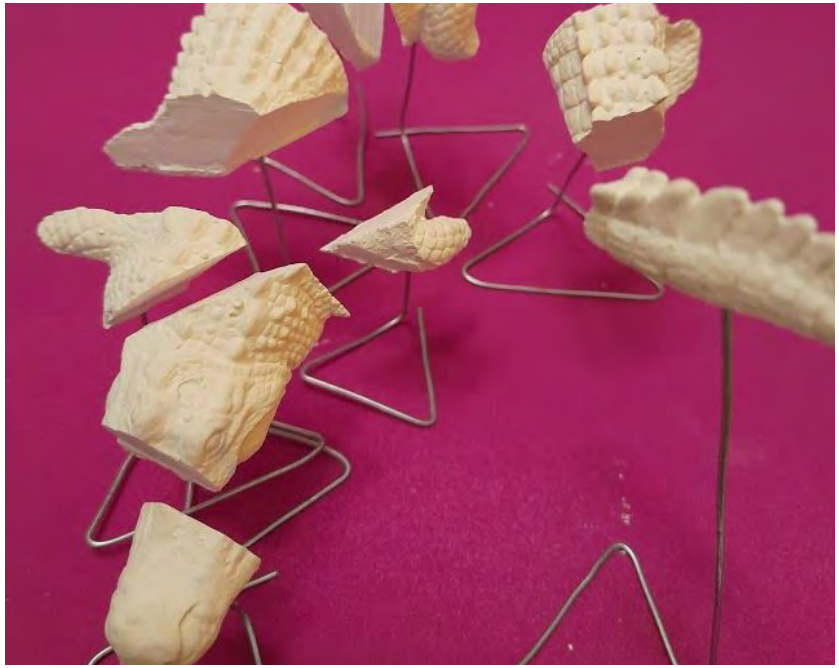

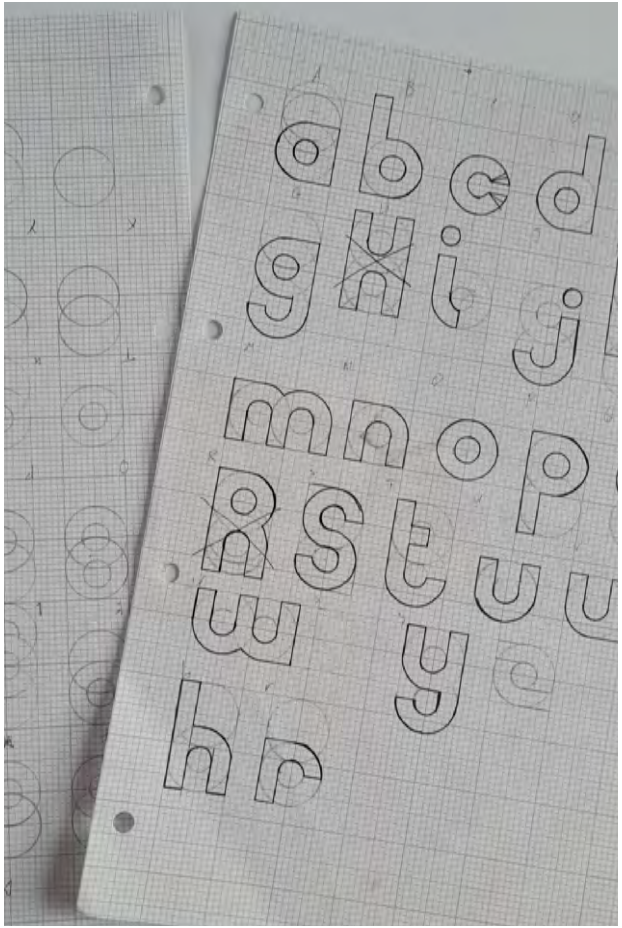

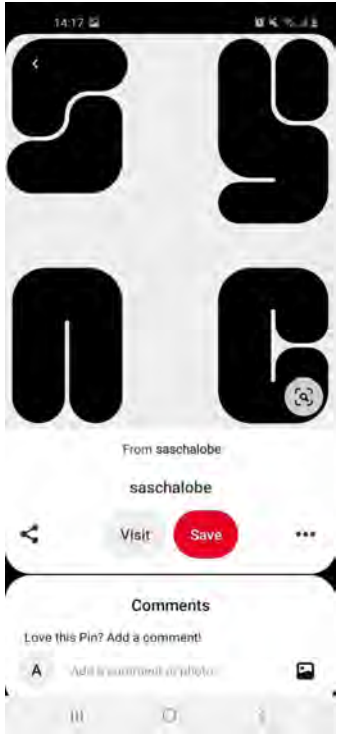
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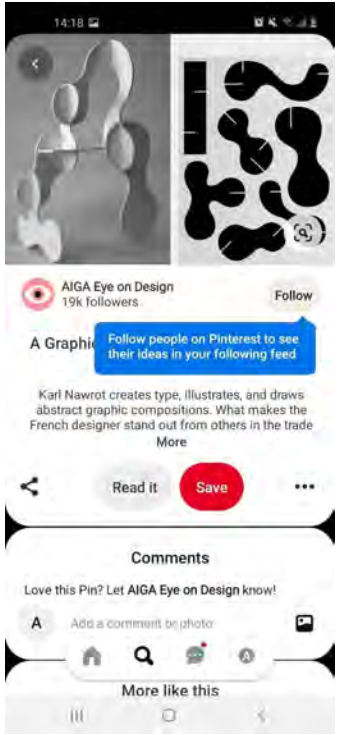
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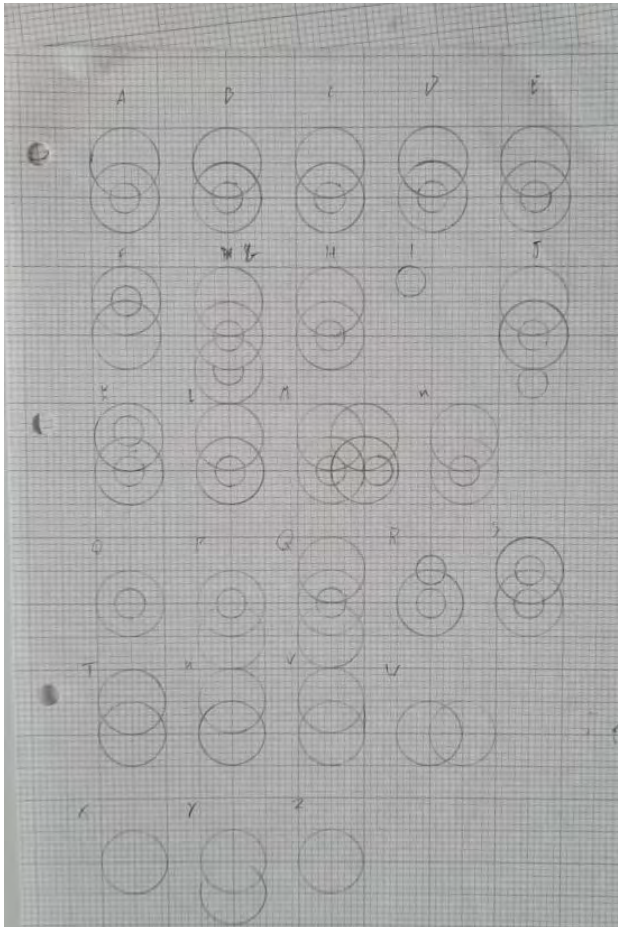
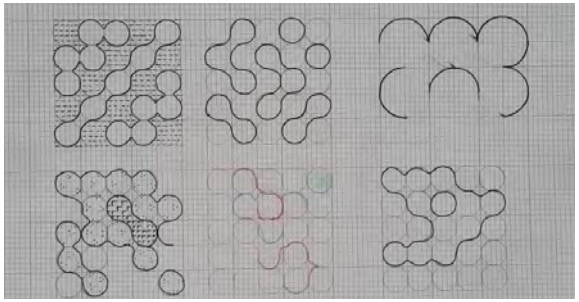
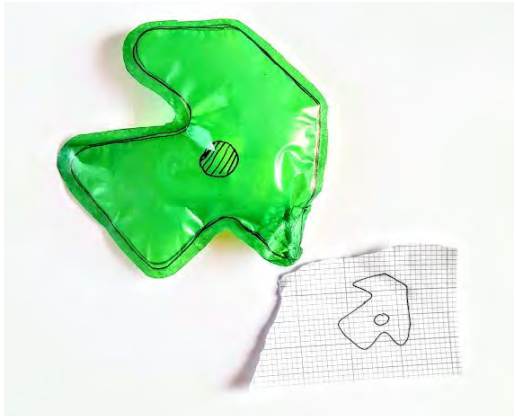
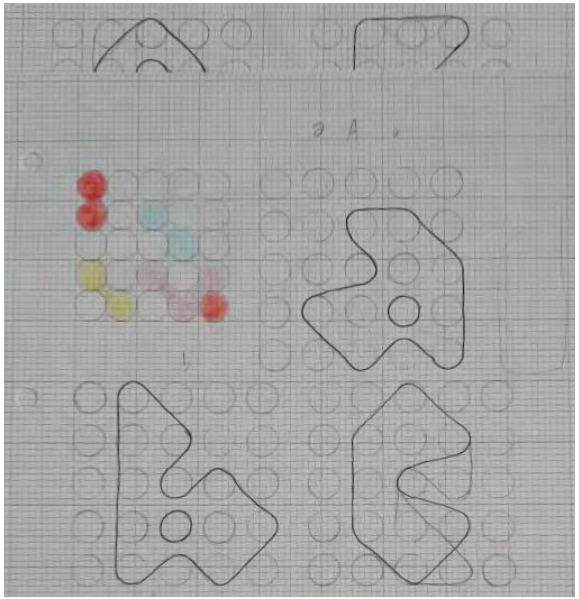


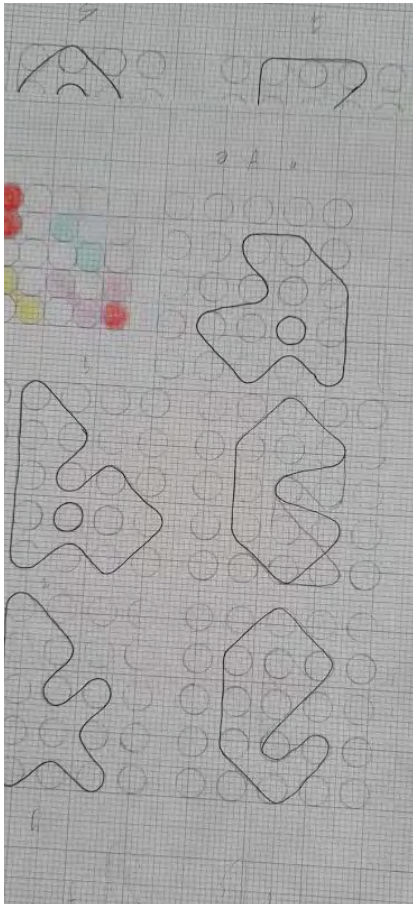


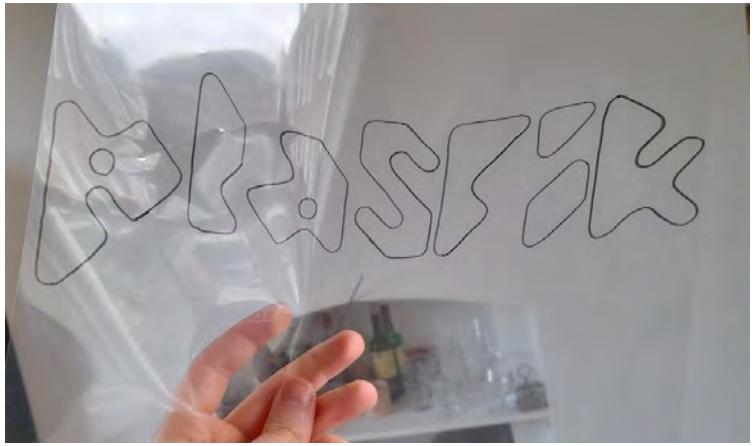


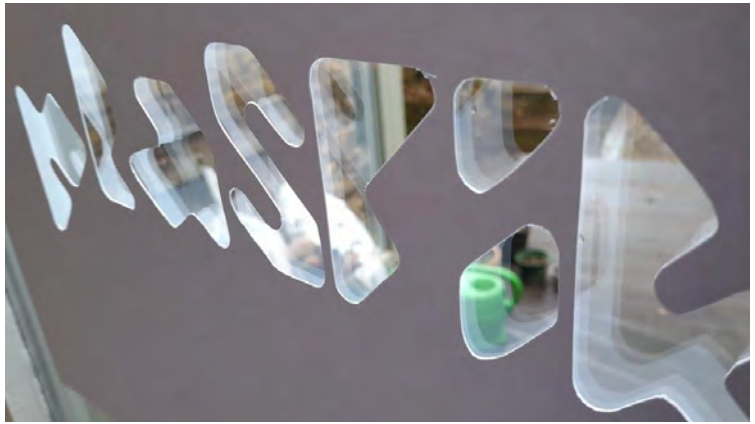


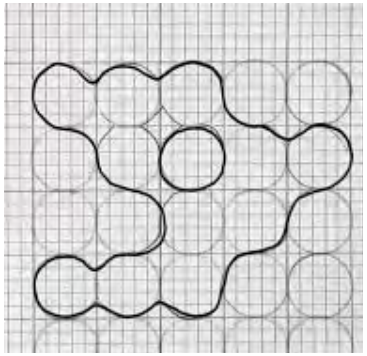
Observing plastics and processes to design a fully plastic related typeface

