



Topic Areas to Consider

Robotics in Healthcare

- Cheap and easy to manufacture prosthetic hand.

Domestic Robotics

-

Inspection Robotics

- Drones + UAV to inspect buildings, pipes, roofs etc.

Modular Storage

- Modular crates used for tools, photography

Bike + E-Scooter Theft Prevention ●

- Lock that can attach to various fixtures (Bollards, crash barriers)
- Smart features. self check to see if locked, GPS.
- Lock bike in places where there is no bike racks.

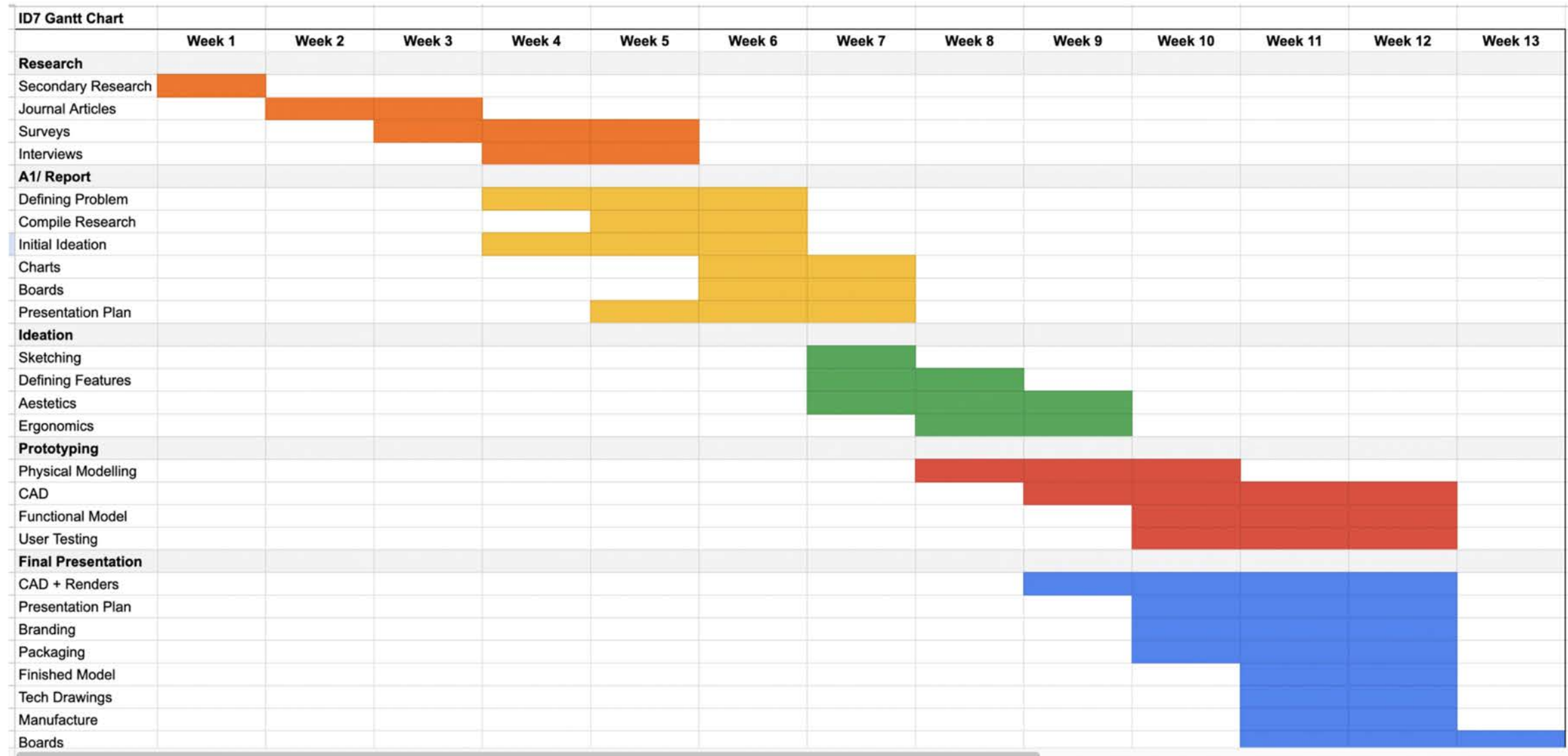
Sustainable + Customizable Furniture

- CNC Furniture can be made locally
- Designed to fit user's needs.
- Easily transported + reused.

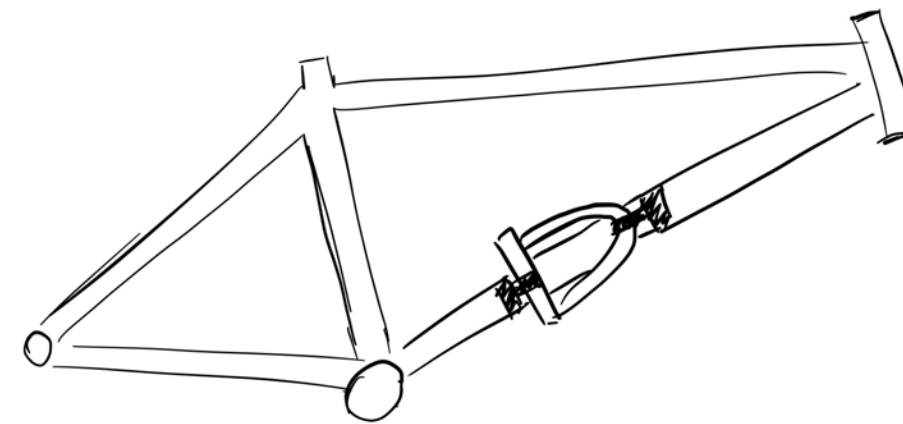
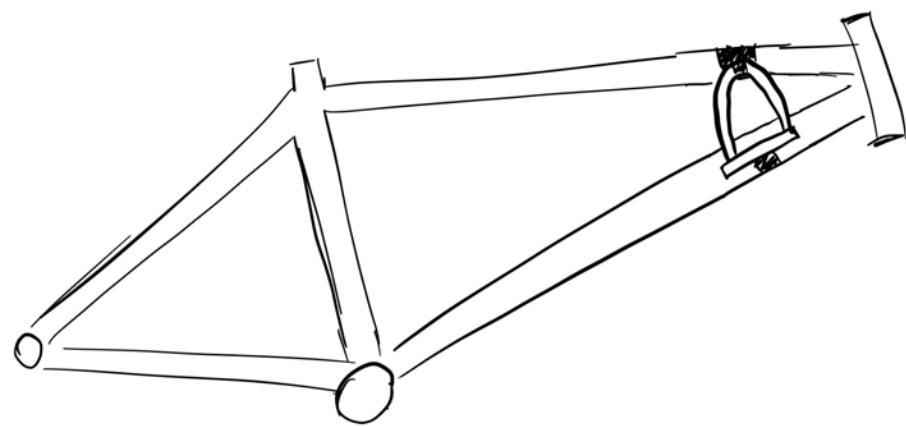
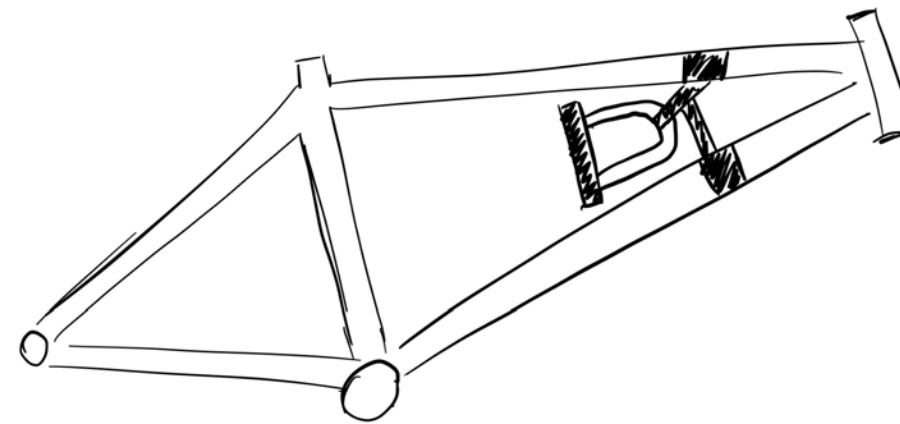
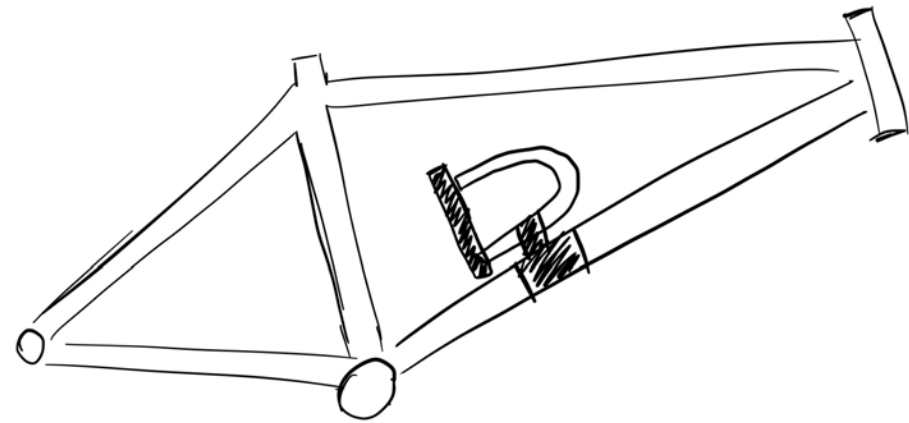
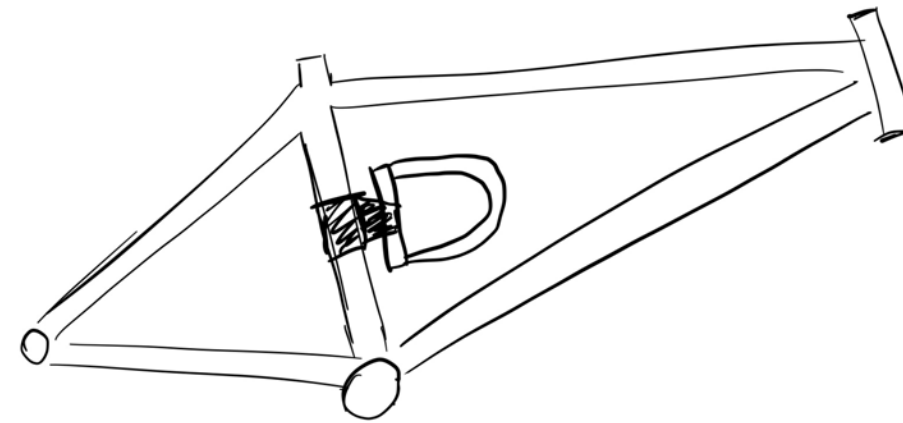
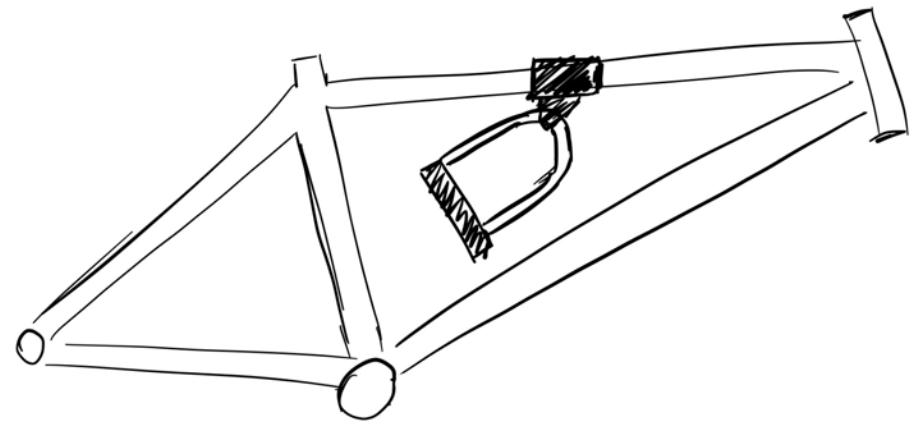
Project Organization

- Research - Week 1 - 5
 - Journal Articles
 - Surveys
 - Interviews
 - Secondary Research
- Report / AI - Week 5 - 7
 - Defining Problem
 - Compile Research
 - Initial Ideation
 - Presentation Board
 - Presentation Plan
- Ideation - Week 7 - 11
 - Sketching
 - Defining Features
 - Defining Aesthetics + Ergonomics
- Prototyping - Week 8 - 11
 - Modelling
 - CAD
 - Functional Modelling
 - User Testing
- Final Presentation / Design - Week 12 - 13
 - Logo / Branding
 - Packaging
 - High Quality Model
 - Tech Drawing
 - Defined Manufacturability
 - High Quality CAD + Renders
 - Presentation Boards

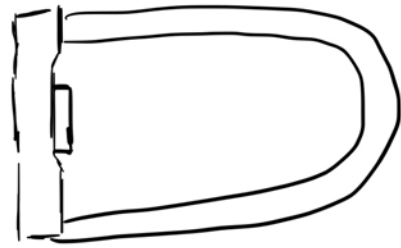
Project Organization - Gantt Chart - Initial



Bike Lock Mounting

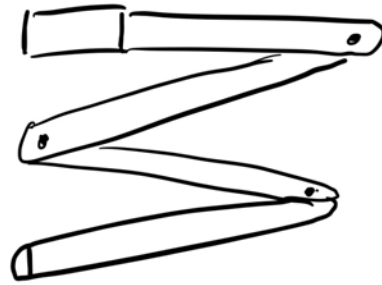


Types of Locks



D - Lock

- High Security
- Small opening



Folding Lock

- Med / High Security
- Wide opening



Cable Lock

- Low Security
- Versatile



Chain Lock

- Medium Security
- Versatile

Existing Locks - High End

Hiplok D1000 - \$445

ABUS Bordo 6500 a Smart lock - \$395

Kryptonite New York Chair - \$329

ABUS Bordo Alarm 6000KA - \$188

Kryptonite New York Mini - \$173

Kryptonite Krypto Lok 685 - \$139

Hiplok DX - \$119

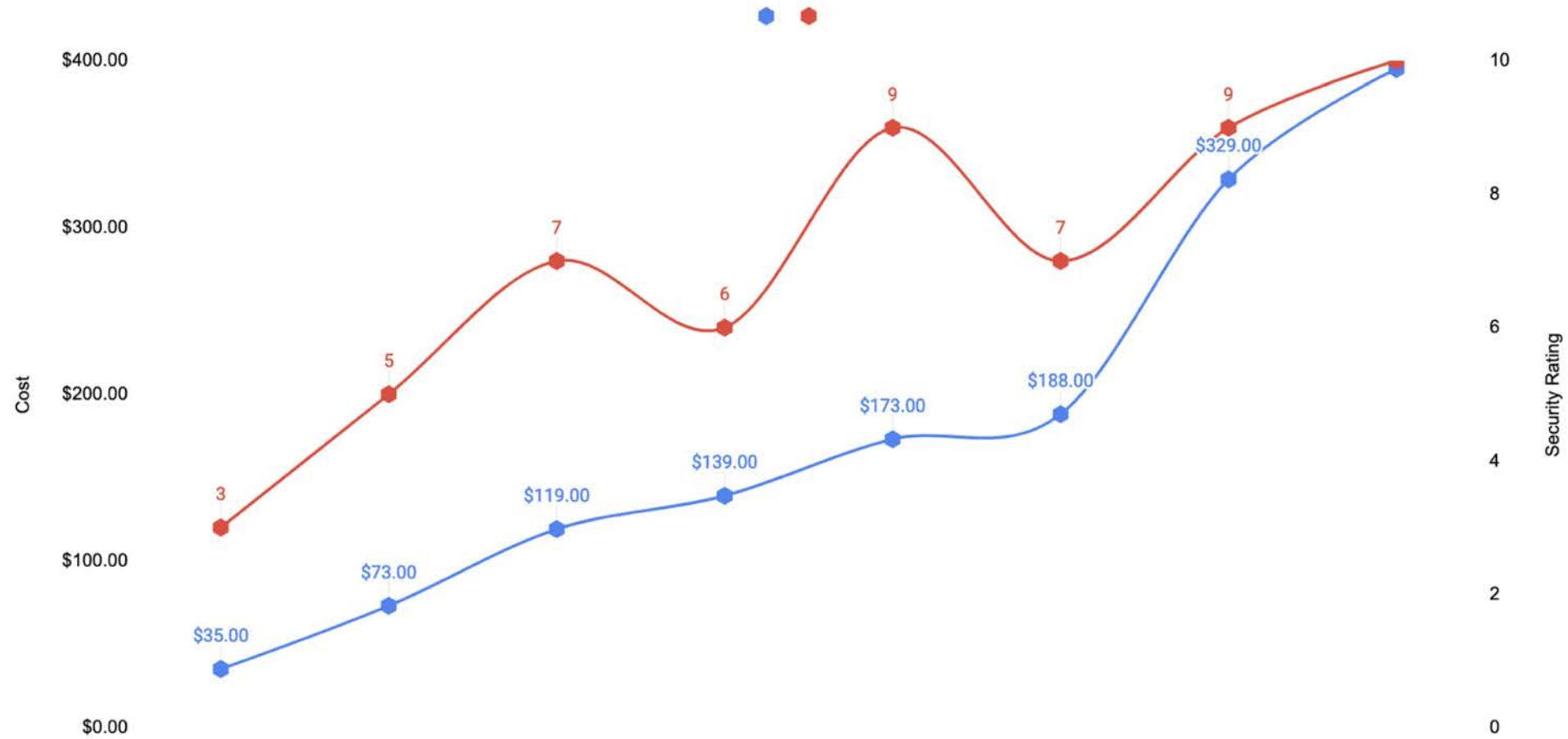
Kryptonite Keeper 785 - \$73

Magnum Armoured Cable lock 100 - \$35

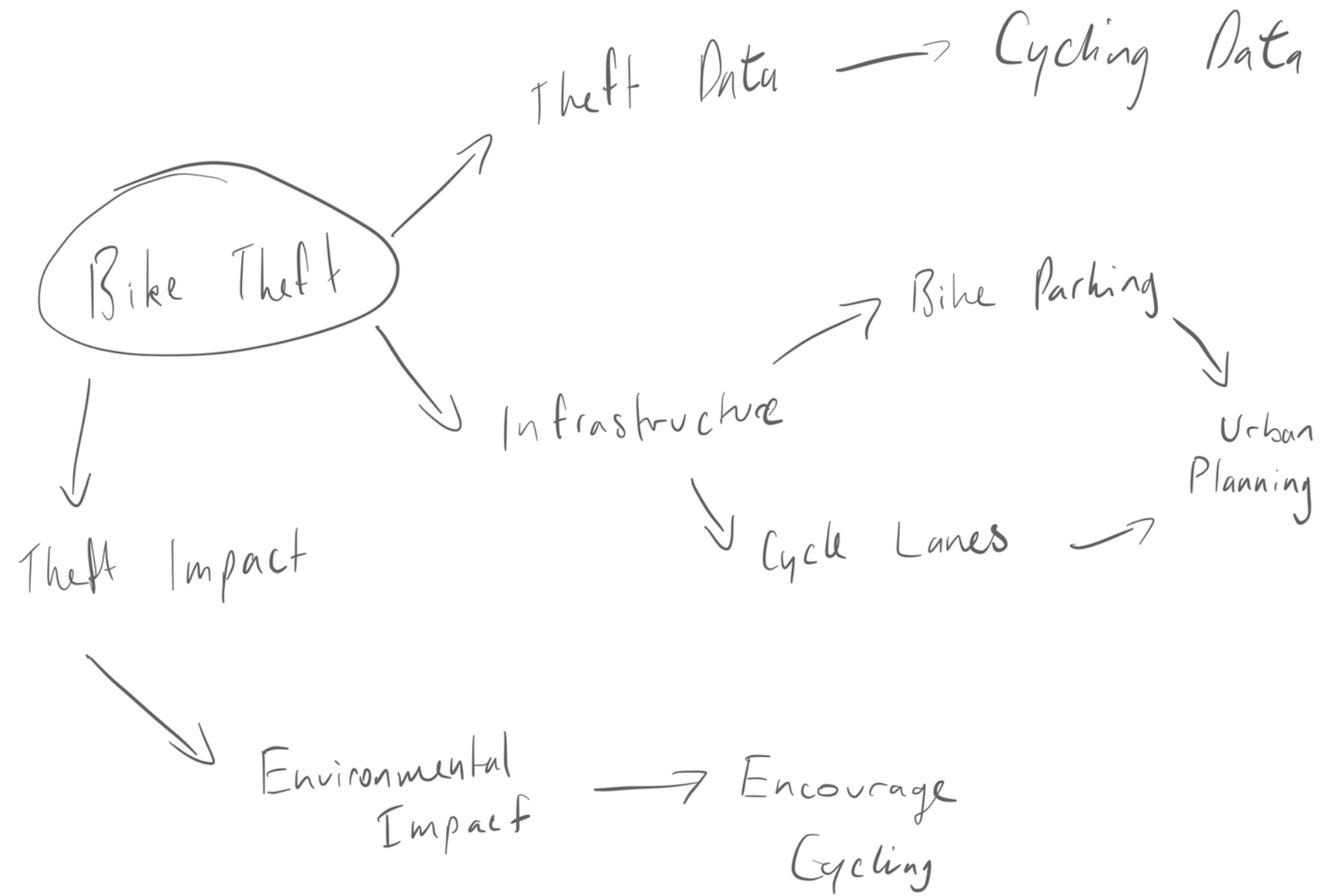
Existing Lock - Comparison + Chart

	A	B	C	D	E	F	
1	Name	Type	Price	Security	Weight	Features	Link
2	Hiplok D1000	U-Lock	\$445.00	10	1900	Grinder Proof	https://www.99bikes.com.au
3	ABUS Bordo 6500a Smart X	Folding	\$395.00	10	2300	Bluetooth Connected	https://www.amazon.com.au
4	Kryptonite New York Chain	Chain	\$329.00	9	6920	Heavy Duty	https://www.99bikes.com.au
5	ABUS Bordo Alarm 6000KA	Folding	\$188.00	7	1730	Alarm System	https://www.amazon.com.au
6	Kryptonite New York Mini	U-Lock	\$173.00	9	2006	18mm Shackle	https://www.amazon.com.au
7	Kryptonite Kryptolok 685	Folding	\$139.00	6	1066	Folds neatly	https://www.99bikes.com.au
8	Hiplok DX	U-Lock	\$119.00	7	1098	Belt Clips	https://www.99bikes.com.au
9	Kryptonite Keeper 785	Chain	\$73.00	5	1588	Protected Chain	https://www.99bikes.com.au
10	Magnum Armoured Cable Lock 100	Cable	\$35.00	3	780	Twisted Steel Cable	https://www.99bikes.com.au
11							

Cost V Security



Research - Journal Articles



Existing Research on bike theft and theft prevention methods

Pedestrians and E-Scooters: An Initial Look at E-Scooter Parking and Perceptions by Riders and Non-Riders

Looking at dockless shared e-scooter parking on footpaths and how it affects pedestrians. Conducted in a US City

Survey and Observations were conducted on pedestrians and scooter riders. Results show that 16% of scooters not parked properly and 6% blocking footpaths.

E-scooter trips replaced trips taken by ride-share and taxis in 39% of cases.

Sting charging stations and identifying safe and convenient routes for environmentally sustainable e-scooter systems

Looking at the benefits of implementing docked e-scooter parking as opposed to dockless scooters. Better for the environment as scooters don't need to be picked up and charged every night by a car.

Use algorithms to determine best place to implement charging station based on points of interest and location of public transport.

Bike Theft in Washington DC Metro

This article employs Routine Activities and Crime Pattern theories to explore the factors that lead to increased risk of bike theft, focusing on Washington Metropolitan Transit Authority Memorial (Metro) property. Utilizing the Metro bike census and other data, we use negative binomial regression analysis to model the relationship between bike thefts and various station- and neighborhood-level risk factors that can either create or close off opportunities for bike thefts. The findings indicate that bike thefts around Metro stations are positively influenced by the number of targets, as measured by the number of bikes per station, and the presence of lively offenders, as measured by the volume of auto-restitution claims. Stations that have greater guardrailing, as measured by the number of nearby businesses, are less likely to experience bike theft. The implications of these findings for theory, methodological considerations, and crime prevention are discussed. We suggest that bike racks can be placed in locations with greater informal guardianship, and discuss ways our findings can inform traditional interventions such as bike locking campaigns.

National Walking and Cycling Participation Survey 2021

Looking at walking and cycling activities of Australians. Shows that 48.3% of Australians took a bike over the previous year. Around 1.5% of the Australian population rode an e-scooter or a skateboard in a typical week.

Bike-friendly business

Government survey looking at how bike-friendly infrastructure can help businesses. 64% of bike riders stop and visit businesses. 31% of riders go to businesses on most every trip. 49% of riders will go out of their way to visit bike-friendly businesses.

Integrating perceptions of safety and bicycle theft risk in the analysis of cycling infrastructure preferences

Cycling infrastructure development is an effective but expensive urban policy to encourage people to use bicycles. Although people usually prefer infrastructure with high cycling priority, authorities in some cities have focused policies on adapting part of current motor vehicle infrastructure to increase the length and coverage of bicycle infrastructure at the road level, which can help to lower infrastructure investment costs. Perceptions are also important in developing programs to promote cycling and they may even be more important for cyclists than the reality itself. In this research, we integrated the perceptions of cycling safety and theft risk into a hybrid discrete choice model in order to better understand cycling infrastructure preferences, using Bogota, a bike-friendly city with security concerns, as a case study. We found that concerns about safety are a significant barrier to using bike lanes at the road level in the city while perceptions of theft risk affect the value or importance that bicyclists place on travel time. Based on modeling findings we proposed hard and soft measures to encourage bicyclists to use bike lanes at the road level.

The climate change mitigation impacts of active travel

Active travel (walking or cycling for transport) is considered the most sustainable and low carbon form of getting from A to B. Yet the net effects of changes in active travel on changes in mobility-related CO2 emissions are complex and, under research. Here we collected longitudinal data on daily travel behavior, journey purpose, as well as personal and geospatial characteristics in seven European cities and defined mobility-related lifecycle CO2 emissions over time and space. Statistical modeling of longitudinal panel (n = 1848) data was performed to assess how changes in active travel, the 'main mode' of daily travel, and cycling frequency influenced changes in mobility-related lifecycle CO2 emissions. We found that changes in active travel have significant lifecycle carbon emissions benefits, even in European urban contexts with already high walking and cycling shares. An increase in cycling or walking consistently and independently decreased mobility-related lifecycle CO2 emissions, suggesting that active travel substitutes for motorized travel - i.e. the increase was not just additional induced travel over and above motorized travel. To illustrate this, an average person cycling 1 trip/day more and driving 1 trip/day less for 200 days a year would decrease mobility-related lifecycle CO2 emissions by about 0.5 tonnes over a year, representing a substantial share of average per capita CO2 emissions from transport. The largest benefits from shifts from car to active travel were for business purposes, followed by social and recreational trips, and commuting to work or place of education. Changes to commuting emissions were more pronounced for those who were younger, lived closer to work and further to a public transport station. Even if not all car trips could be substituted by active travel the potential for decreasing emissions is considerable and significant. The study gives policy and practice the empirical evidence needed to assess climate change mitigation impacts of urban transport measures and interventions aimed at mode shift to more sustainable modes of transport. Investing in and promoting active travel whilst 'demoting' private car ownership and use should be a cornerstone of strategies to meet 'net zero' carbon targets, particularly in urban areas, while also reducing inequalities and improving public health and quality of urban life in a post-COVID-19 world.

Bike Theft in Victoria

Over 2000 bikes were stolen in Victoria in 2021, roughly 19 bikes per day. Estimates show by 2030 11000 bikes will be stolen per year. Unstolen bike thefts equated to \$5.8 million in lost property. Bike thefts are 2 per 1000 cars are 3 per 1000, but are set to overtake car theft rates. 91% of bike thefts are uninsured and that figure has not changed in 10 years.

Bicycle Parking Security and Built Environment

The lack of secure bicycle parking is a serious but often neglected issue that discourages bicycling. Classical environment criminology theories try to explain the pattern of bicycle theft but provide limited insights into the relationship between crime and the built environment. This study examines the association between built environment factors and bicycle theft using a zero-inflated negative binomial model to account for data overdispersion and excess zeros. The assembled dataset provides variables pertaining to the road network, land use, bicycle travel demand, and socio-demographics. The key findings are as follows: (1) Bicycle theft is more likely to occur in areas for commercial purposes, areas with a high population or employment density, and areas with more bike lanes or sidewalks; (2) Bicycle theft is likely to occur at sites with more bike racks or bike stops; (3) Bicycle theft is more likely to occur at mid-blocks than at intersections; (4) Bicycle theft is more likely to occur in neighborhoods with a greater percentage of socially disadvantaged people and in neighborhoods where residents' median age is lower; (5) The likelihood of losing a bicycle is lower in areas with more bicycle trips. In general, the number of bicycle thefts increases in dense areas with more targets and decreases with greater natural guardianship provided by more passersby. With respect to policy implications, governments and transport planners should implement a geographically differentiated surveillance strategy, encourage bicycling, improve the visibility of bike racks to the public, and promote surveillance and natural guardianship in densely developed areas.

