

Project III

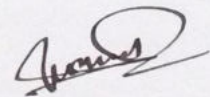
DESIGN OF LAW ENFORCEMENT DRONE

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Co-Guide: Prof. Nishant Sharma

DECLARATION

I declare that this written submission represents my idea in my own words, and where others' ideas or words have been included, I have adequately cited and referenced the original source. I also declare that I adhered to all principles academic honesty and integrity and have not falsified, misinterpreted or fabricated any idea/ data/ facts/ sources in my submission. I understand that any violation of the above will be cause for disciplinary action by the institute and can also invoke penal action from the sources from which proper permission has not been taken, or improperly cited.

Signature: 

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APPROVAL SHEET

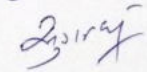
This Mobility & Vehicle Design Project titled Design of Law Enforcement Vehicle by Nikhil Kunnath is approved in partial fulfilment of the requirements for Master of Design degree in Mobility and Vehicle Design.

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External Examiner: 

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ACKNOWLEDGEMENT

I sincerely thank my guide Prof. Lance G Rake for his guidance & support during the course of this project. I also thank my Coarse Coordinator/Co-guide Prof. Nishant Sharma. Last but not the least I would like thank my friends and family for their support and views.

CONTENT

Declaration	i
Approval sheet.....	ii
Acknowledgement.....	iii
Content.....	iv

Pre Research

1.Introduction.....	1
2.Maharashtra police	2
2.1.The Units.....	3

User study

3.The Vehicle fleet.....	5
3.1.Jeep Category.....	7
3.2.Motor Cycle.....	8
4.Patrolling	9
4.1.How its done.....	10
4.2.Inference.....	11
5.Emergency Response.....	12
6.Public Relation.....	14
6.1.Inference.....	16
7.A Cop Life.....	17

Secondary research

8.The Foreign Counterparts.....	22
8.1.France.....	22

8.2.Italy.....	23
8.3United States.....	24
8.4.Germany.....	25
8.5.Inference.....	26
9.Unmanned Vehicles or Drones.....	27
9.1.Land Drones	28
9.2.Aerial Drones.....	31
9.3.Inference.....	34
10.Design Brief.....	35
10.1.Gadgets Borrowed.....	36
11.Concept 1.....	38
12.Concept 2.....	42
13.Concept 3.....	45
14.Initial Mockups.....	52
14.1.Final mockup.....	54
14.2.Final model.....	56
15.Reference.....	59

1. INTRODUCTION



<http://blog.ipleaders.in/wp-content/uploads/2014/10/Police.jpg>

For things to run smoothly in a country the government makes law and orders. But ensuring that the things are in order is a tough job. All humans have personal goals and agendas and there is always a possibility for clash of agendas which leads to problems. Hence the police force has been given the task to maintain Law and Order in the country.

To ensure that the task assigned to them is done, the police have to be in the run looking out for the good and the bad happening in their domain. To get that job done, transportation plays an important role and the vehicles in use must have the capabilities to aid the cops in doing so.

This project looks into the vehicles which our police forces use and analyze the purpose for which they are used, to make appropriate design interventions so that the job of the cops are made better. A police officer should be a respectable personality in the community. And so do the vehicles which they use.