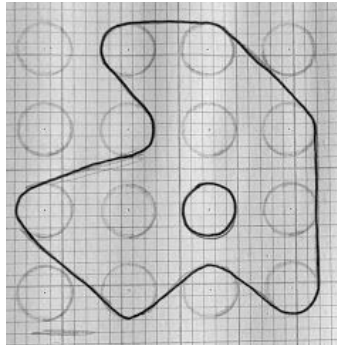

PLASTIK

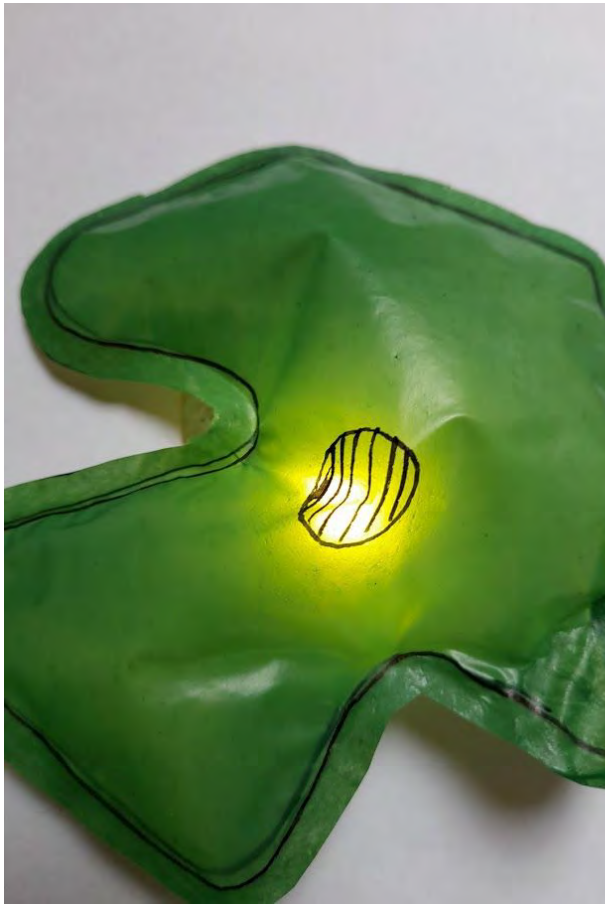


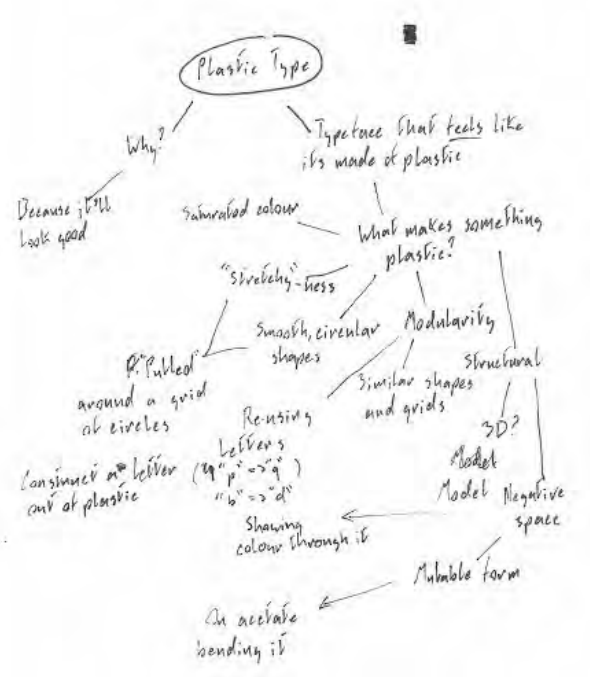








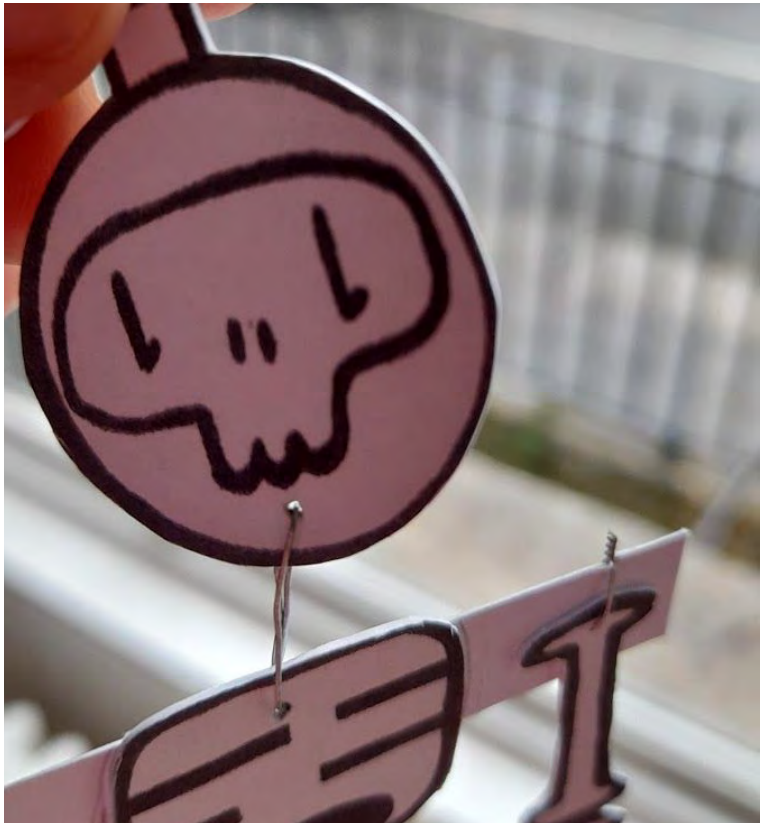


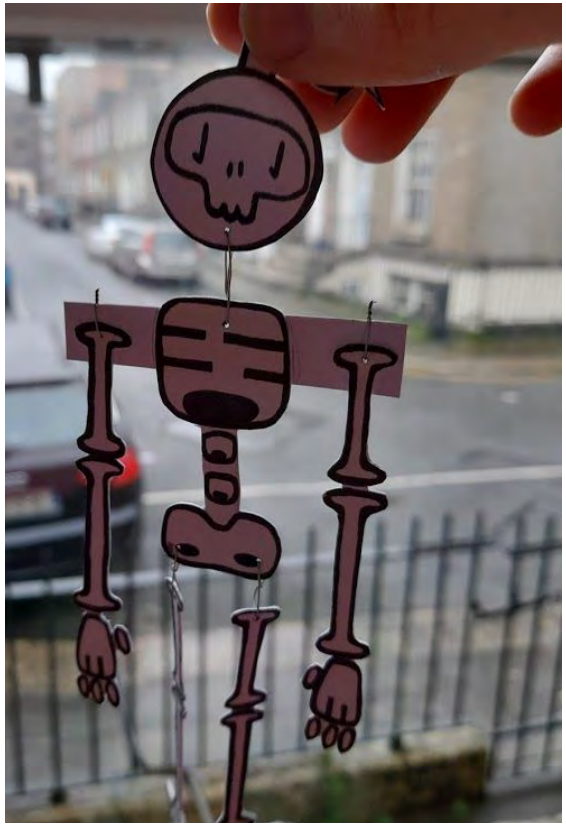


Using plastics like bubble wrap, acetate and green bin bags I worked through a number of processes -layering, stenciling, heat sealing, and constructing an inflatable- to create a fully plastic related font.



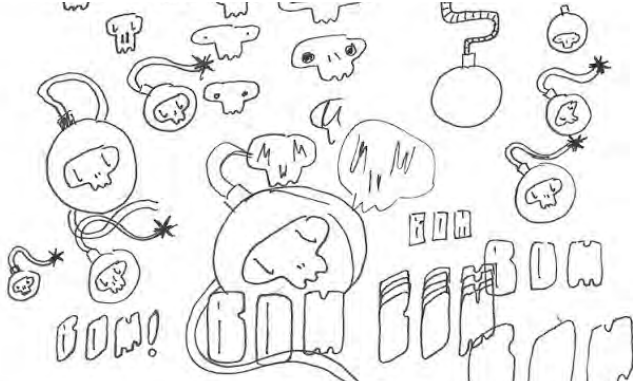
Using Doodling as a design motif and Tagging as a reference to marking objects, place and body.

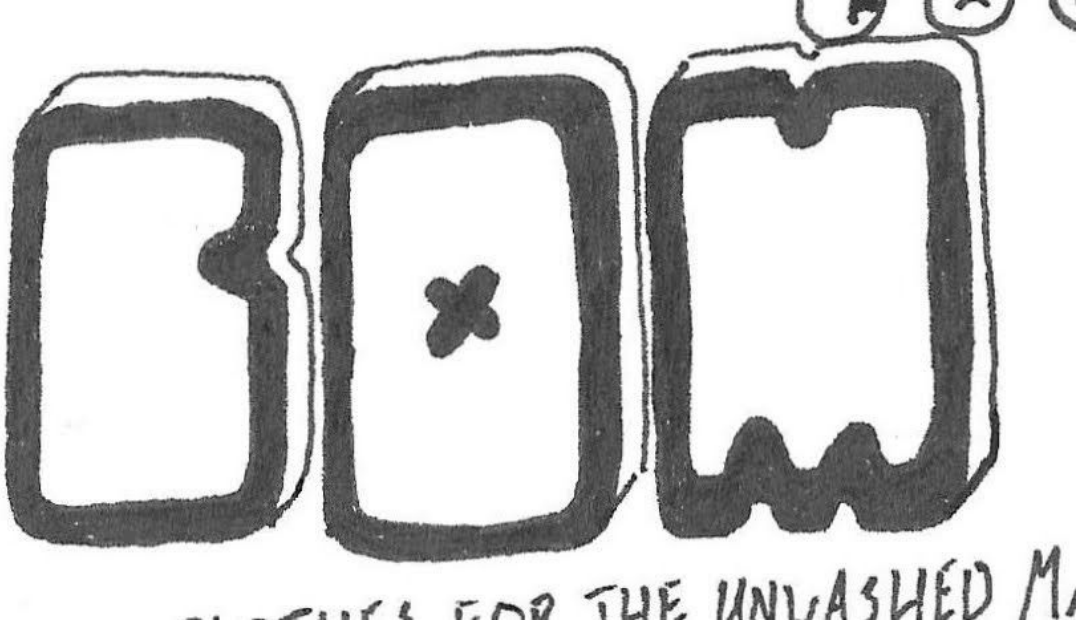





BOM

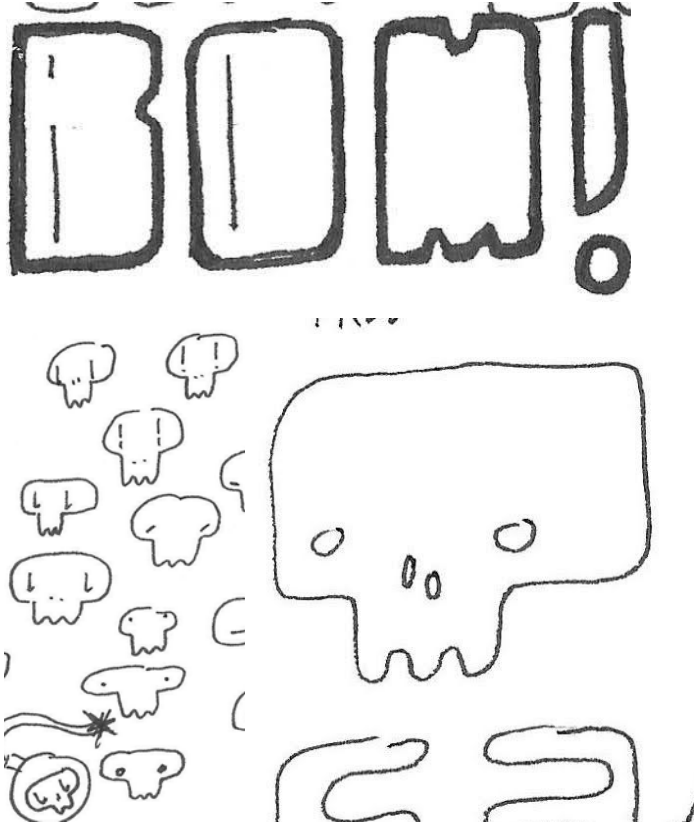

BOM!
BOM!


BOM
BOM
BOM!


