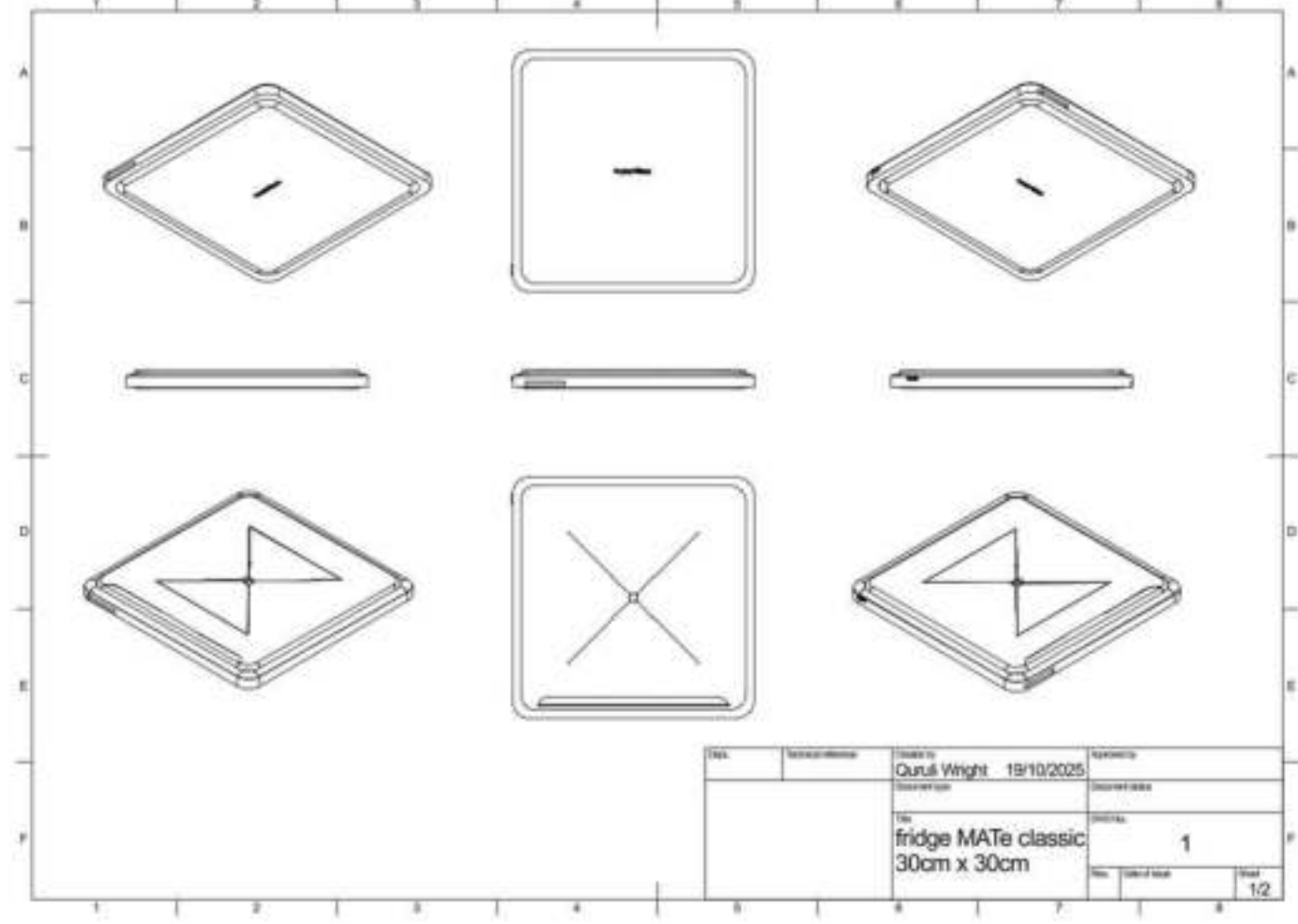
Q - what are you making? I've barely seen you cook!
oh, well I've been meaning to change my food lifestyle cause I just felt so
disorganised and I kept throwing food away which was kinda sad.
Also, I've been using the FridgeMATE app and I've been eating better,
being more organised, it's way easier to communicate with each other
what we need to go buy so I'm so glad you decided to get us those!