2. MAHARASHTRA POLICE

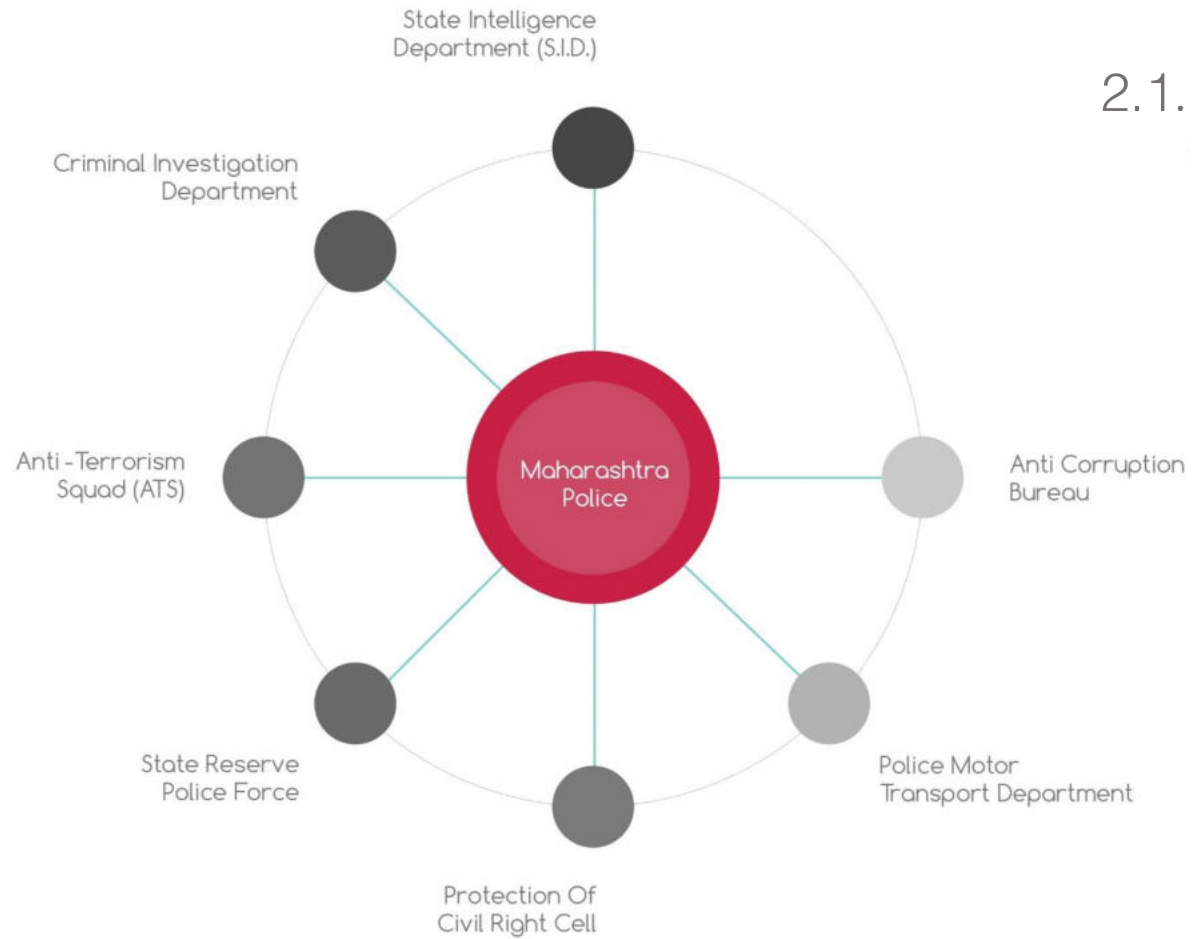
Maharashtra is the third largest state in the country and is also the world's second-most populous sub-national entity. the Maharashtra police force is one of the largest in the country and consists of about 1.9 lakh Policemen and 1.5 lakh women officers. The police force have adopted Commissionerate system having 10 Police Commissionerates and 35 Police District Units. The Police force have a huge task of enforcing Law and Order in their state. To ensure smooth functioning, various special teams or units have been set up in force which will handle specific operations whenever required.

The Police force works with the moto of 'Protecting the righteous and annihilating the evil'.

‘ सद्रक्षणाय खलनगिरहणाय ’

PRIMARY RESEARCH

2.1. THE UNITS



State Intelligence Department (S.I.D.)

Deals with collection, collation, analysis and dissemination of information in on such as Political, Security, Communal, Labour activity, Security concern & Matter affecting - Law & Order.

Protection Of Civil Right Cell

In order to deal effectively with atrocities on the members of Scheduled Castes and Tribes, a Special Cell known as Protection of Civil Rights Cell had been set up.

Criminal Investigation Department

Analyzes crime patterns and advise the government on remedial measures. Always maintains high ethics and integrity. Encourage initiative and innovation. Adopt professionalism and scientific attitude in investigations and inquiries.

Police Motor Transport Department

Was established in 1948 to cater to the needs of mobility of Maharashtra Police. Headed by an officer of the rank of Supdt. of Police, who is a technocrat having expertized in the field of automobile engineering.

Anti - Terrorism Squad (ATS)

It aims at collecting and collating information about anti-national elements working in any part of Maharashtra. It works in co-ordination with Central Agencies, like IB, RAW.

State Reserve Police Force

The SRPF is a proud-armed Police Unit deployed for Maintenance of Law & Order, Disaster Management, Anti-Militancy Operations, Security of Vital Installations, Feeding Training Units .