BOO


EXPLOSIVE
FLAVOR
Included


BOM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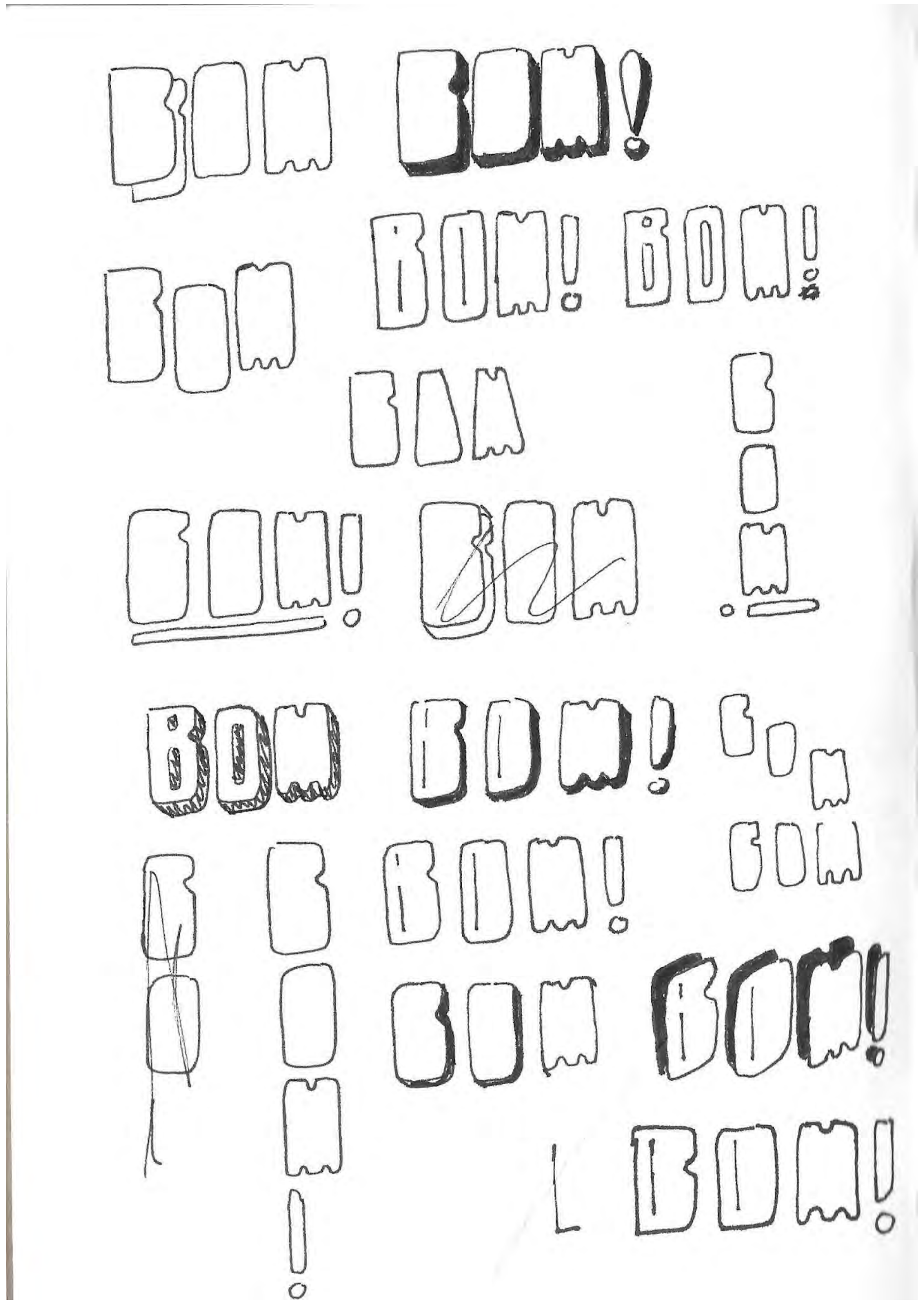
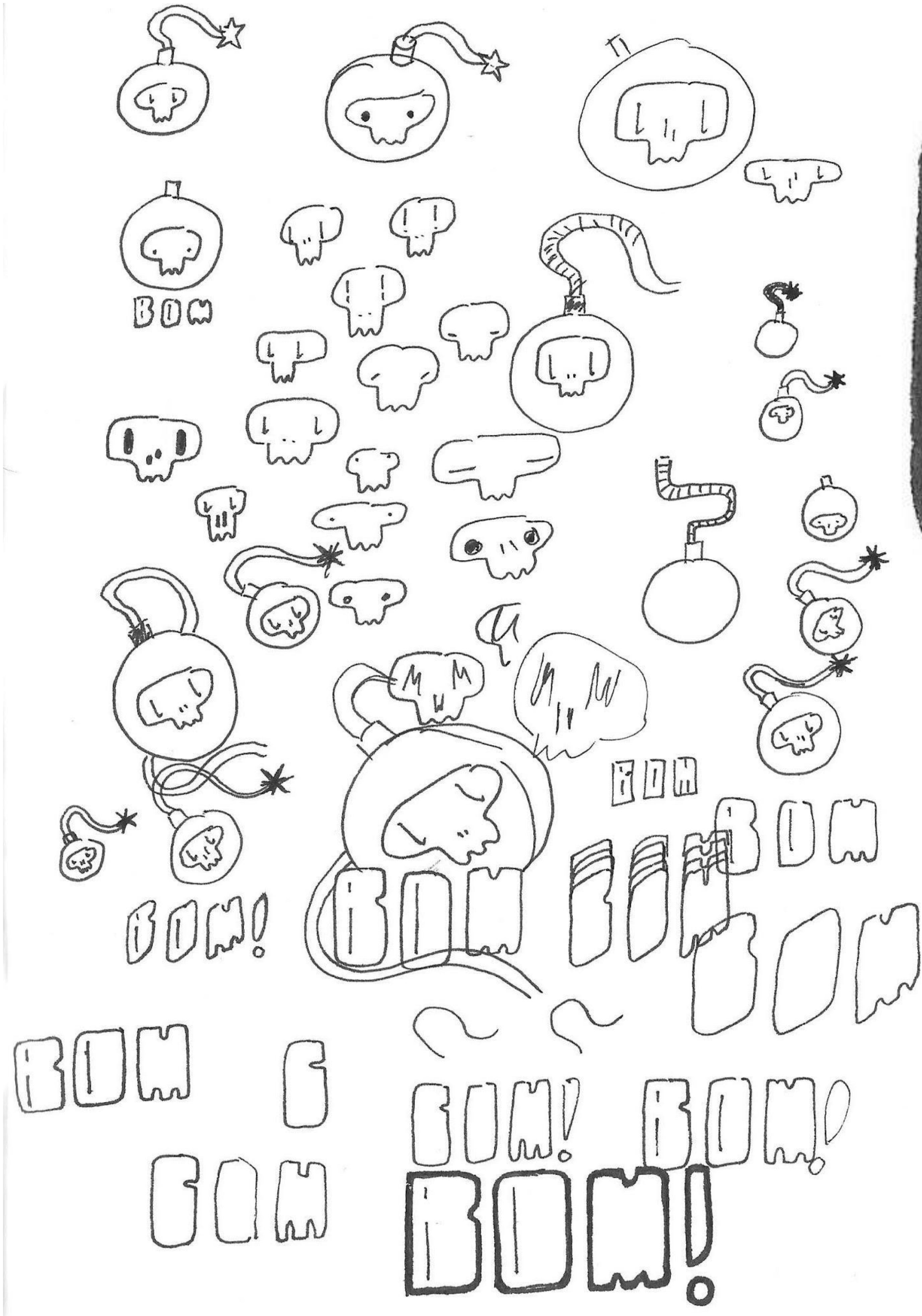
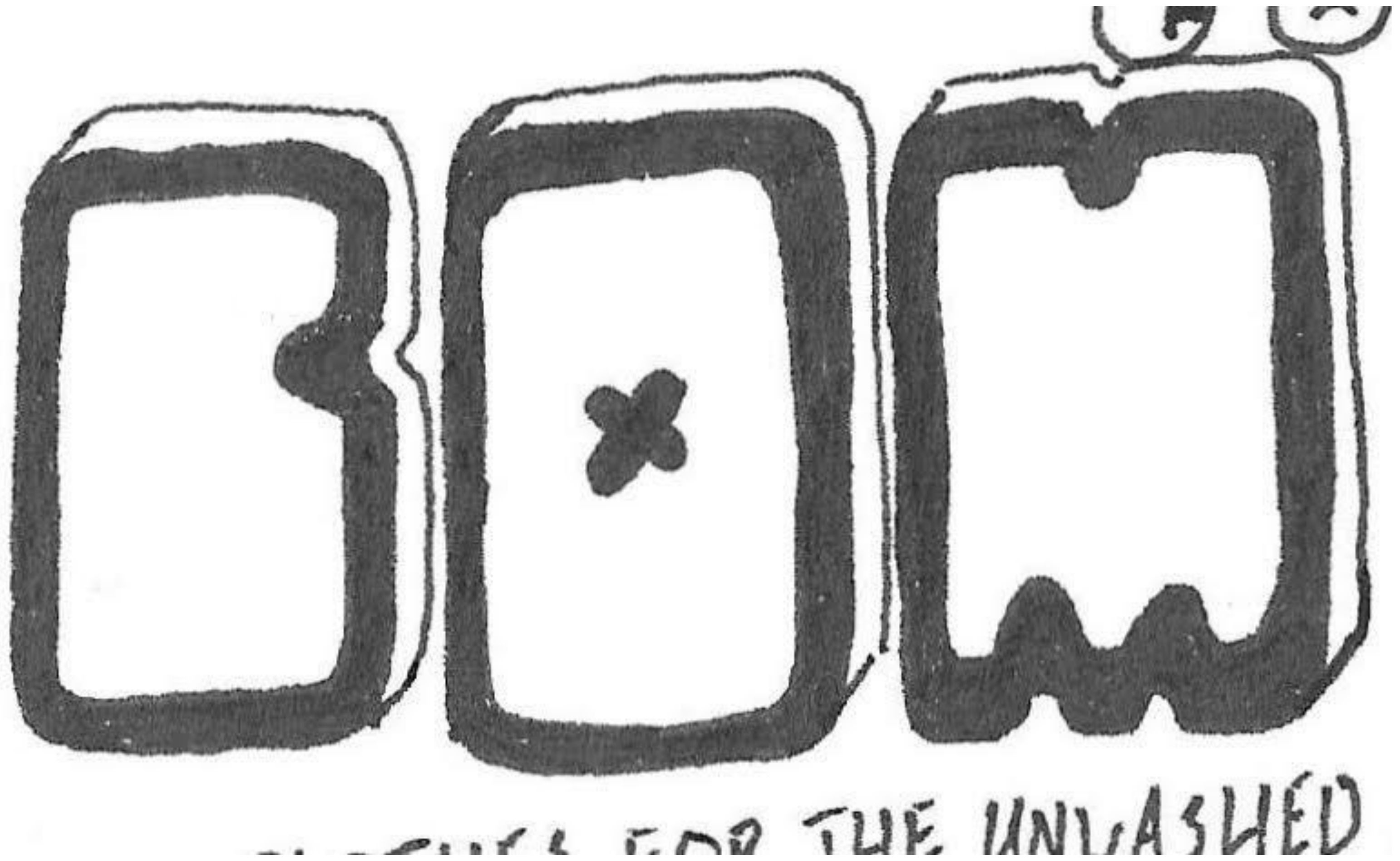
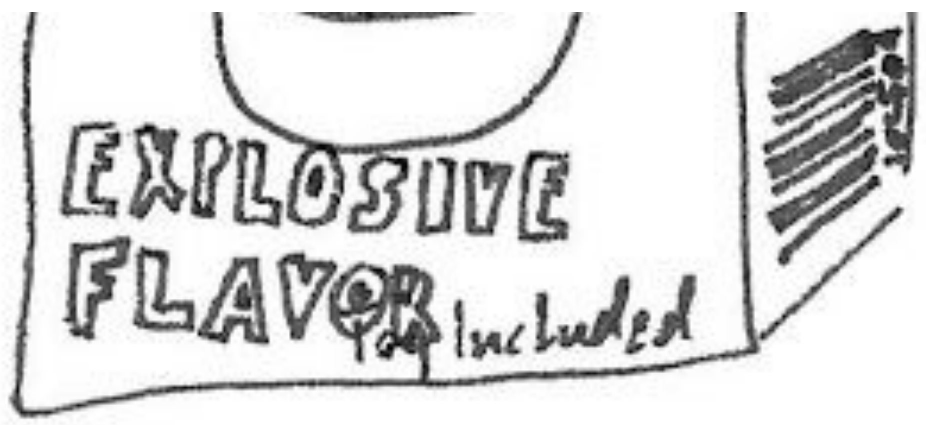
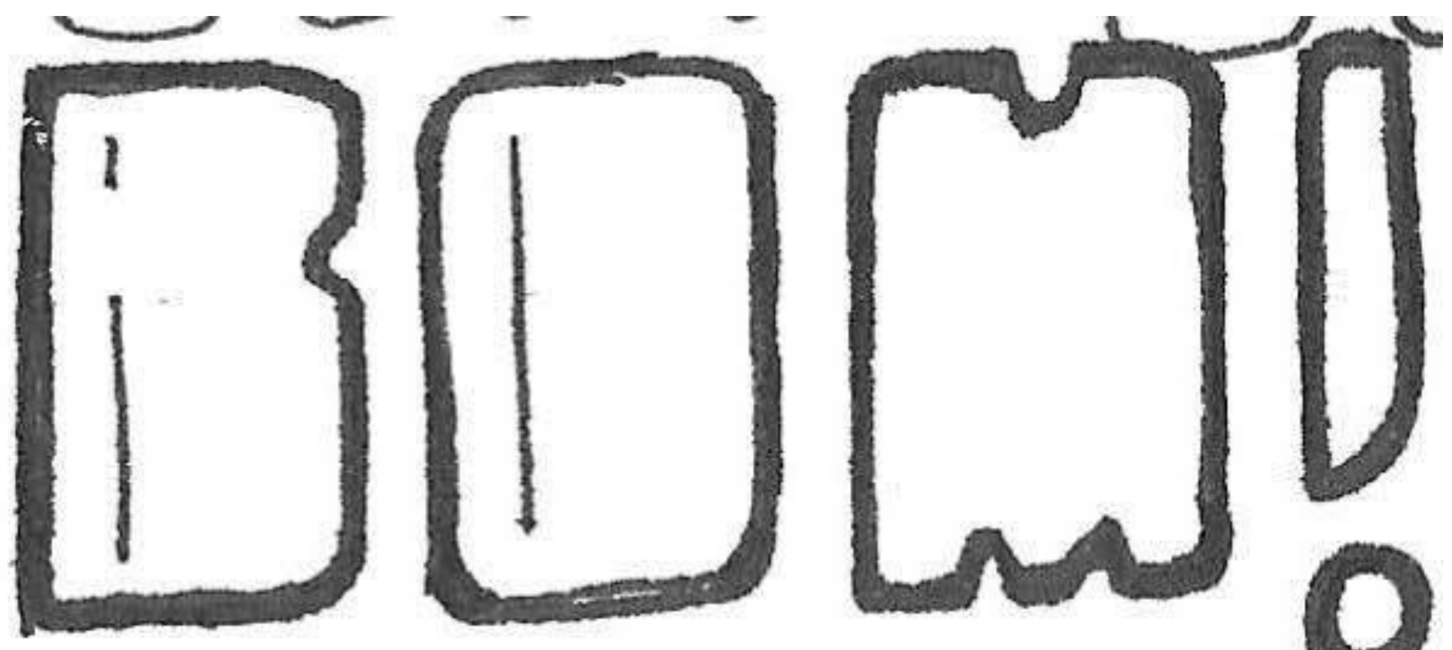


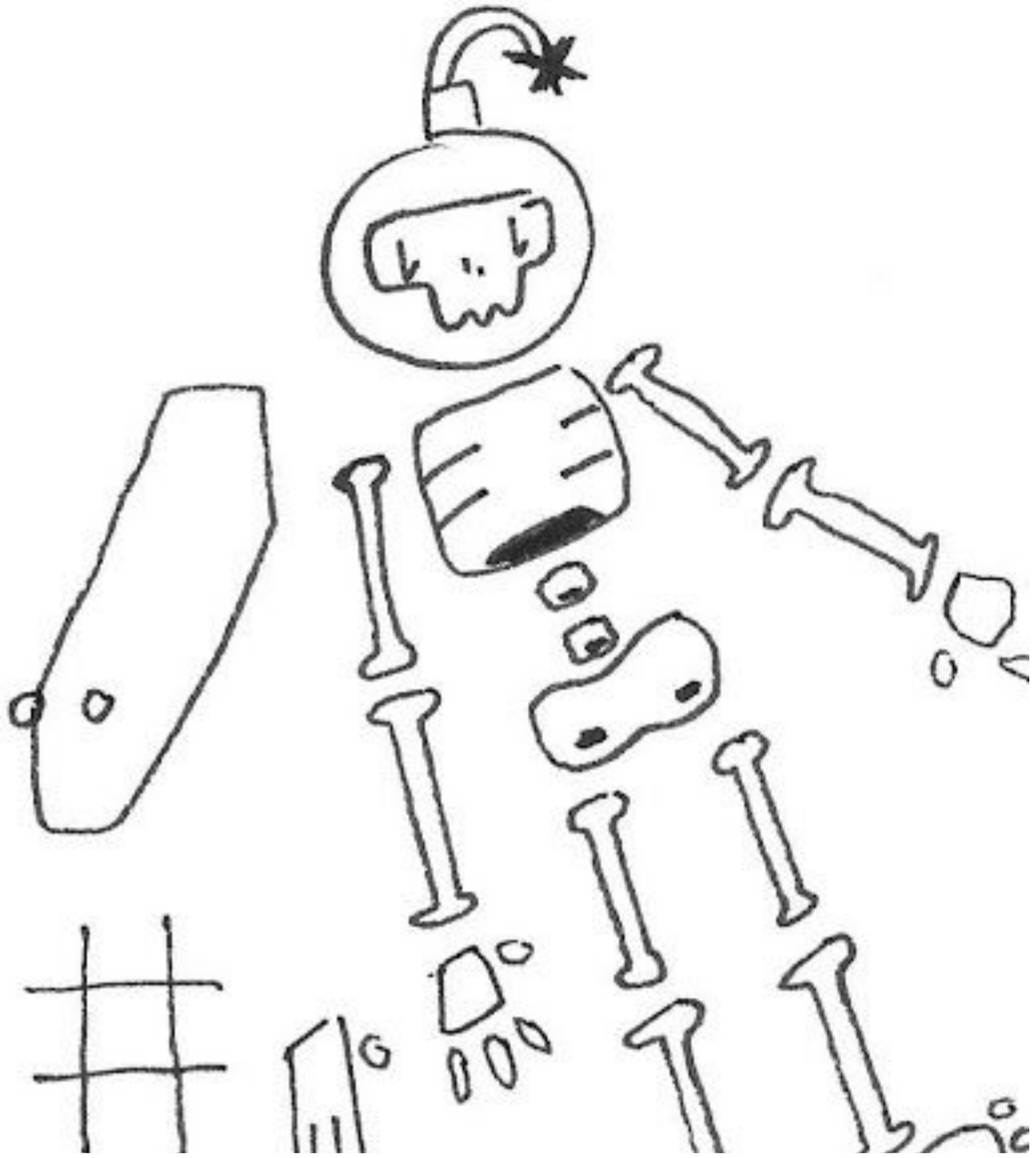






Concept and Design sketching





Idea consolidation
+ Mind maps!

Territory

Territory/Space

Physical? No?

Ownership

Branding/Tagging

Invasion??

Displays of ownership

Branding (Literally?)

Hierarchy

Tagging

Images onto things

I own this COW

MOO

Onto body??

Clothes Brands (Duh)

Invasion!!

Encroaching onto body?

On shirt

Off shirt

"Tagging" the body

Oh Wow! "BOM"

Why "BOM"? + Why the Skeleton

BOMB!

The body

- Explosive!!! → lots of energy!
- Short and sweet :)
- Purposeful misspelling
  seems more naive → youthful
- Destruction necessary for construction
  → Represents new potential

- Ball bomb with fuse
  - is classic iconography
    → instantly recognised
- Connection with the name
  Bom = Bomb! (duh.)
- Doodle-like → naive → youthful!
  [we love the youth!!]
- Fuse lit
  → Possibility? Danger?

Insecurity
Potential
Vanity
Death
Creativity
Fun

=> Invasion
Body
Symbols
Ownership
Control

=> Self Projection
Identity
Marking onto self
Icons
Branding

Sick shirt bro

- "If the Head is a skull, the body is a skeleton" continues. 469 BC
- skeleton represents DEATH
  But immaturity of drawing makes it overly disturbing
  * Mature, but taking the piss

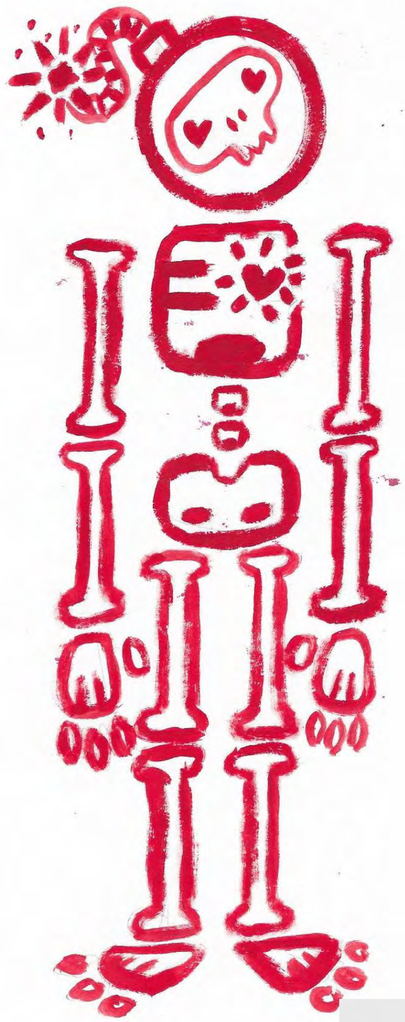
- Shape theory
- nice smooth lines
- rounded = friend
- fuse fire jagged = danger!