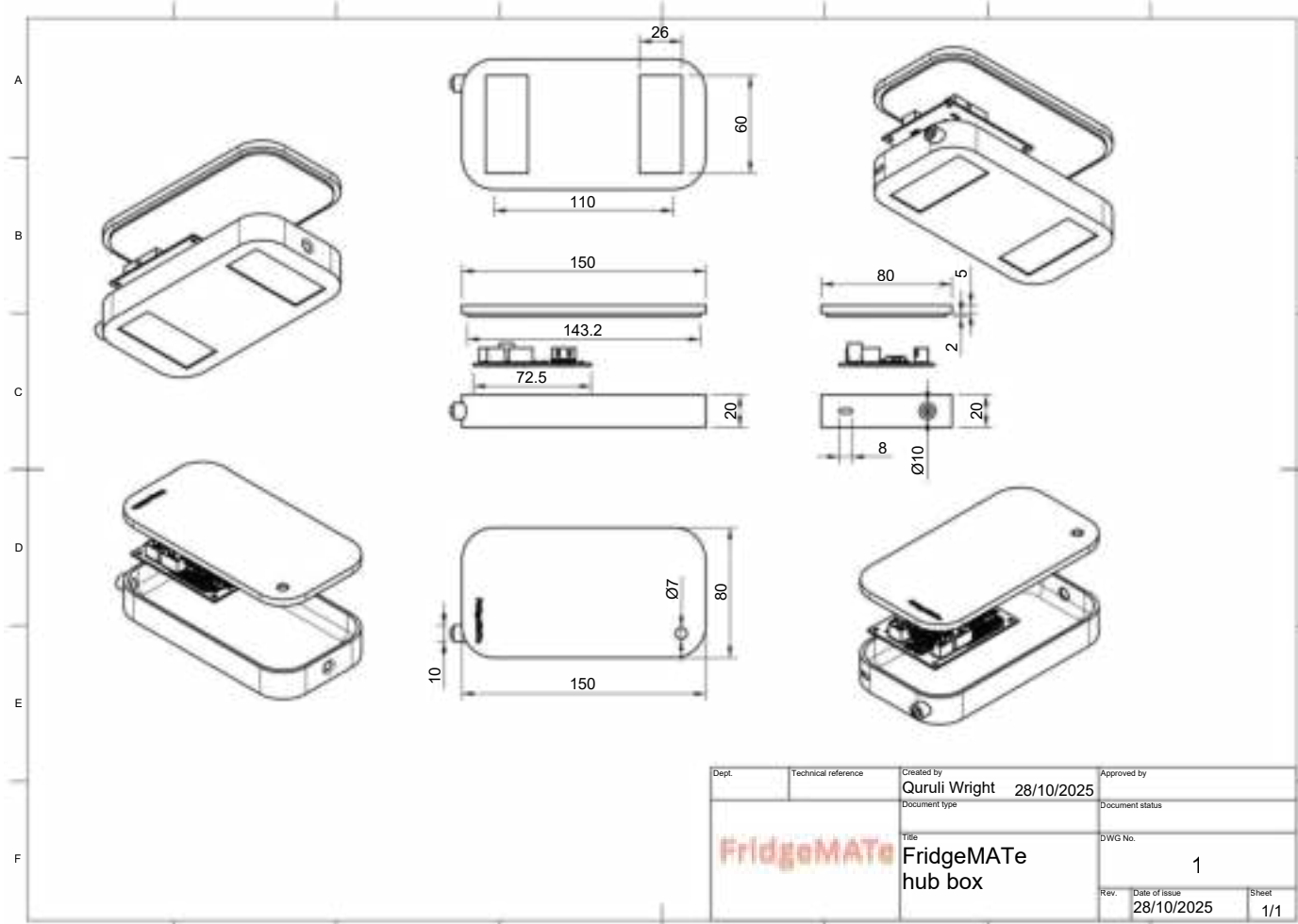
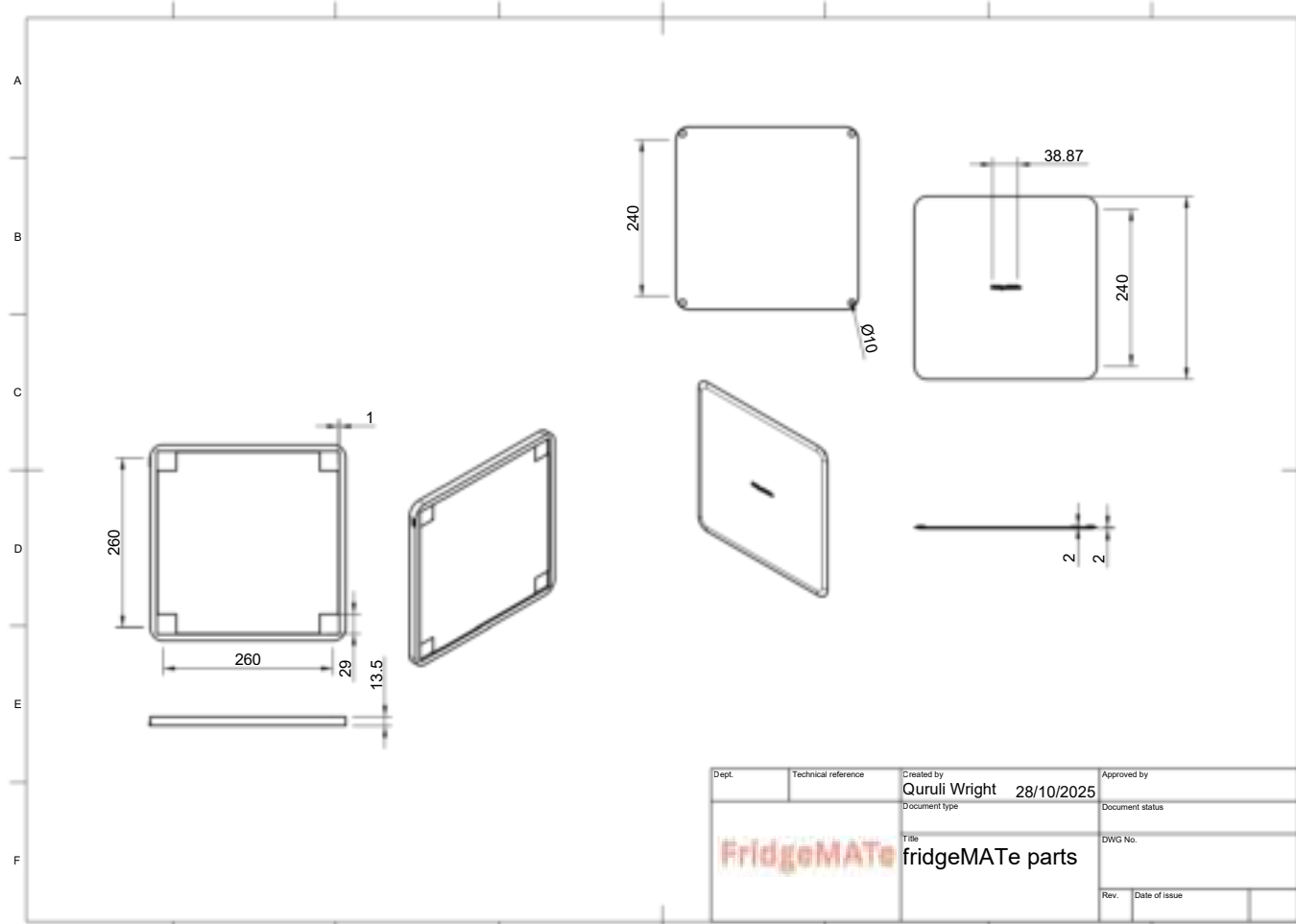
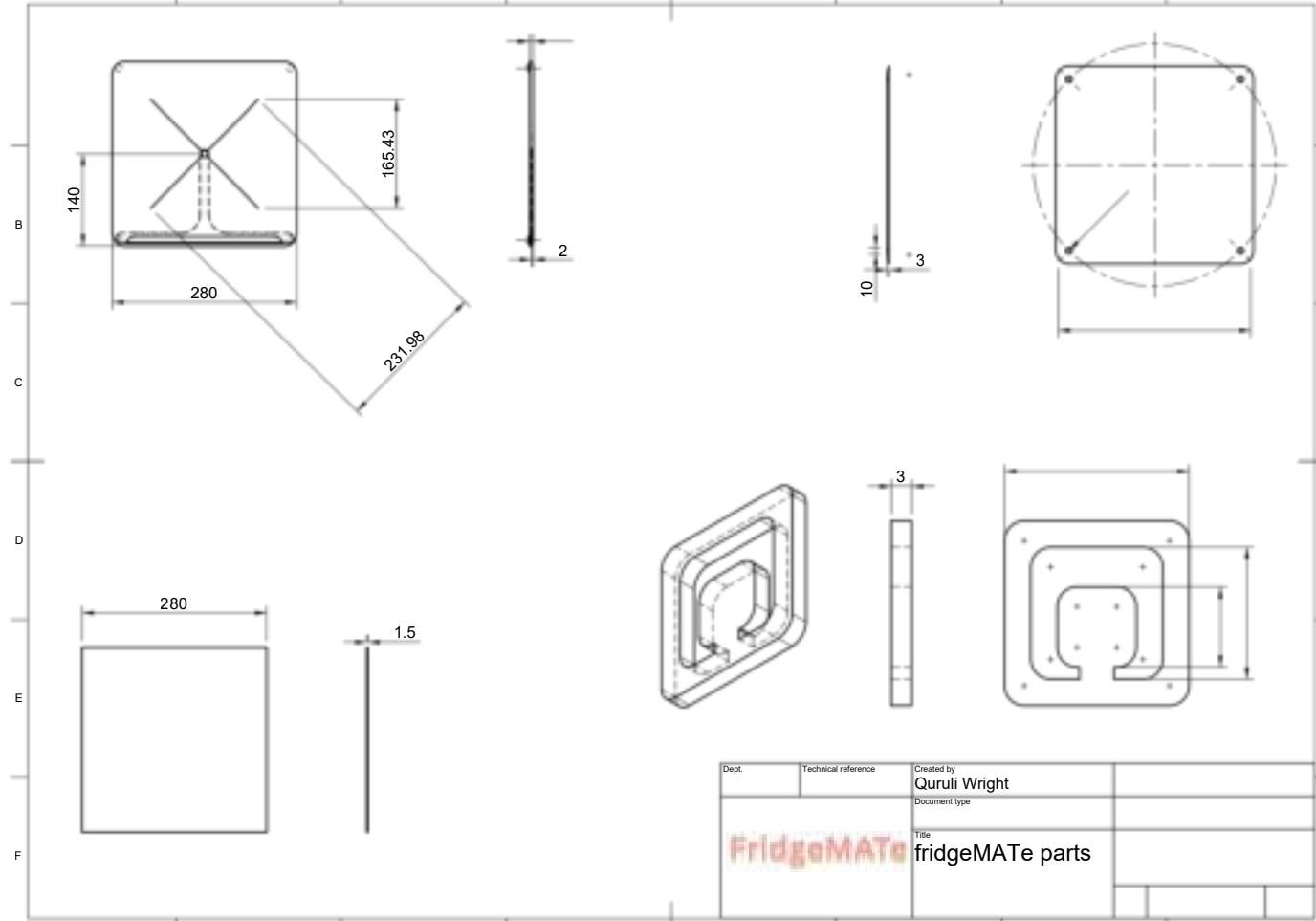
Q - I am ~~glad~~ glad you're
Right now I'm
actually cooking
this salad that
FridgeMATE suggested
for me. Without
it I definitely
wouldn't have
noticed that these
vegetables were
gonna go off soon!