E-Bike Survey

E-bike users were often taking trips on their bike that would otherwise be taken by motorized vehicle.

Property Vault

Bike registration program that uniquely identifies your bike and input information into a national database. Company also sells product to attach an AirTag to your bike.

Climate One will open Australia's first 100% electric fleet

The most important thing is for governments to understand that converting the car fleet to an electric fleet is not going to solve the problem.

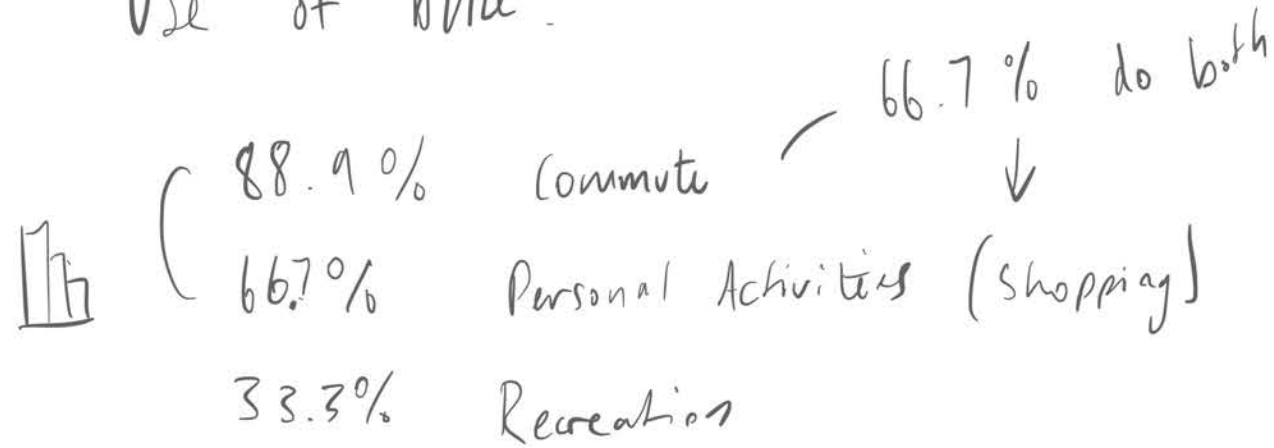
The UN has called on countries to invest at least 20% of their transport budgets in walking and bike infrastructure to combat climate change and disease driven by motorized transport.

Environmental Risk Factors Influencing Bicycle Theft: A Spatial Analysis in London

Urban authorities are continuously drawing up policies to promote cycling among commuters. However, these initiatives are counterproductive for the targeted objectives because they increase opportunities for bicycle theft. This paper explores inner London as a case study to address place-specific risk factors for bicycle theft at the street segment level while controlling for seasonal variations. The presence of certain public amenities (e.g. bicycle stands, railway stations, pawnshops) was evaluated against locations of bicycle theft between 2013 and 2018 and risk effects were estimated using negative binomial regression models. Results showed that a greater level of risk stemmed from land-use facilities than from area-based socioeconomic status. The presence of facilities such as train stations, secure houses, pawnshops and payday lenders increased bicycle theft, but no evidence was found that linked police stations with crime levels. The findings have significant implications for urban crime prevention with respect to non-residential land use.

Survey Analysis

Use of bike:



Where do you lock bike the most:

School	- 4	44%	17.24	5
Work	- 5	55%		

55-17 16

29

27.58 8

What lock do you use?

Specific Brand	- 1	11.1%
Some detail	- 6	66.6%
Little to no detail	- 2	22.2%

Lock on stolen bike:

V-Lock	} 20%	- High Security
Folding Lock		
Cable Lock	} 50%	- Low Security
Chain Lock		
No Lock	- 30%	- No Security

Survey Analysis

How was bike stolen?

Lock cut	-	8	40%
Improper locking / No Lock	-	8	40%
Not relevant	-	4	20%

Purchase after stolen

Yes	-	7	-	43.75%
No	-	9	-	56.25%

What would prevent the theft?

Better Lock

5
25%

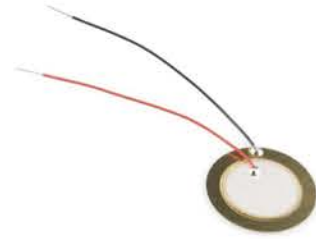
Higher security bike
parking

9
45%

Not relevant

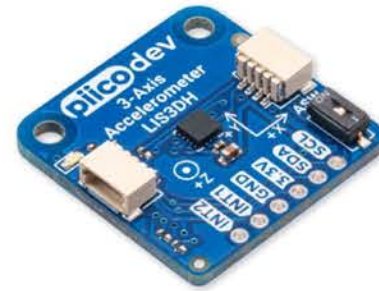
6
30%

Find out what sensor could detect an angle grinder being used.
Vibration, sound?



Piezo Element

<https://core-electronics.com.au/piezo-element.html>



Accelerometer

<https://core-electronics.com.au/piicodev-3-axis-accelerometer-lis3dh.html>



Sound Sensor

<https://core-electronics.com.au/sound-detection-sensor-module.html>

Need to test what would work best

Observation 1

Observation undertaken on a Thursday morning from 9:00 am to 10:30 am in late winter

Locations

- Suburban train station
- Local library
- Central station
- CBD streets
- QUT Gardens Point

Train Stations



external rack used more than secure rack



need to request access



limited bike lockers parked by entrance no obvious racks

City Streets



full rack near restaurants and separated bike lane



designated scooter bay



no rack, so locked to pole



no rack so bike locked on railing



large variety of bikes

Uni



↑ very full secure racks at uni

Library



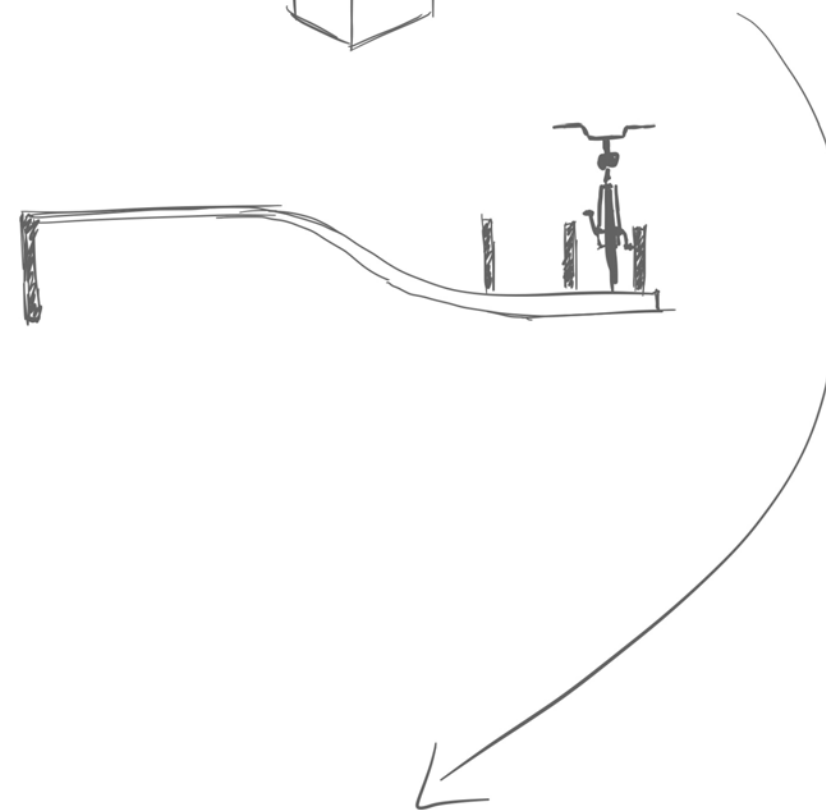
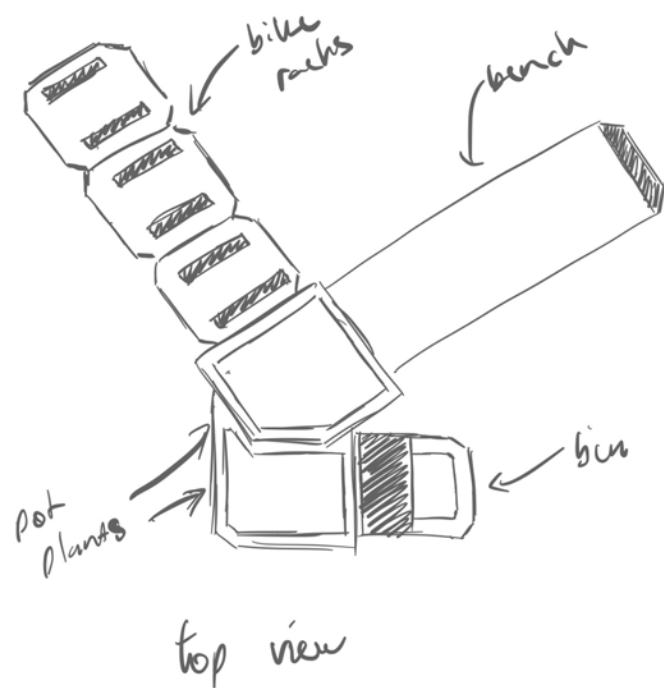
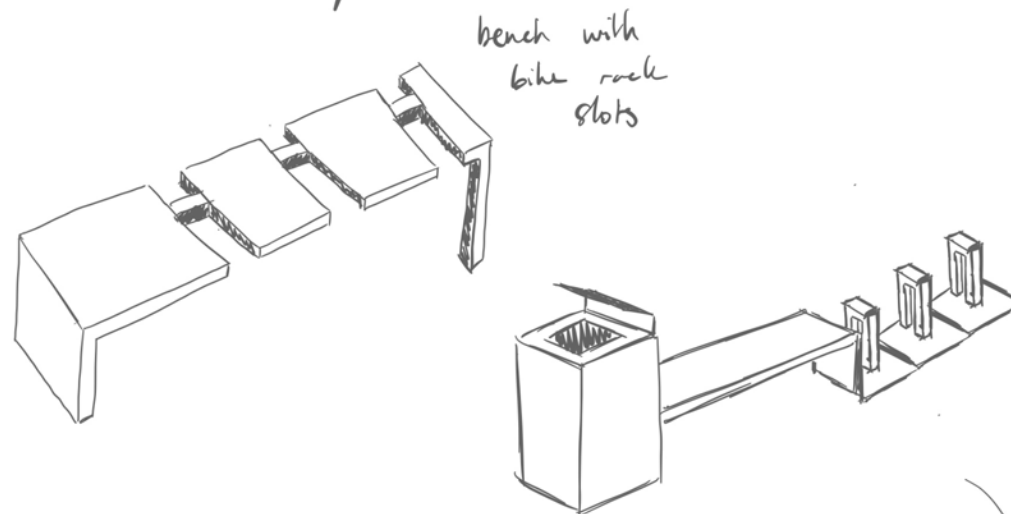
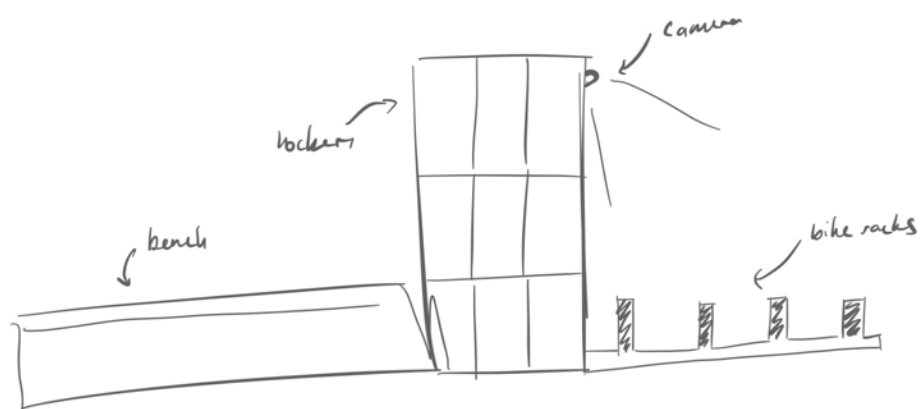
← racks by entrance in high traffic area

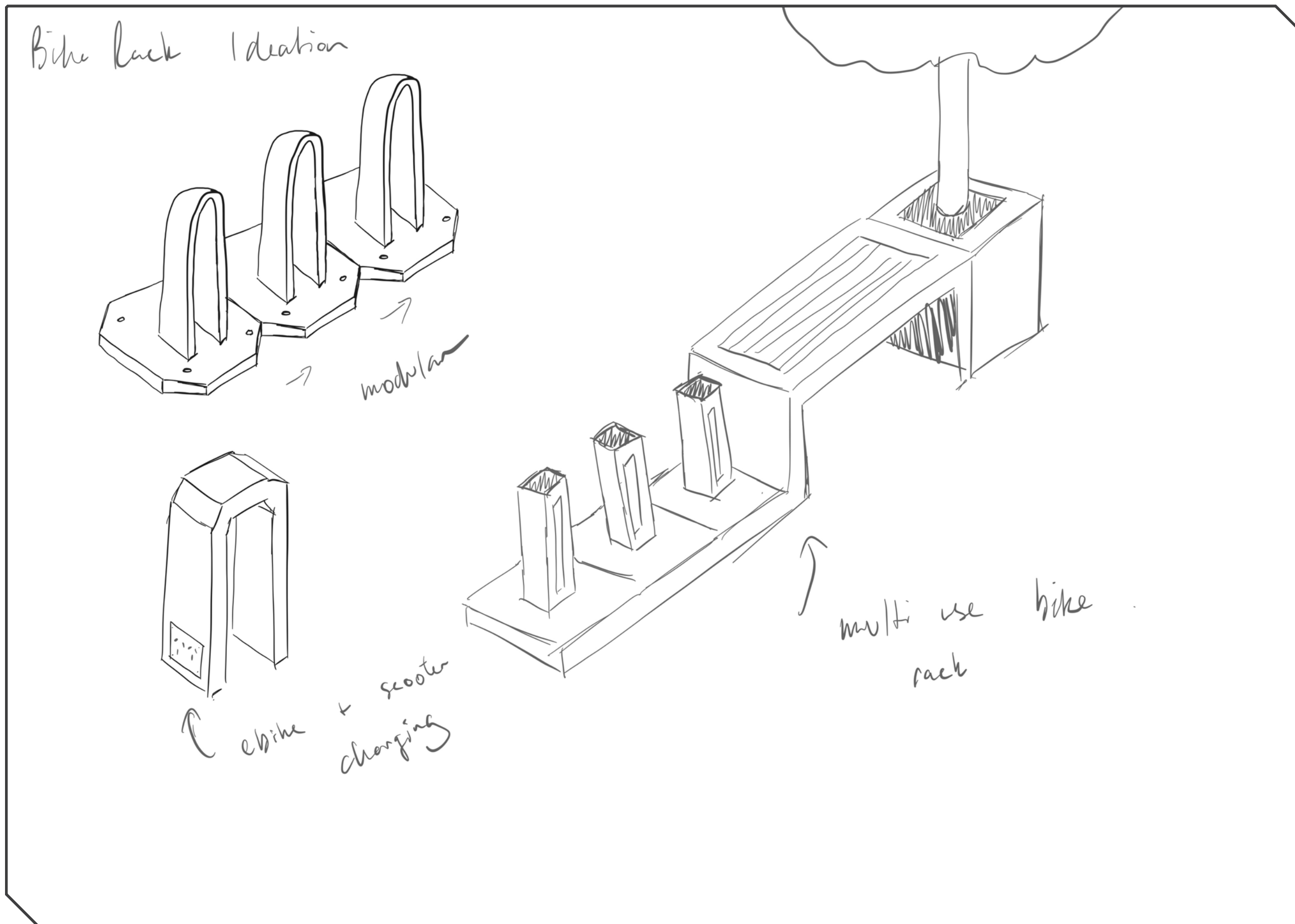
Key findings

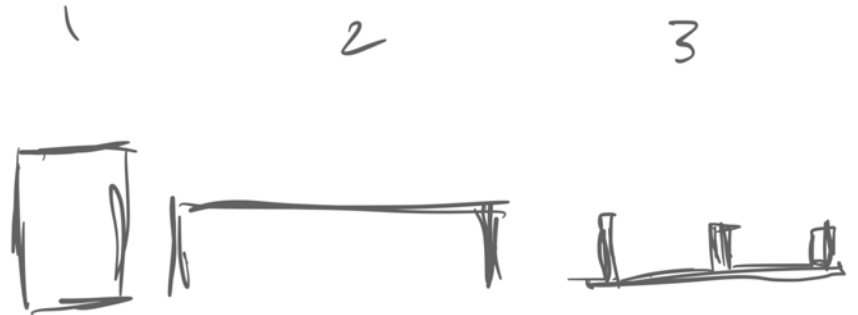
- Bike racks near cycling infrastructure seem to be more used.
- People will attach bike to poles etc. if racks not available

Ideation 1 Modular Bike Rack

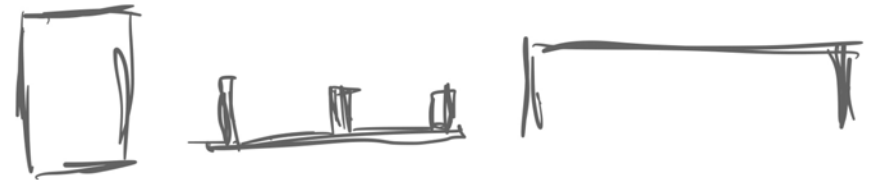
Purpose - Public furniture that encourages people to use the space surrounding bike racks to enhance security.



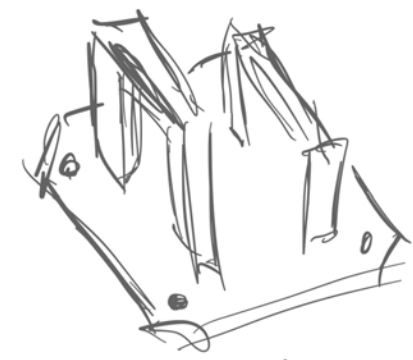




Swap around to suit different locations

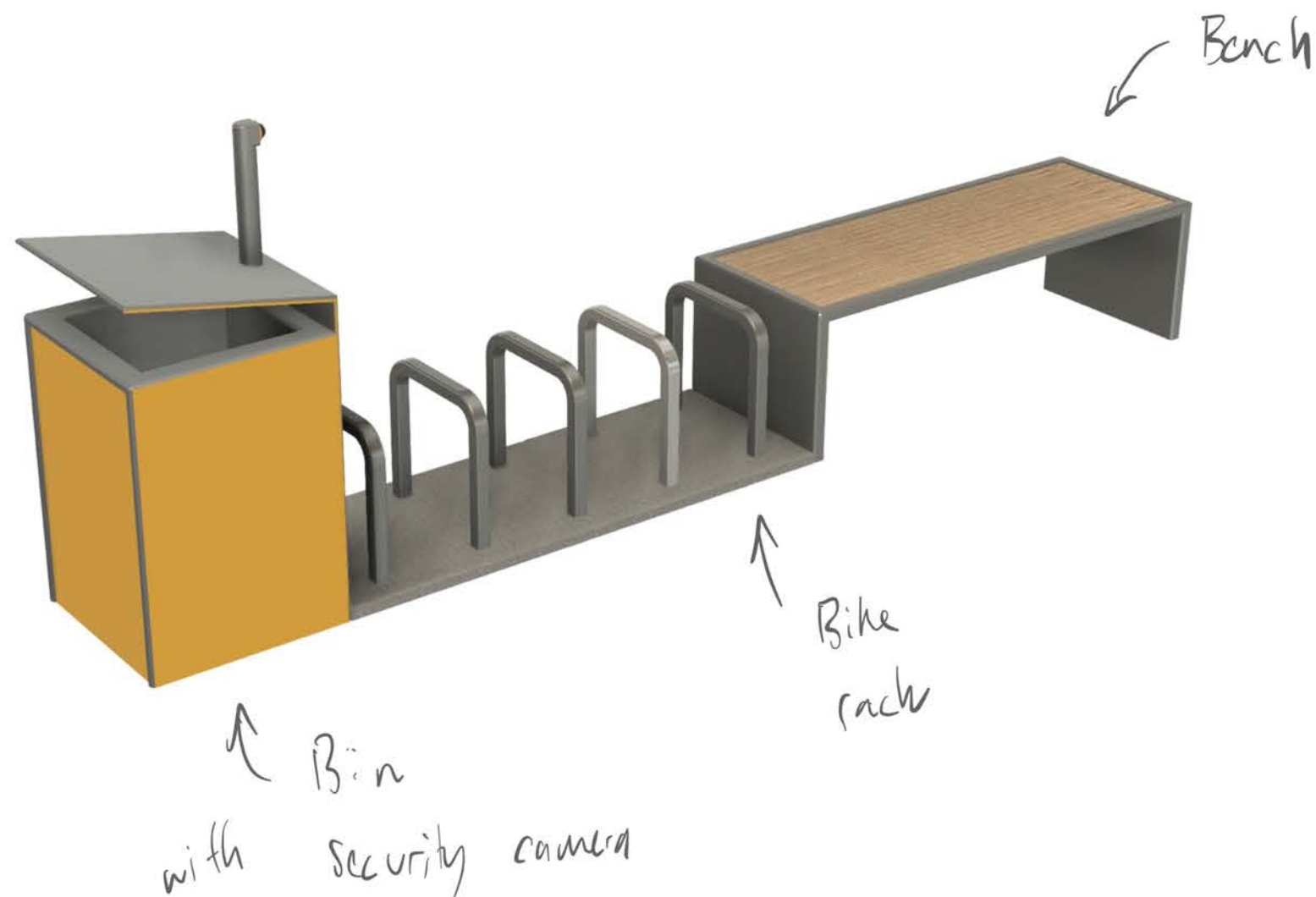


← camera to watch bikes?



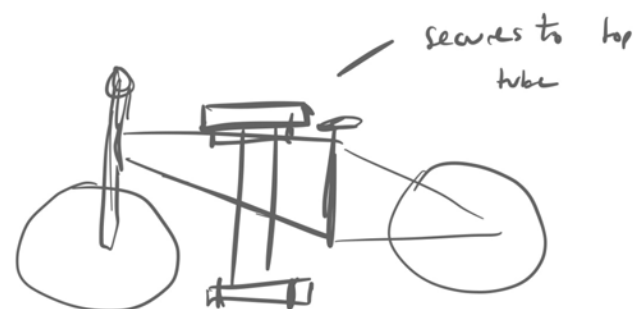
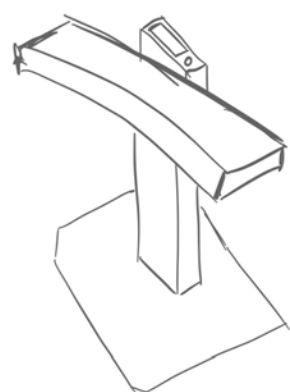
↑ modular plates for different situations

Fusion 360 Reader

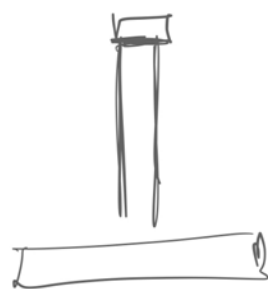


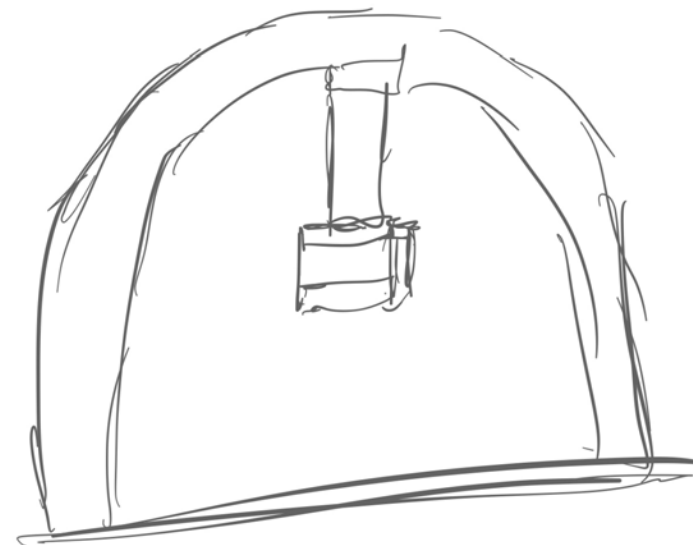
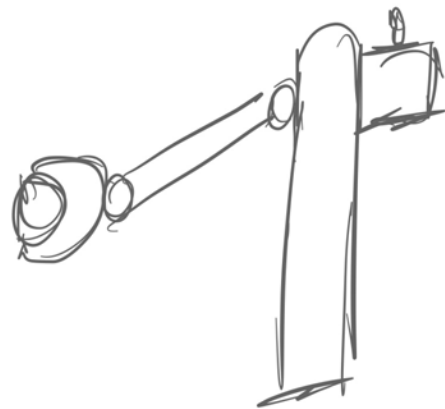
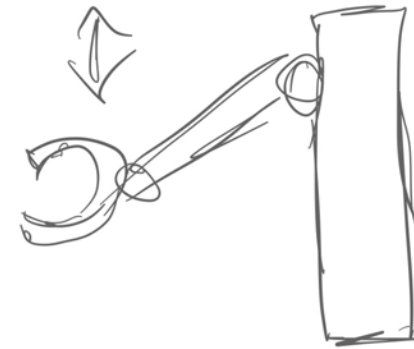
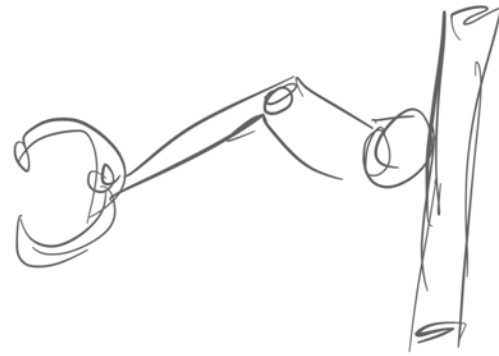
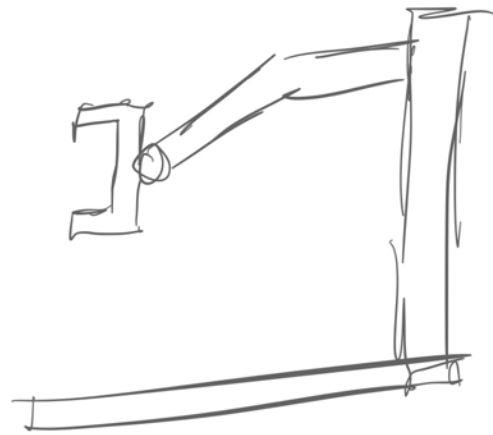
Ideation 2 Universal Bike Rack w Lock

Purpose - Encourages users to lock their bike even if they have no lock

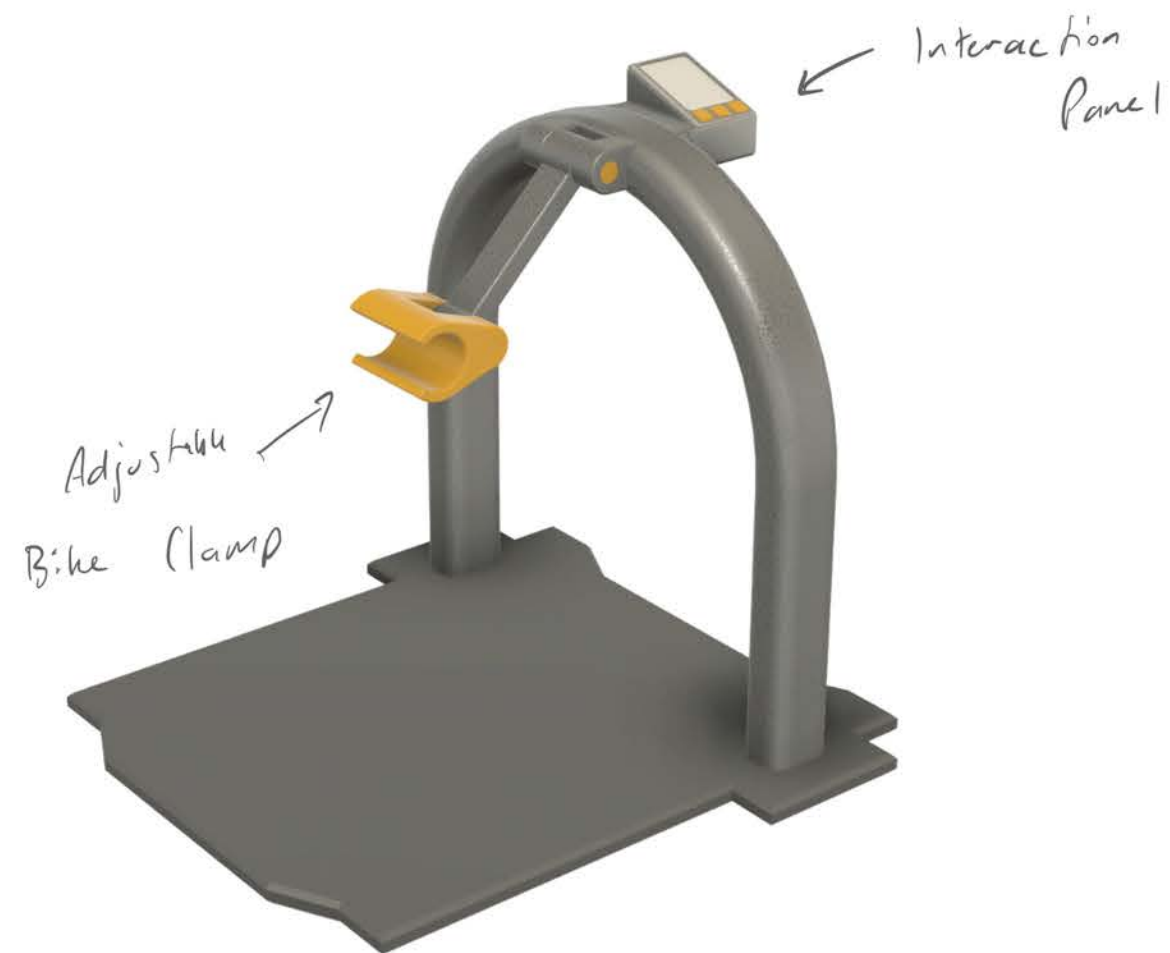


Could be
subscription based
for revenue
generation.