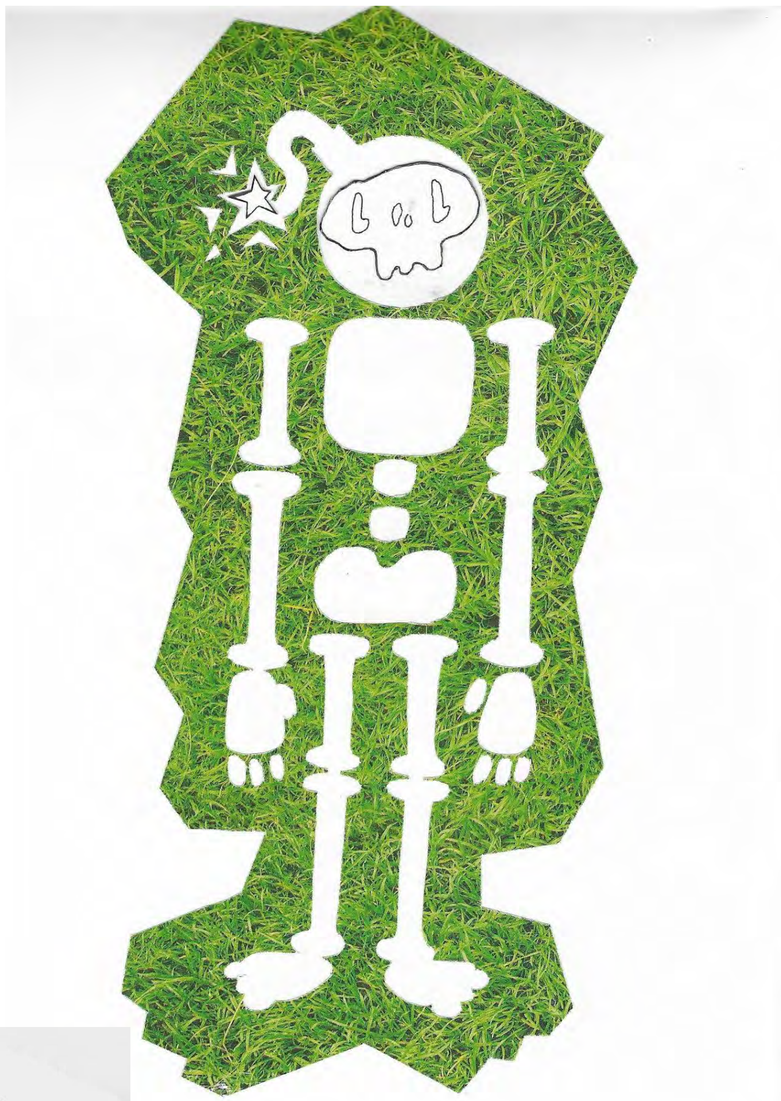
Mr. BOM

Design Philosophy

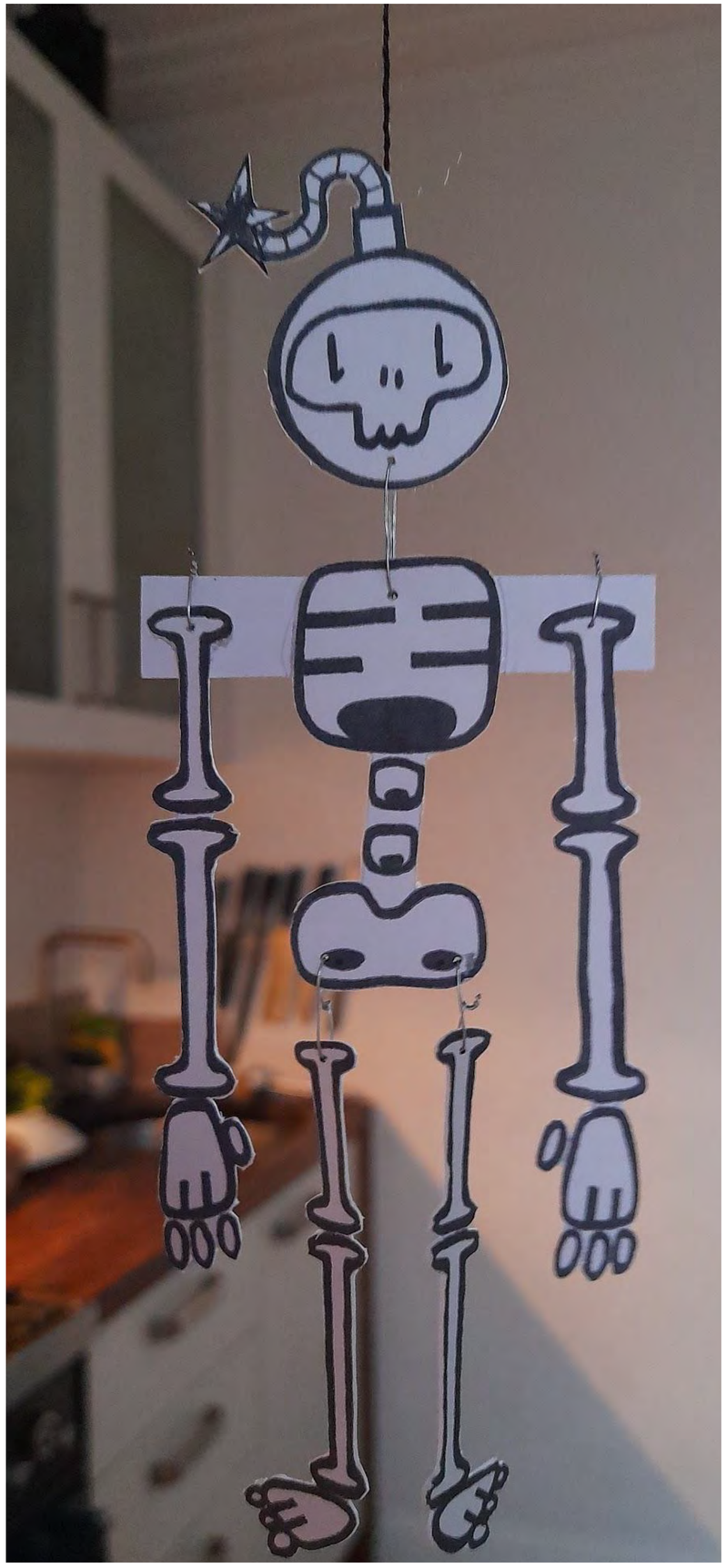
youthful! Kinda "poppy" like an explosion is

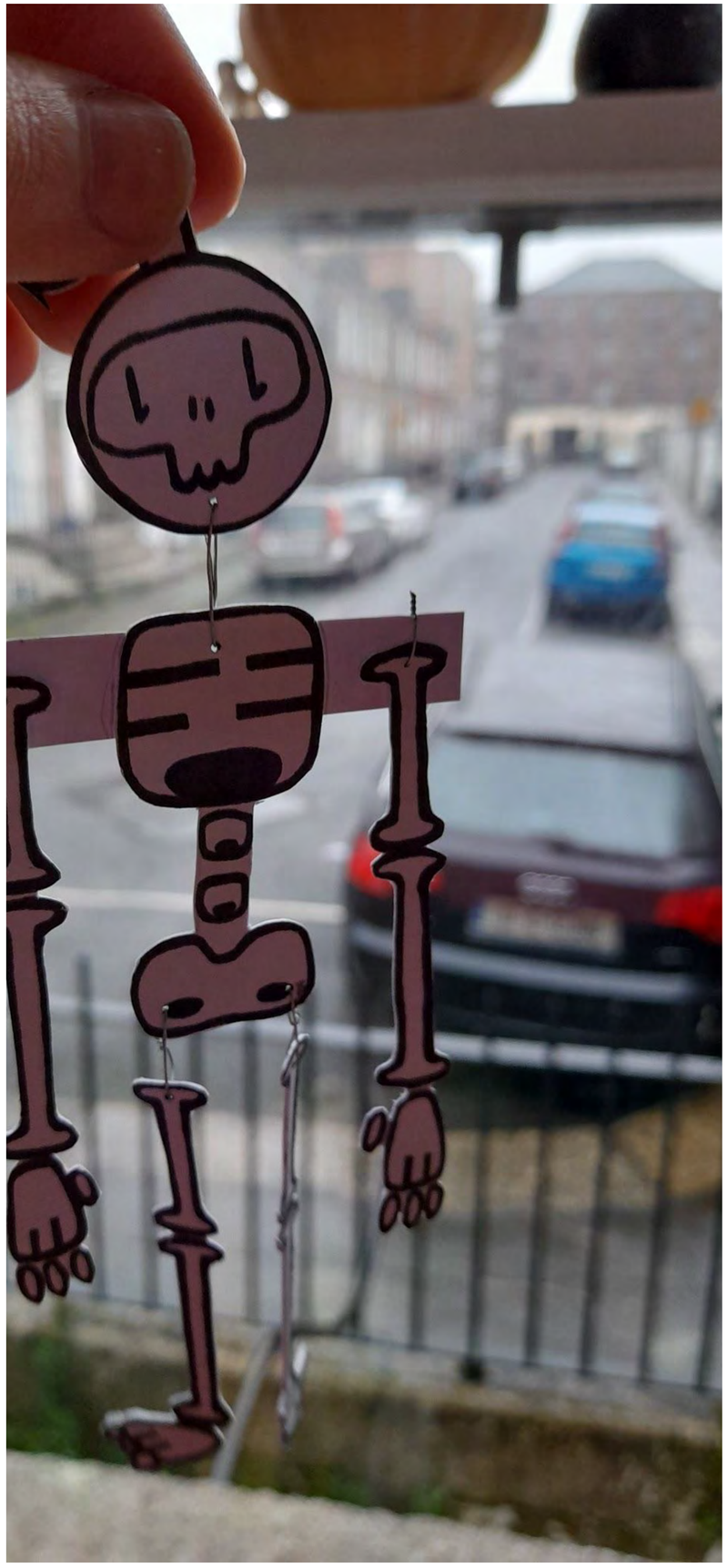
Bright, bold, pastel colours

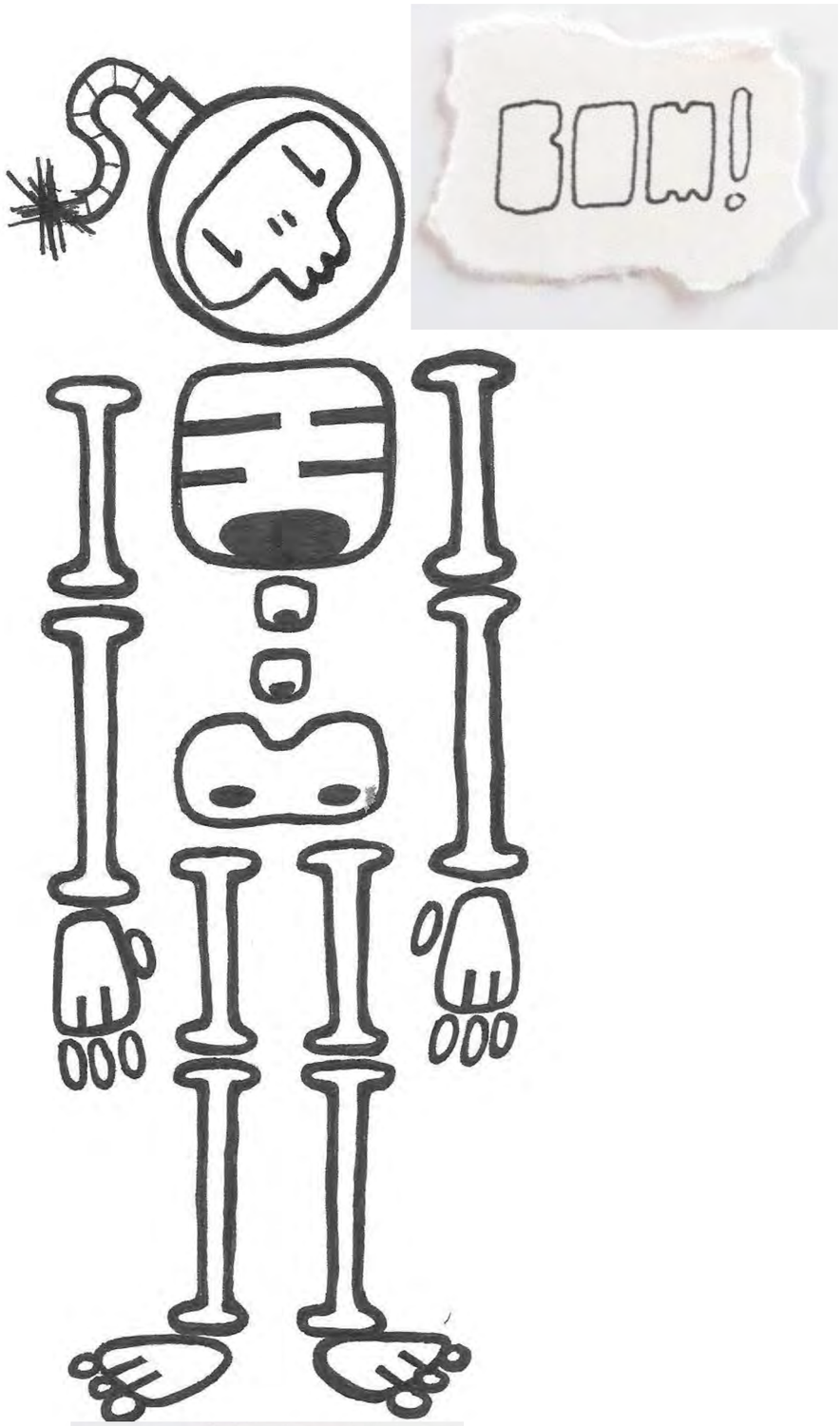




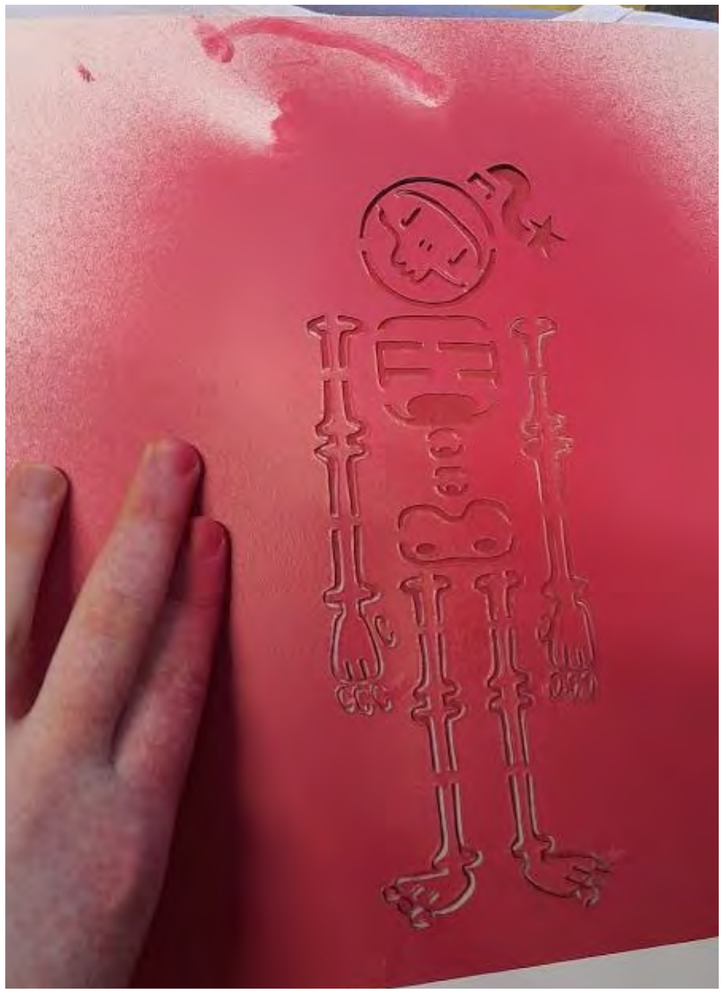
Experimentation + Iteration in different mediums.