Anti Corruption Bureau

Constituted under the Government of Maharashtra, Home Department, with a view to eradicating the evil of bribery and corruption.



59

Special Purpose
Vehicle



836

Big
Vehicle



728

Light
Vehicle



2590

Jeep
Category



361

Car
Category



3297

Motor
Cycle

3. THE VEHICLE FLEET

The statistics of the Maharashtra police vehicle fleet according to the Motor Transport Department shows a total of **7871** vehicles being categorized to carry out their duties.

Big Vehicle Category

This category consists of all the heavy vehicles like the tow trucks. Other vehicles which belong to this category are those which carry armed officers in large numbers. These vehicles are only used when the numbers exceed the capacity of light vehicles.

Special Purpose Vehicle

Used for transporting combat forces who are armed. The vehicle is fully shielded and bullet proof. The vehicle is drawn into action only during emergency situations where the cops might need to face groups of people who are armed.

Light vehicle Category

These class of vehicles are used to transport officers in large numbers. In most cases they are controlling mobs, elections duties, guarding administrative offices etc.

Jeep Category

The most commonest of vehicles used by the police force. The police rely on this vehicle for most of their duties. The most important of them is patrolling. The vehicle is required to be available 24x7 as these are one of the fastest means of transport for the cops.

Motor Cycle Category

They are the most crucial set vehicles which the police force have. Only this vehicle can penetrate into the nooks and corners of the city. They have better maneuverability but lack safety and protection from adverse weather.

Car Category

This segment is basically personal vehicles for the gazetted officials of the police force. They come as a part of their perks for reaching certain rank in the police force.



3.1. JEEP CATEGORY

Models in use :

Mahindra Bolero, Tata Sumo, Toyota Qualis, Maruti Gypsy

Basic function :

patrolling, piloting, transporting personals

Equipment's installed:

Sirens, revolving lamps, protection to fragile elements (windows & glasses), Wireless communication, personal armory (lathee/revolver)

Condition:

Base models without air condition.

Avg. number of people travelling: 3-4

Frequency of use:

should be always available at any point of time.

Priority:

Transport personals, inspection, and when situation demands more than 2 police personals at site..

Code name: PETER /PETER1 /Powai Mobile wireless

Drivers:

Officers of the rank Police Constable – Head Constable



Code name: Martial/Martial 1/Charley(Ladies)
Drivers: Constable –Head Constables

3.2. MOTORBIKE CATEGORY

Models in use :

Bajaj Pulsar, Hero Honda achiever, Bajaj avenger, Bajaj caliber, Honda Unicorn, Honda shine, Hero Honda CBZ.

Base models with white paint with police logo and name.

Basic operation :

patrolling. Providing public aid

Equipment's:

none.(the officer behind should always have a wireless)

Avg. number of people travelling: 2

Frequency of use: always on the run.

Priority:

Reach the destination as fast as possible.