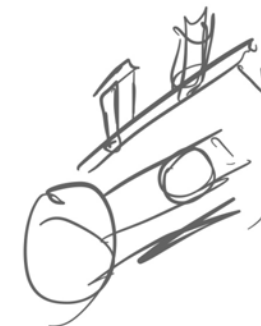
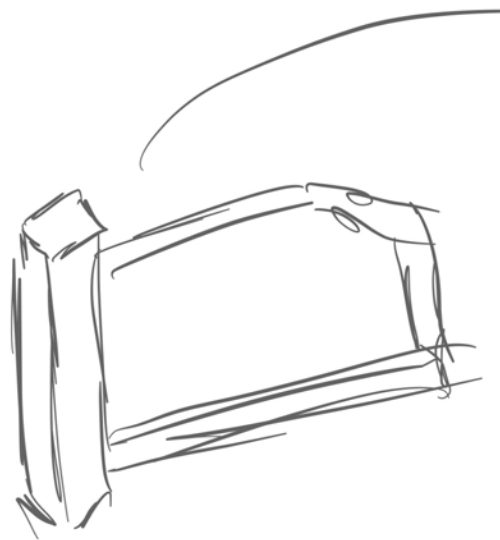
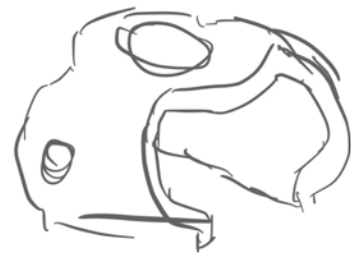
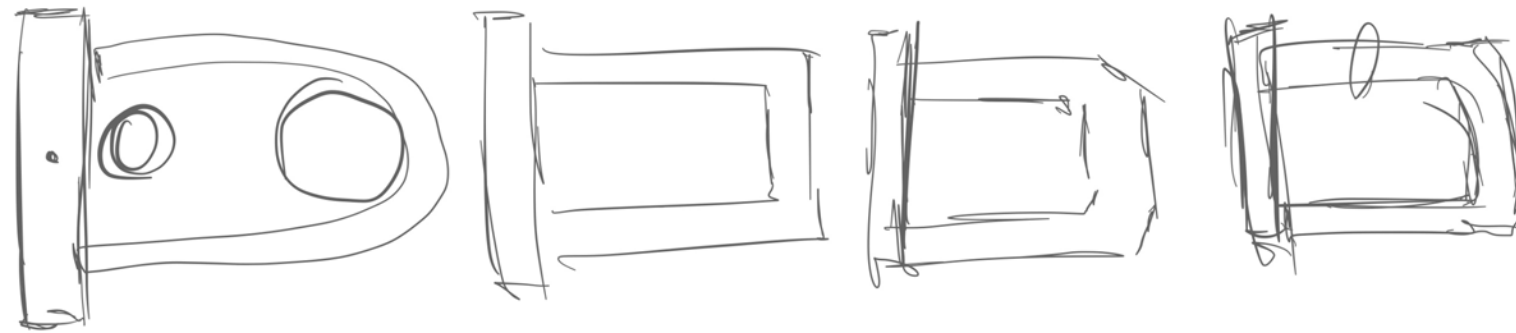
Fusion 360 Reader

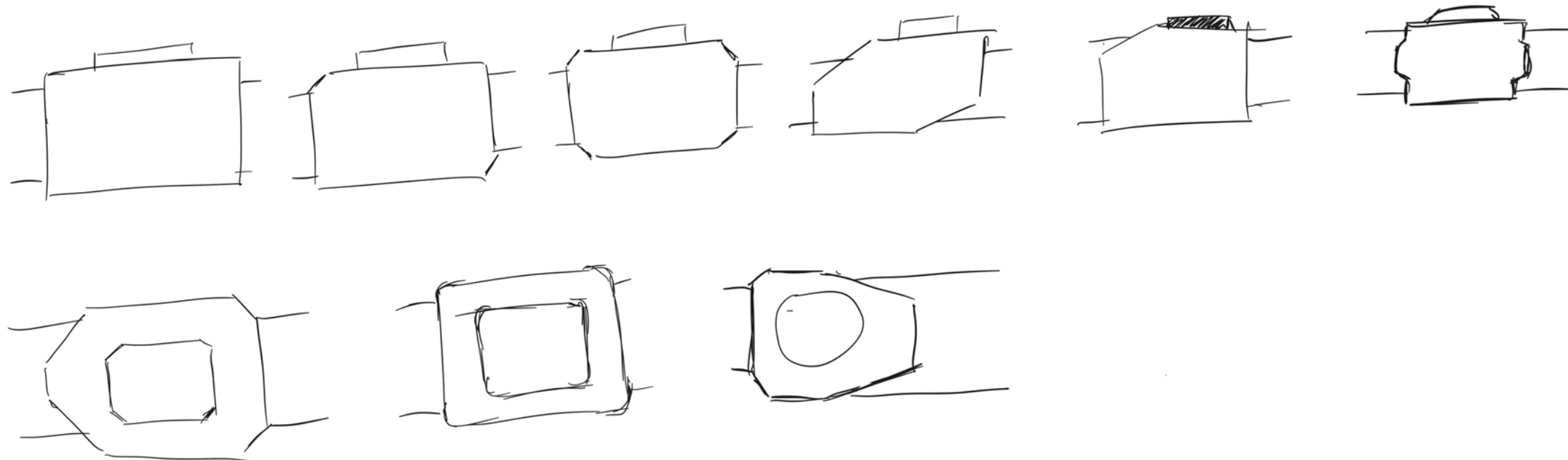
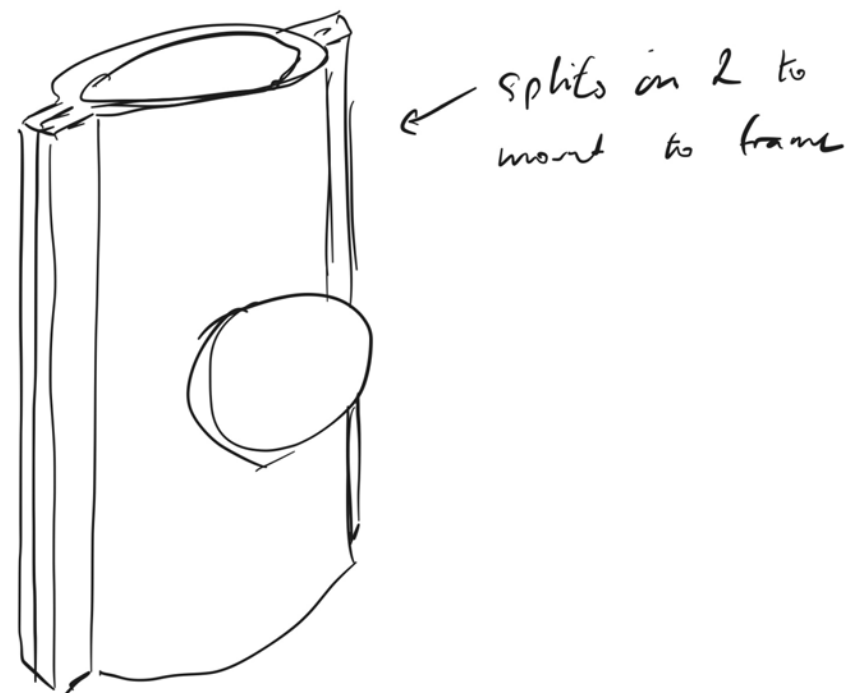
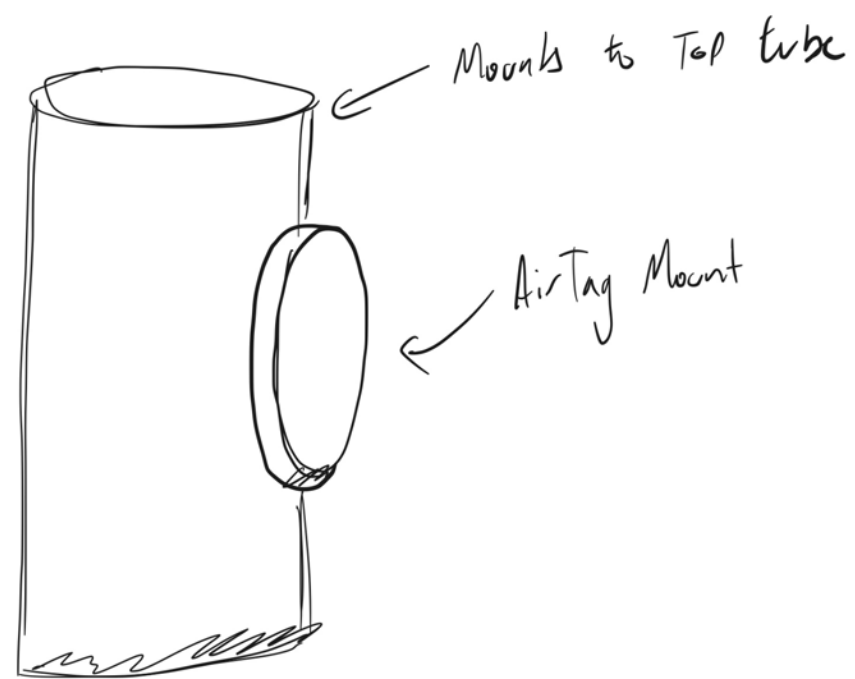


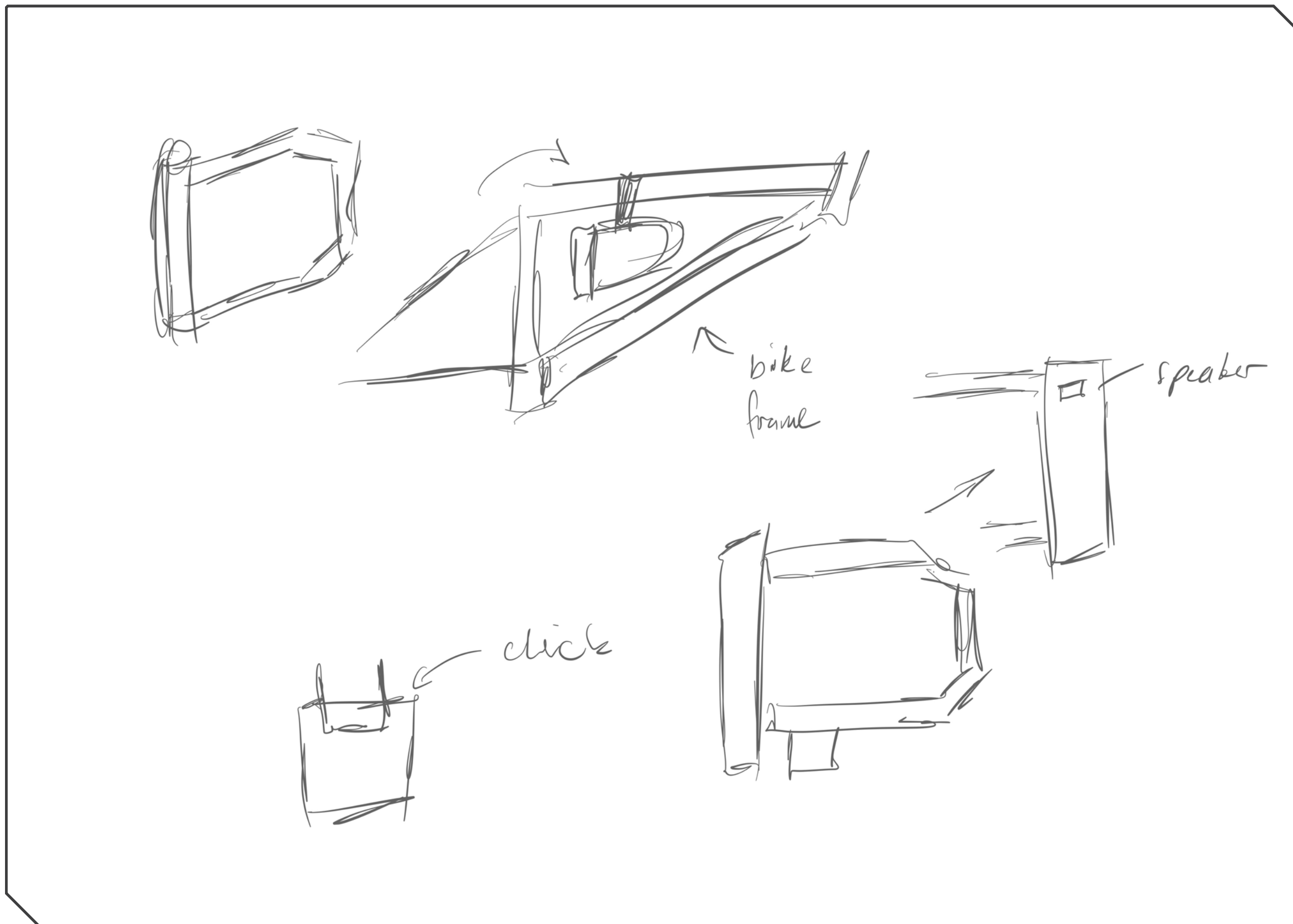
Iteration 3 Smart Lock

Purpose - Lock that resists thieves by integrating smart technology

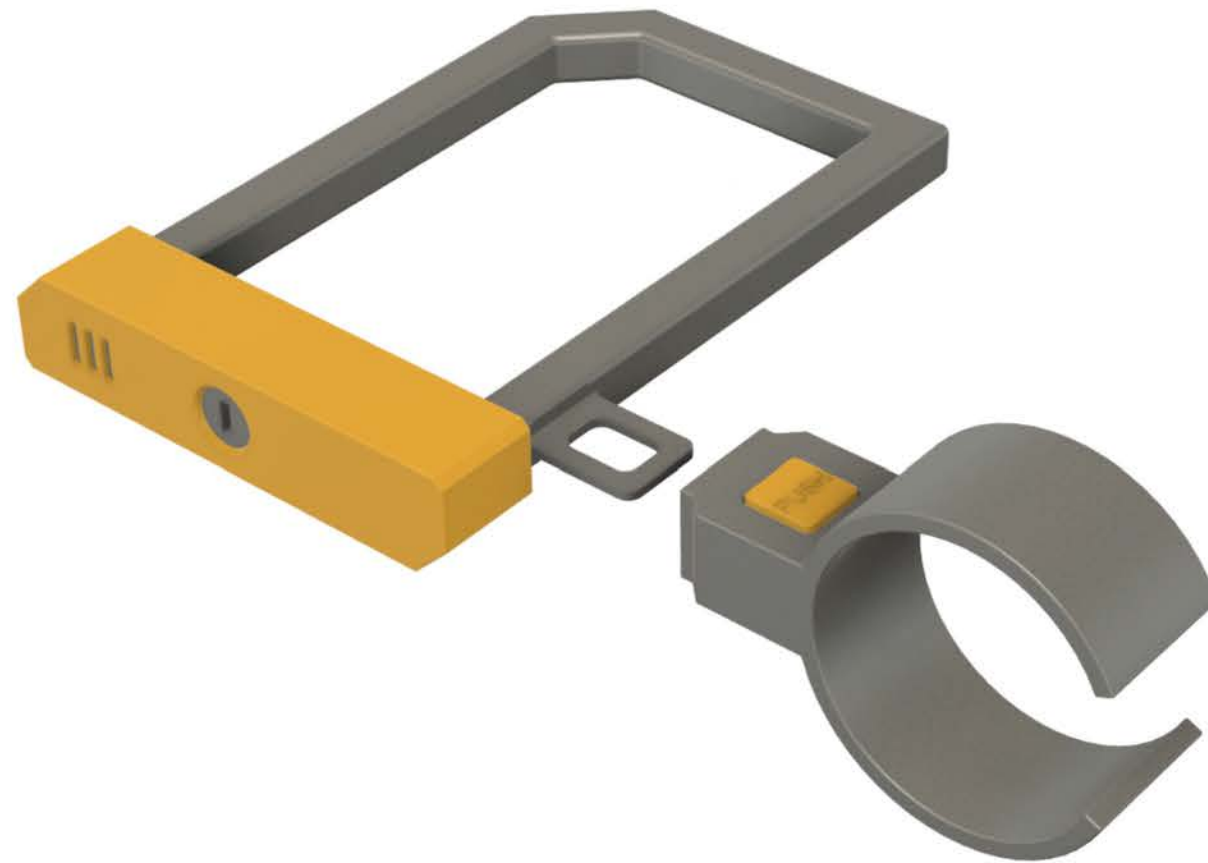
- Alarm
- vibration sensor
- microphone?
- air tag







Fusion 360 Render



Ideaation 4 - Locking Bike

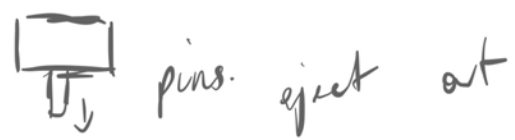
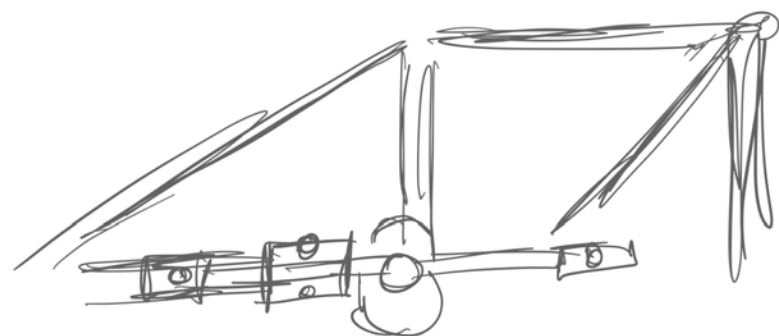
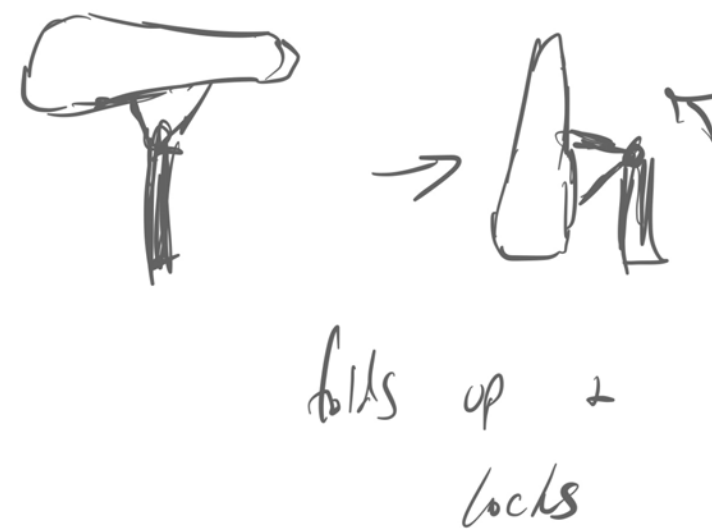
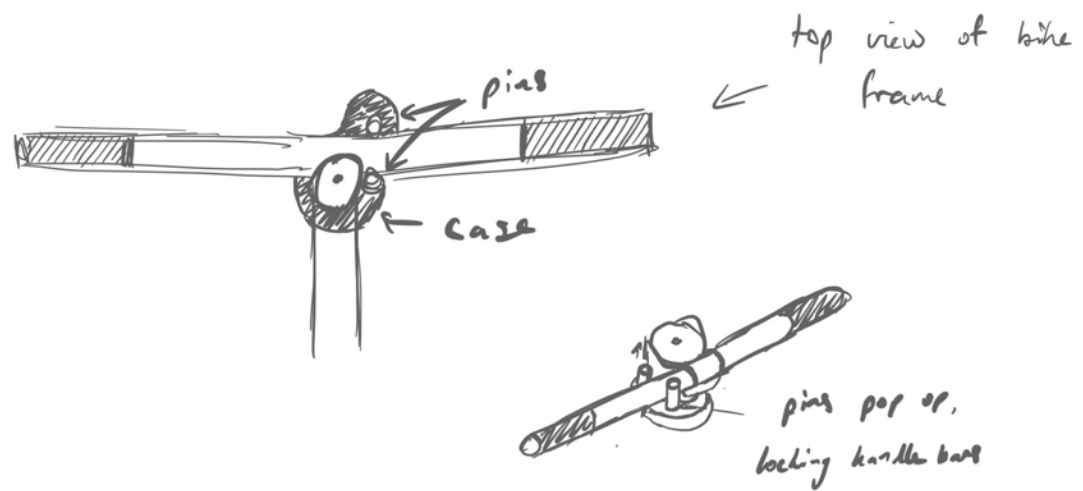
Purpose - Bike with a built in lock to solve the problem of no having a lock or forgetting your lock.



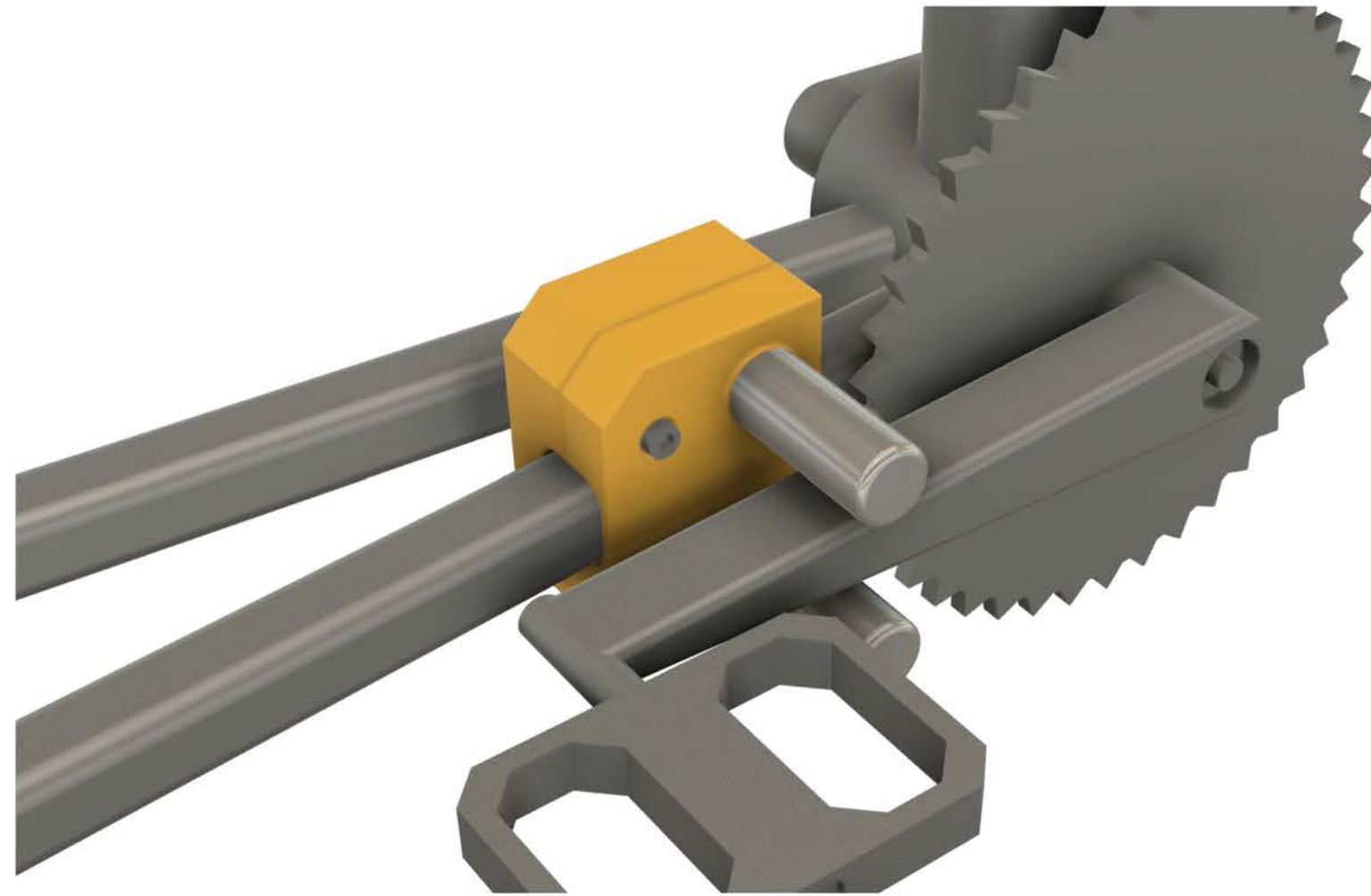
Wheel lock?

(unrideable when locked)

- wheel can't move
- steering lock
- pedal lock
- seat folds away?