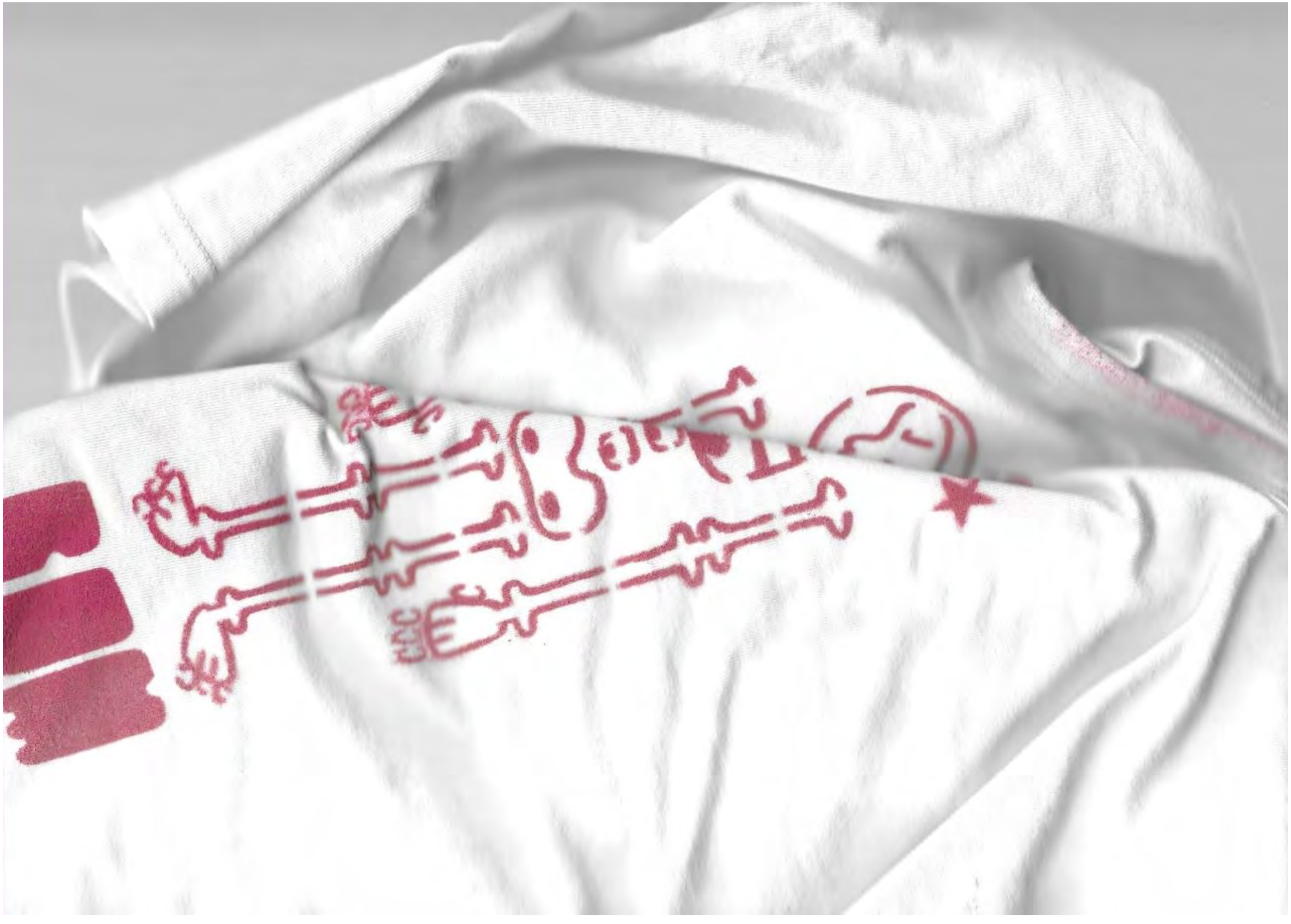


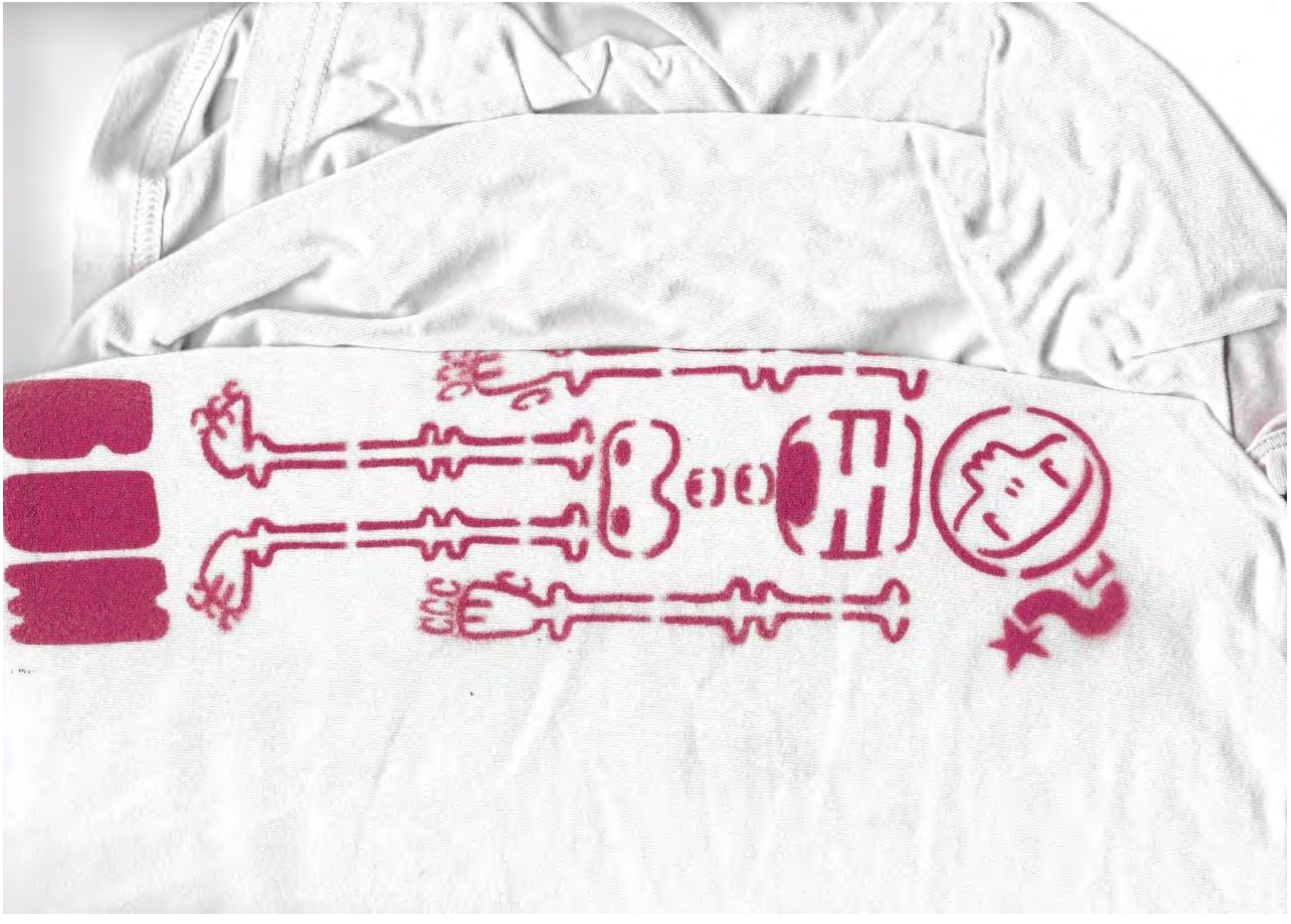

BOM!
Finished Design


BOM

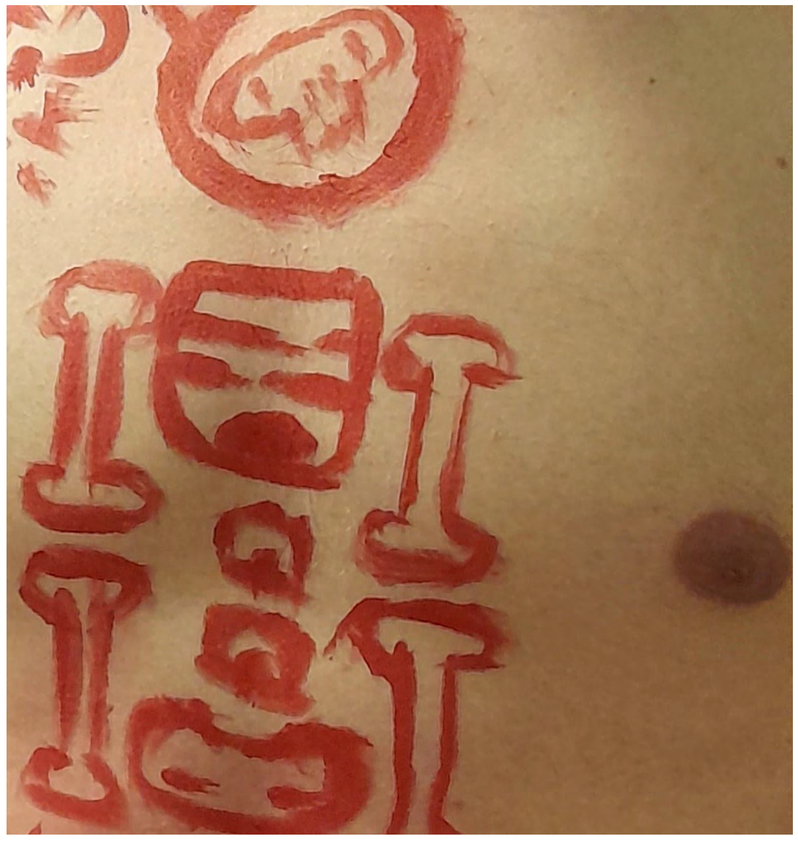


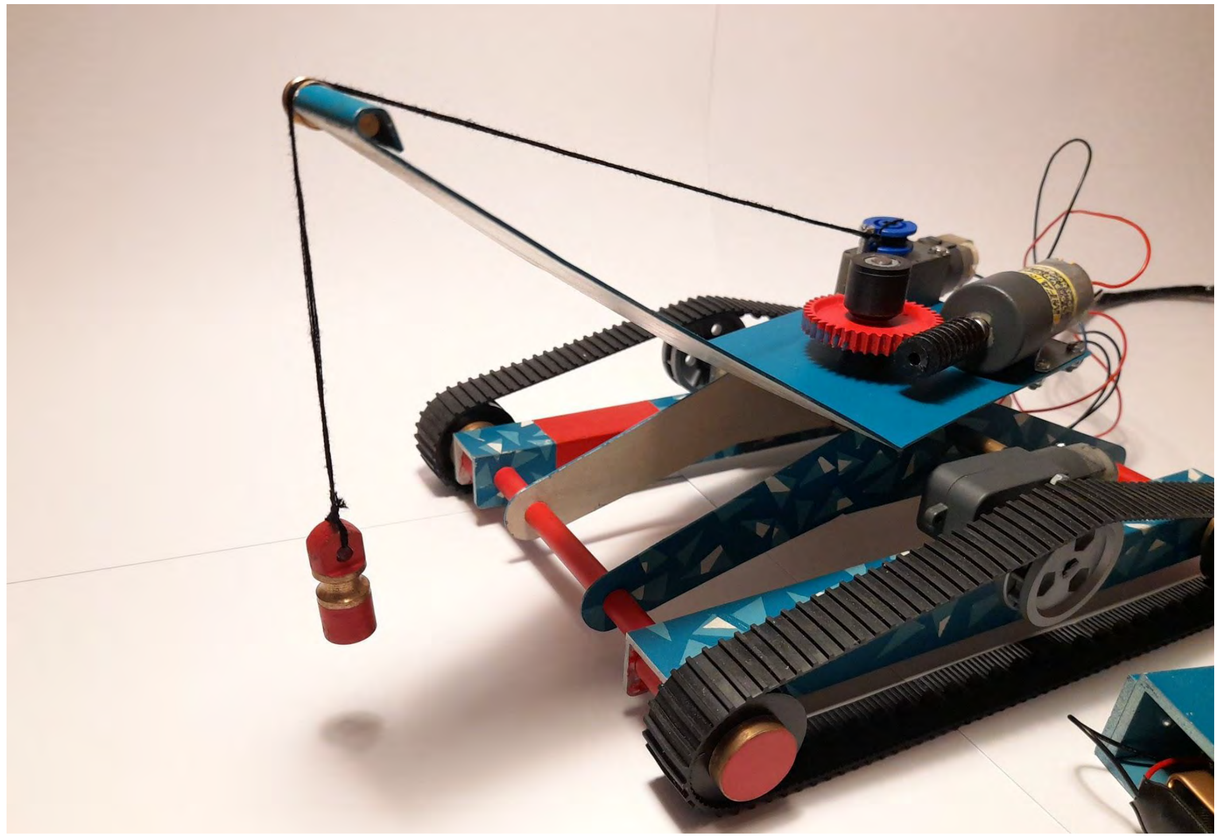
T-shirt scans

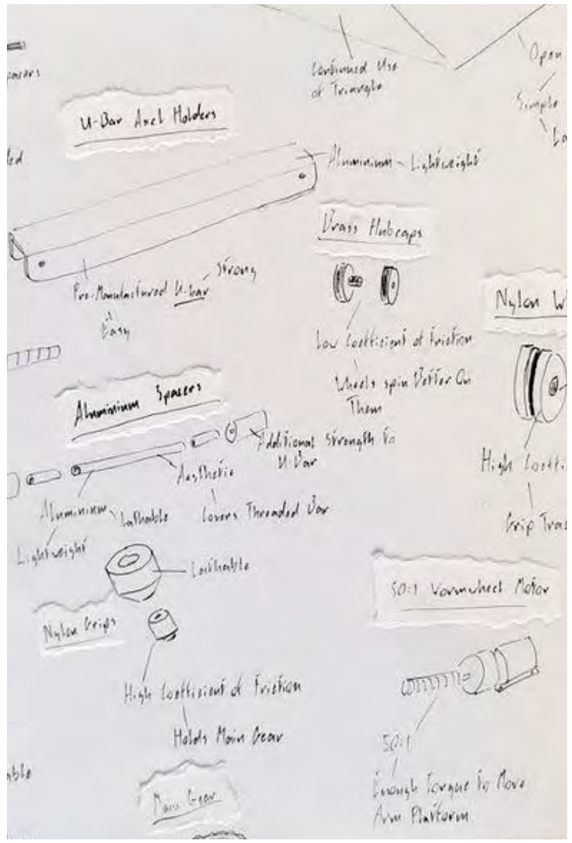




T-shirt on model







H

H

Remote Control Vehicles are deployed in many environments to search, locate, identify and retrieve. Rescue robots in development are being made with abilities such as reconnaissance and mapping, removing of shoring up of rubble, delivery of supplies, medical treatment and evacuation of casualties. As an emergency technology robotics is a branch of engineering that involves the conception, design, manufacture and operation of robots. Tele-robotics is a domain of robotics concerned with the control of semi-autonomous robots and remote control vehicles from a distance. This domain often uses tethered connections and incorporates engineering, nanotechnology and mechatronics.

Design a model *Remote Control Vehicle* to the general specifications below.
The *Remote Control Vehicle* should be your own unique design and should:

(a) Incorporate a drive-train using caterpillar track technology to ride over rough terrain;
(b) Have an arm, which can traverse the working area to locate, raise and lower an object;
(c) Include an operator's control and switching panel which may be tethered to the vehicle.

Presentation of the completed project should ensure that:
(d)**

(a) All main operating features are clearly visible without dismantling
(b) The longest dimension *of the vehicle* does not exceed 400mm
(c) Electric power does not exceed 9 Volts

**
H
*Extract Taken From Given Brief.

H

What do we need to do?

The brief has outlined the general areas that robotics are designed and used for nowadays. This is a set-up for the fundamental thought processes that are considered when designing something following a brief, giving us a launching pad for ourselves to use as a basis for our design; whether this be for setting up the issues the brief presents or for finding a theme to "build" our project around to help guide us. Future decisions may be drawn from these considerations and will be referenced further along.

Now for the elements we will need to incorporate into the project...

(A). A caterpillar track supported by a drive train must be incorporated into the design of the vehicle

(B). An arm that has the ability to move around and find an object; and then be able to raise and lower it

(C). A remote that can control the operation of the vehicle; switch it on or off, move it, etc..; which may be connected to the vehicle itself.

(D). All mechanisms housed in the vehicle must be visible without disassembly.
The longest length of the vehicle can not be over 400mm. Use of voltage over 9V is not permitted.