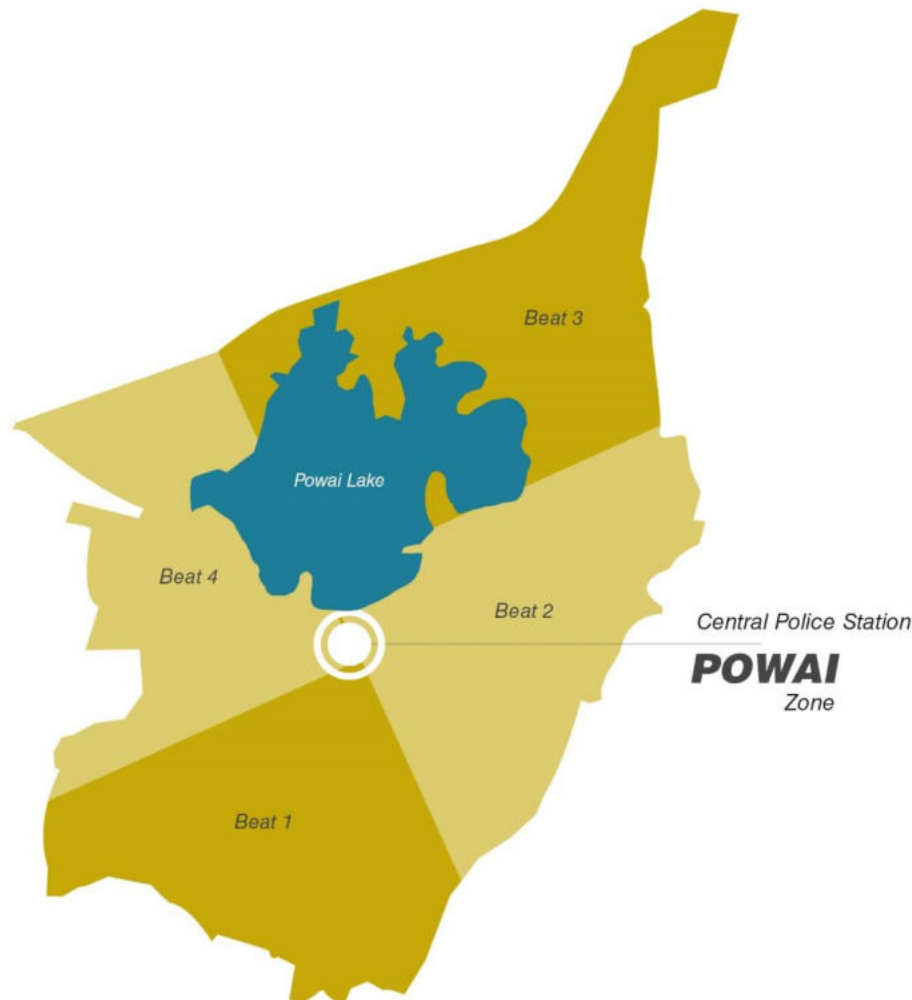
4. PATROLLING

‘Patrol’. An expedition to keep watch over an area.

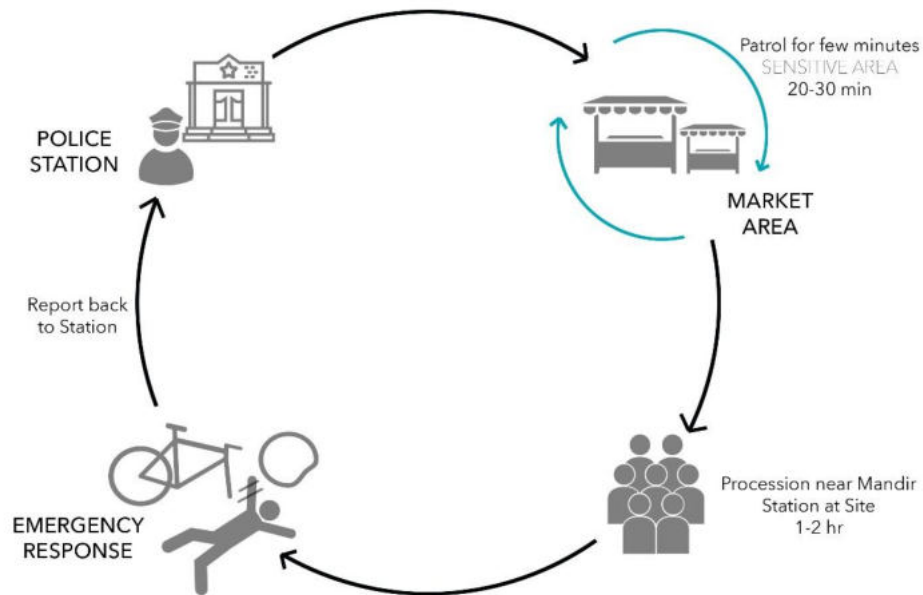
Mumbai police have been practicing Beat policing from the early days to ensure efficient policing over their area. A beat is the territory and time that a police officer patrols. The earlier practice of Beat policing was done by walking and cycling. This was a more transparent way of doing policing as the public could interact with the officers and address their issues. But the other side of the coin was that the process was slow and didn't cover much area while patrolling.

The Mumbai police is broadly divided into five regions namely Central, North, South, East and West. For administrative purposes, each region is subdivided into 3 to 4 zones. Each zone is again divided into four Beats on the basis of which the patrolling duties are assigned.

Every beat is ensured with at least 2 Martials and a Peter. The Central Station will be ensured with the backup vehicles in case the assigned vehicle gets damaged or if the latter needs any assistance.



4.1. HOW ITS DONE



A very brief procedure.

An officer of the rank Senior Police Inspector is assigned the duty of being the In Charge everyday. He is the man who assigns the duties to the other fellow subordinate officers. He assigns the patrolling schedules, i.e the **location/area to patrol** and the **time to patrol**. The officers have to respond to all emergency calls depending on the location of the matter irrespective of their patrolling duties.