Fusion 360 Render

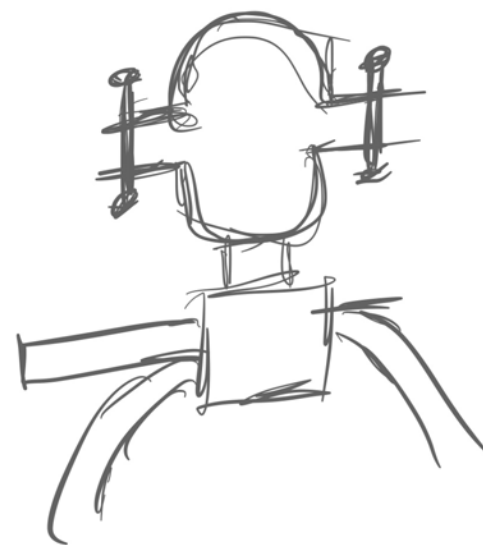
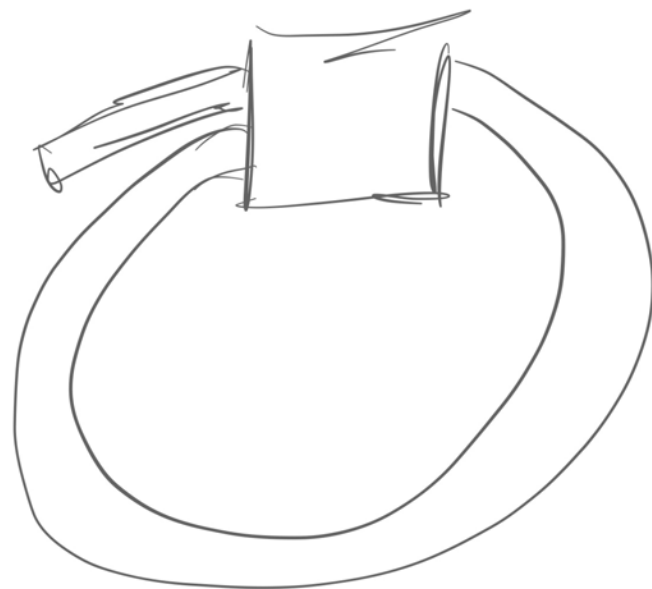
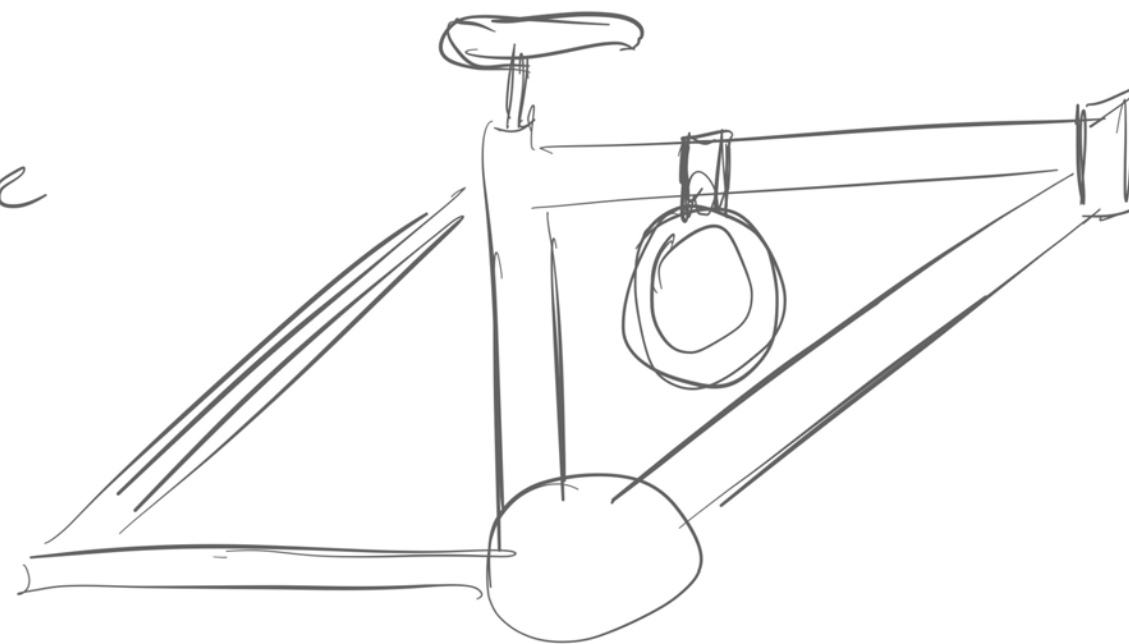
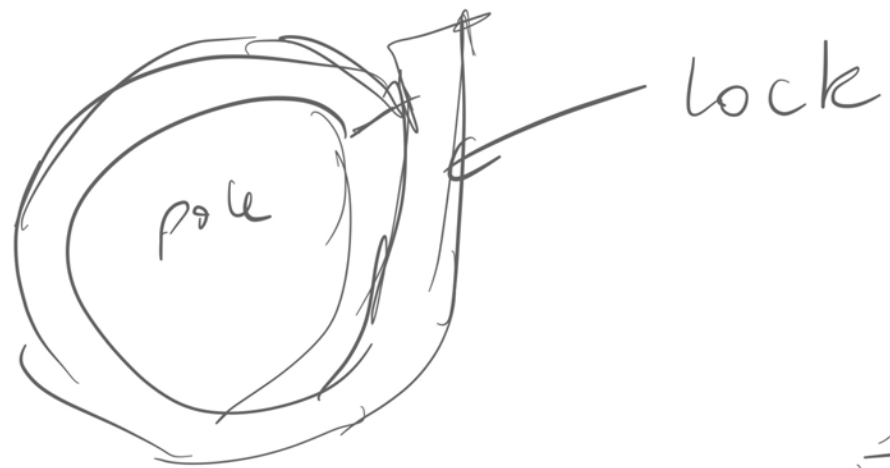


Idea 5 - Anywhere lock

Purpose - Helps user lock their bike to common public infrastructure, where bike racks may not be present.



ratcheting mechanism



Fusion 360 Render

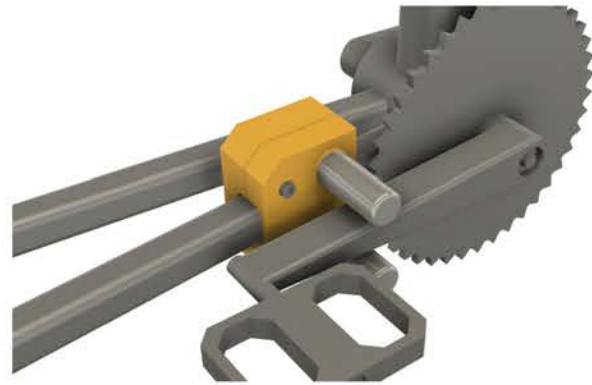


Initial Concept Presentation - Feedback

Will proceed with the concept to the left taking best parts of each.

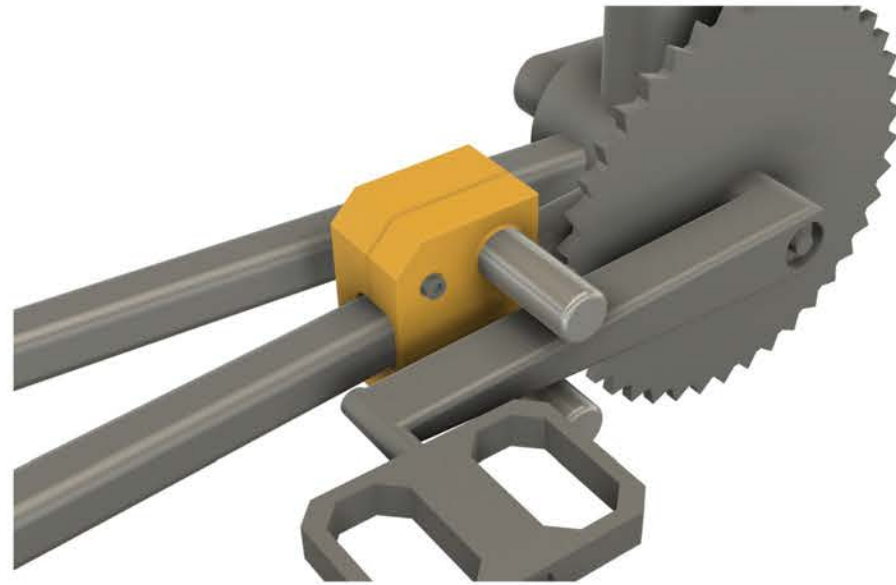


Main idea to proceed with



Attachment method to bike could be incorporated

Idea 4 - Analysis



Bike Pedal lock

- Locks pedals in place to prevent people riding off with bike
- Would not stop the wheel from turning as initially thought
- Adding additional bolts to stop wheel from rotating would solve issue.

Idea 5 - Analysis



Anywhere Lock

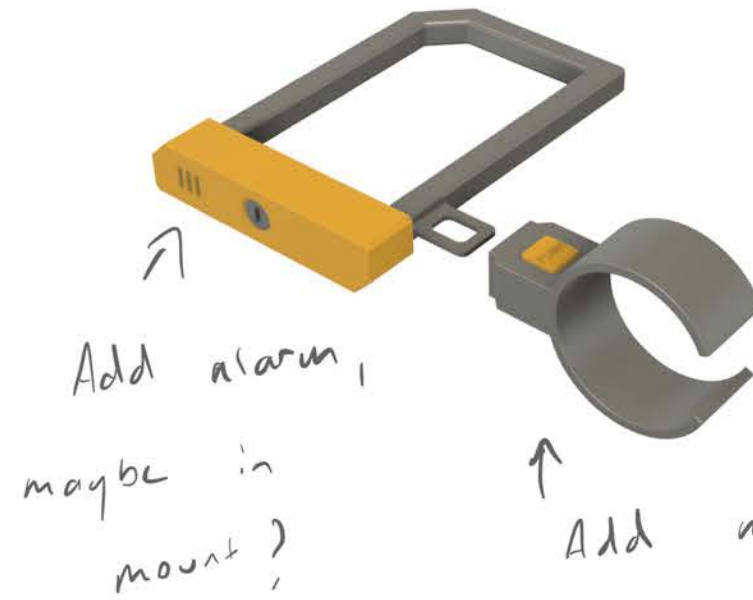
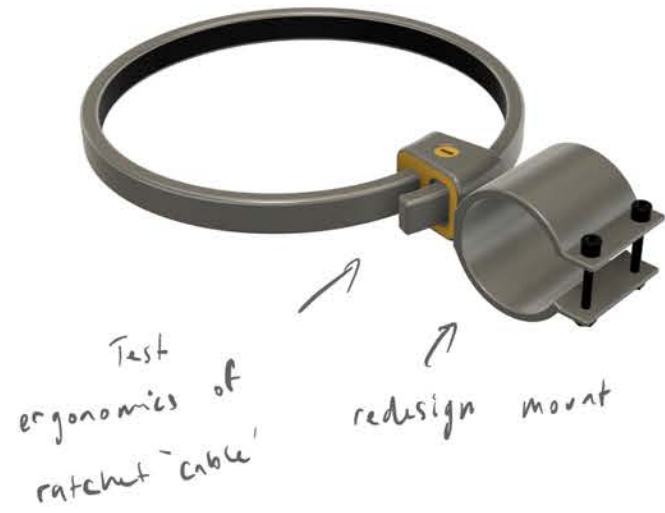
- Semi-rigid ratcheting lock attaches anywhere.
- Exposed bolts means taking lock off would be easy
- Semi permanent attachment to bike could restrict places to lock bike, ex. a low bike rack.

Idea 3 - Analysis



- U-Lock
- U-Lock with built in alarm + mounting w Air tag.
- Lock isn't very revolutionary
- Good alarm concept + mounting bracket.

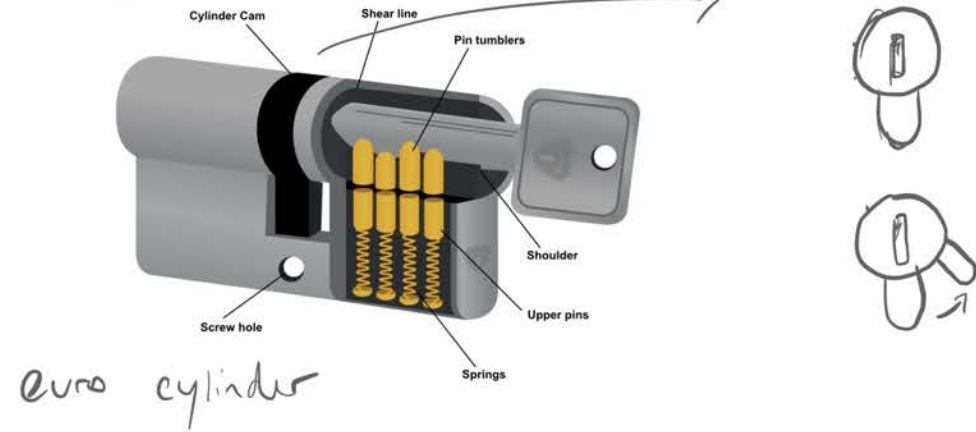
New Lock Concept Features



Lock Research



Cylinder Pin-Tumbler Lock



Internal Design - Lock Ideation

Features -

Cable end

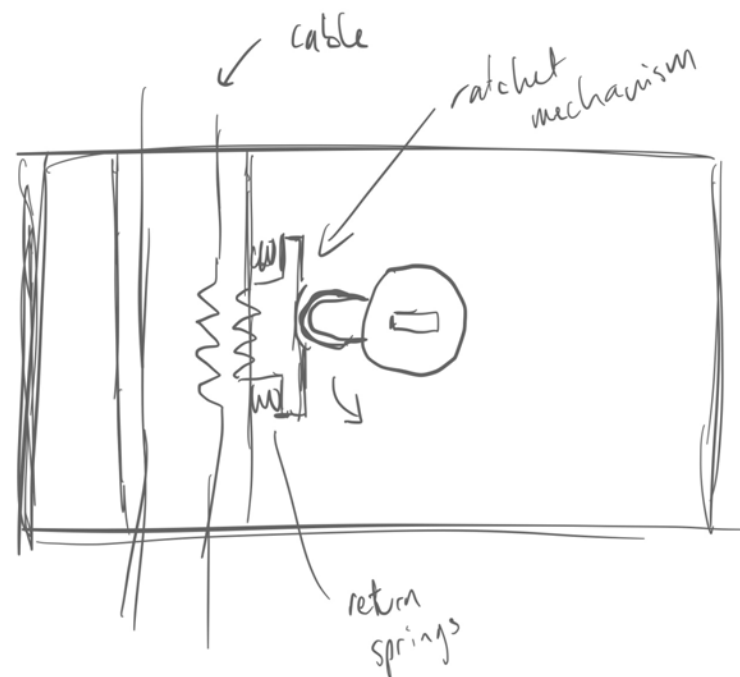
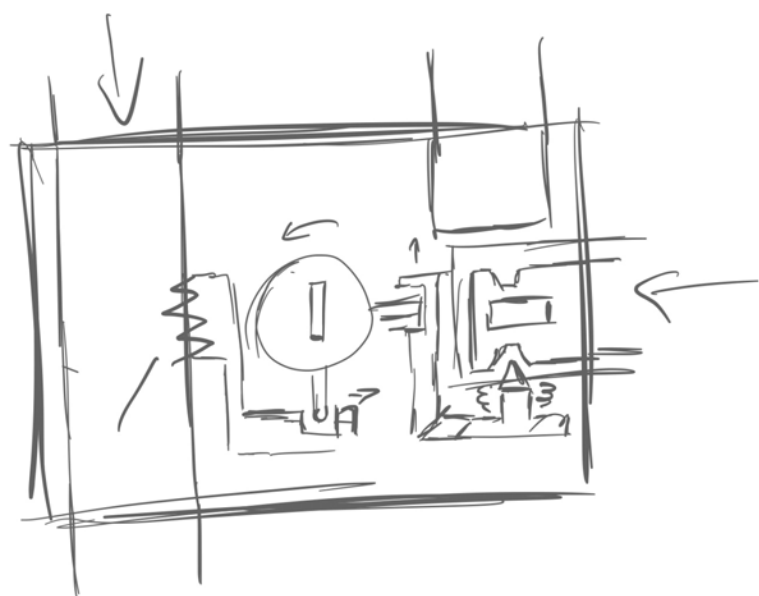
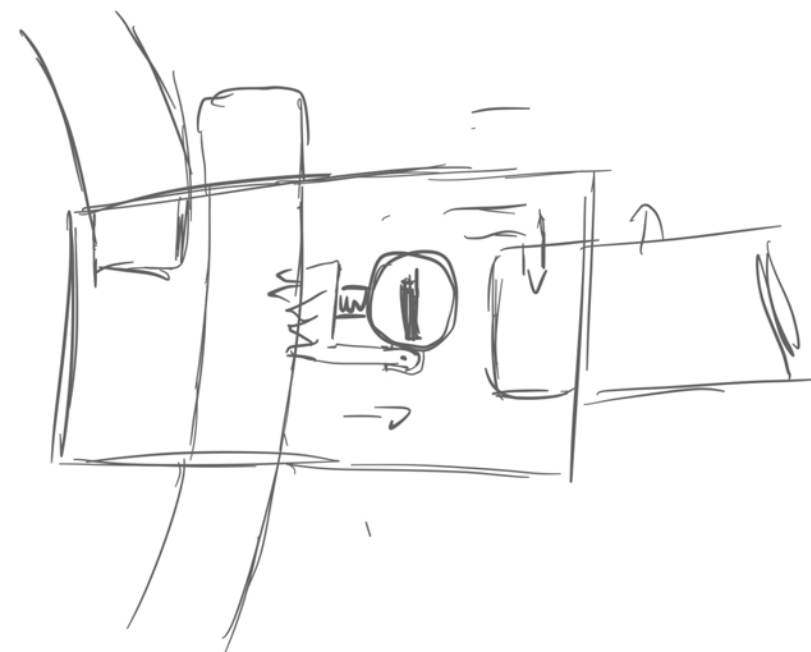
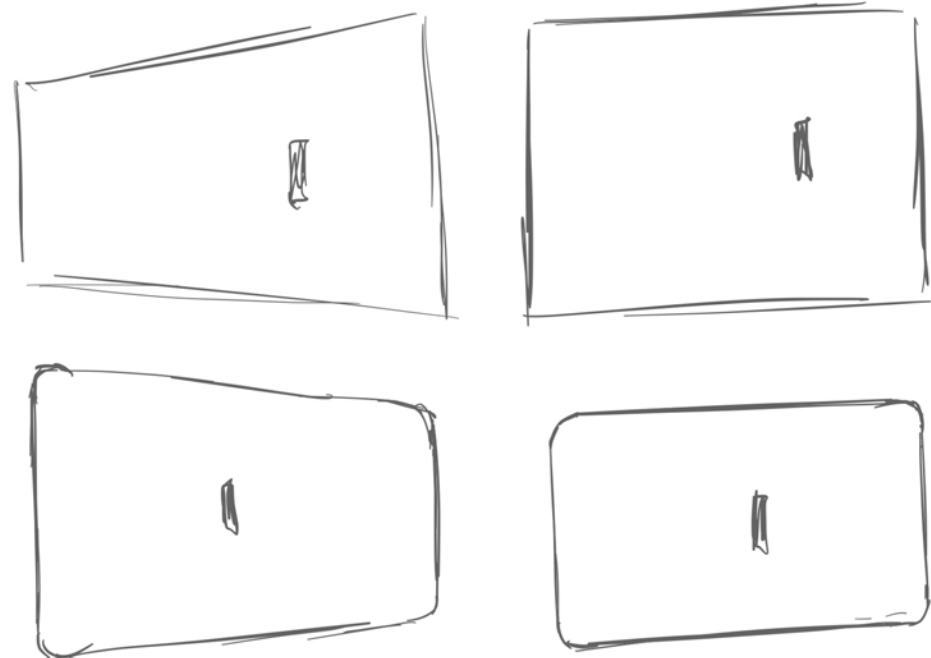
Cable ratchet section

Lock Barrel

Holder connector

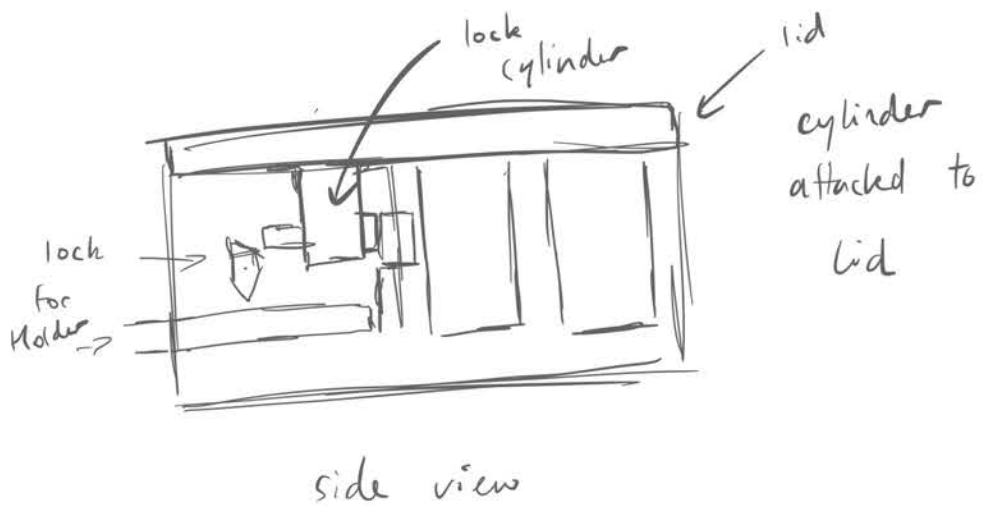
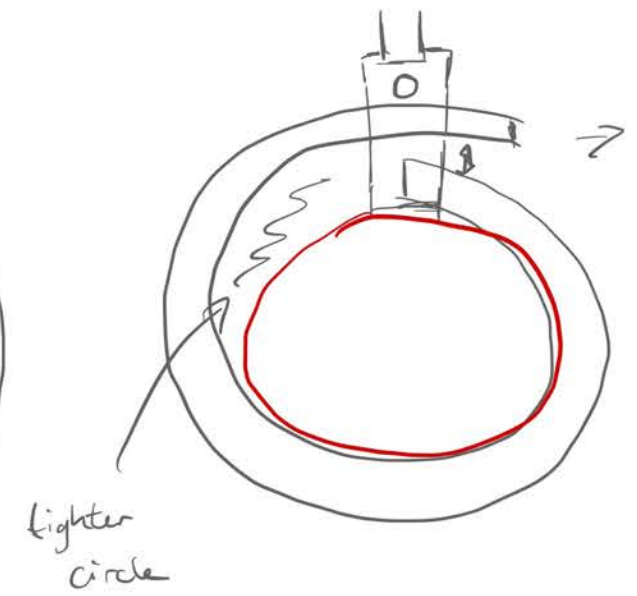
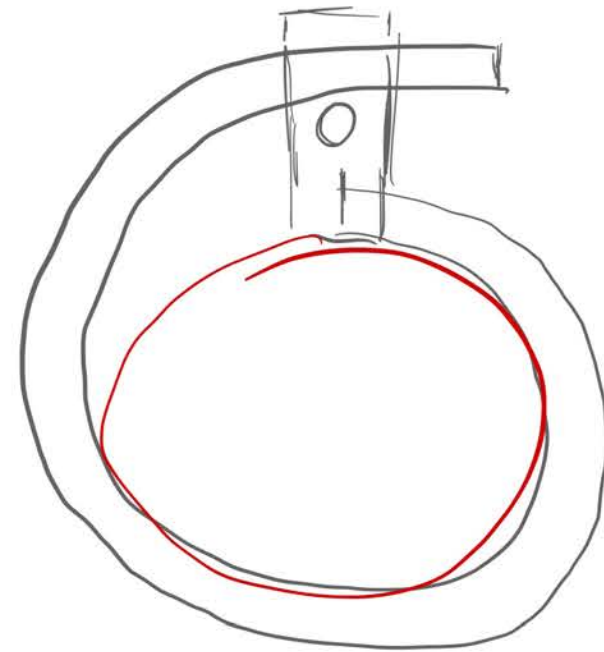
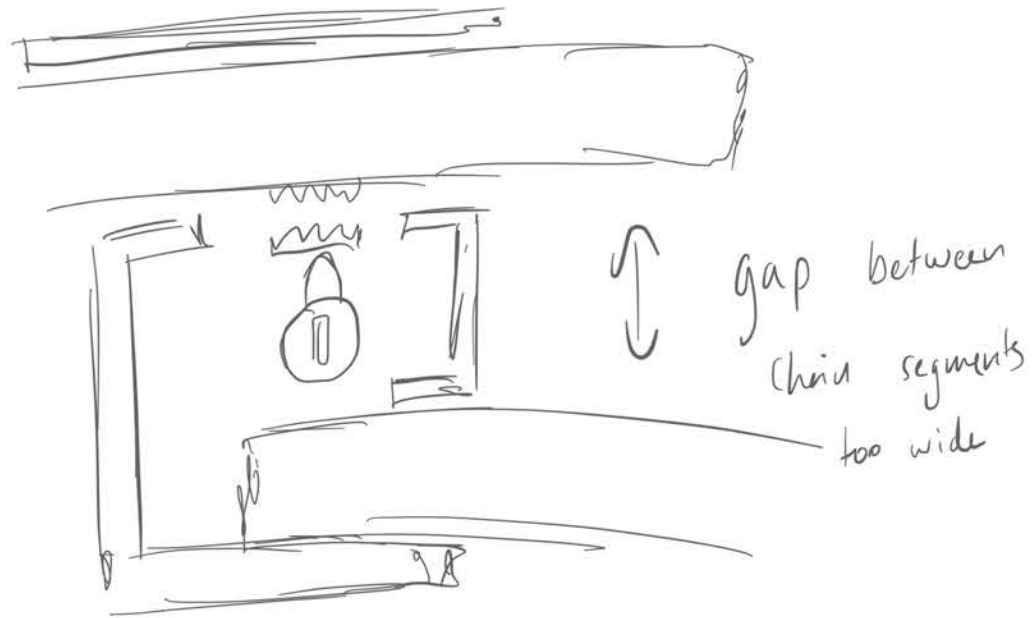


Internal Design - Lock Ideation

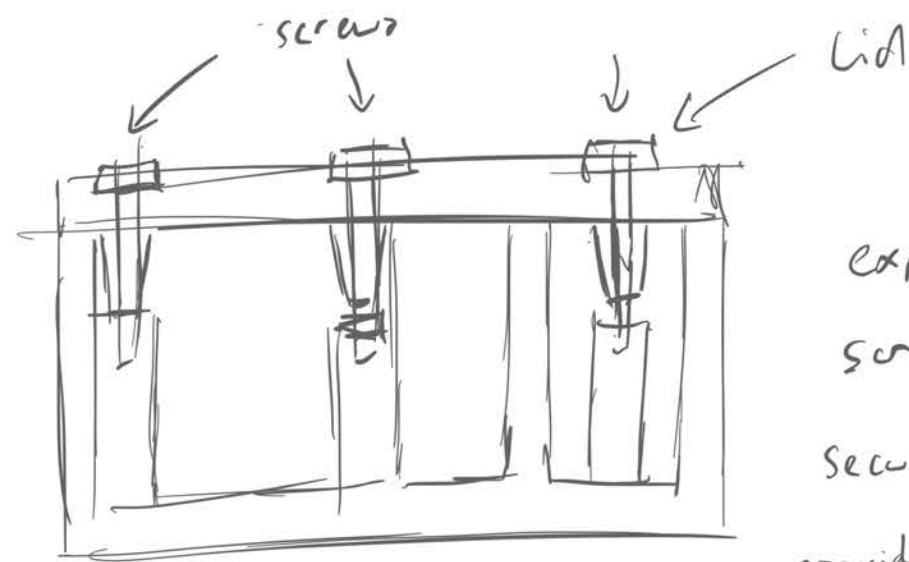
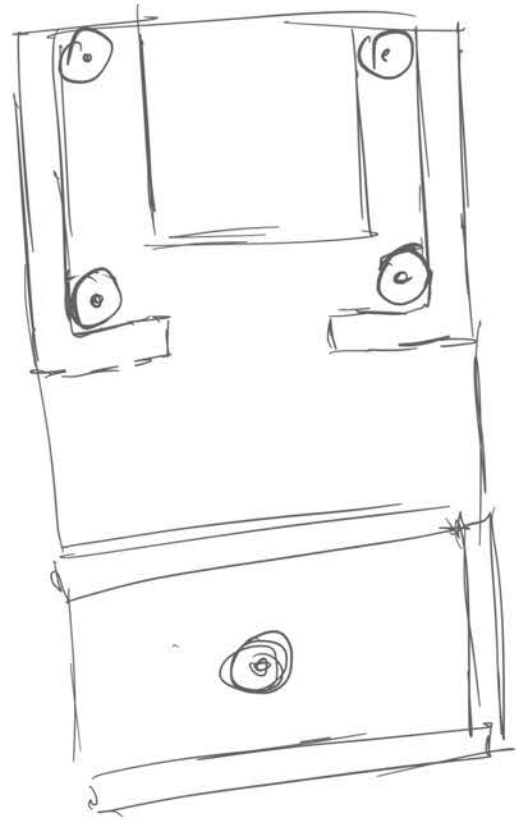


Cam moves out of way releasing ratchet.

Internal Design - Layout



Internal Design - Lid Attachment

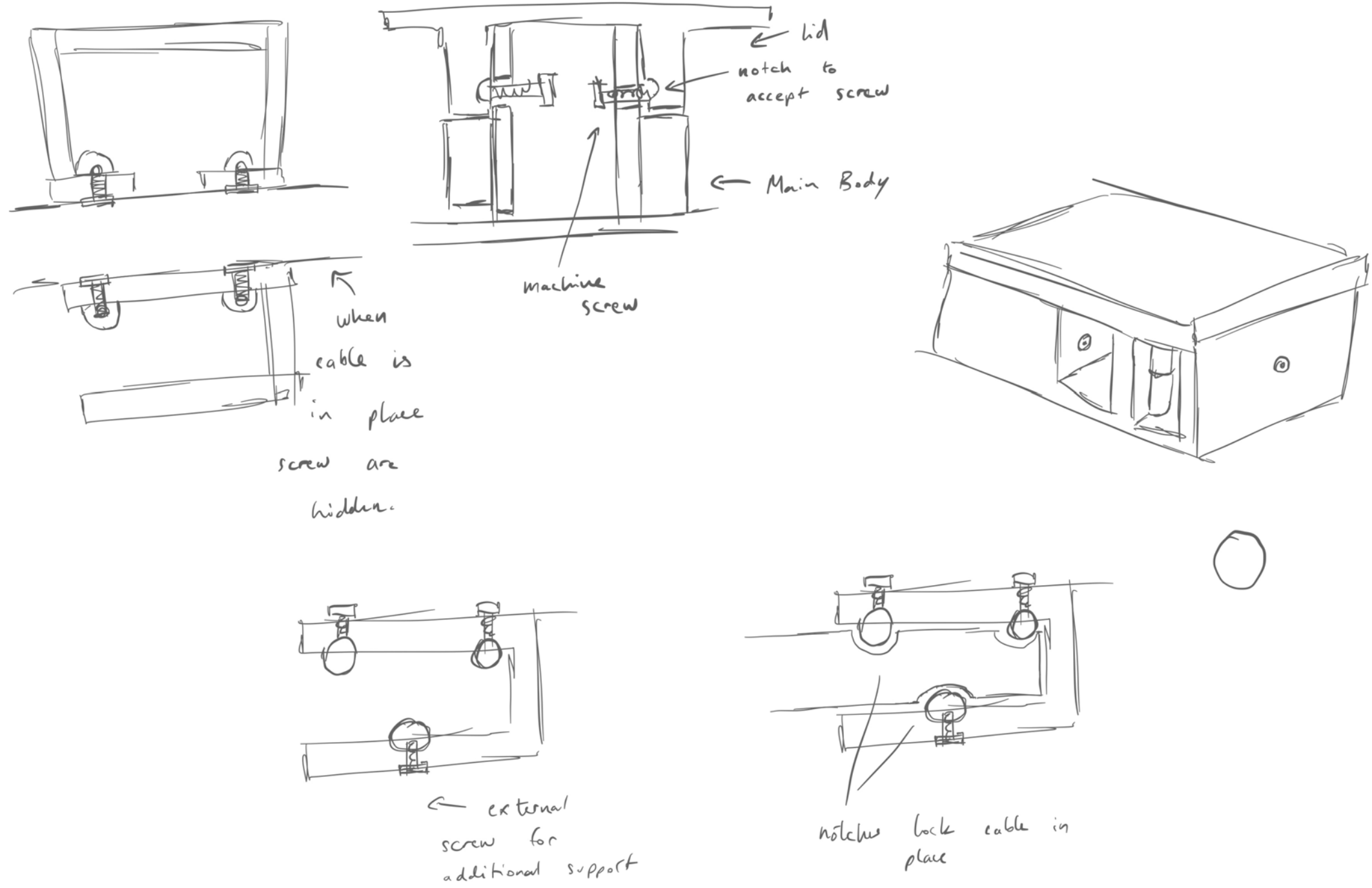


Exposed screws (even security screws) provide vulnerability in lock.