Brief

The initial blurb given in the brief outlines what a remote control vehicle and what robotics in general are, citing many of the different functions provided by them. We can use these as references as what to do later in the project but we have also been given specific problems to tackle

(**A**). Incorporating a "drive-train using caterpillar track technology" gives us a necessary mechanism that we can use as either our primary or secondary source of motion, however there are a few elements of this we must consider.

First is the length of the tracks themselves. The length of the tracks limits the diameter used for the sprockets guiding them and the distance between those sprockets, impacting the final dimensions of the vehicle.

Material is another issue. We are looking for something with a high coefficient of friction to grip the ground beneath itself and also good elasticity to bend around the drive-train or being comprised of multiple rigid pieces "chained" along into a suitable track.

The parts of the drive-train; sprocket and idler(s); are required to sustain wear with gripping and moving the caterpillar track.

The form and position of the drive-train and its individual parts. The number of sprockets/idlers required for the drive-train to be supported allows us to make choices in manipulating its shape, such as a triangle if we had two idlers and a sprocket. That being said the placement of the main motorised sprocket needs to be investigated if having the sprocket grounded or elevated would be more efficient.

(**B**). An arm that is mounted onto the vehicle is a mandatory piece that has to be capable of locating an object, seizing it, raising it, and then lowering it. Notice how there is no Mention of releasing the object once it has been grabbed by the arm, allowing us a marginal freedom.

So a loose construction of the arm could be comprised of a platform to mount itself on, the main "Arm" body, which would move to locate the object and finally a "Grabber" that can be lowered to seize the object, then raised. Using this we can imagine what will be necessary for each part.

The platform which the arm is attached to could be a part of the main chassis that makes up the vehicle or could be more complex being able to rotate or perform other movements easing locating the object. Any motors needed for either the "Grabber" or "Arm" can be fixed to this platform as well to be space efficient.

The "Arm" body would need to be maneuverable but also have a mechanism or system comprised within itself to either operate or house the "Grabber". Giving the "Arm" the correct dimensions to reach over the vehicle would also need to be considered too

Analysis

p. 2

(**C**). Since we're dealing with a remote control vehicle the need for an "operator's control" and "switching panel" can be satisfied with a controller esque device housing any necessary components like the vehicle's OFF/ON Switch or the Switches for the vehicle's other Mechanisms.

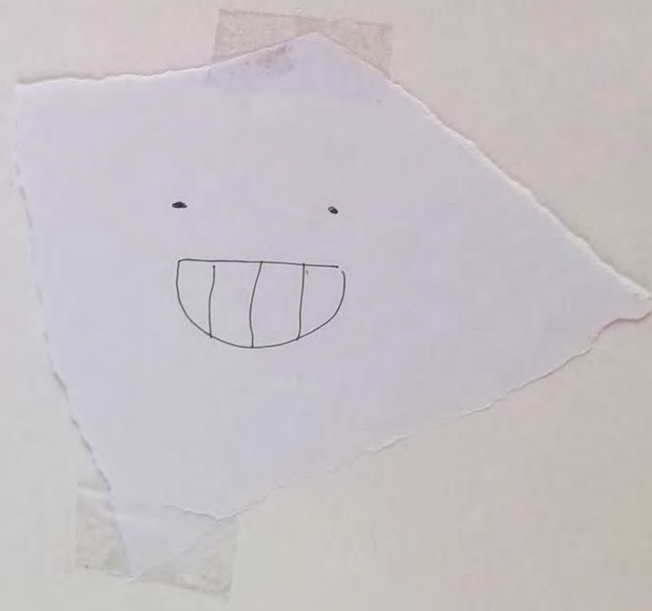
Tethering to the vehicle is a relevant clause to take notice of and means we can achieve a remote control vehicle without having to depend on more complicated methods like radio control or extra circuitry and focus on a more mechanically focused design.

(**D**). Restrictions placed on us for the presentation of the project are clear cut.

We must have any and all features of the vehicle "clearly visible without dismantling". Being wary of this one could make an "open" design with there being some uncovered sides to the vehicle, or perhaps for an enclosed vehicle making it out of a clear material or putting in windows to look inside.

Keeping any dimensions of the vehicle less than 400mm seems rather self-explanatory but it's something we will definitely be thinking of before making our designs.

Ensuring our vehicle's circuitry does not exceed 9 volts means we will have to strictly keep ourselves within this limitation and will become important for when we investigate our circuitry.



THEME?

Design Brief

Vehicles are deployed in many environments to search, loca
e robots in development are being made with abilities such as r
moving or shoring up of rubble, delivery of supplies, medical tre
. As an emerging technology robotics is a branch of engine
ign, manufacture and operation of robots. Tele
vel of semi-autonomou

Serious?

Sleek?

Retro?

ROBOTO

construction!

Realistic?

Toy?

Remote control

Tether?

Raise/Lower

Grab

Locate

1 Motor to move
1 Motor to operate other arm movement

4 motors MAX

Caterpillar Track

Locate

Control?

"Motions"

2 Motors

investigation

TRACKS?

Height

Vehicle Length

Optimal Radii?

Length of Track,
- impacts body
- Track bit smaller?

Parallel... But independent

Free Rotation

Brass Cups

Nylon Wheel
(Indent for Runners)

Idlers on bottom, Sprocket on top

One idler top/bottom, Sprocket on bottom

VS

Which is better?

U-Bar?

Threaded Aluminium Bar

ARM?

1. ✗
2. ✗
3. ✓

Nice Shape
Stable with trough
- Improves Moment of force
- Int. bent sheet metal

Object???

Lathe? Bend

Not Attractive / Practical

Hard to make

Flashy but BIG

Teeth turn and open claw
- Can grab/let go is that necessary?

Can Raise+Lower, but locate?

Magnet

Ferrus

- Simple
- Arm+Body combo
- Electro magnet?

Manufacturing of arm

Add placement of "Winch" motor

Restrictions with body

crane

Checklist
- Easy to manufacture
- Look attractive
- Function

So...

Lathe?

Brass?

Bent Aluminium Platform

Inverse Worm Wheel Motion!!!
- Frees up space on body
- Compact → ←
- 2 Motors on platform

Stationary Gear

Rotating Platform

Motor turns platform

Fulley?

Nylon Loops

Can it Move? Strength?

Magnet

Ball Bearing / Brass Disk (Friction)

Lathe?

Interference

Magnet

Objects?

Premade?

Best Shape/Weight?

Theme?

Ferrus

Investigation

REMOTE?

On/Off?

L.E.D (Lit when ON)

Iconography

ALEX FG

Engraved/ Acid Etched

Painted?

Movement close to Thumbs

Thin, bent aluminium

Folded Metal joints?

Lathe Piece?

Manufacturing

Attractive

Simple

VERY COOL!

Thicker, heavier piece (good weight)

U-Bar?

Distance?

M

DPDT switch

Reversable Motion

4 motors

4 DPDT

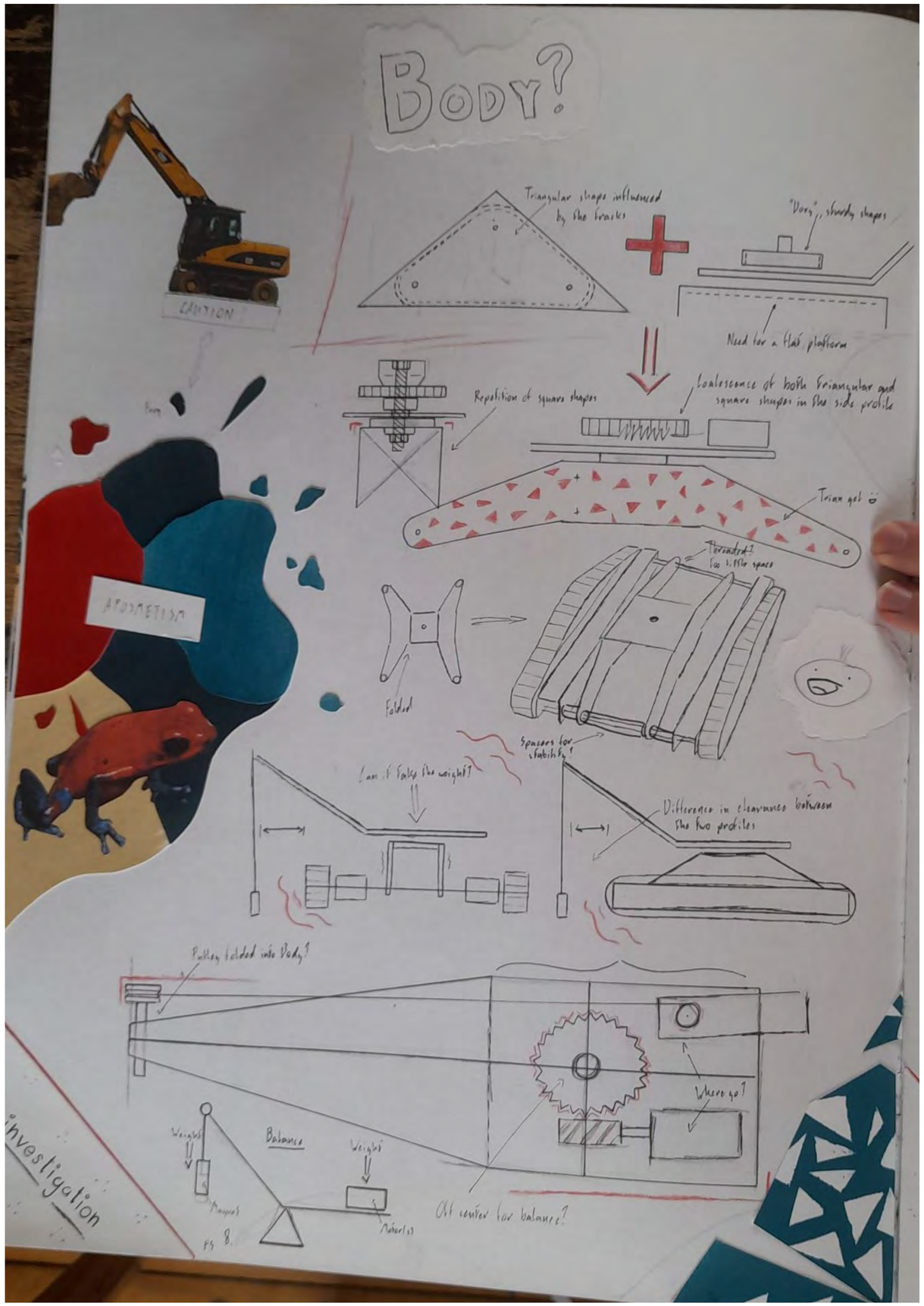
Maps?

Two seperate circuits? (Traction/Body)

Sequence VS. Series? (Voltage// Current)

7 Volt Enough?

"DEAD CIRCUIT"



THEME

I tried initially to investigate the potential themes or ideas I could structure my project around and took to the brief given to find them.

The brief mentioned robotics and remote controlled vehicles so I tried to look into what exactly they are, why they are like that, what their function was etc. This inspired me not only about what mechanisms I'd be using in the project but also gave a lot of inspiration in what the project's overall design and look would be. From old retro toy robots I became curious about the aspect that the project was a toy product or had a 1950's era design; or both.

The functions that a robot can be designed for referenced in the brief, "shoring up rubble" and "delivery of supplies", lead me to look at construction vehicles like diggers or cranes since they usually use caterpillar tracks for movement and have arms that lift heavy loads, making them an easy reference for my own work. The images I looked at gave me many ideas for the arm mechanism I needed to create for the vehicle but also for the form the vehicle would take.

TRACK

Investigating the tracks I tried to first confront the relationship their design would have in relation to the body of the vehicle; how the length of the tracks give would impact the overall length of the vehicle, if the tracks were shaped triangularly how would that affect the shape of the vehicle and where would the third Idler/Sprocket be placed?

With this in mind I tried to roughly sketch out the body and tracks together which got me started on another issue; if each track on either side of the vehicle was operated individually by their own motors would that cause inaccuracies in movement? The obvious solution to me was to have two

axles in parallel to each other going into two U-bars, creating two pairs of wheels along a square frame for the tracks to spin on, but that in itself wouldn't allow either side to movement individually and in opposite directions to the other, which I decided I wanted since it would allow greater control of the vehicle and the ability to turn.

To solve this I came up with the idea for brass "hub caps" that would be mounted onto the ends of the axles with clearances in them to allow their wheels to spin.

The last issue to consider was the placement of the drive motor and idlers in the track mechanism. I looked at having the drive motor at the top of the triangle shape of the tracks or having it at either of the bottom positions and investigated which solution was superior. In small demos I performed inside the room I discovered that having the drive on top proved better, the additional tension easing their operation. I considered this for my final design and found that having the tracks stretched over 20mm over their normal length improved performance.

ARM

Taking inspiration from the construction vehicles I looked at, I started investigating multiple different ways I could construct a potential arm for my vehicle. In the end I went for a crane inspired arm over others because I thought it's relative simplicity in design and function would be easy to manufacture and attractive from an aesthetic perspective.

Initially I went for a stationary arm incorporated into the main body of the vehicle, since the requirement to locate the object was technically already solved by the vehicle's ability to move in all directions, but I decided to challenge myself with having the arm be able to rotate itself.

To achieve this I was going to have the arm as a platform attached to a gear that would be rotated by a worm wheel, but this caused a lot of troubles as the placement of this worm wheel along side the arm platform confused the design of the main body and had me stumped for some time. Finally I had a break through realising I could invert the movement of the two gears with a stationary main gear and a worm wheel that would spin itself in a radius around it. The main gear would be fixed onto the body of the vehicle on a piece of threaded bar that would have nylon grips to hold it in place, as well as a brass disc that would have the arm platform between itself and the grips holding that in place too and reducing friction. The worm wheel and its motor would be attached separately to the arm platform in contact with the main gear and a motor used for a simple winch mechanism that let the arm raise and lower the object also positioned here. This solution provided a way to maintain an open design required by the brief and gave me a solid structure to finalise the design on.

REMOTE

Before moving onto finalising the body of the vehicle, since I had the mechanisms I'd be using in my vehicle worked out, I decided to instead conceptualize the remote control that would operate the vehicle.

Having four motors to control, the two for the tracks and the other two for the arm, would require four switches and I had decided previously I wanted each motor to be able to move in each of its polarities directions, meaning I would have to use Double Pole Double Throw switches. I looked at other controllers to see where I would place these and keeping with my retro theme I investigated old video game controllers used in the NES game console and the Nintendo Gameboy. These made me consider the two most important things for a controller; being able to hold and control it comfortably; and being able to easily understand how to operate the vehicle with it.

With both of these in mind I designed a concept of the controller; the two switches controlling the tracks being placed correspondingly on the far left and right of the remote with the remaining two controlling the arm being placed in the middle, slightly closer to the user to accommodate for the radius of the thumb's movement. Using scrap pieces of U-bar and holding them for reference, I found that a length 130mm, width 50mm and depth 25mm was the most comfortable for my own hands. These dimensions in mind I gave actual measurements to the placement of the switches and found I could use two switches on either side to create an interference fit for the placement of a 9V battery in its circuit.

Being a suitable time to test any potential circuitry I sketched up multiple circuit designs and put them to the test. I discovered that having the electronics conjoined in one whole parallel circuit to a single 9V battery wasn't providing the amount of Amplitude I desired. I decided to instead have two separate circuits, one for the tracks the other for the arm, with their own individual batteries which allowed us to keep within our 9V limit and simplified the circuitry some what.

The last problem I investigated was the tether connecting the remote to the vehicle. I cut a length of wire and used that to discern a comfortable distance that the tether should have between the vehicle and remote. I also had the remote designed with a small hole to allow for the circuitry to pass through into the tether.