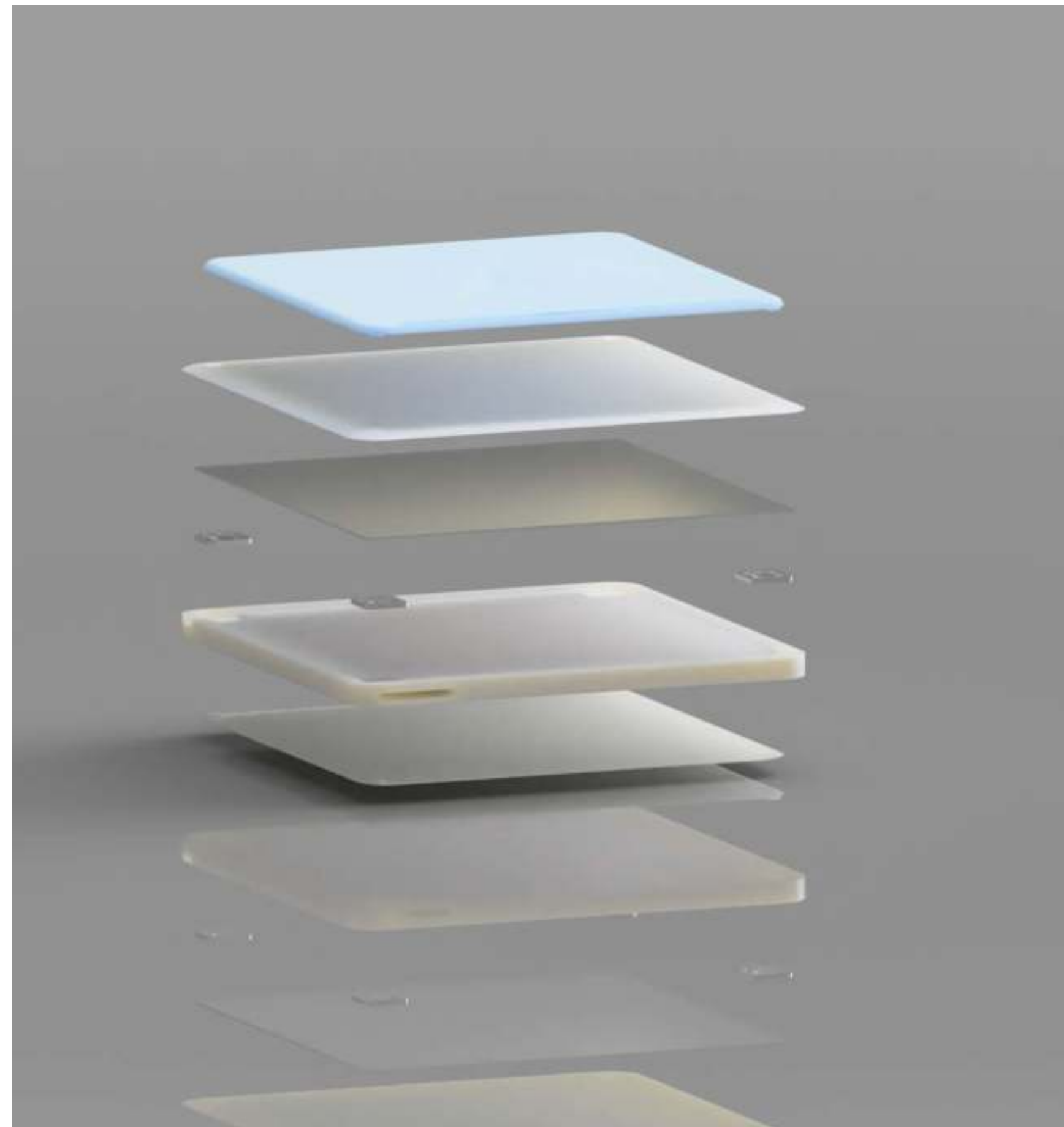