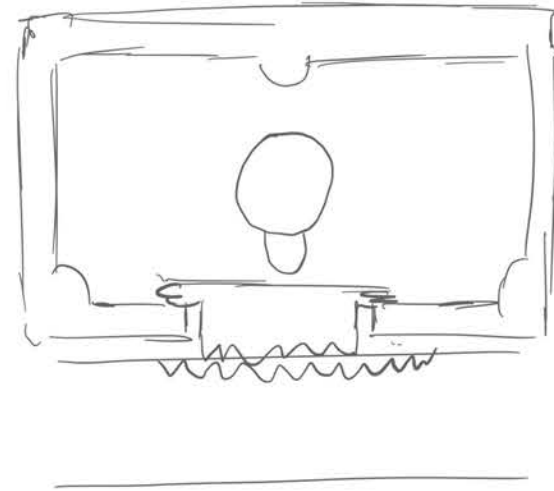
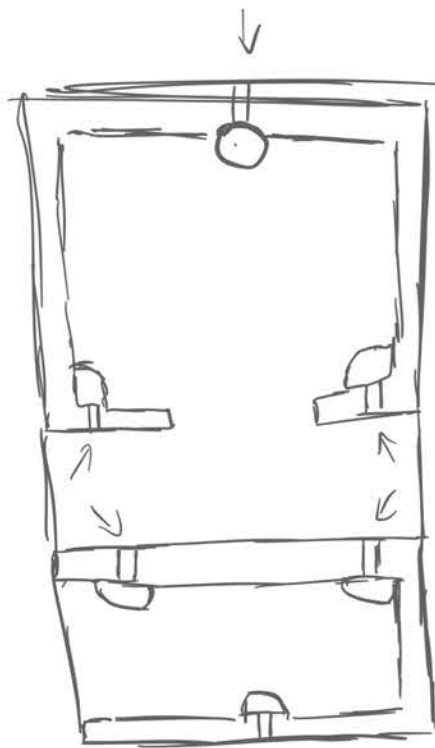


Manufacturing Aim!
Cast steel w/
integrated screw thread

Internal Design - Lid Attachment



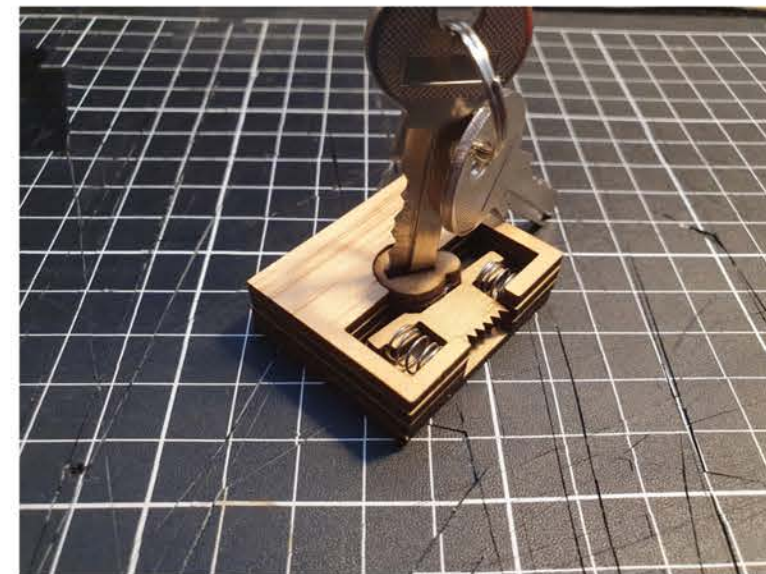
LOCK INTERNALS



Laser Cut Prototype

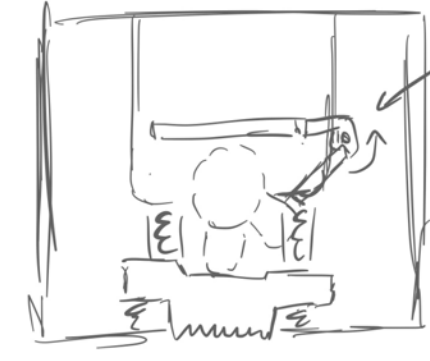
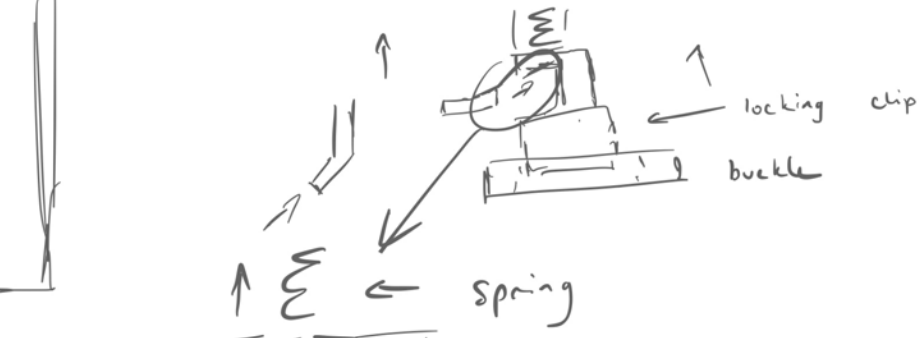
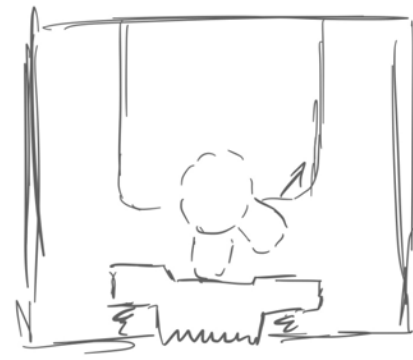


Locked



Unlocked

LOCK INTERNALS



would get
complex
around
corner



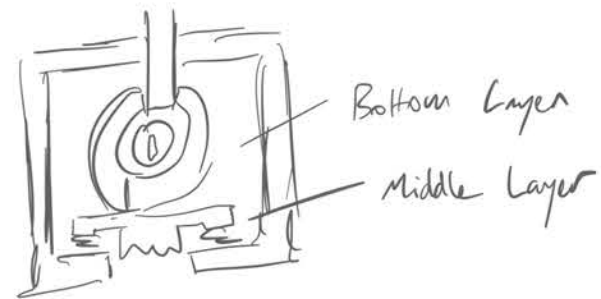
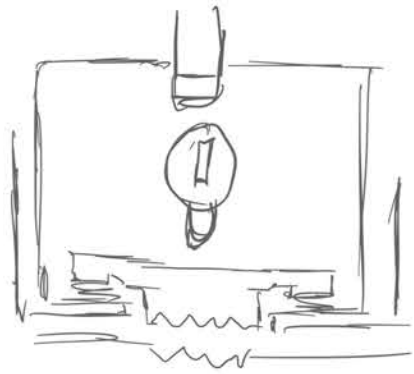
piece slides in
pushing locking clip
up releasing buckle



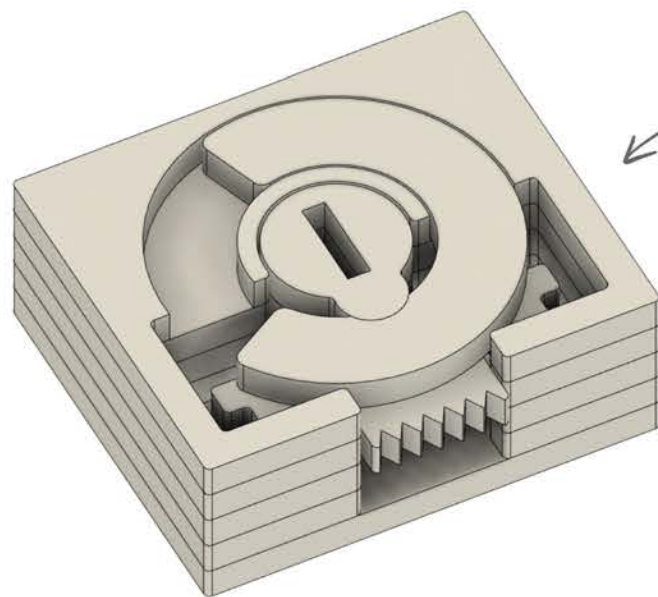
— 2
— 1
32 28 10
(14) —
— 2



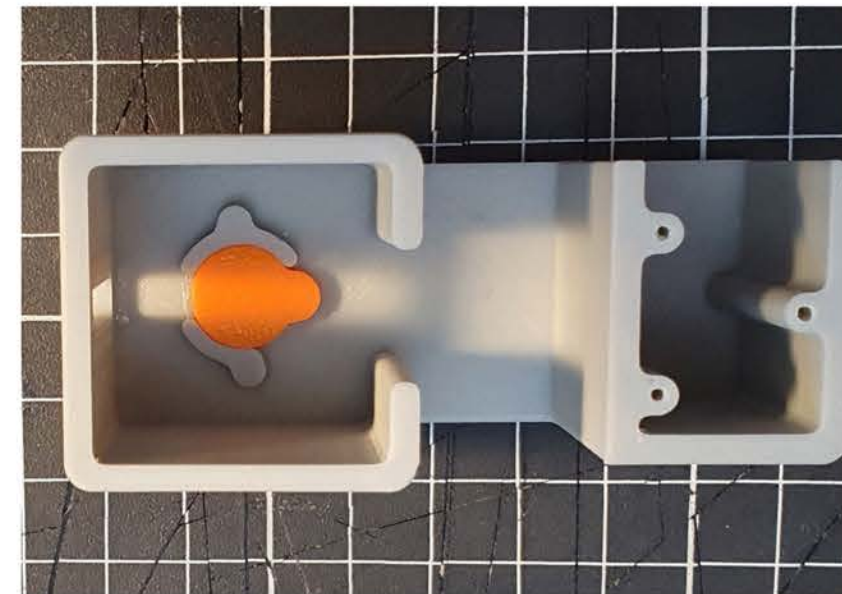
LOCK INTERNALS



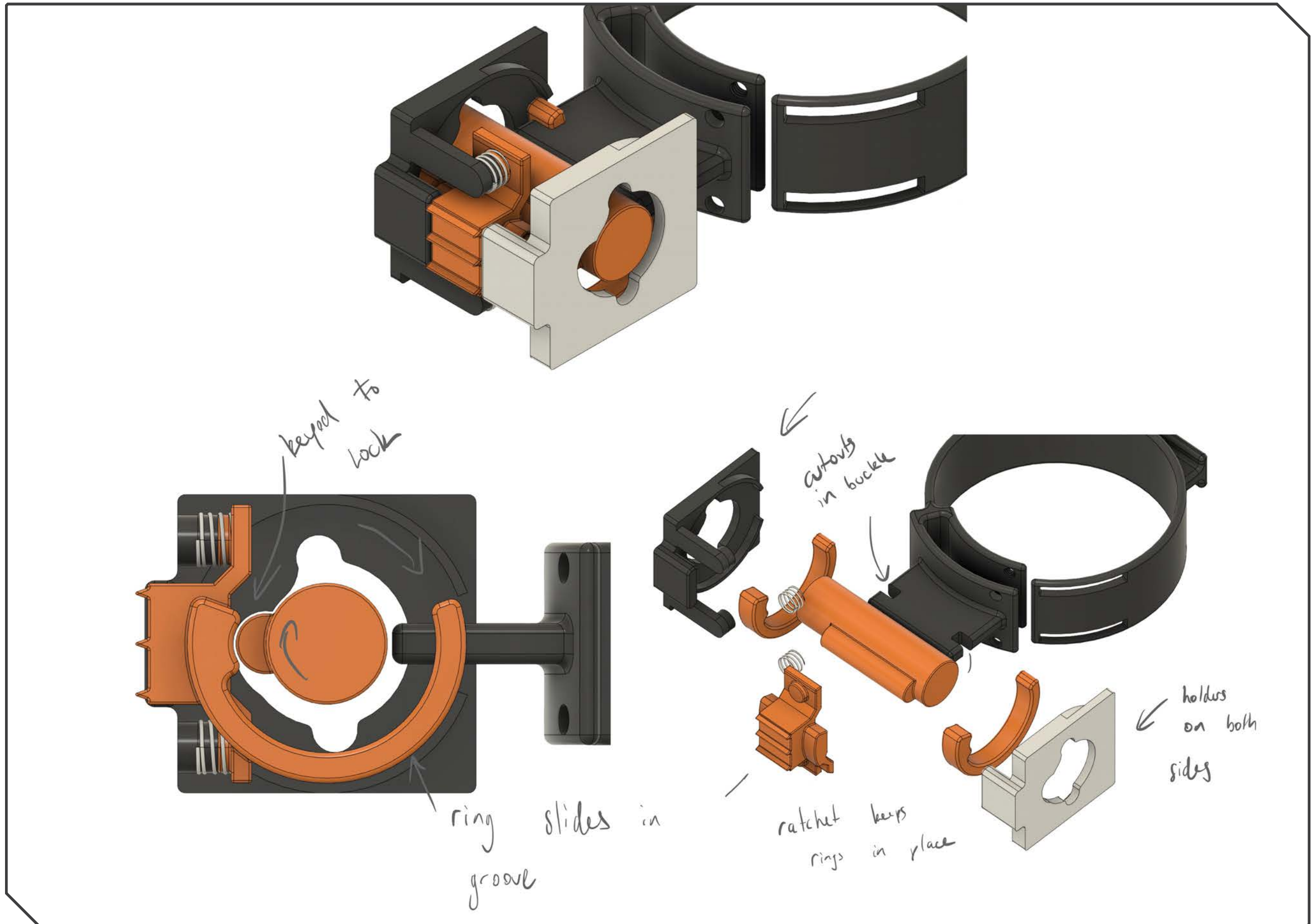
Part rotates
+ releases buckle



add ring on
other side for
symmetry
+ strength



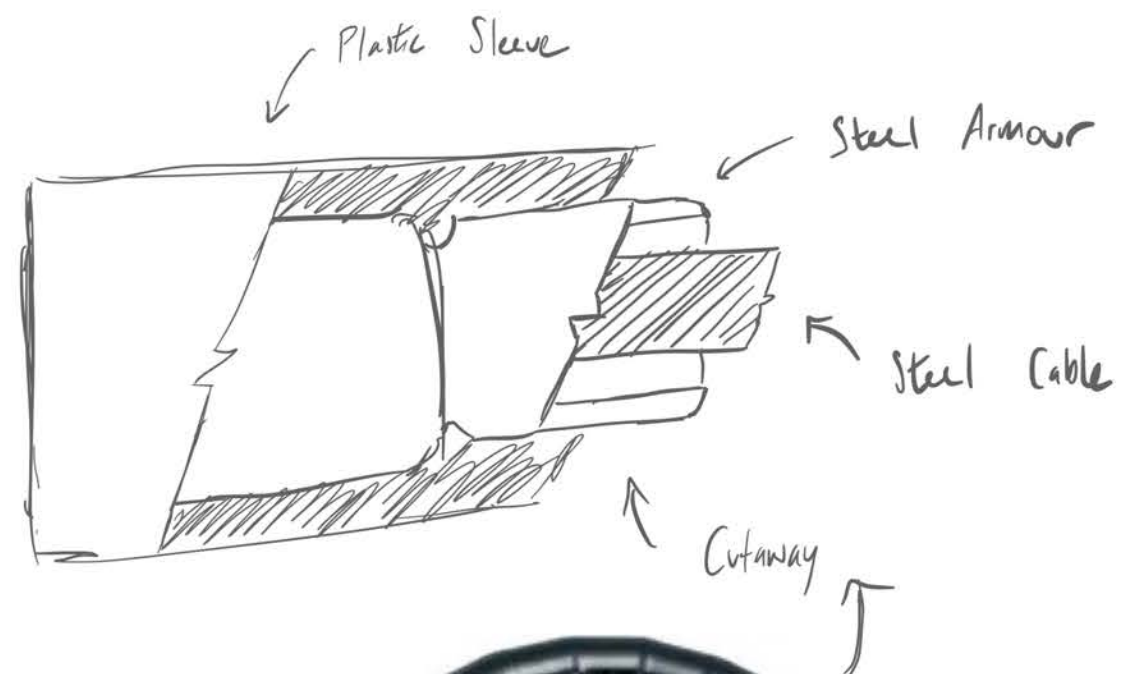
LOCK INTERNALS



Cable Design

Features

- Armoured Steel
- Flexible

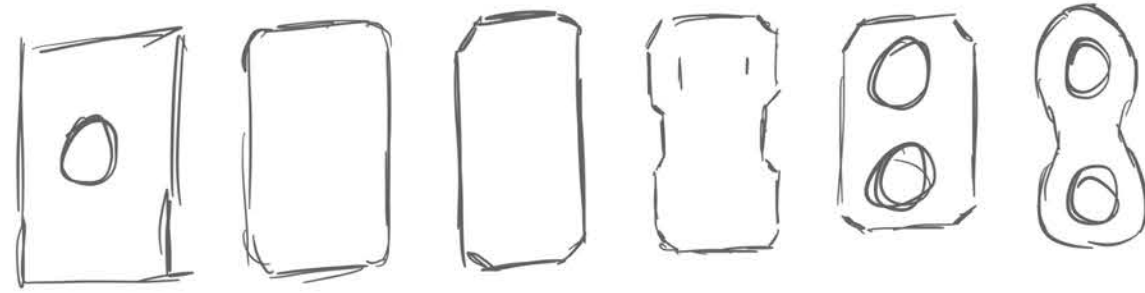


Existing Product

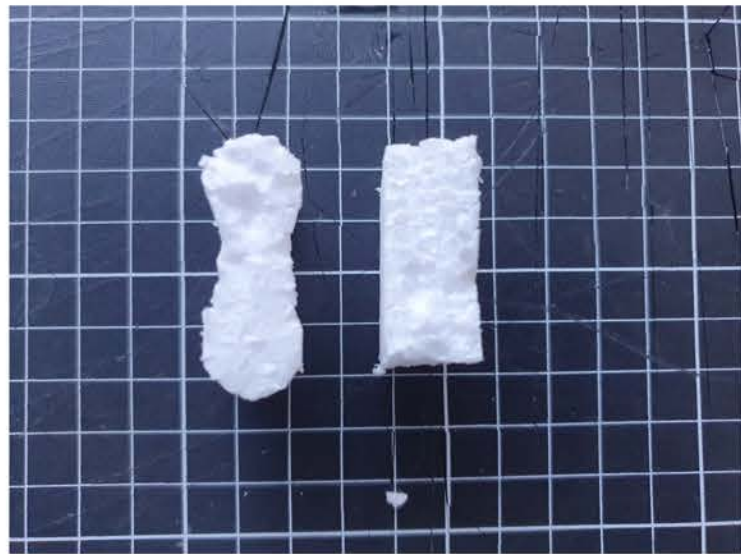


https://www.99bikes.com.au/lock-magnum-armored-cable-180-x-25?gclid=EAlalQobChMljauQ68qGggMVnc9MAh3WBQ_9EAQYBCABEGjIOvD_BwE#fo_c=3252&fo_k=2ad8aa449c48627e988f0e81831f8850&fo_s=gplaa

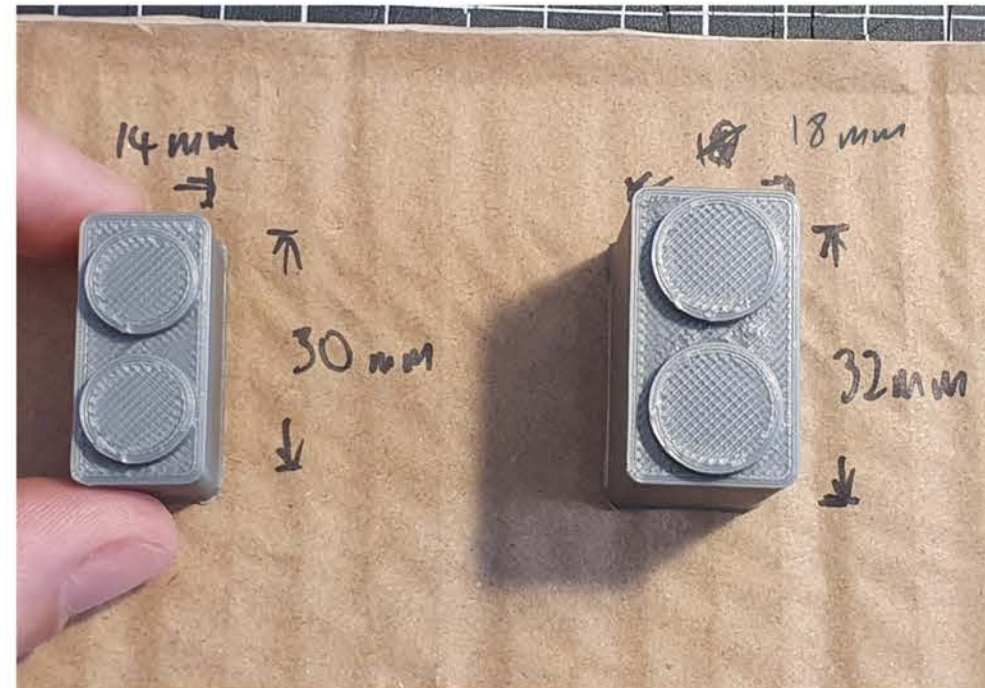
Cable Ideation



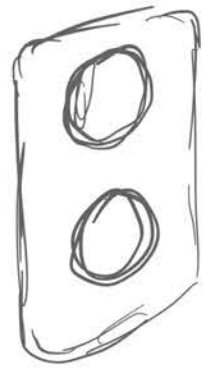
2 cable for more strength



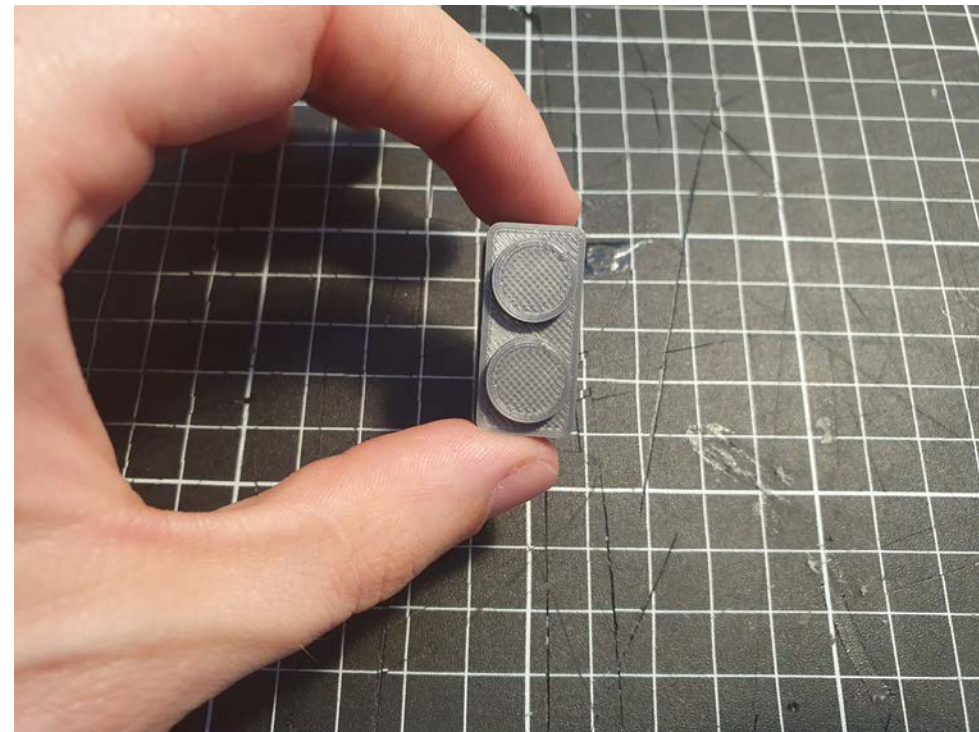
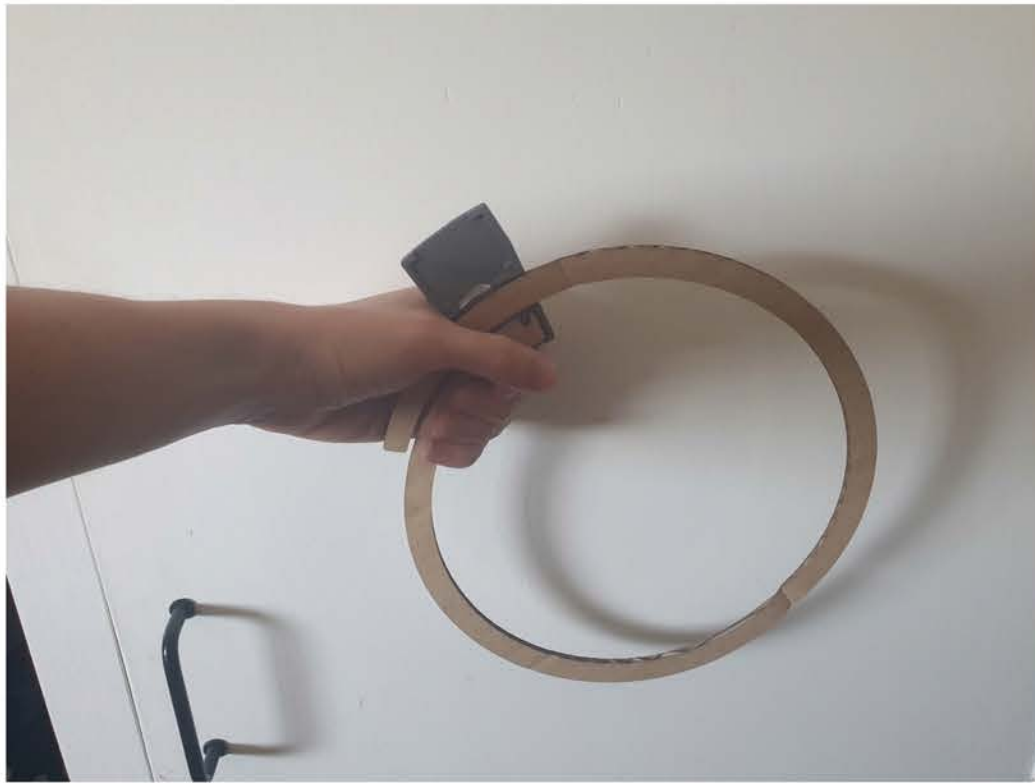
Profile Concepts



Initial Size, increase for higher security
12mm cable v 14mm



← braided steel



Persona - Who is this product for?

Lifestyle - Active + Social

Job - Tech / Self Employed

Car - Tesla? Hybrid / Electric

Clothes - Good quality - well made

Products Owned - Apple products
- Latest Tech
- DJI, Go Pro, Macbook, Dyson





Shao-Ang Chen



DJI Air 2S - All In One - DJI



Brown Archives - leManoosh



YIF MECHACICAL HARDWARE LOCK 2D



JT



REVEALED: INEOS Grenadier's Interior and Intent



CarSpy



CarSpy



Motion Controller for DJI FP...

Best Buy



Apple AirTag Case Cover Fit ...