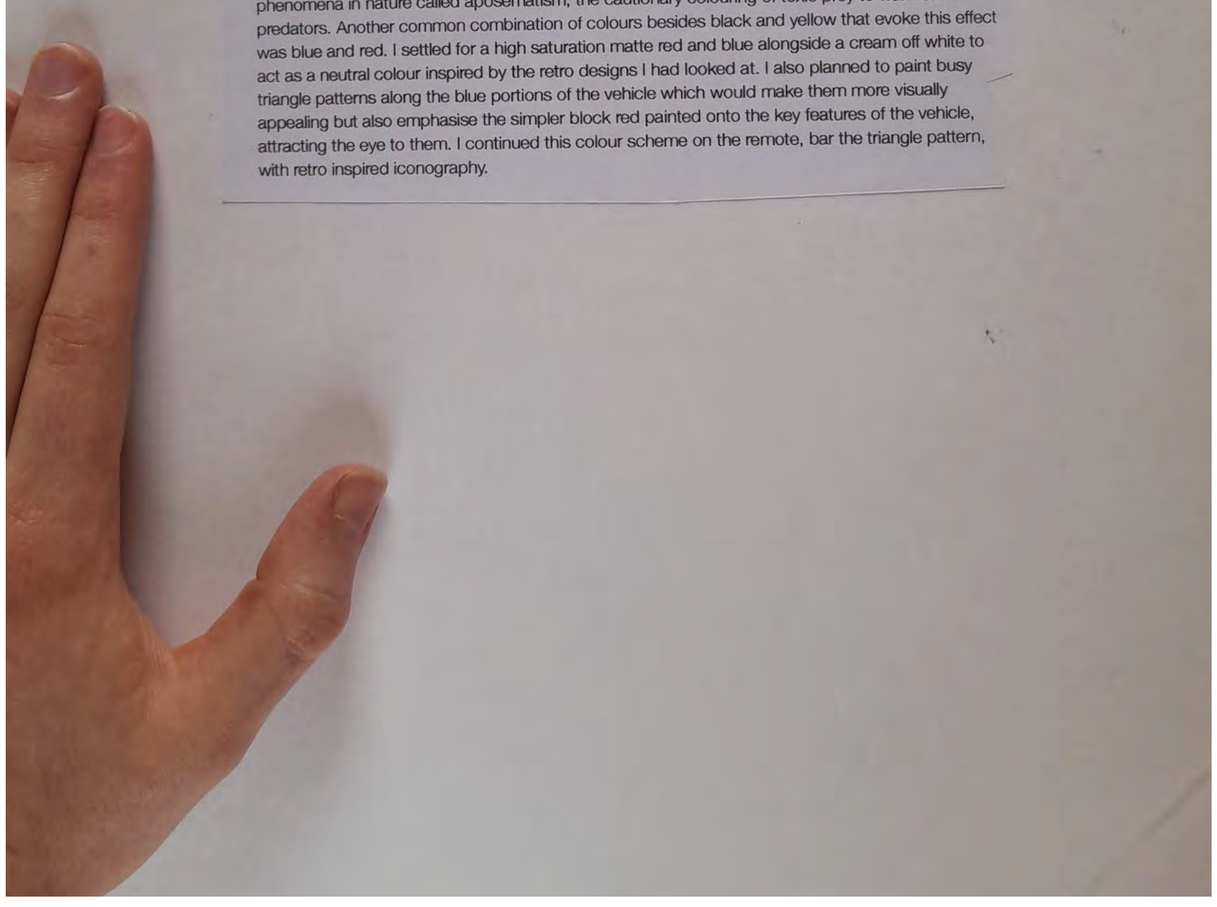
BODY

I took aspects from the solutions I had already come up with when investigating how to design the body of the vehicle. The track's design had the pre-existing bar that I could use to attach the body to, but had a triangular shape I would want to repeat to keep a conformity to the design. Similarly the platform's design required a flat base to work that needed to be strong enough to withstand weight.

Marrying these needs I came up with a body that combined both square and triangular forms that would be held in place by spacers along the bar; providing a stable, flat base for the arm and maintaining a uniform shape with the tracks.

I knew I wanted to finish the piece by painting it so I investigated how to make it as visually appealing as possible.

Looking at construction vehicles I found they were coloured their classic black and yellow due to a phenomena in nature called aposematism; the cautionary colouring of toxic prey to warn off predators. Another common combination of colours besides black and yellow that evoke this effect was blue and red. I settled for a high saturation matte red and blue alongside a cream off white to act as a neutral colour inspired by the retro designs I had looked at. I also planned to paint busy triangle patterns along the blue portions of the vehicle which would make them more visually appealing but also emphasise the simpler block red painted onto the key features of the vehicle, attracting the eye to them. I continued this colour scheme on the remote, bar the triangle pattern, with retro inspired iconography.



Aluminium Body

Aesthetic — Interesting Interesting Shape

Triangle + Square — Shape gives Strength

Aluminium

Easy to Manufacture

Lightweight

Aluminium Arm Platform

Sheet Aluminium

Bendable

Lightweight

Continued Use of Triangle

Open Topped — Mechanism Visible

Simple

Easy to Manufacture

Brass Spacers

Smaller than Aluminium Spacers

Weaker

Stronger Metal Needed

Still Lathable — "BRASS"

Sturdier

U-Bar Axel Holders

Aluminium — Lightweight

Pre-Manufactured U-bar

Strong

Easy

Brass Hubcaps

Low Coefficient of Friction

Wheels spin Better On Them

Nylon Wheels

Lathable - Easy

Threaded Aluminium Bar

Pre-Manufactured Bar

Easy

Aluminium Spacers

Additional Strength to U-Bar

Aesthetic

Aluminium

Lightweight

Lathable

Covers Threaded Bar

High Coefficient of Friction

Grip Tracks

Brass Arm Platform Disc

Lathable

Nylon Grips

Low Coefficient of Friction

High Coefficient of Friction

Holds Main Gear

50:1 Wormwheel Motor

50:1

Enough Torque to Move Arm Platform

Magnet

Lathable

Brass

Heavy

Balances Arm

Main Gear

Good Size in Comparison to Platform

Gear

Looks Cool

"Yellow" Motor with Gearbox

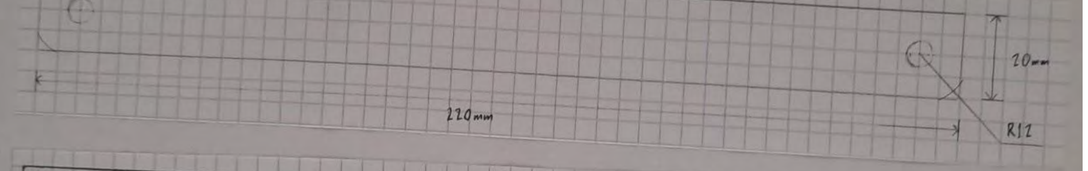
Low Speed

Easy to Control

"Lower" Body Parts List

· 2	Pieces	U-Aluminium	220mm long, 20×20×2 mm	(A)
· 2	Pieces	Aluminium Threaded Bar	M6 × 174mm	(B)
· 4	Pieces	Aluminium Bar	816 × 16mm	(C)
· 4	Pieces	Aluminium Pipe	Drilled 86, 88 × 24mm	(D)
· 2	Pieces	Aluminium Pipe	Drilled 86, 88 × 50mm	(E)
· 4	Pieces	Brass Bar	820 × 4mm	(F)
· 4	Pieces	Brass Bar	820 × 10mm	(G)
· 4	Pieces	Nylon Bar	830 × 14mm	(H)

A.



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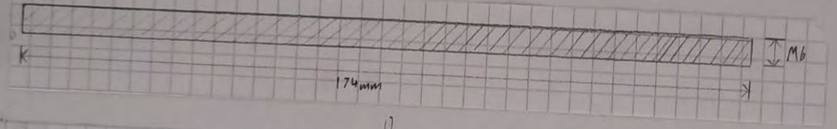

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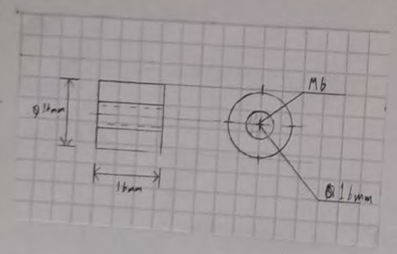

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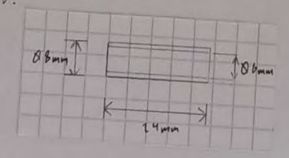

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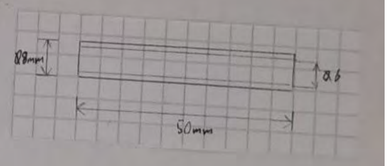

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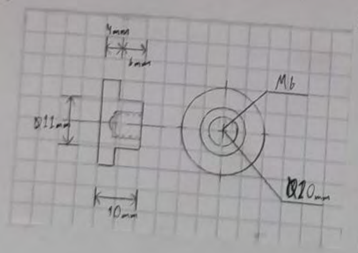

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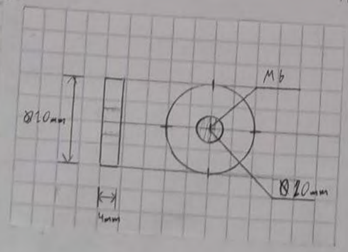

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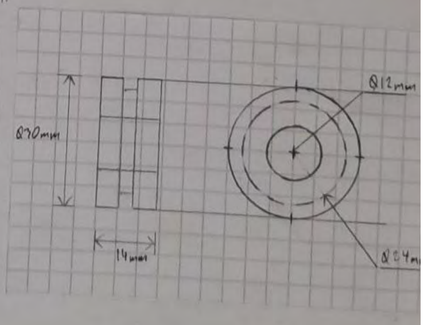
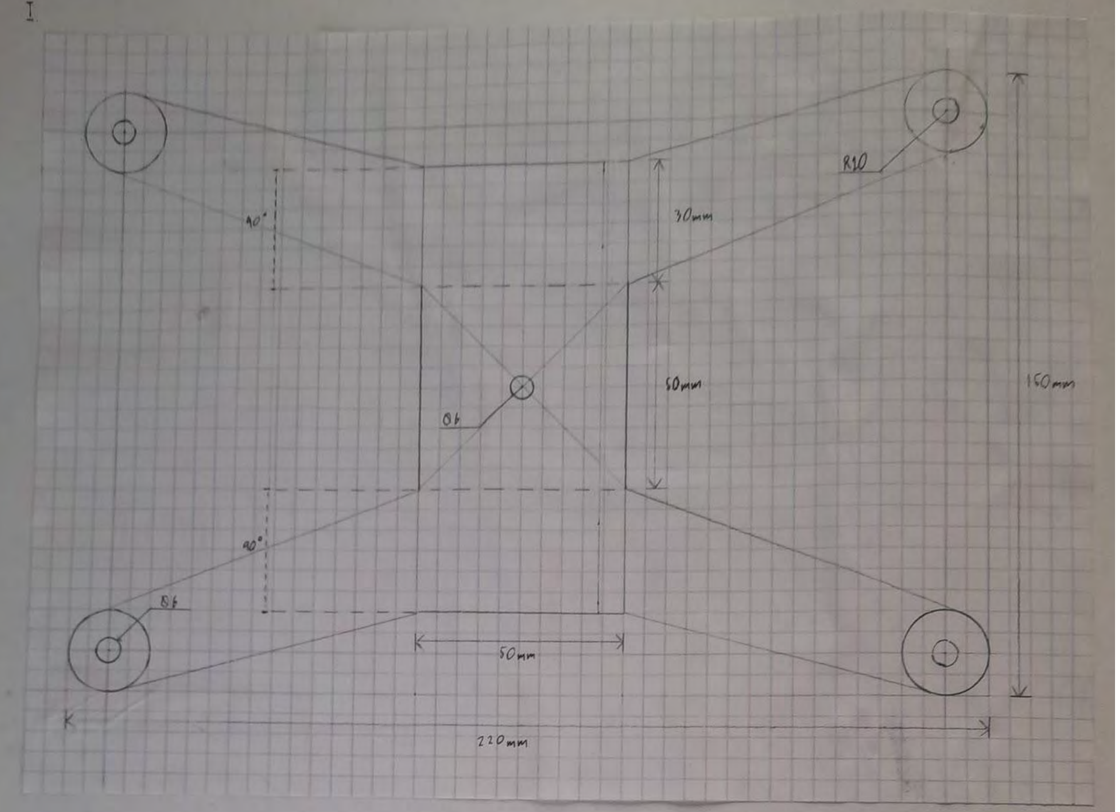


WORKING DRAWINGS

I



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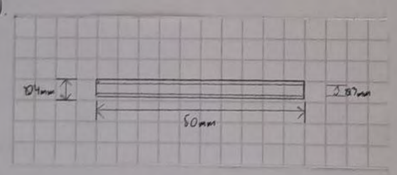

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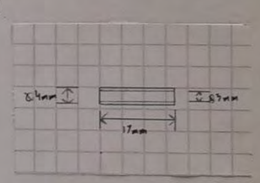

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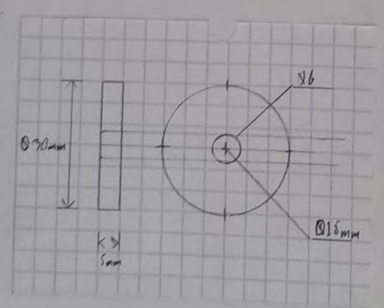

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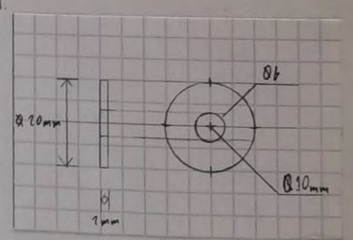

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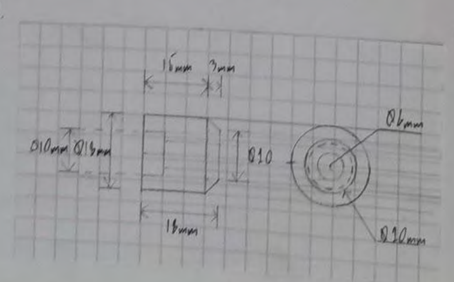

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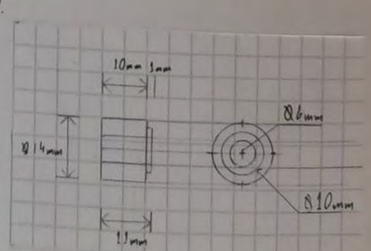
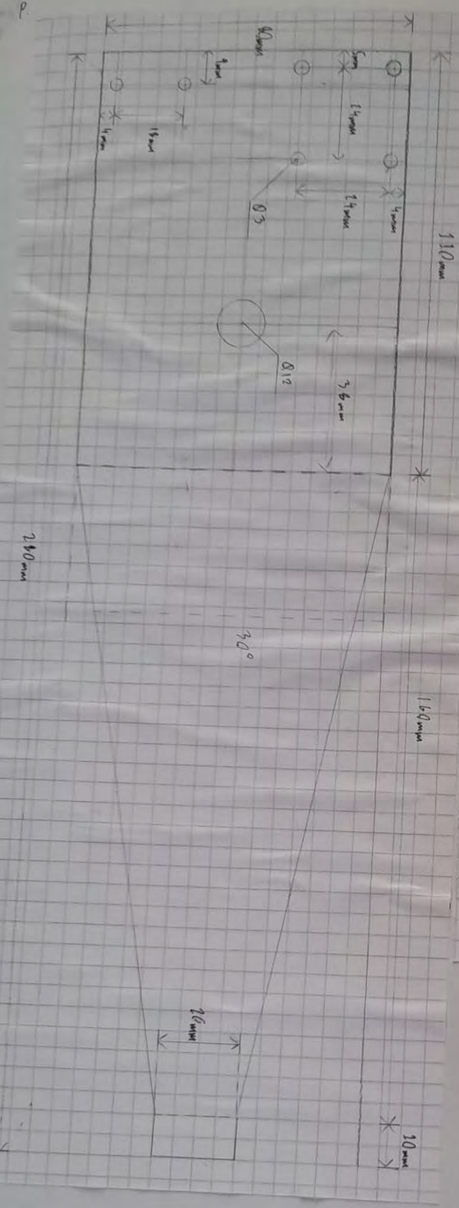