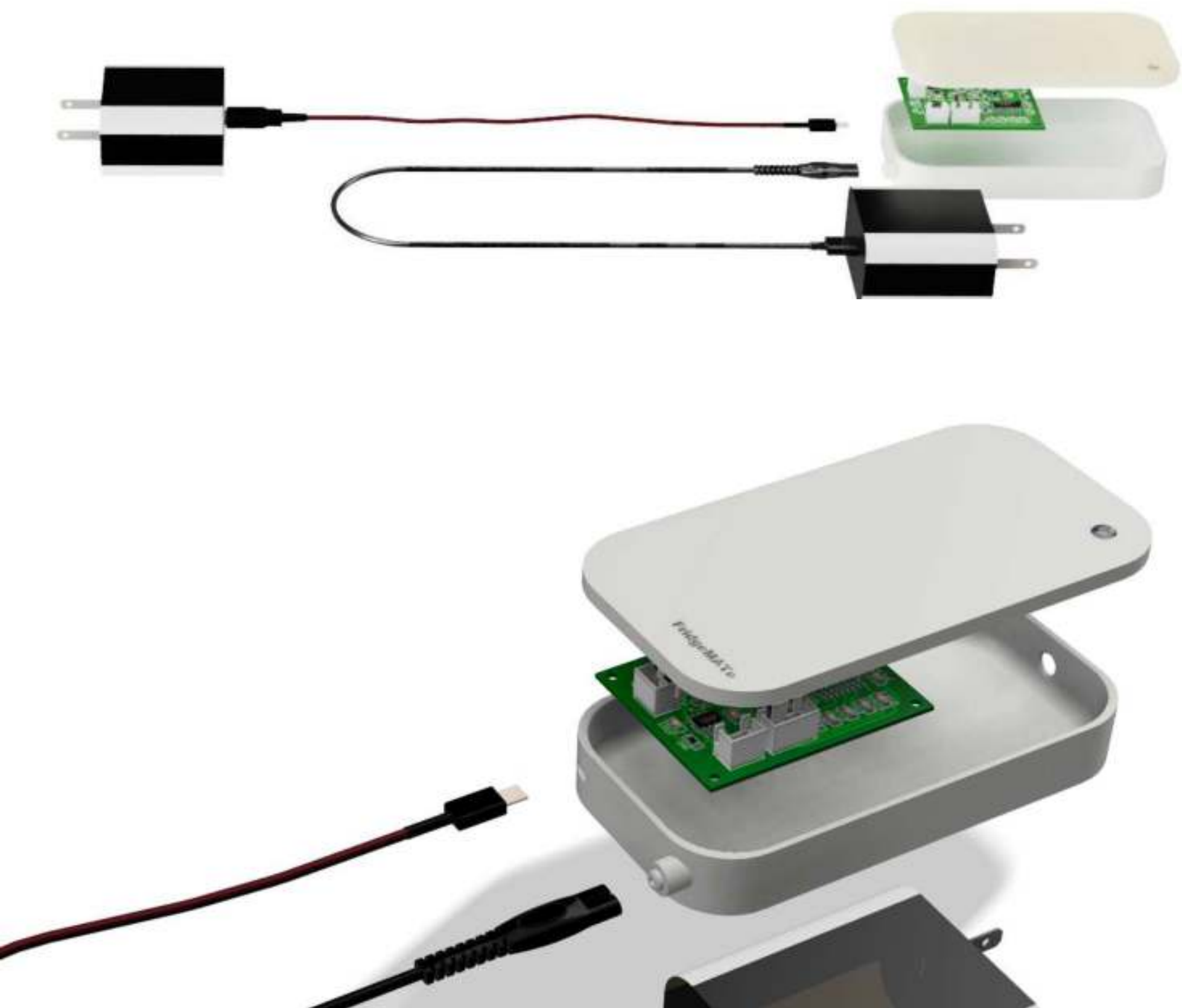
That's great!
Save me some too!