VRS DESIGN INC



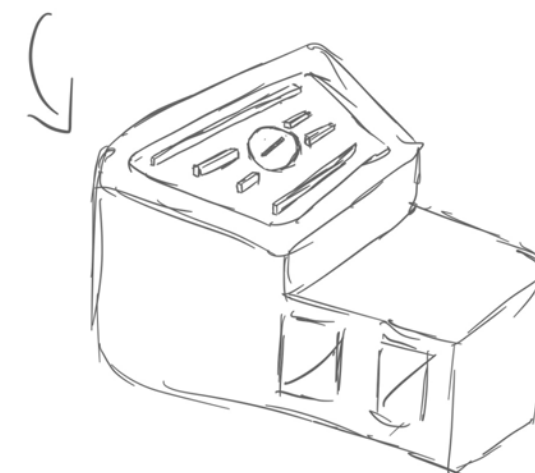
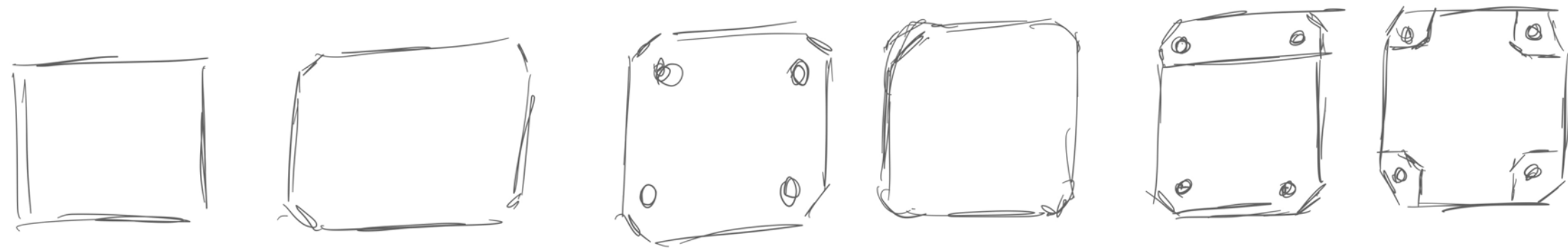
JT



Part Line Archives - leManoosh

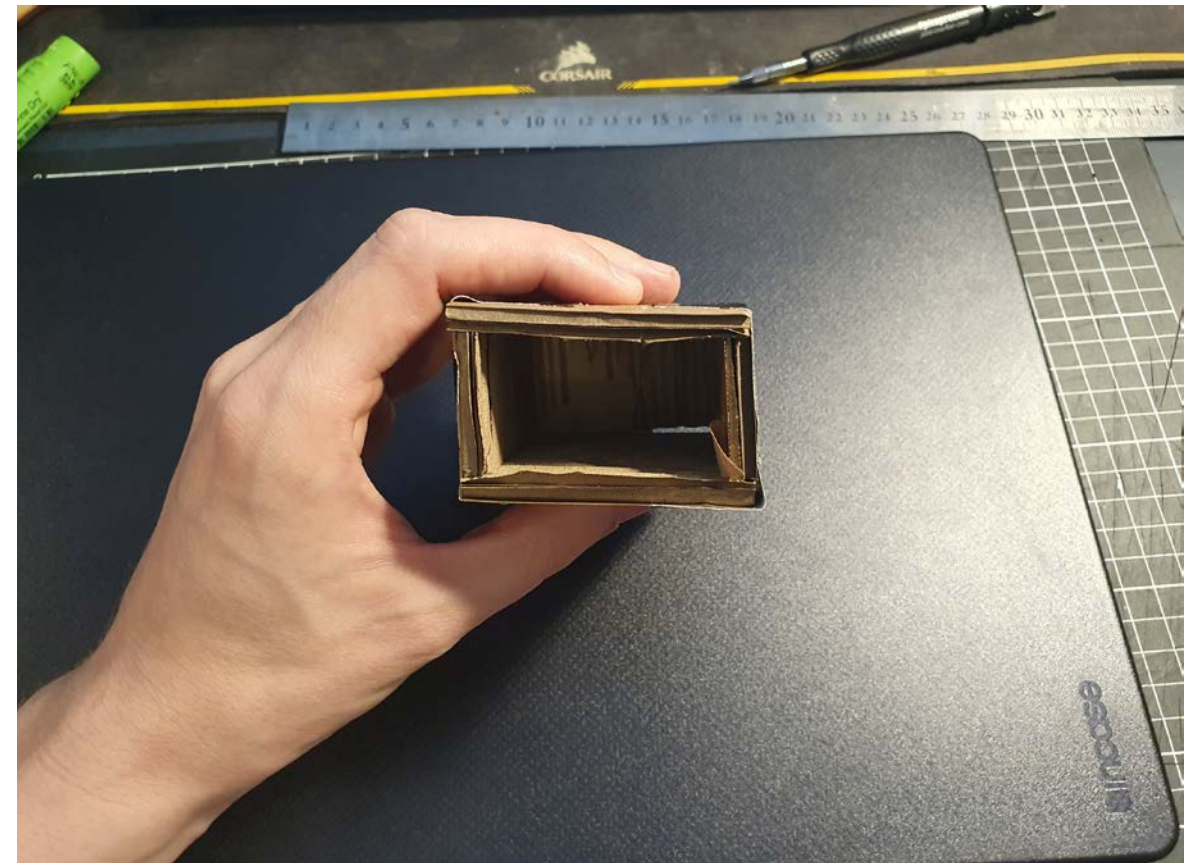


Get A Look At The 2019 BMW Z4 M40i From Every Angle I...

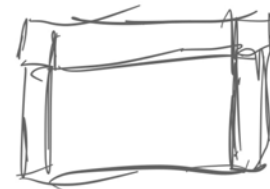
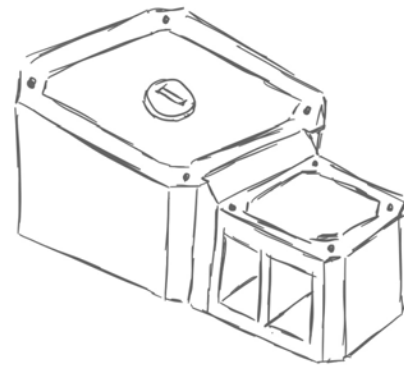
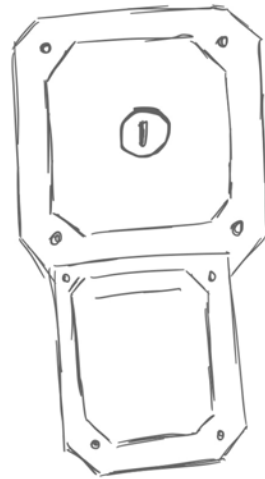
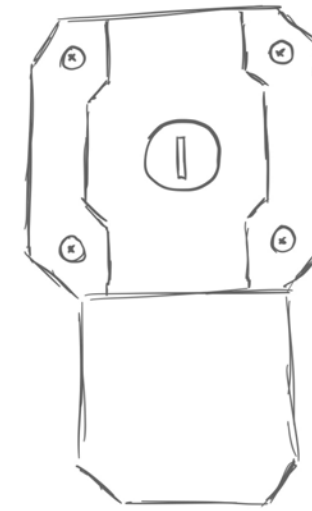
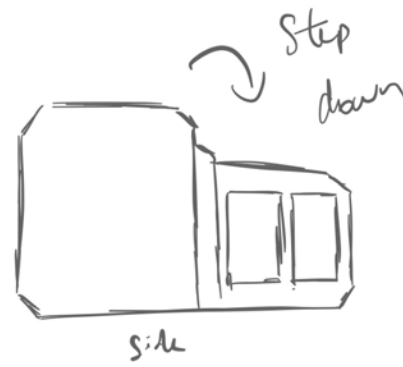
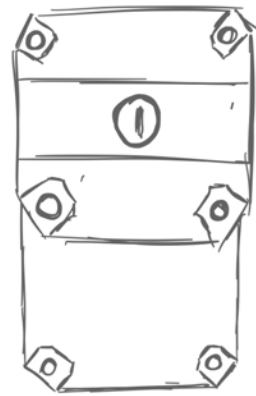
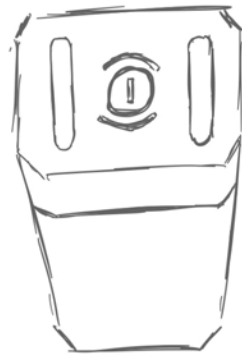
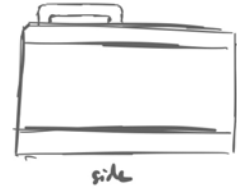
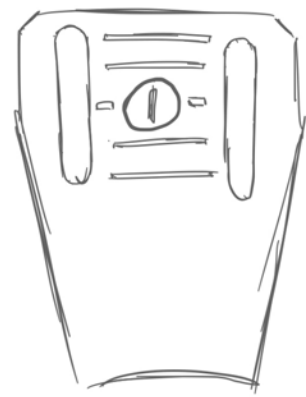


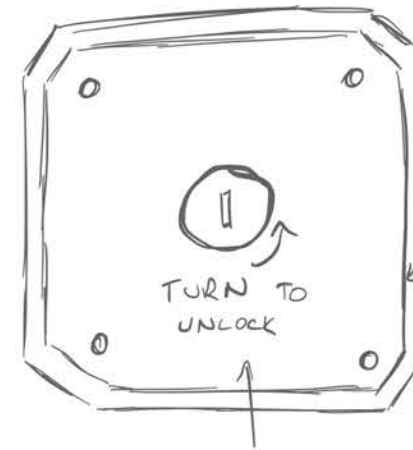
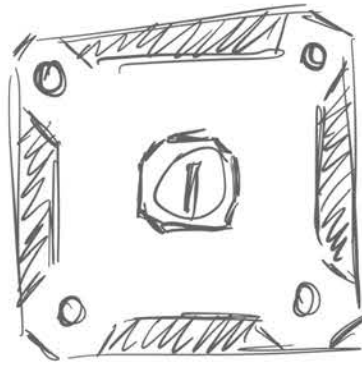
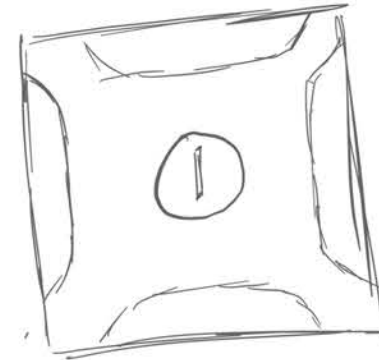
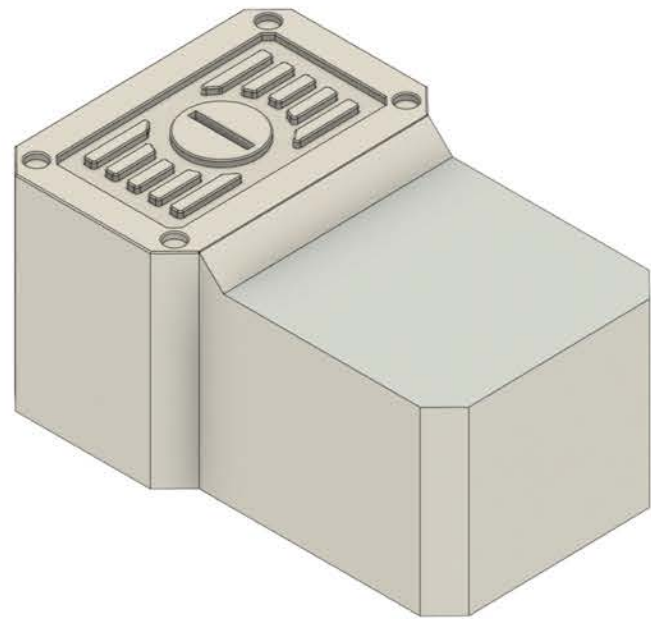


Testing estimated size and feel in hand



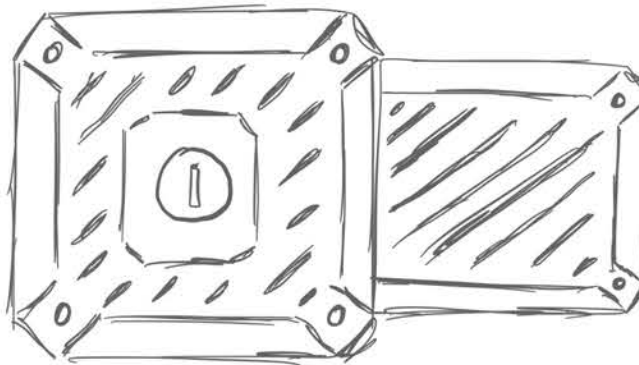
FORM AND DETAILS



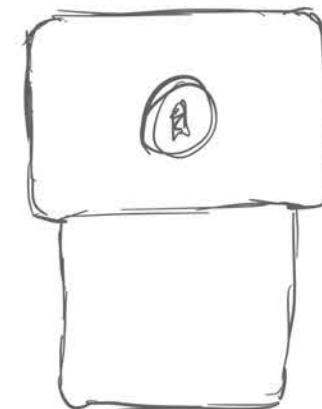
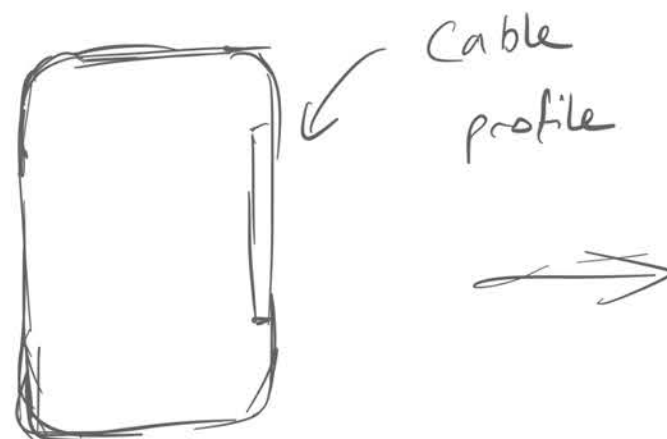
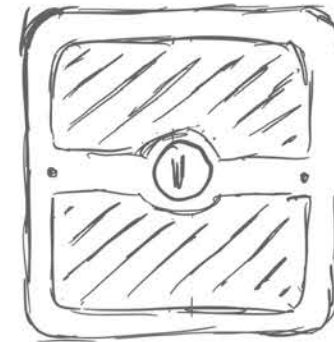
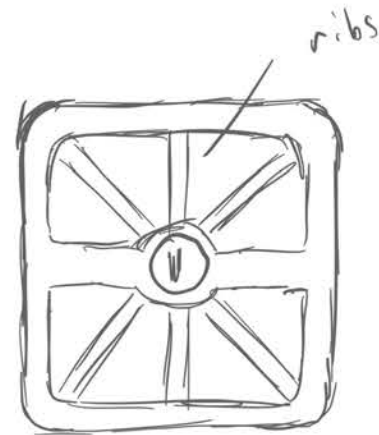
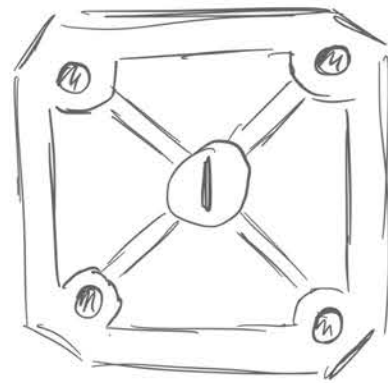
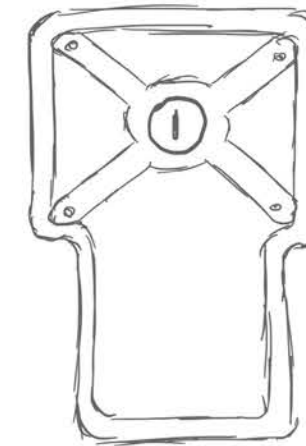
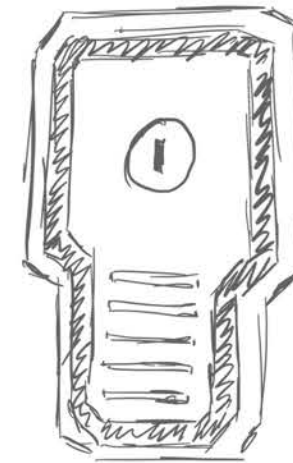
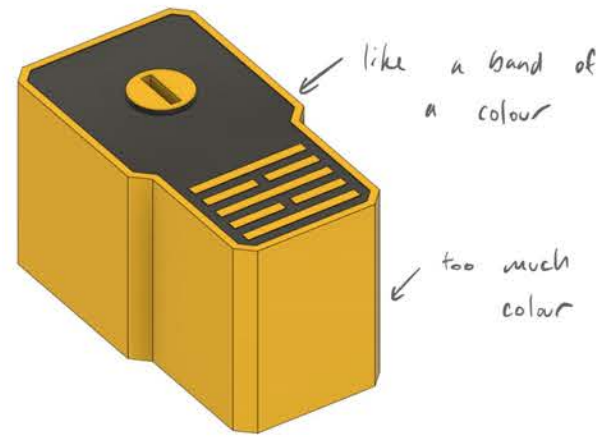


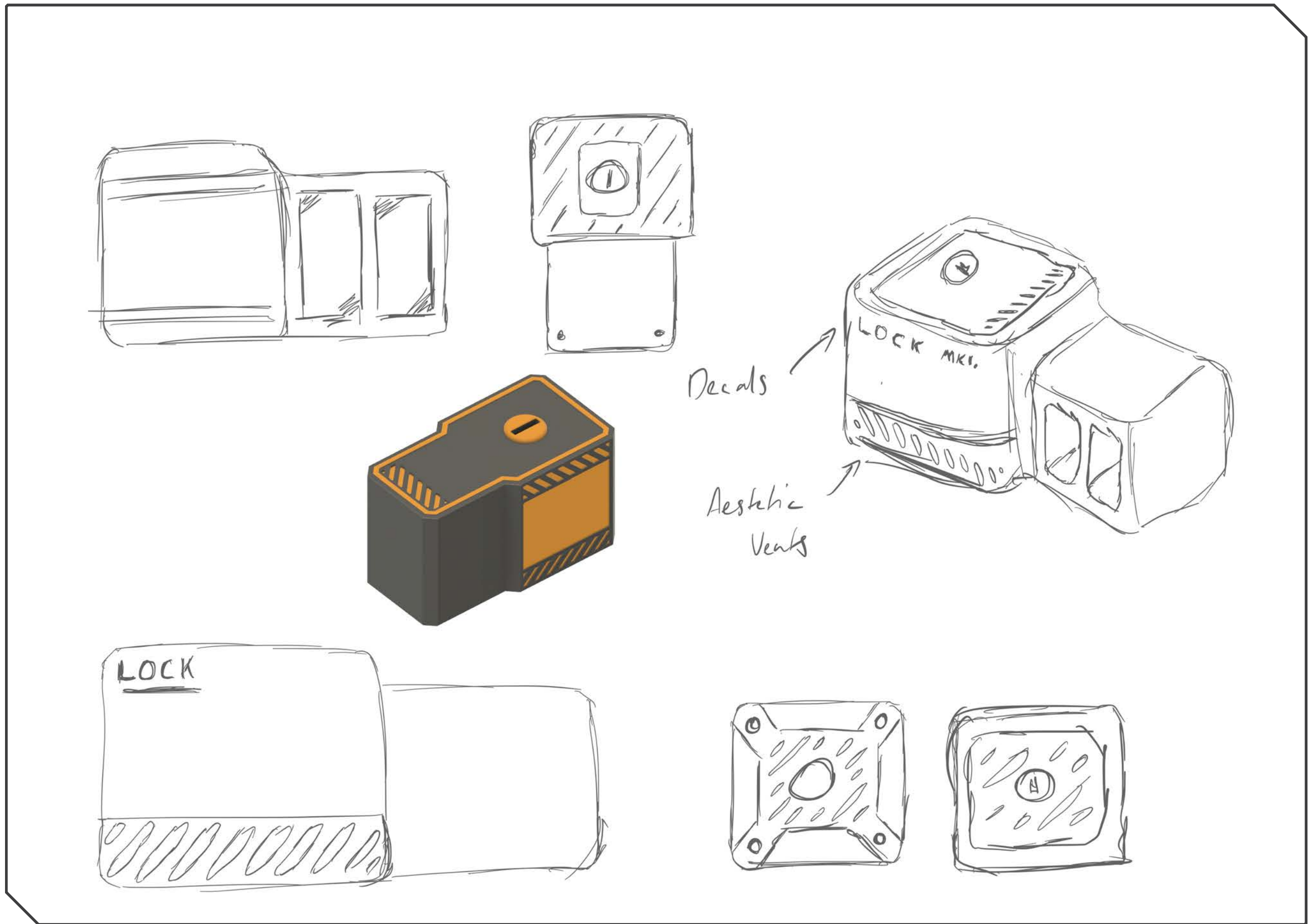
accent
colour

labels

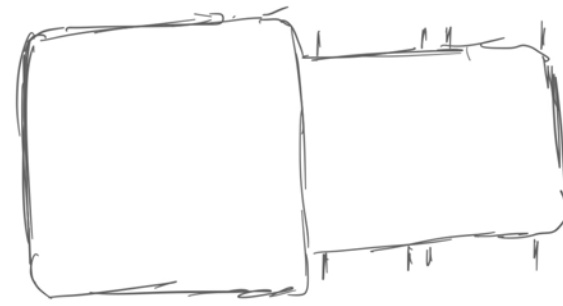
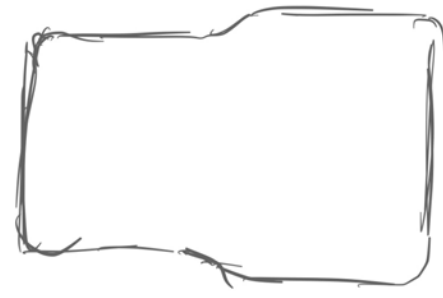
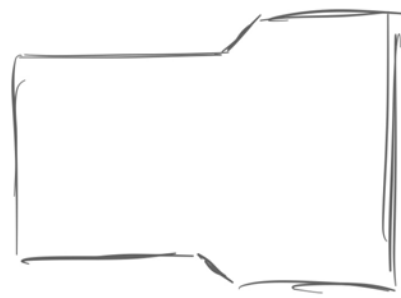


FORM AND DETAILS



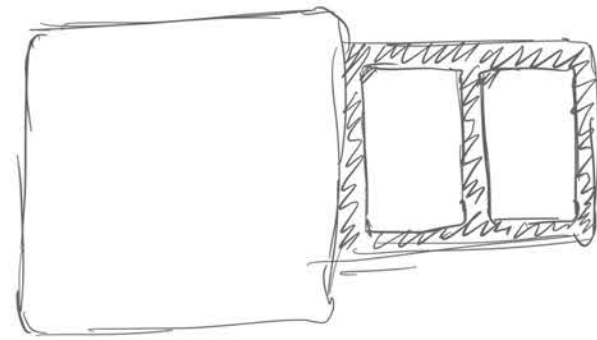


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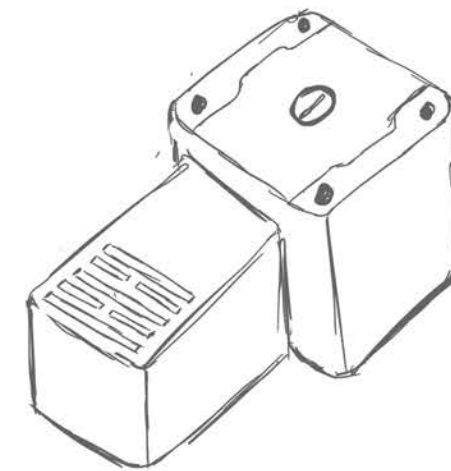
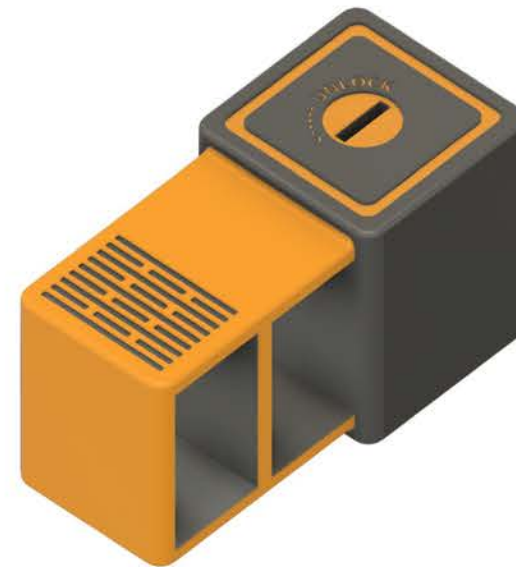
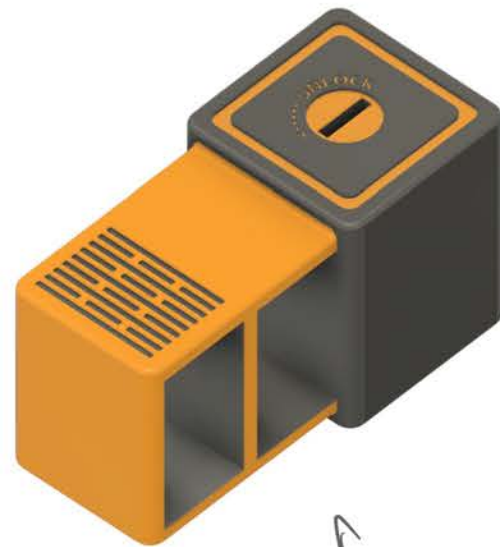
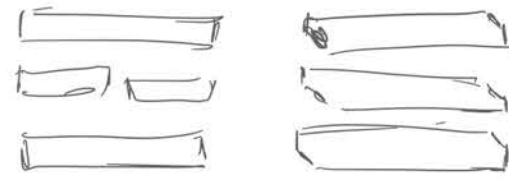


Existing products for inspiration

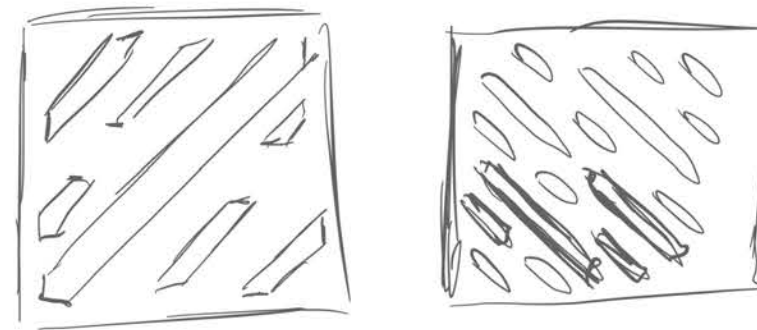
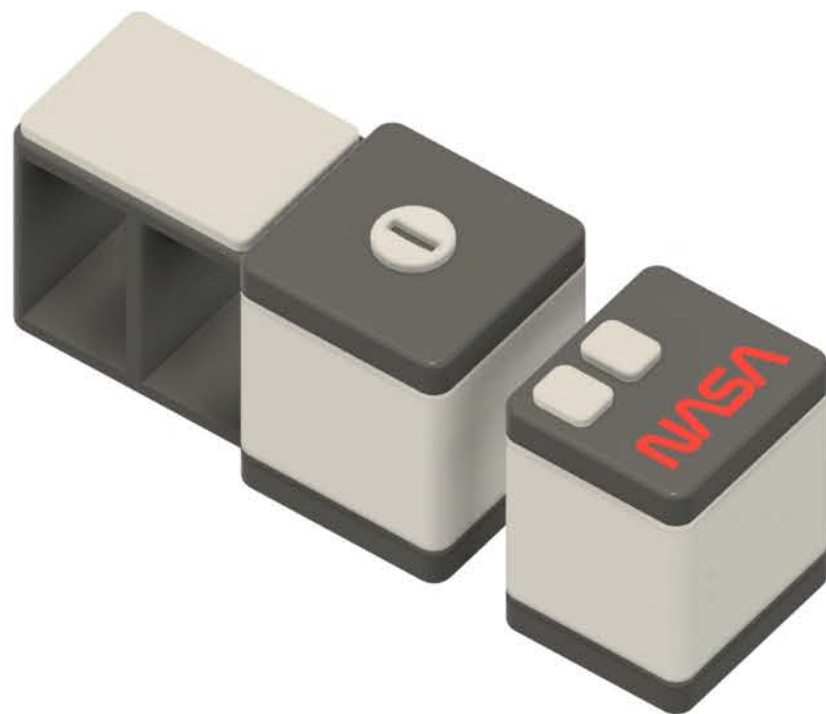
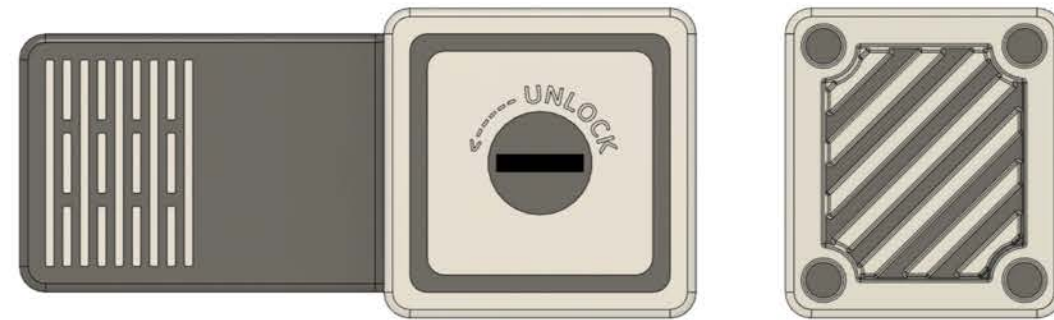
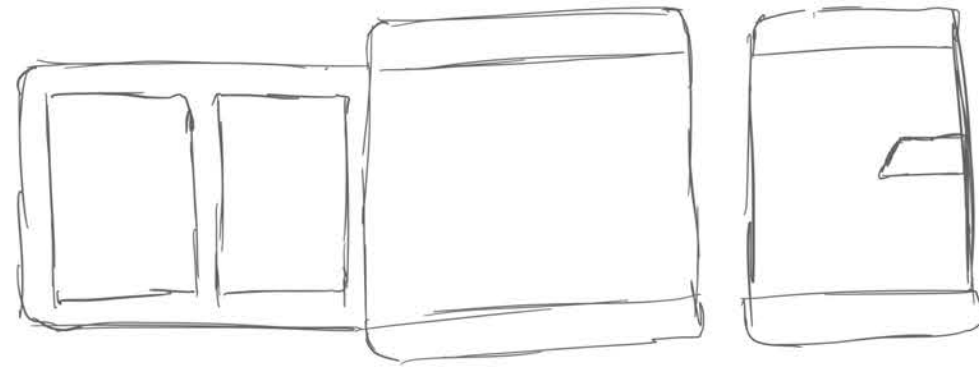