Location

The location is decided by the following factors:

- The information gathered by the department about all the public events happening in their zone and assigns officers to patrol accordingly.
- Sensitive areas. Every zone has sensitive areas where there are large number of people, or some important government property, or religious places, or markets. These sensitive areas will be under the police surveillance more often.

Time

- The time is allocated according to the sensitivity of an area and the availability of officers. Since the area has to be surveyed 24x7, the officers have to work in shifts.

4.2. INFERENCE

Observation are made by human eye and through CCTV footages at major areas of the town.

CCTV cameras are always stationary at a location.

Small events can be missed by the human eye as the vehicle is moving.

Events can also be forgotten when they return to the station. Recalling events from human memory is not always true.

Consistency and efficiency of work cannot be expected due to human fatigue.

No comfort in the vehicle and the officers have to roam under the scorching sun or under heavy rainfall.

Patrolling is a 24x7 activity. The job requires the cops to give proper attention to its surroundings. But achieving that through human mind and eye coordination is difficult. Things are not visible clearly to naked eyes at night.

Night patrols are crucial.

The vehicle is less maneuverable in tighter spaces.

The vehicle (Jeep category) is crucial in handling emergency as it is used to transport personals.

The vehicle is either in motion or is stationed for certain amount of time at a location.

Public events attracts the police force as they are responsible for the safety of the people.

5. EMERGENCY RESPONSE

These are situations which the police have to respond to no matter what. It is these situations which makes the police force alert and to be prepared at anytime of the day. The type of emergency situation can be varied. But still the officers have to be prepared to face them.

Emergency situations are informed either by the people through '100' or through the senior officials in the force to the control room. The control room then passed the information to a specific station or all stations depending on the place where the event is happening or on the senior officials order. Depending on the seriousness of the matter, the vehicles are sent to the spot where the officers are being needed to give their attention. The closest vehicle to the event is the first to reach. But if the situation is not that serious, then the Martials are the ones who approach the situation for aid.

Some of the commonly faced scenarios by the police officers are:

Accidents

They are a common event and the police needs to respond quickly as they wouldn't the seriousness of the accident. If the accident was intense and someone gets injured very badly, the ambulance should reach quickly as possible. There are scenarios where the police might need to take the injured to the hospital by themselves.

Armed possession

Another scenario is when they are informed that some one is in possession of some kind of arms and him being involved in a conflict. The situation can be with a group of people also. The number is not always known. If it is a group, the situation cannot be dealt by 1 or 2 officers. Hence they request for backup.

But apart from these, emergency situations can be any thing. It can be a **fire breakout, an uncontrollable mob, robberies, women abuse, disaster management** etc. Regardless of whether the situation is serious or not, the police have to arrive at the site within 5 minutes from the time the information was passed. They reach within 5 minutes in some cases because the officer would have been close to the location already. But in some cases, the police cannot reach the site in time due to various reasons. The traffic and road conditions being one of them.

6. PUBLIC RELATION



Traffic police stationed in the streets of south Mumbai

Police gets most of the information from the public. It is one of their primary source. So maintaining a good relation with the public is an important aspect. With that intention in mind the Government has introduced Community Policing in various parts of the state. But despite of such efforts, the perception which the public have about the cops are still varied. Some might have had good instances with the police and some might have had bad ones. There is group which always stays neutral also. But the Police Force believes that they should have a positive and healthy relation to the public as they feel the public can also contribute to the well being of the community.

In the present scenario, if someone has a concern which they feel they should share it with the cops, they have to go to the police station and give a petition. Or they could do that online through the police website. But a verbal conversation is always better than a document for understanding a situation. People also share their concerns about the community through social media platforms such as facebook, television shows etc. But in all these scenarios, the public might have a feeling that the cops are not taking any initiative to help them do their part conveniently.

But the police have also taken some initiative towards setting up a good relation between the two. Every week the senior officials of the station holds community meeting sessions with the community representatives and share their concerns. This is a positive measure which the cops have taken. Having known the importance of social media, the Mumbai police have laid their attention towards reaching people through 'Twitter'.

The Mumbai police with its witty one-liners and catchy tweets became an overnight social media sensation after being launched on Twitter in December 2015. The witty and humorous posts on the feed really connected with the youth and has seen the account garner over one lakh 80 thousand followers. The official accounts of both the Mumbai Police and the Commissioner of Police have done several issues like campaigns on women's safety, cyber safety, general traffic rules and avoiding drugs. But Mumbai police's recent tweets may not be as witty as earlier, but are surely more informative with statistics, instructions and counsel to help people. The word play may have been reduced in recent times, but not the effort in spreading awareness about issues that affect the common man.