WORKING DRAWINGS

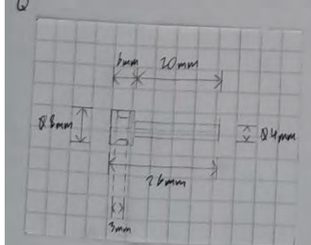
P



"Upper" Body Parts List

1	Piece	Sheet Aluminium	150 × 220 × 1mm	(I)
2	Pieces	Aluminium Threaded Bar	Ø3 × 134mm	
2	Pieces	Brass Pipe	Drilled Ø3, Ø4 × 60mm	(J)
4	Pieces	Brass Pipe	Drilled Ø3, Ø4 × 17mm	(K)
1	Piece	Brass Bar	Ø30 × 4mm	(L)
1	Piece	Aluminium Bar	Ø20 × 8mm	(M)
1	Piece	Nylon Bar	Ø16 × 10mm	(N)
1	Piece	Nylon Bar	Ø14 × 11mm	(O)
1	Piece	Sheet Aluminium	80 × 280 × 1mm	(P)
1	Piece	Brass Bar	Ø6 × 2mm	(Q)
1	Piece	Brass Bar	Ø12 × 30mm	(R)
1	Piece	Aluminium Threaded Bar	Ø6 × 48mm	
4	Nuts, End-Cap	Brass/Steel	M3	
3	Machine Screws, Phillips Pan Head	Brass/Steel	M3 × 25mm	
4	Machine Screws, Phillips Pan Head	Brass/Steel	M3 × 8mm	
2	Nuts	Brass/Steel	M6	
2	Tracks		500 × 18 × 1mm	
3	"Yellow" Motors with gearbox			
1	50:1 Motor with worm wheel			
	Length of thread			
2	Ø Sprockets		Ø30 × 5mm	

Q



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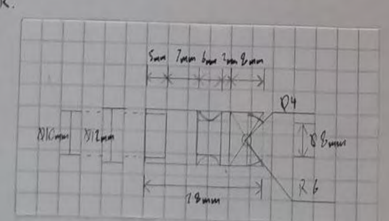
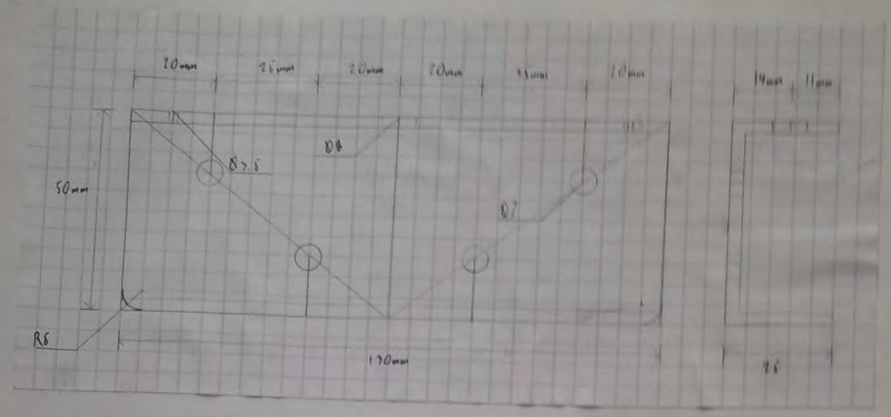
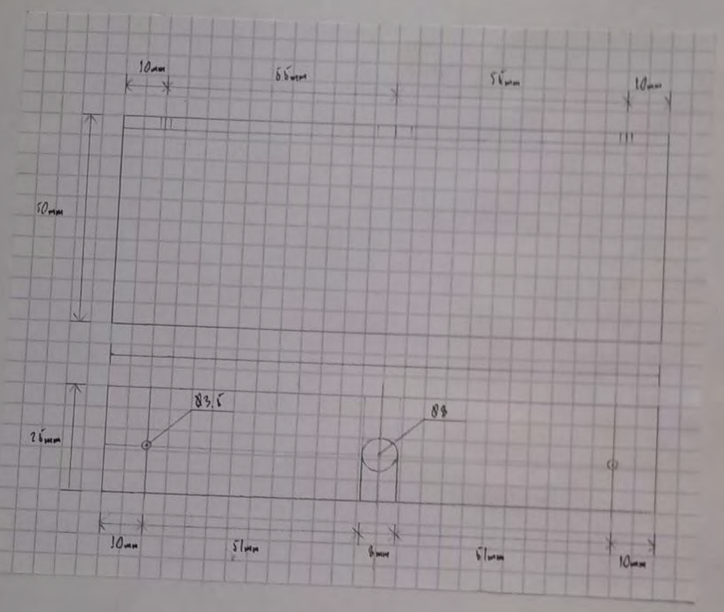






Remote Control Parts List

- 1 Piece U-Aluminium 130mm long. 50×25×3mm
- 1 Piece L-Aluminium 130mm long. 50×25×3mm
- 4 DPDT Switches
- Length of Red/Black Wiring
- 2 9V Batteries

WORKING DRAWINGS

(a) Incorporate a drive-train using caterpillar track technology to ride over rough terrain;

DONE! ✓

(b) Have an arm, which can traverse the working area to locate, raise and lower an object;

DONE! ✓

(c) Include an operator's control and switching panel which may be tethered to the vehicle.

DONE! ✓

(a) All main operating features are **clearly visible without dismantling**;

DONE! ✓

(b) The longest dimension *of the vehicle* does not exceed **400 mm**;

DONE! ✓

(c) Electric power does not exceed **9 volts**.

DONE! ✓

DONE! ✓

I am incredibly happy with how my project has turned out with the end result being attributed to the skills I learnt throughout the process.

While I stumbled at the start I learnt proper project management and kept up with self imposed deadlines which lead to a steady progression in the project.

Working and operating within realistic boundaries while also trying to push myself made me learn how to effectively triage out flashy ideas for simpler ones in a way that maximised the finished product.

More so than any other project I've done so far I also learnt the potential in discussing ideas between my peers to communally tackle a problem alongside rapidly experimenting with ideas to produce fast, effective solutions.

While if I was to do this again I would do many things similarly there are a few things I know myself I could improve upon and rectify.

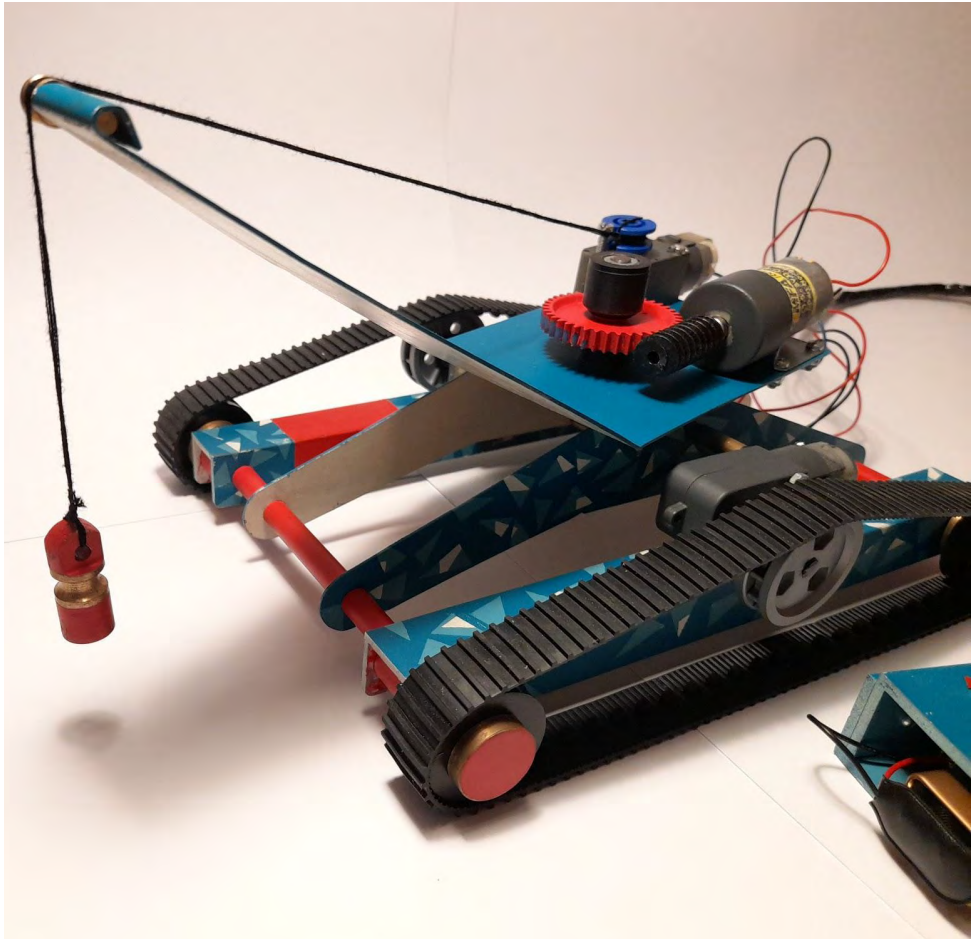
When first trying to come up with ideas for the projects design I let myself get easily overwhelmed by the need for a perfect solution right away and had each individual problem get tangled up in the others creating a mental stalemate. If I split up and solved each problem individually like I did later in the project in the beginning I would've made considerably more progress.

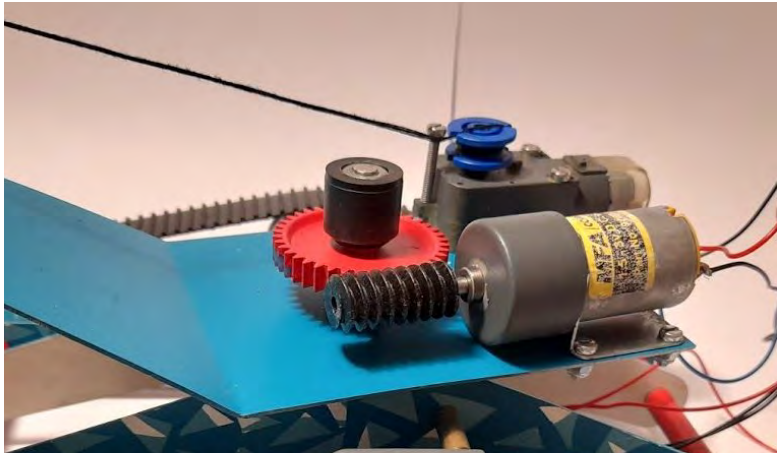
While speed was a good thing overall in my project there were a few times I rushed myself and made a mistake in a design or making a piece which only caused me to lose time instead of saving it. If I were to do this again I would maintain a more meditative process where I wasn't always expediting myself.

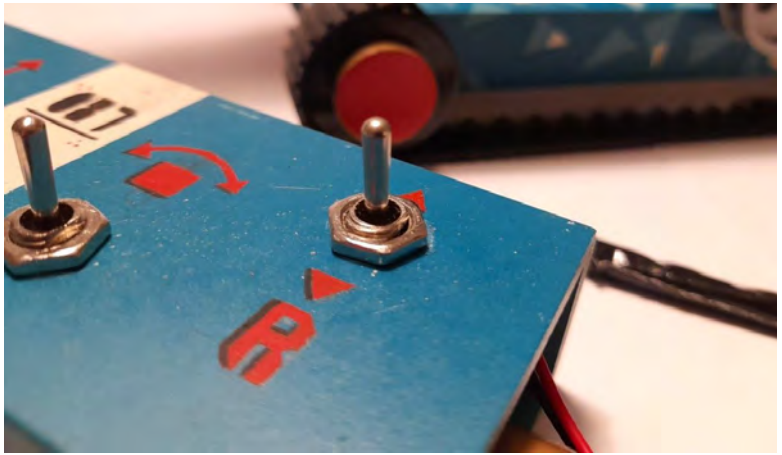
Lastly something that I missed early on in the project was taking record of every single process I was doing when either designing or making a piece. I spent a lot of time retroactively correcting this which could have been better spent elsewhere.

EVALUATION

Fin.



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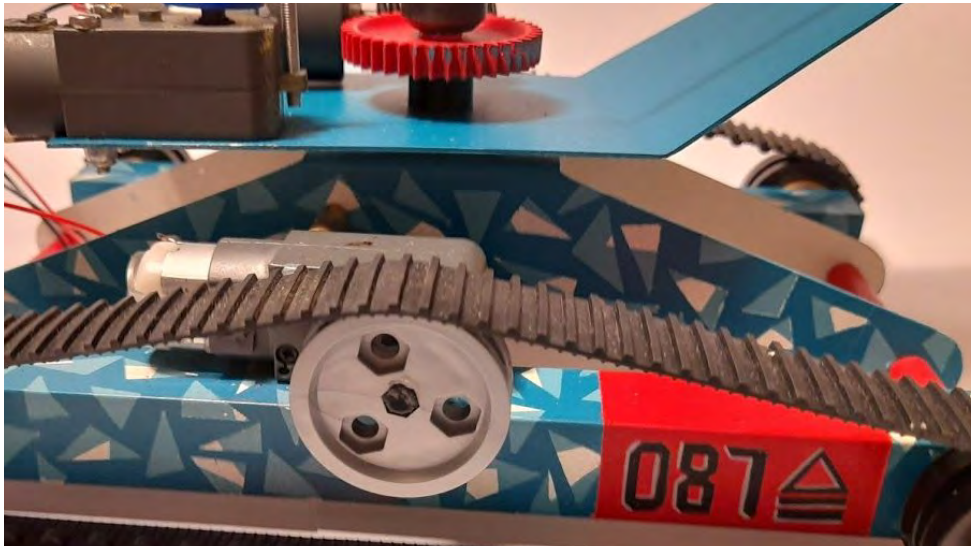
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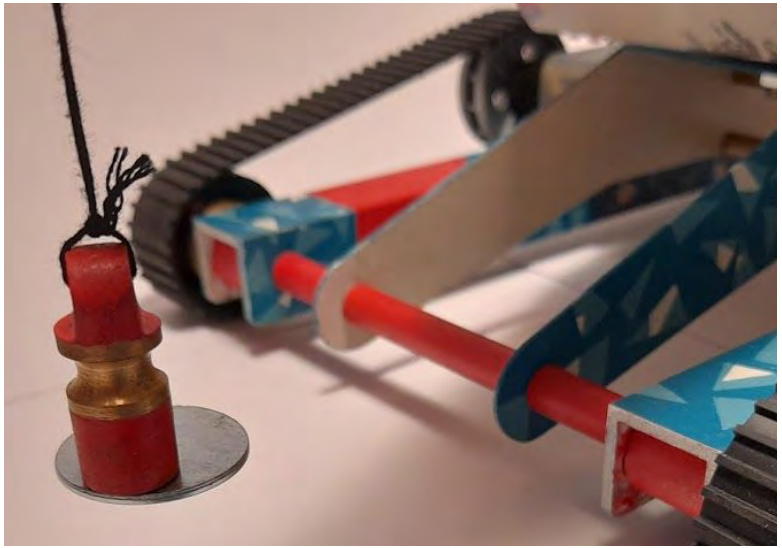

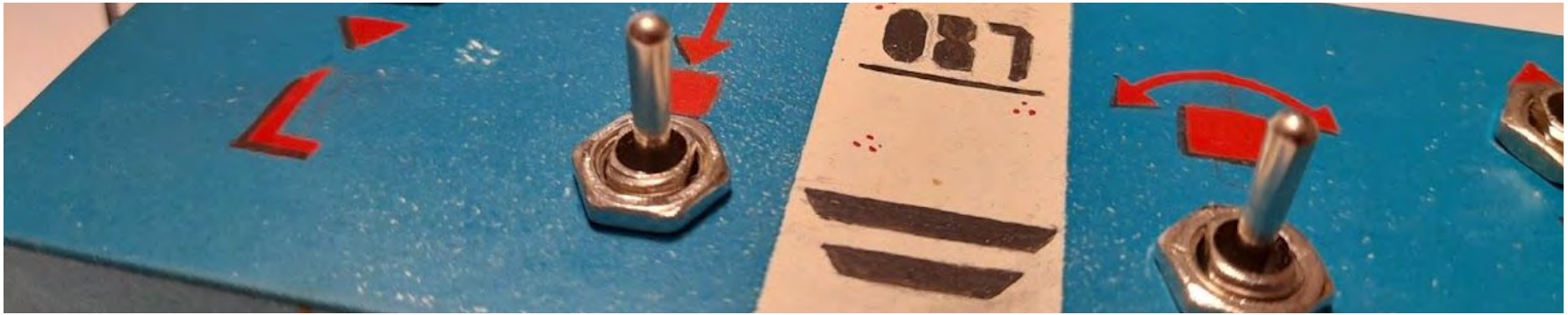
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