Long process, many many
takes and bloopers, as well as
audio recording to lay over the
footage + editing in imovie!

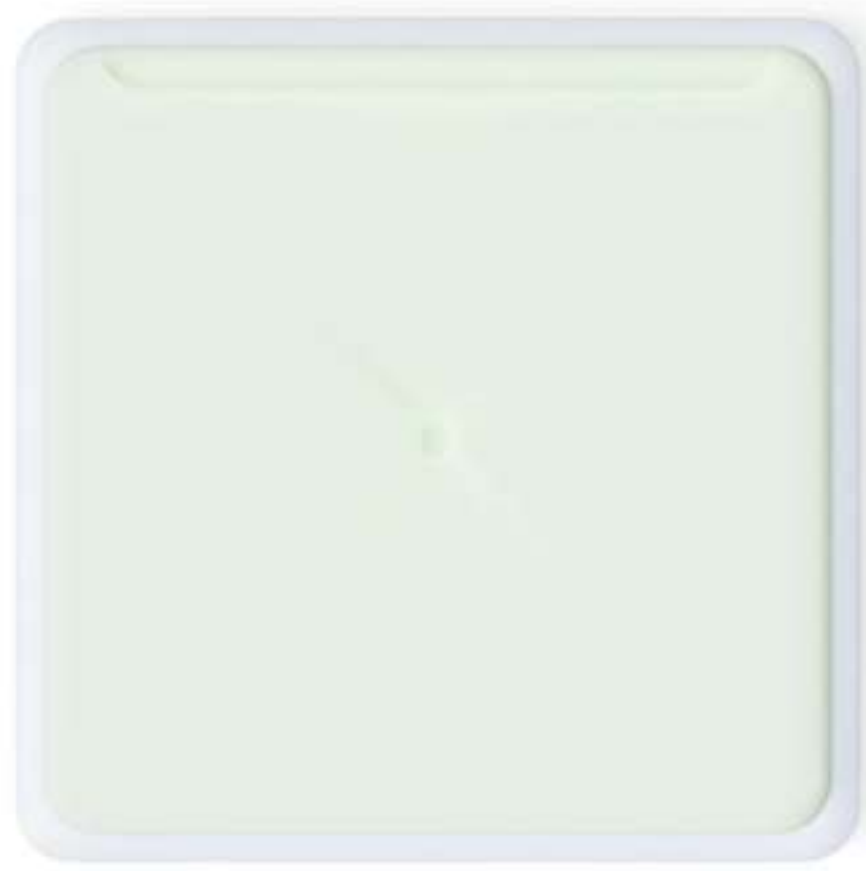


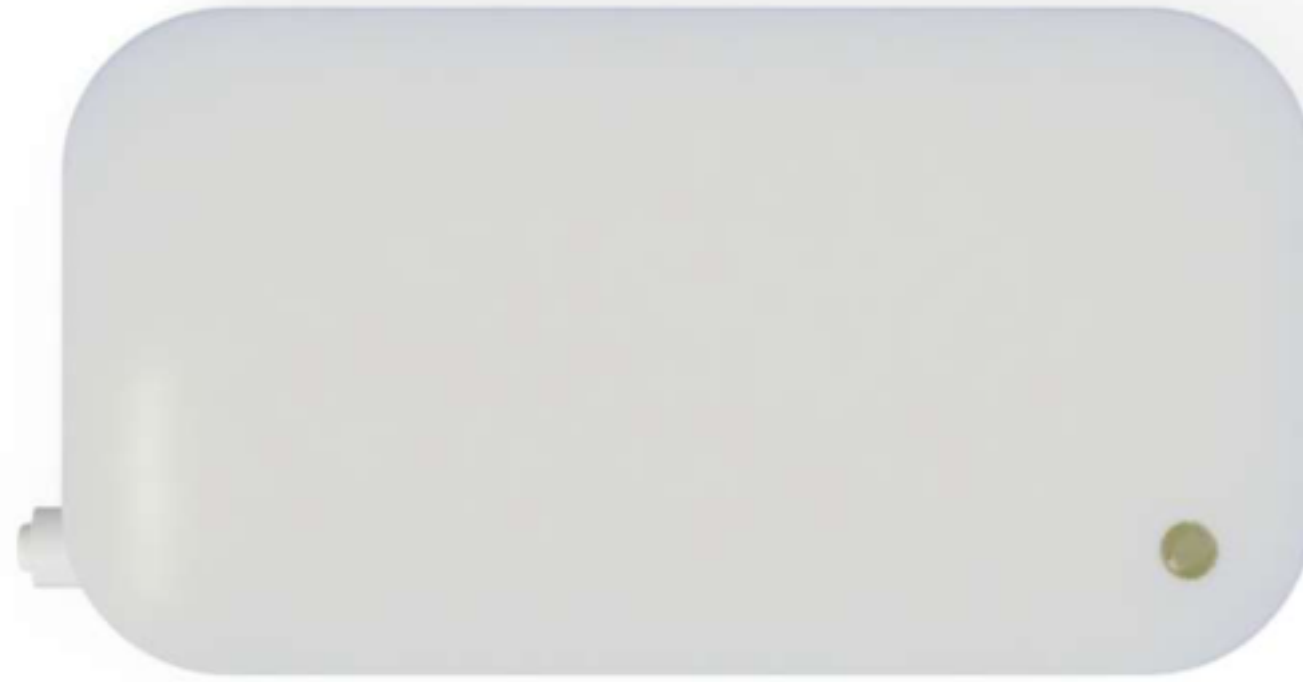




Part Image	Pt no.	Name	Qty per mat	Manufacturing method	Material	Colour
	1	Top detachable silicone cover layer	5	Liquid injection moulding	Food grade, dishwasher safe and non-slip silicone	Comes in red, blue, green, yellow and orange
	2	Top plastic layer	1	Injection moulding	Soft, smooth and silicone like polypropylene	White
	3	Flat board	1	Laser cutting	Aluminium 5052-H32	Natural aluminium silver
	4	Load cell	4	Purchased item		
	5	Replaceable ethylene gas absorbing filter	1			White
	6	Plastic mat body	1	Injection moulding	Soft, smooth and silicone like polypropylene	White
	7	Bottom detachable silicone cover base	1	Liquid injection moulding	Food grade, dishwasher safe and non-slip silicone	White
	8	FridgeMATE hub lid (with logo print and hole for light)	1	Injection moulding	Soft, smooth and silicone like polypropylene	White
	9	FridgeMATE hub base (with power plug entrance and hole for wire connection with mats)	1	Injection moulding	Soft, smooth and silicone like polypropylene	White
	10	PCB board (attachments; hub, microcontroller, li-po 1000 battery, battery charger, MCP6541, 24 bit ADC)	1	Purchased items built as one		
	11	Wires connecting hub and the mats	1	Purchased item		
	12	Small LED on hub lid	1	Purchased item	Plastic + LED light	Clear (green + blue light modes)
	13	Double sided strip magnet	1	Purchased item		
	14	Power plug to power the FridgeMATE hub, therefore all mats	1	Purchased item	Plastic	Black
	15	Plug and cord to charge the rechargeable battery inside for emergency use/no electricity access scenario		Purchased item	Plastic	Black