6.1. INFERENCE

The public is the key information provider to the police force.

Beat patrolling ensured that the public had a trust over the cops.

Current system does not allow much interaction between the public and the police.

Community policing given importance in the recent times to maintain a good relation with the public.

The police force are open to new ways to interact with people and are trying to become more social.

Twitter account gaining popularity.

Have to go to the police station to tell your concerns.

Less number of eyes for a large population and area.

Probability of a vehicle to be present in or nearby to an emergency situation is low due to the current vehicle strength.

Reaction time to an emergency situation is very varied in case of the jeep due to the traffic conditions and its availability to respond is also not guaranteed due to any mechanical failure.

The quicker to respond, a better view of the situation is possible.

Some situations may require human intervention.

Accidents scenarios require first aid treatments.

Control room not having a visual clarity of the situations. Thereby increasing the possibilities of them giving wrong directions. Visual clarity could bring swiftness in performing their job.

7. A COP LIFE



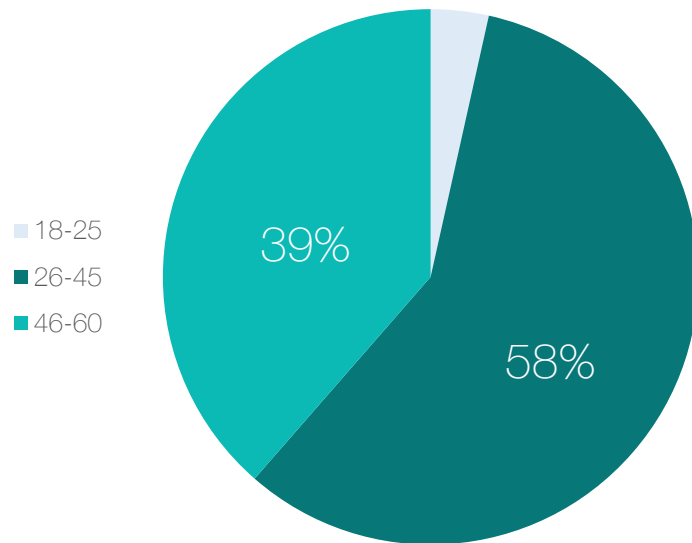
an officer doing his traffic duties.

Finding the wrong and the guys who are doing the wrong is not an easy job. It may be interesting for the first few times. But doing it again and again and again is not an enjoyable job. But our police officers stay determined and make sure that things go smoothly in their neighbourhood.

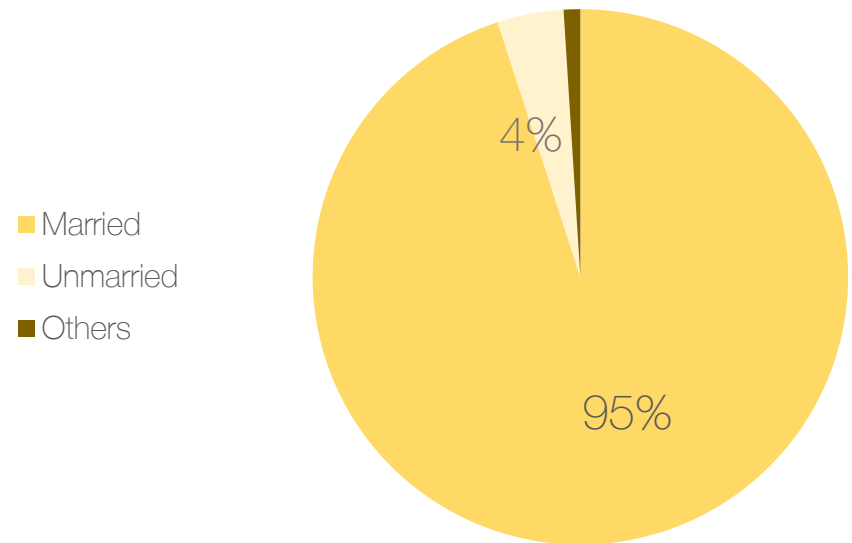
The Ratio

The maharashtra police has a total strength of 1.95 lakh police officer of which 1.8 lakh officers are the members of the constabulary, in other words who are in the ranks from Police constable to Head constable. And the job of these men are to look after a population of 114.2 million people. Now if we see the ratio, one police officer has to watch over nearly 500 people. This is a tough job altogether.