2 tone

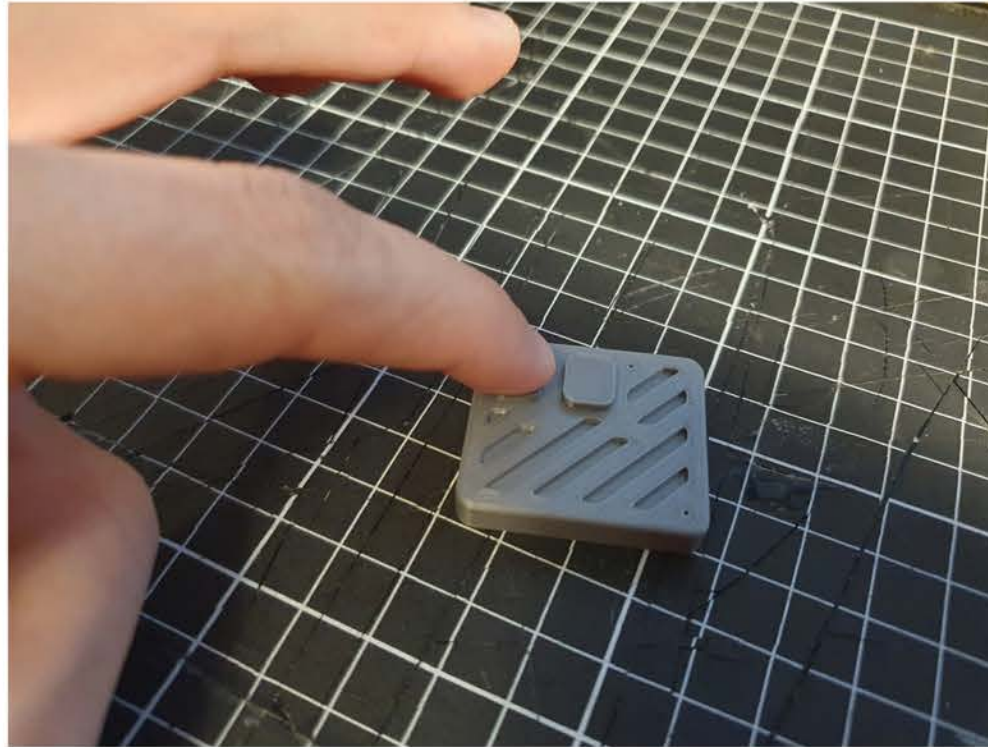
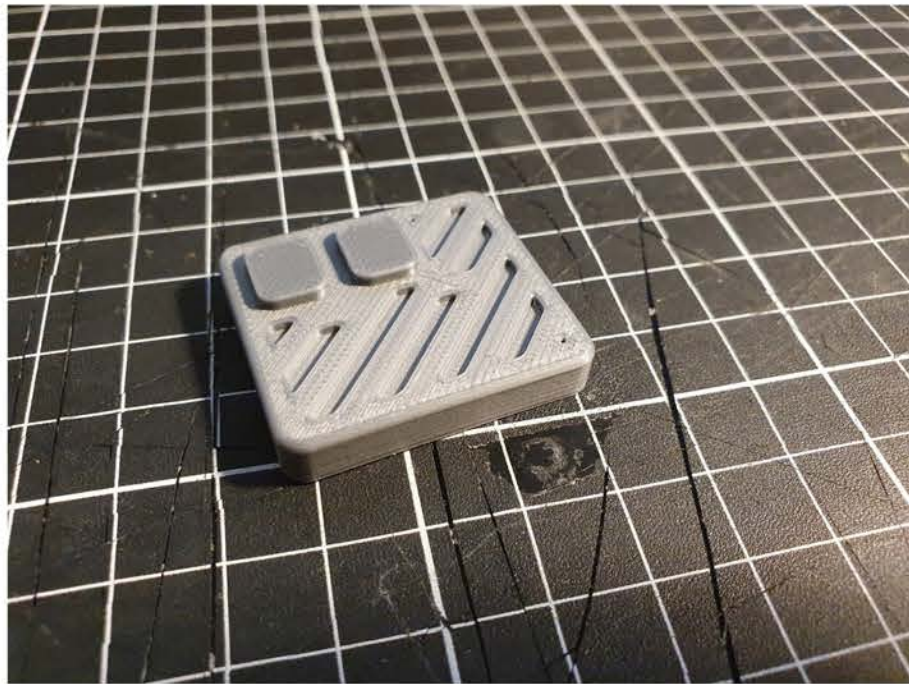


Aesthetic vents
could act as
grip



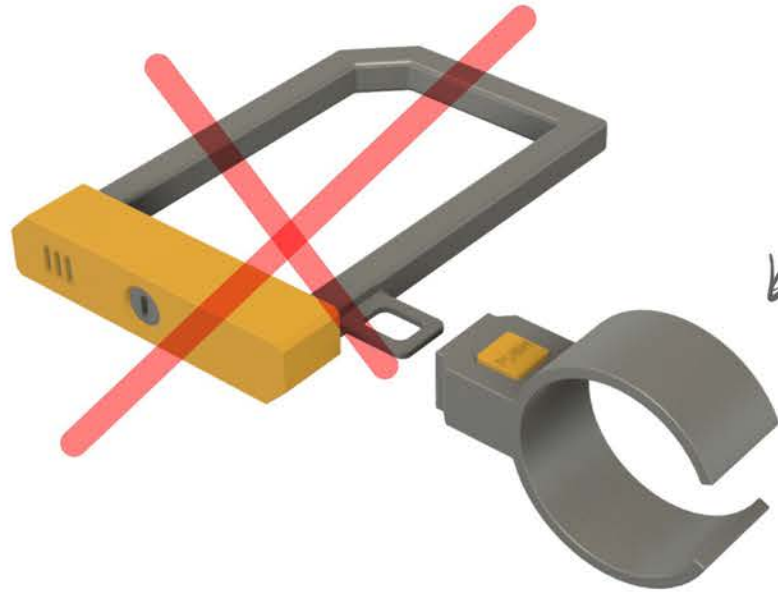
Some different vent designs





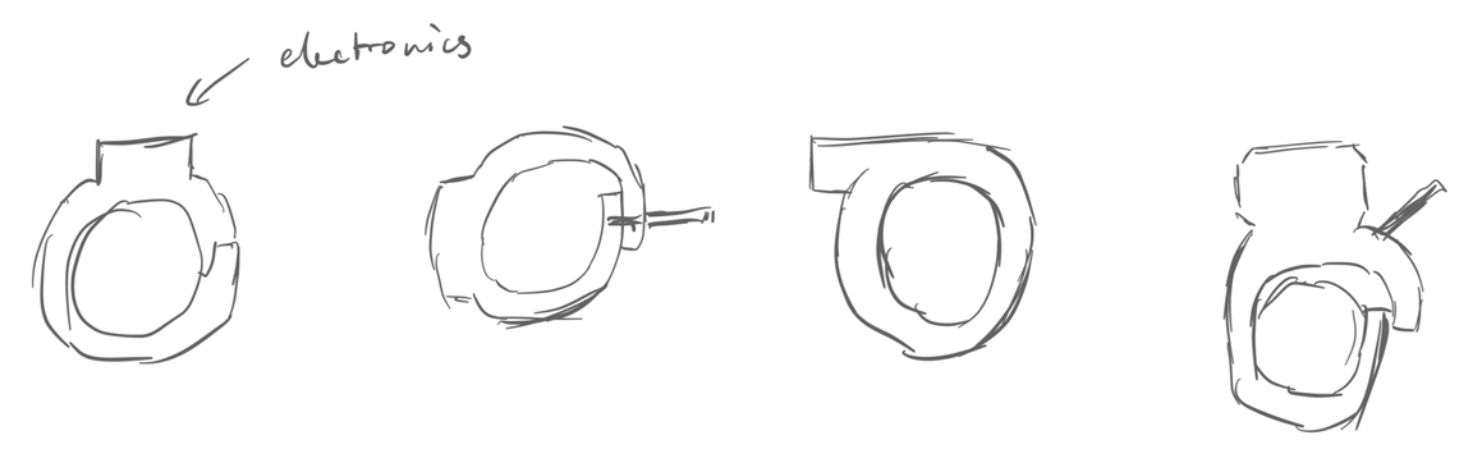
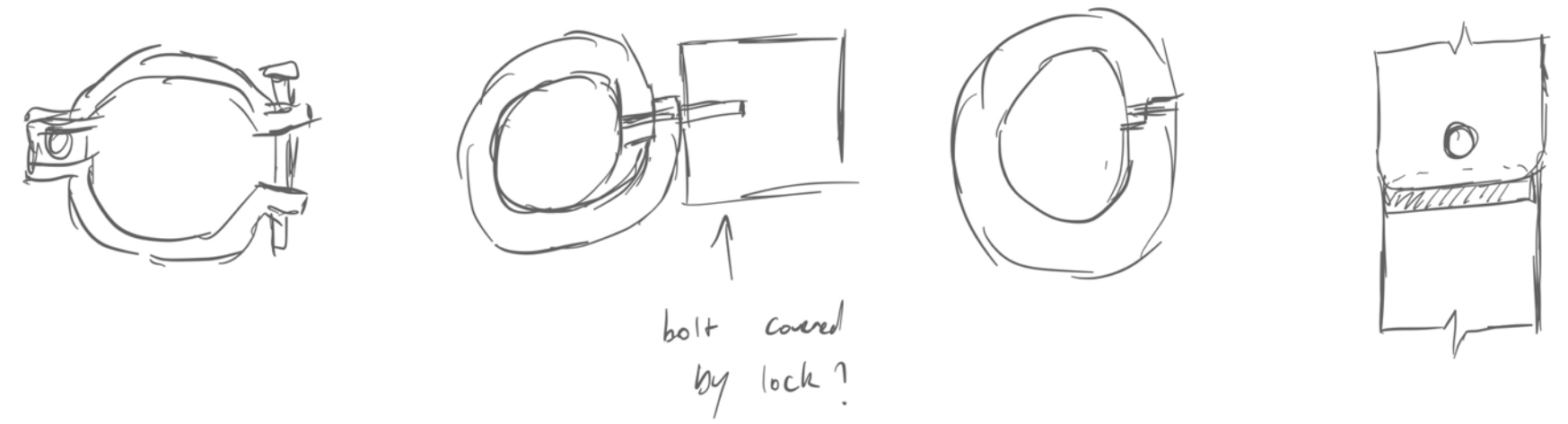
Checking button sizes

Lock Holder

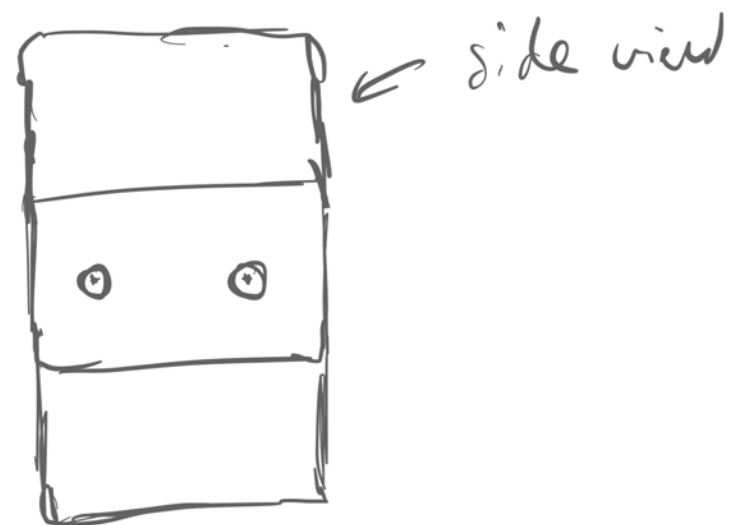
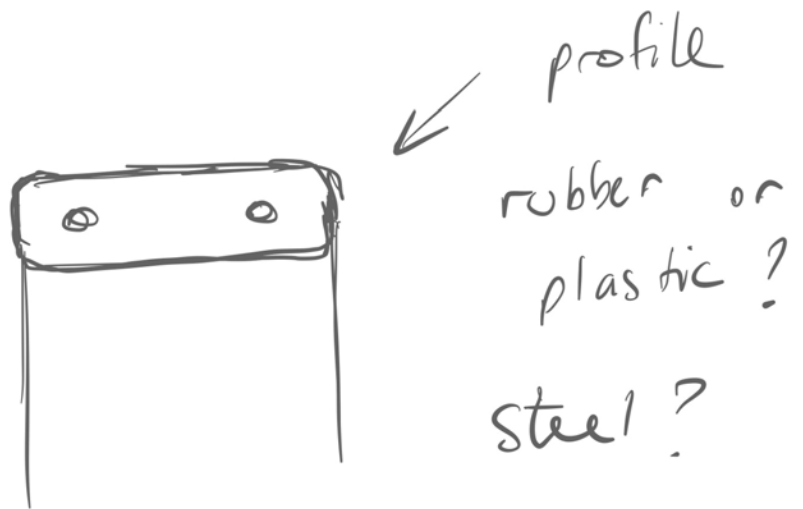
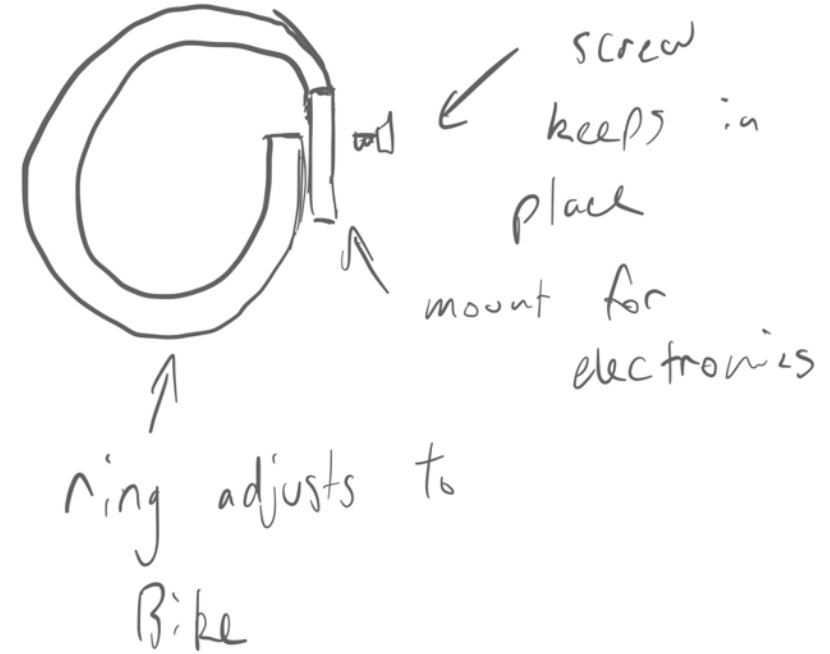
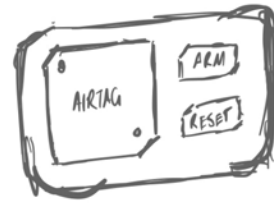
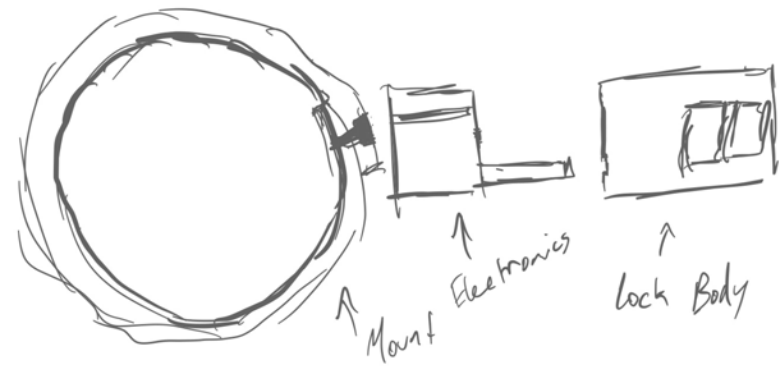


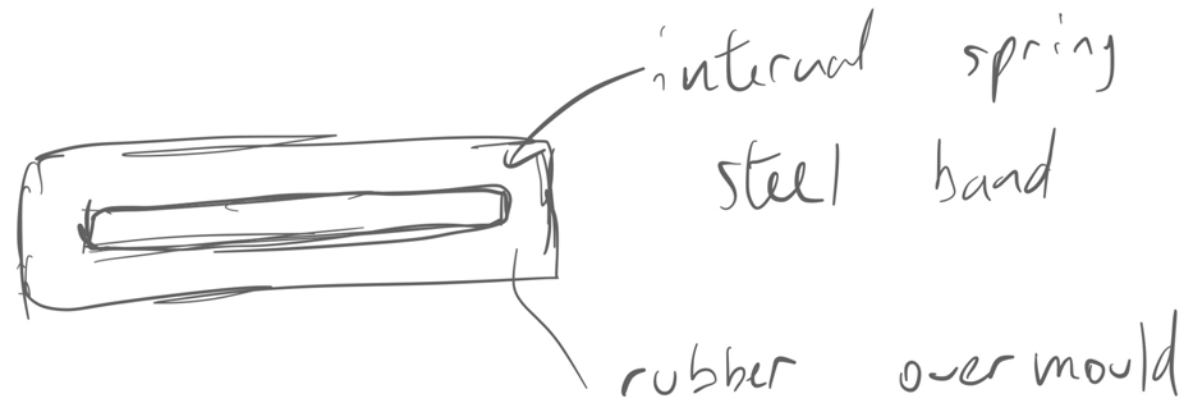
Features

- Easy + quick attachment to lock.
- Adjustment to attach to different sized bikes + scooters
- AirTag Holder
- Alarm System
- Be secure.
- Battery
- Bluetooth

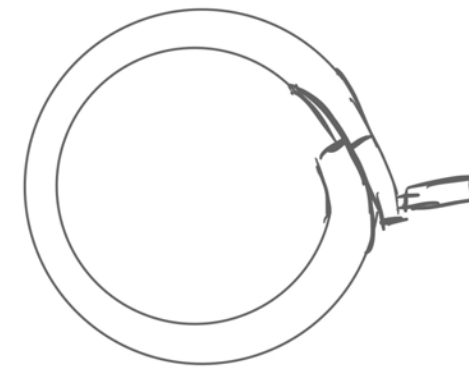
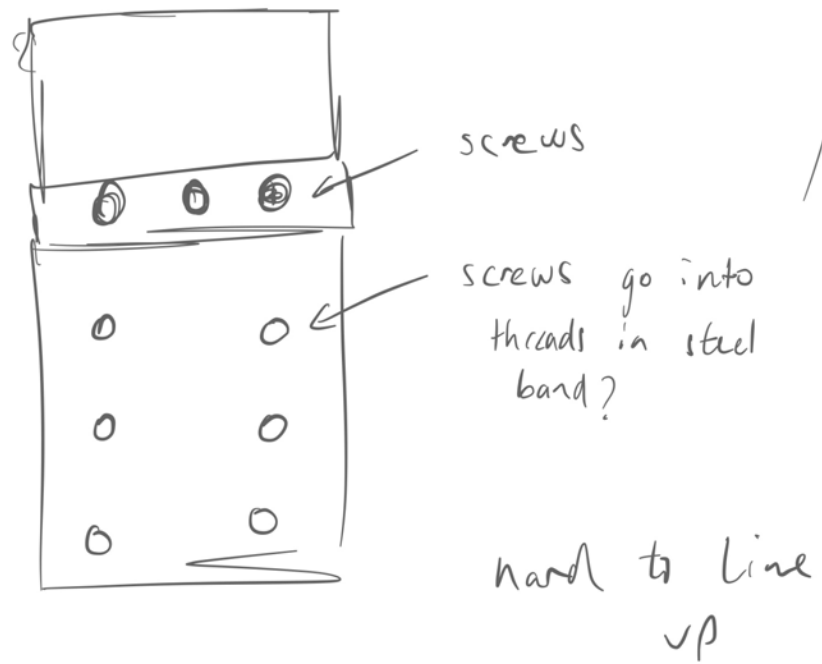


MOUNT AND ELECTRONICS



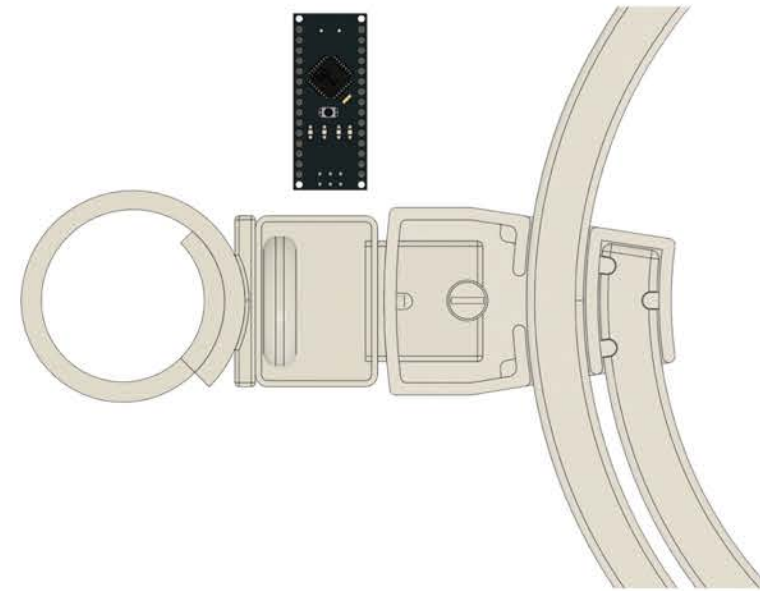
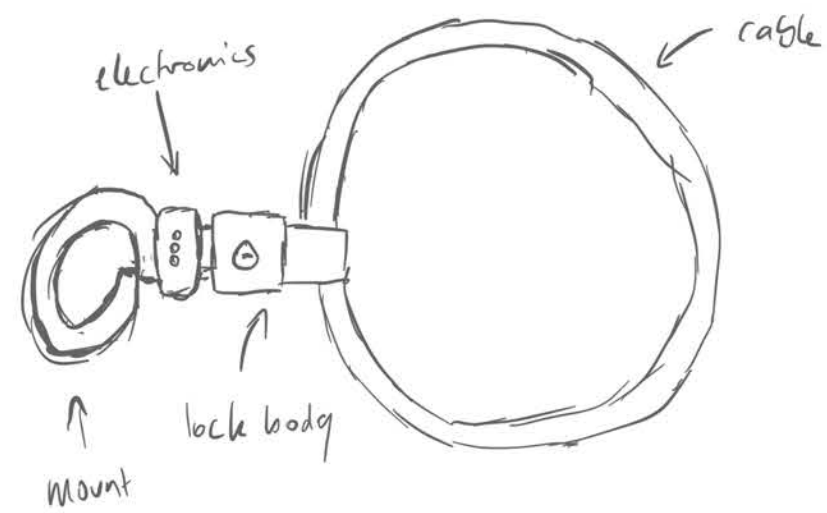
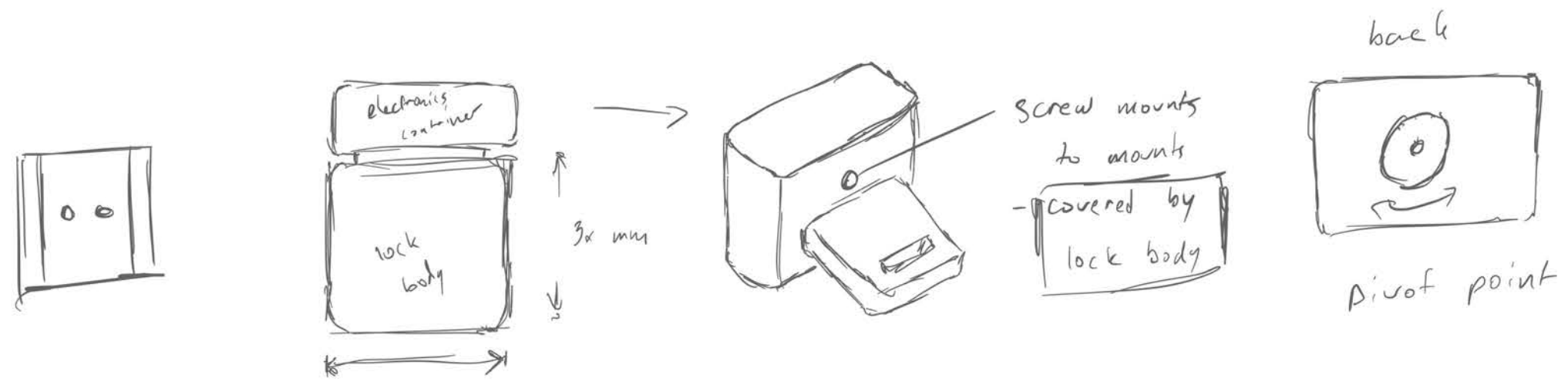


needs to be
cut resistant



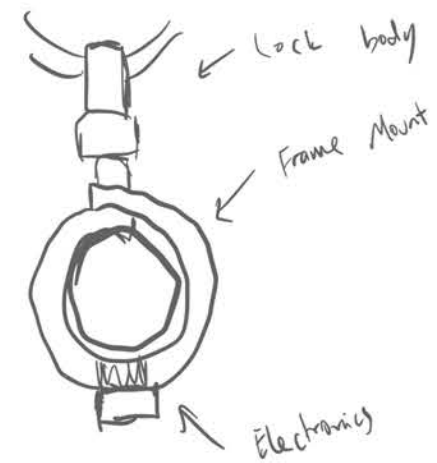
matches
aesthetic of
cable!