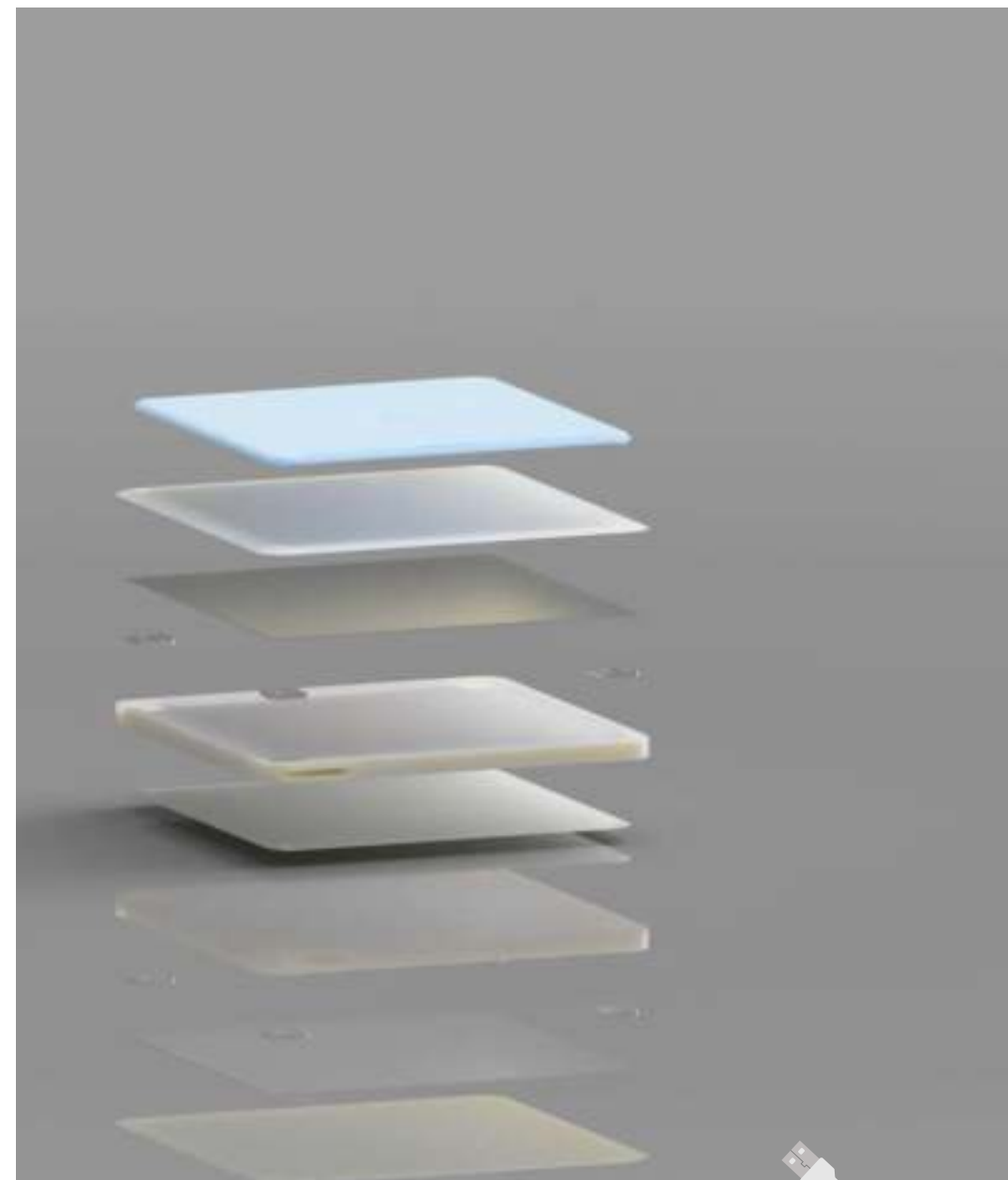






render done on blender





Open the app, set it all up including wifi and Bluetooth, making sure all my mats are connected. You can set your profile pic and add other members and sync the app for effective communication.

First things first, decide what colour you want each mat to be each symbolising a food category. They are interchangeable and can come off to be washed.

Then set up your profile picture and invite other household members and sync the app with them.

Here you can see contents in your fridge categorized by each mat and exactly how much of what is available, laid out in expiration date order. The smart mats are supported by Ai but if its ever inaccurate you can edit these details like so.

it can also create an automatic shopping list for you. You can tick them off one by one as if it’s a fun challenge game. You can also control at what point a food item ends up in this list. This prevents users from accidentally buying duplicates, therefore not wasting food or money and maintaining organisation. Once the purchase is made and you physically put the item on the mat, the mat can then determine what it is exactly based on these two factors – the flybuys receipt and weight of each item if identical.

ased on what the weight the mat measures, it can detect items which hasn’t been touched and has been forgotten about and remind you through a notification. With this and nearing expiry date food items, the app suggests various recipes to efficiently use up all your ingredients before spoiling according to your preferences.

App can also communicate approximately when each ethylene filter needs replacing

mat is essentially a weight sensor mat however with the integration of AI and other tech, user can sync their flybuys or everyday rewards to allow the mat to effortlessly predict and determine exactly what is placed on the mat. Overtime, the AI tracks repetitive habits

https://www.amazon.com.au/White-Magic-Basics-Kitchen-Compost/dp/B09B3G28KV?ref=ast_sto_dp&th=1

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