Age of Police Constables



Marital Status



Ref:
Ph.D. Theses - A study of work culture in Maharashtra Police with special reference to Mumbai Metro Region
Anupama Nerurkar
SNDT Women's University
Department of Commerce

The Marital status

95% of the officers are married making them liable and responsible for the happiness and well being of their family members apart from their duties as a police officer. Hence adequate amount of time should be available to a Police officer too for giving attention to the liabilities he is bound to. The officer also need to be a good father, husband and a role model for the others.

The positive Attitude

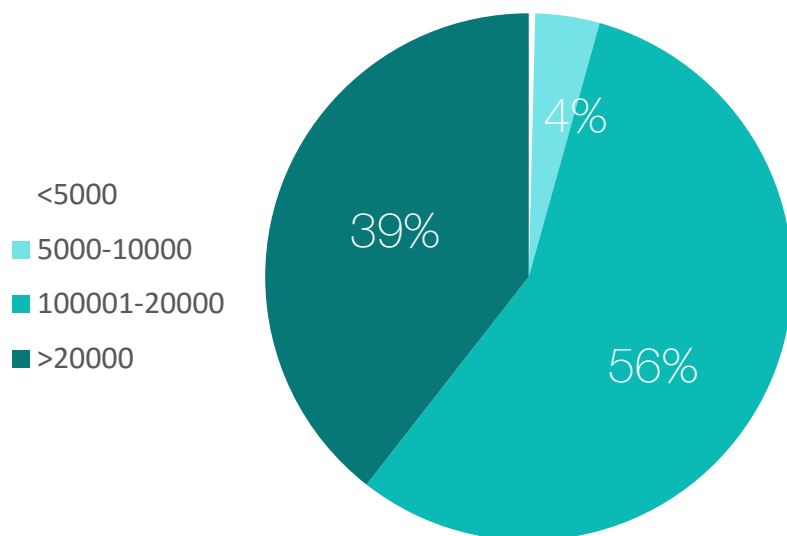
Despite having several problems within their domain, the Police Officers show optimism and positive attitudes towards their profession. Every Cop is proud to be one amongst the force which takes care of the city and ensures the smooth functioning. They earn respect through their duty and this is a real motivation to them. They would defend criticisms when faced about the police administration and put some sense into the conversation.

The Bombay Police Manual, 1959, states that the constabulary in each district is divided into two branches, the armed and the unarmed. The main functions of the armed police are to escort, guard and reserve duties whereas the men of the unarmed police, after training as policemen, will be required to devote their energies and intelligence to promotion and detection of crime. Police constabulary consists of about 80 percent of the total work force in the police department. They are no doubt the backbone of police force as they come into the contact of public including the complainants and criminals.

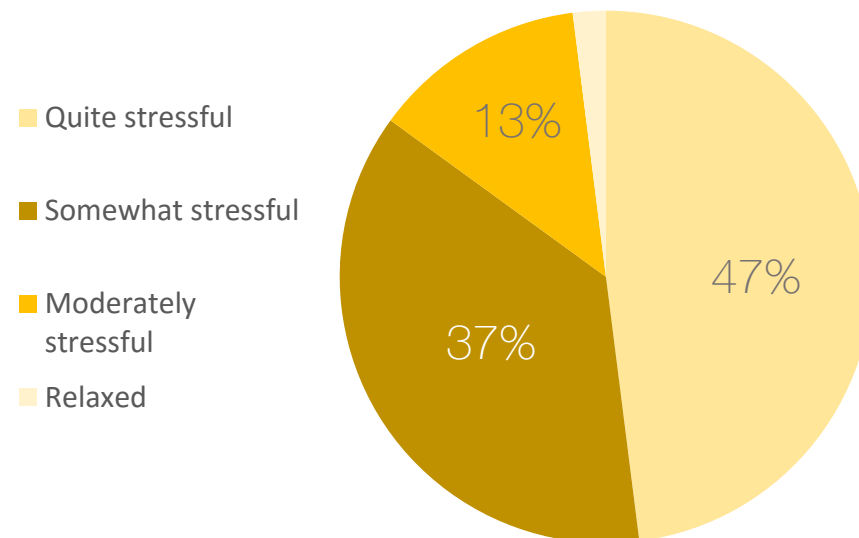
The Age group

The age of the police constables is an important parameter to decide workculture. Police constables are more active on the field and require fitness and stamina to work for 24 hours continuously in special circumstances. With the growth in age, the basic functioning of human organs becomes duller. As Patrolling requires human vision and attention all the time, the age really matters of the Police officers.