MOUNT AND ELECTRONICS



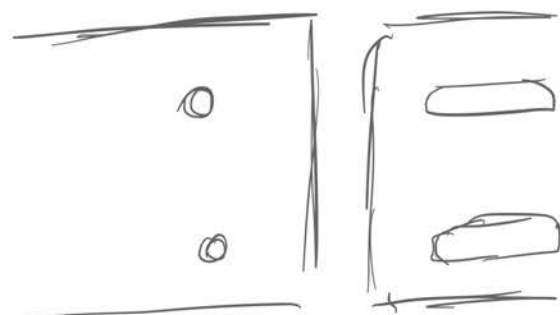
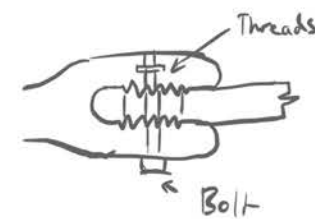
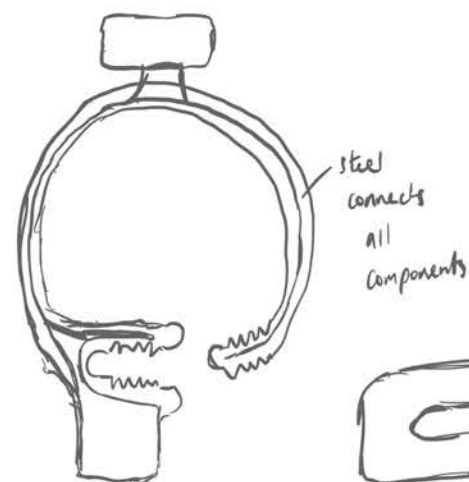
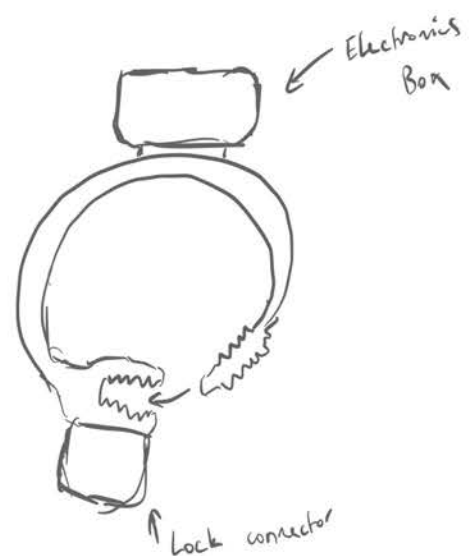


Initial Analysis shows
Lock without electronics
already fits well in frame.
Need to relocate electronics



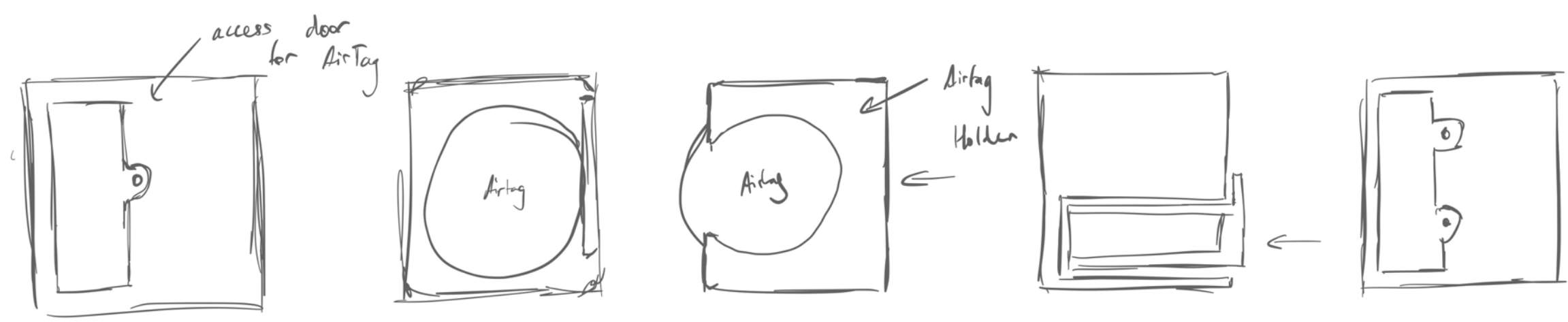
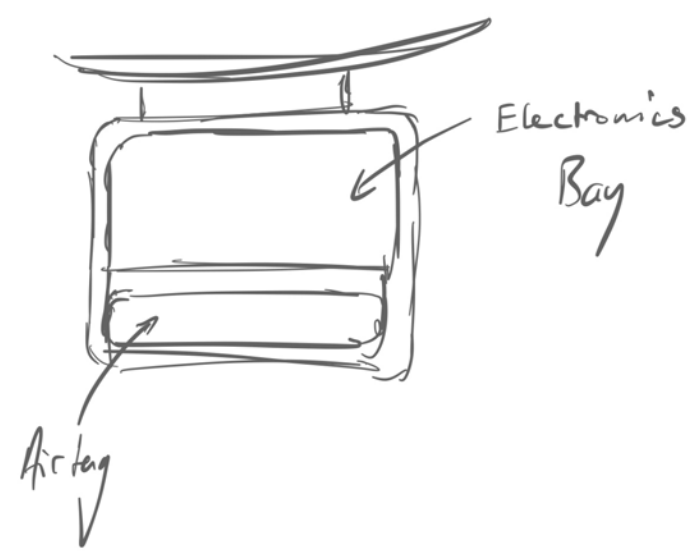
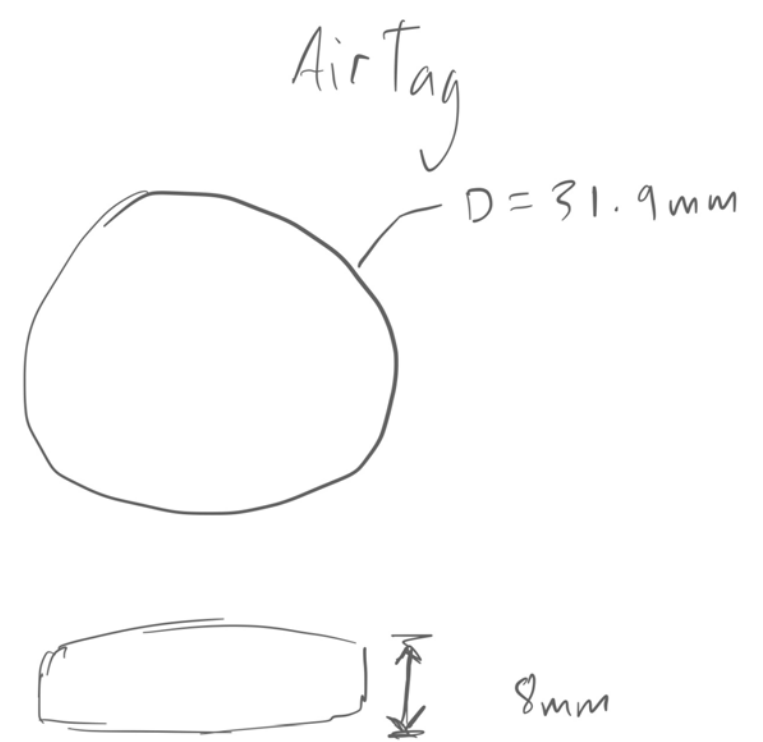
JOINT AND ELECTRONICS

Snap-grip clamp



bolt keeps
mechanism
secure







Electronics internal layout
and Air tag Trays

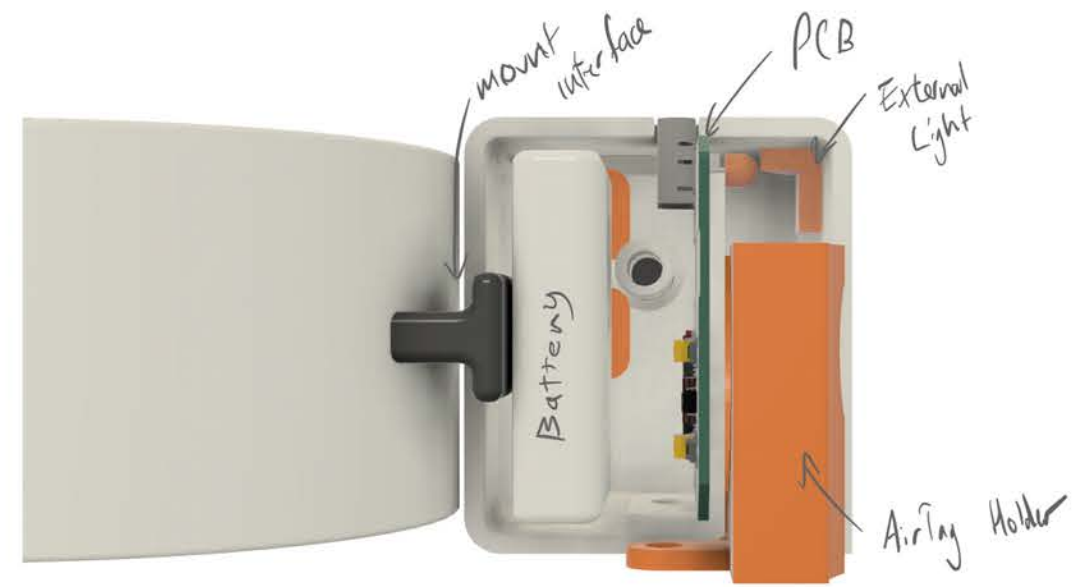


Preliminary CAD Model
Still working on final details

Final CAD



Final Design

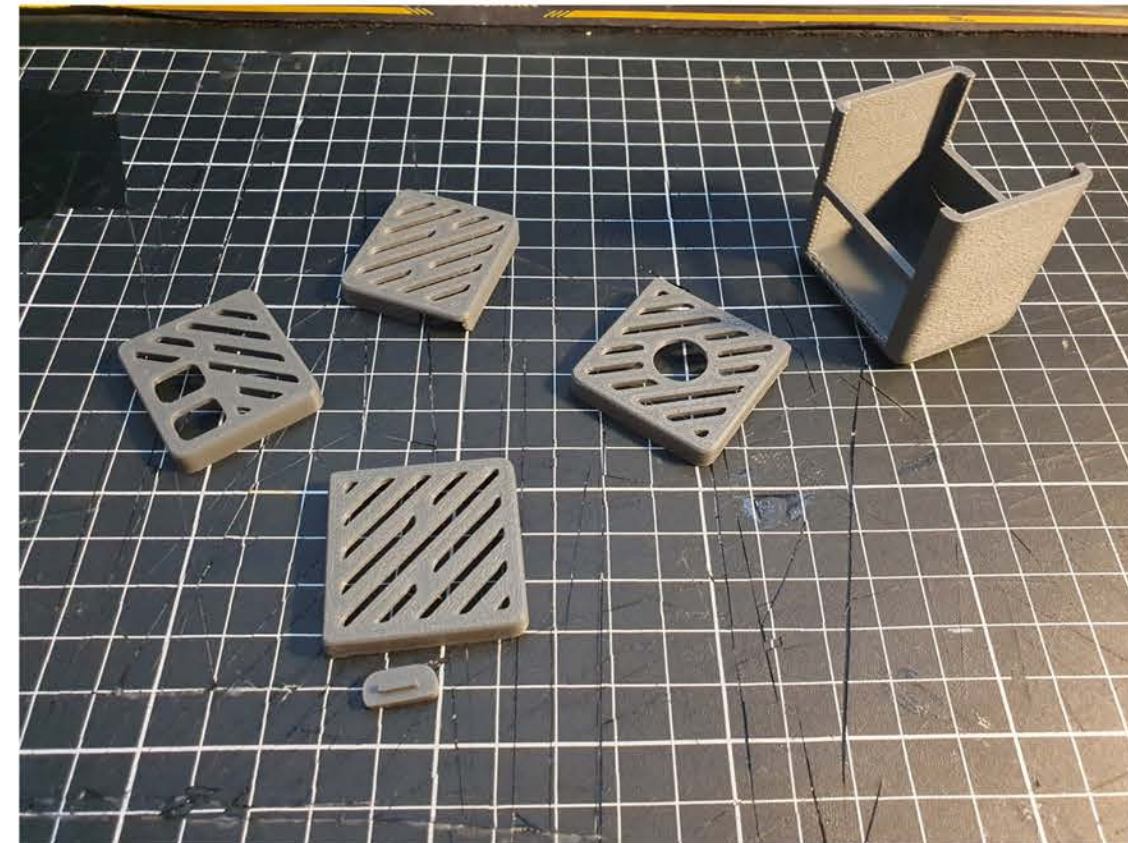
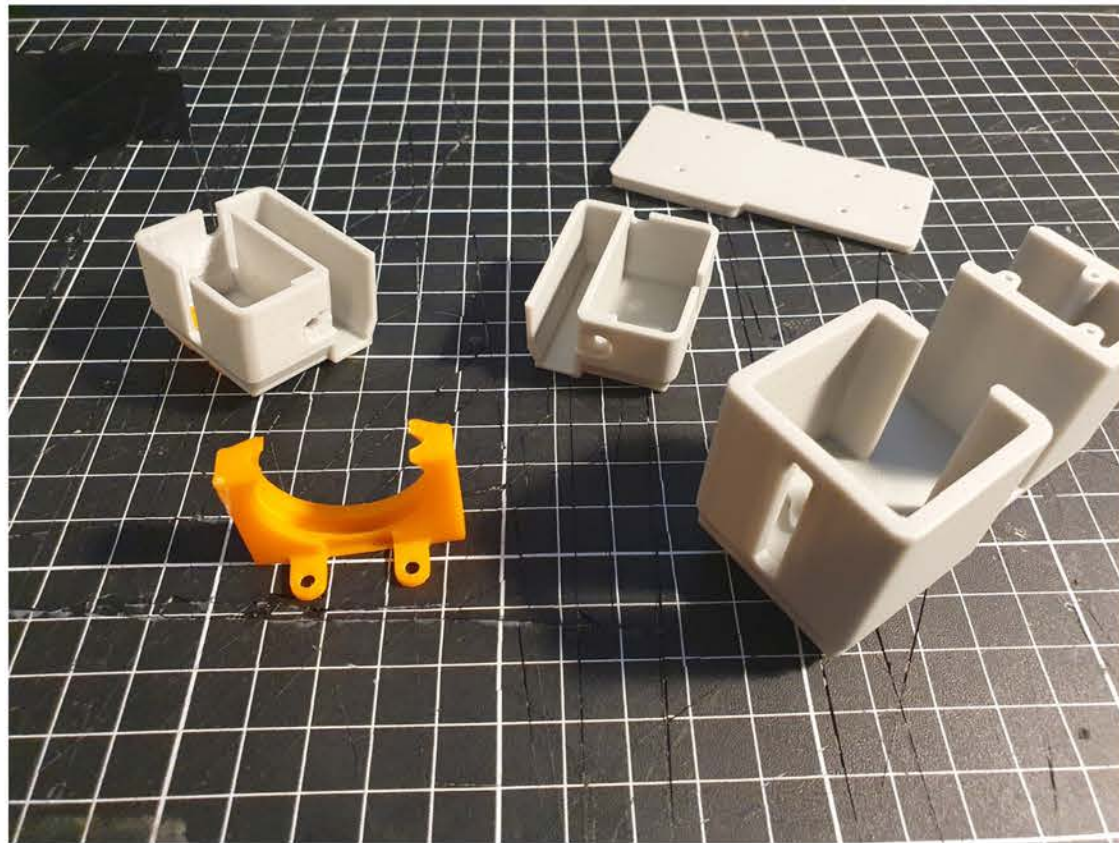


Internal Design

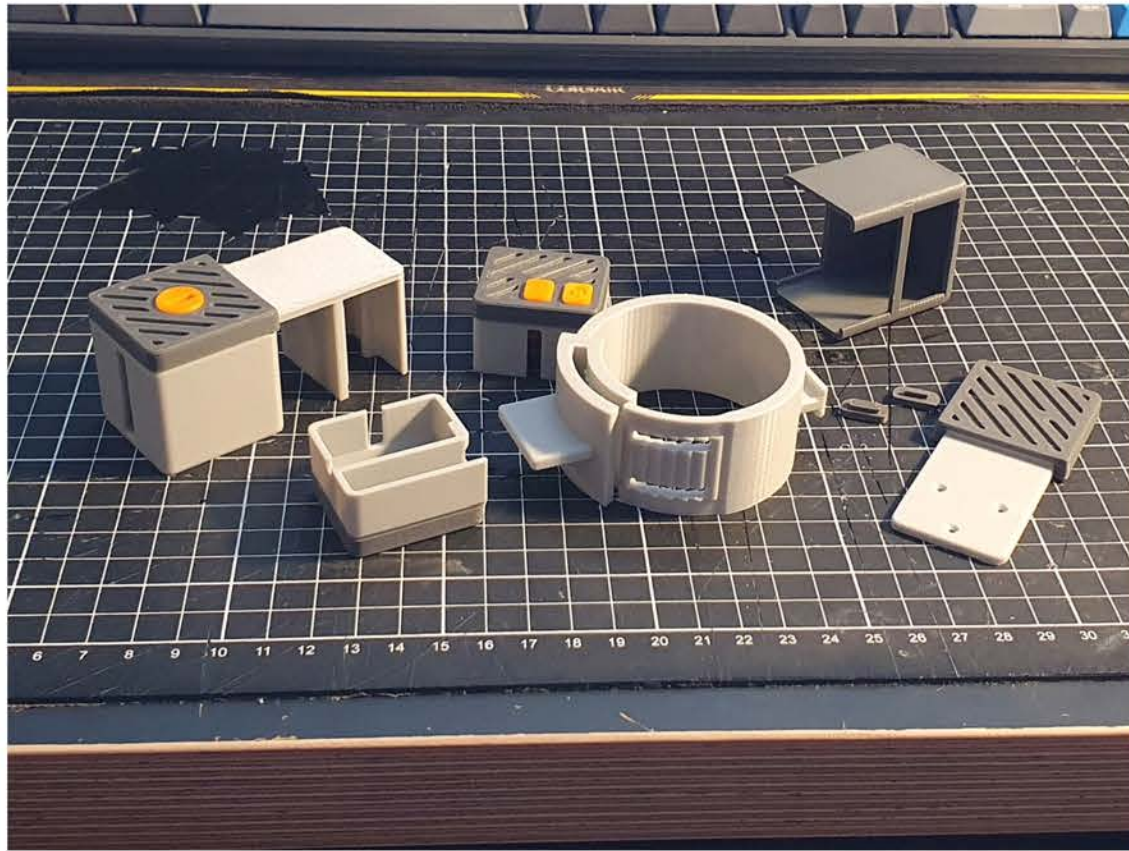




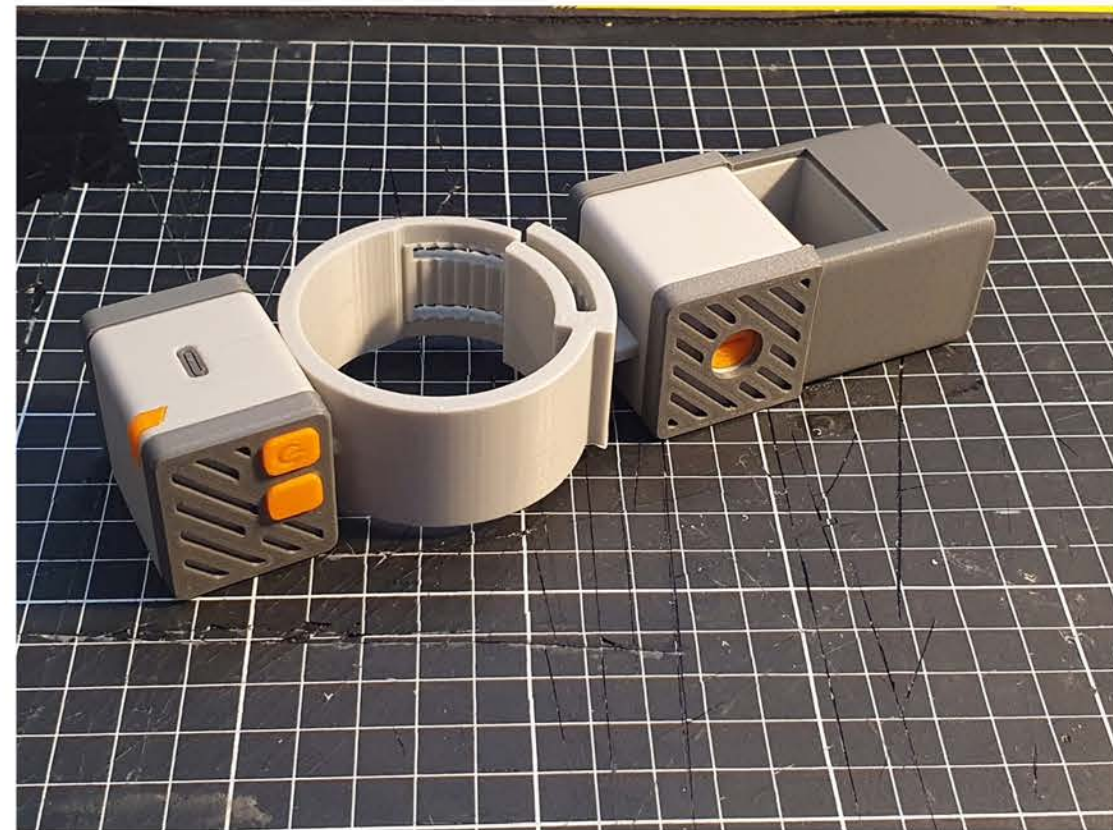
Final Prototype



3d Printed Prototype



Family Photo



Final Assembly



Final Physical Prototype

FINAL DESIGN AND DETAILS





Testing final prototype on an electric scooter

Manufacturing

Bill of Materials (BOM)

Standard Parts (off the shelf)

Custom Parts

Drawings

Quality Assurance (QA)

Injection Moulded Parts

- ABS

- TPU

Screws

- M2

- M3

Cast Steel

- Spring Steel











- Hardened Steel

Braided Steel












PCB

Springs





BOM

Number	Name	Description	Image	QTY	Source	Materials	Manufacturing Process	Comments
1	AirTag Holder	Holder to keep AirTag secure		1	Custom	ABS Plastic	Injection Moulded	Injection Moulded as most economical at scale
2	Battery	Power Source		1	Off The Shelf	Various	-	
3	Buckle Catch	Used to keep holder buckle attached to lock body		2	Custom	Glass Filled Nylon	Injection Moulded	Injection Moulded as most economical at scale
4	Button 1	Secondary button		1	Custom	TPU	Injection Moulded	Injection Moulded as most economical at scale
5	Button 2	Power Button		1	Custom	TPU	Injection Moulded	Injection Moulded as most economical at scale
6	Cable	Main Cable		1	Custom	Braided Steel Cable and TPU	Injection Moulded (Over Moulded)	Injection Moulded as most economical at scale
7	Cable Retainer	Used to lock cable in place		1	Custom	Glass Filled Nylon	Injection Moulded	Injection Moulded as most economical at scale
8	Lock Top Plate	Plate to attach to lock body		1	Custom	Cast Steel	Cast	Cast as is economical and provides accurate parts
9	Enclosure 1	Electronics enclosure		1	Custom	Glass Filled Nylon	Injection Moulded	Injection Moulded as most economical at scale
10	Enclosure 2	Electronics enclosure		1	Custom	Glass Filled Nylon	Injection Moulded	Injection Moulded as most economical at scale

FINAL DESIGN AND DETAILS

11	Enclosure Cover 1	Electronics enclosure vanity cover		1 Custom	ABS Plastic	Injection Moulded	Injection Moulded as most economical at scale
12	Enclosure Cover 2	Electronics enclosure vanity cover		1 Custom	ABS Plastic	Injection Moulded	Injection Moulded as most economical at scale
13	Lock Holder	Holds lock to bike		1 Custom	ABS Plastic, Spring Steel	Cast + Over Moulded	Cast as is economical and provides accurate parts
15	Keyway	Key lock		1 Off The Shelf	Various	-	
16	LED Window	Diffuses light for lock status		1 Custom	Polypropylene	Injection Moulded	Injection Moulded as most economical at scale
17	Lock Body	Enclosure to hold all locking mechanisms		1 Custom	Cast Steel	Cast	Cast as is economical and provides accurate parts
18	Lock Cover	Vanity cover for lock body		1 Custom	ABS Plastic	Injection Moulded	Injection Moulded as most economical at scale
19	Lock Guide 1	Used to keep buckle catch in place		1 Custom	Glass Filled Nylon	Injection Moulded	Injection Moulded as most economical at scale
20	Lock Guide 2	Used to keep buckle catch in place		1 Custom	Glass Filled Nylon	Injection Moulded	Injection Moulded as most economical at scale
21	M2 x 8mm Bolt	Lock screws		5 Off The Shelf	Black-Oxide Steel	-	
22	M3 x 12mm Bolt	Holder retaining screws		2 Off The Shelf	Black-Oxide Steel	-	

FINAL DESIGN AND DETAILS

23	M3 x 5mm Bolt	Airtag holder screws		2 Off The Shelf	Black-Oxide Steel	-	
24	M3 x 25mm Bolt	Electronics enclosure screw		1 Off The Shelf	Black-Oxide Steel	-	
25	PCBs	Electronics boards		1 Custom	Various	Pick and Place, Milling etc.	
26	Spring	Used to retract cable retainer		2 Off The Shelf	Steel	-	

Branding



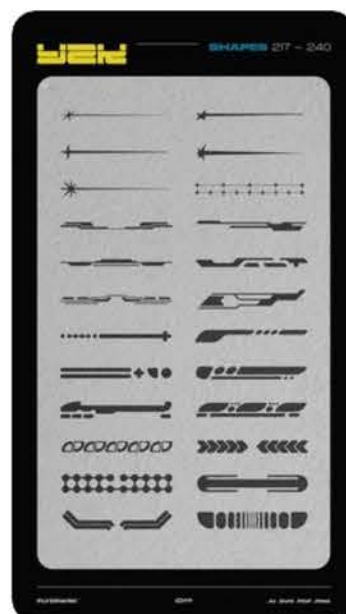
70 BDF067 133 E 46 C8 8266
9 C71 E4785102 —... ☆



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stock de Aminulloh |... ☆



Elements, science fiction
sticker for futuristic design ☆



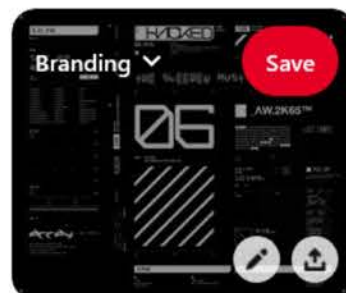
Y2K Shapes and Graphics ☆



Fauna - Futuristic Font on
Yellow Images Creative Store ☆



Gamer from NeatoShop | Day
of the Shirt ☆



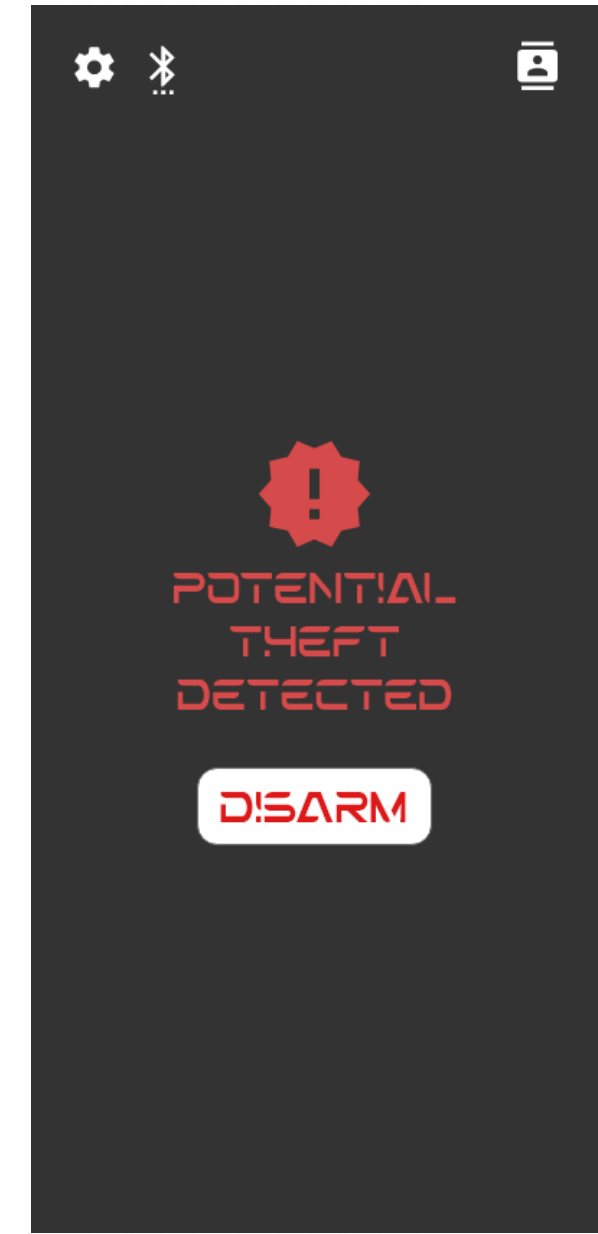
☆



Aboro - Futuristic Science...
Creative Market ☆



Nebula Sci-fi Font on Yellow
Images Creative Store ☆



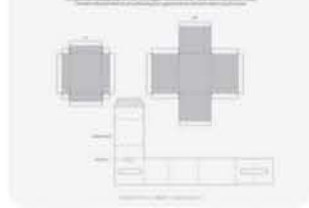
Simple Companion App

Packaging

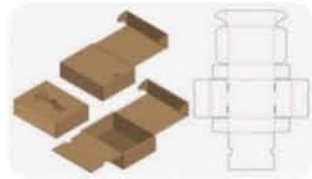
14 PINS



MUG BOX



Ben Ludtke



Premium Vector | Box packaging die cut template...



HOYO drill



3 Core Moments You Need To Implement in Packaging...



Rollable Plastic-free...



Rollor Packaging | Sustainab...

7.9k



I tried the best probiotic on...



Stained with Style



Business Cards of the Week - PaperSpecs



Packaging Archives - leManoosh



Dinara



Puma launches self-lacing Puma Fi trainers



Belife Brand Experience...



GRAFY DESIGN



Purafina - Branding



erva



Pins By P.J.



ASIA DESIGN PRIZE - SAN LAMP SYSTEM





White Box w simple
branding

Video

Sequences

- Lock In Use
- Lock Fly Around
- Exploded View, Showcasing Insides
- Lock in place of bike
- Lock mount attaching to bike
- Lock unlocking
- Alarm, Arming, Bluetooth Connection
- USB-C Charging

Render