Monthly Income



Stress in work Life



Ref:
 Ph.D. Theses - A study of work culture in Maharashtra Police with special reference to Mumbai Metro Region
 Anupama Nerurkar
 SNDT Women's University
 Department of Commerce

Working hours

8 hours of working time is quite a common thing for a normal working employee. And people complaint about their work even in that 8 hour. Some of them can be the work is too hard, there is no break in between and so on. But working 12 hours a day is a tough job. And the people doesn't actually know how that is. It is a tiring job for the officers. The above mentioned 1.8 lakh officers keep watching the city by patrolling in jeeps which are not even air conditioned, sometimes stationed at certain places to keep watch.

Payscale and Duty

The members of the Constabulary have concerns over their salary or pay having put so much effort and dedication and working hours to do their duty. Getting a leave from his/her duties is one of the hardest things ever to happen for them. Apart from all these, the seniority in the police force is another problem as all senior officials are not just and wise. But they learn from experiences. There will be small clash of thoughts between the senior officials and their subordinates.



An officer charging fine for not wearing helmet.

SECONDARY RESEARCH

8. THE FOREIGN COUNTERPARTS

8.1 FRANCE

Peugeot 308



https://commons.wikimedia.org/wiki/File:French_Police_p1230006.jpg

The French cops also face problems similar to what the Mumbai cops face in a way. They too have narrow streets and busy people. But the car which the Police Nationale uses is the Peugeot 308. It is powerful enough as it is equipped with a 1.6 Litre engine which gives around 200bhp.

But the most interesting thing is that they have used a hatchback. Now that makes sense because when you have narrow roads they can maneuver through these roads much easily. Apart from that, the Peugeot 308 has an Euro NCAP rating of 5. Which means that whoever is driving that vehicle has the assurance of safety with them.



8.2. ITALY

Alfa Romeo Giulia

Italy has a tradition of having gorgeous cars for the law enforcement.

It is a four seater yet a small car. Making it easy for the cops to roam around the city to do their duty.

Even though the car was used in the late 60's, it is still remembered as one of the most famous cop cars of Italy.

The car is not as aggressive as the current police cars. And hence the people had an affection towards the car.

The car featured in most of the Italian movies during that era. 'The Italian Job' being one of the famous movies.



<http://www.car-revs-daily.com/2015/10/18/1966-alfa-romeo-giulia-super-polizia/>

8.3. UNITED STATES

BRP Spyder F3-P



<http://commercial.brp.com/commercial-and-government/product-offer/on-road/spyder-f3-p.html>

Designed specifically for cop duties by BRP and certainly offers everything which the current motor bikes offer to do the job of a cop and offers even more.

The vehicle is a new segment introduced into the force and provides confidence while driving and personal safety.

The stability controls are designed by Bosch and provides great visibility to the cops to see what is going around as well as to the public to find the cops when needed.

Cruiser riding posture which is comfortable for a job like patrolling.

Has a powerful engine, but also capable of doing all the slow speed operations.

Enough cargo space also provided in the vehicle with USB ports in the rear cargo.



<http://www.conceptcarz.com/vehicle/z10184/brabus-cls-v12-s-rocket.aspx>

8.4. GERMANY

Mercedes Benz CLS BRABUS 'Rocket'

BRABUS has been building the world's fastest street-legal sedans for several years running.

the world record for street-legal sedans to 365.7 km/h.
0 – 100 km/h in 4.0 seconds, 0 – 200 km/h in 10.5 seconds, 0 – 300 km/h in 29.5 seconds

twin-turbo V12 engine, produces a maximum power output of 730 hp / 537 kW at 5,100 rpm

Most famous pursuit vehicle in the German Police force.

Germany Has highways with no speed limits.

8.5. INFERENCE

The cops not satisfied with their payscale for the amount and time of work they have to put in for the safe functioning of the government.

The job is not an enjoyable one as they have to deal with the bad in most cases.

Possibility of overcoming this effect of fatigue and inconsistency in work through artificial eyes or more number of eyes on the watch which is possible through drones.

The vehicle has to adapt to more than one type of function.

Fatigue occurs due to extended working hours.

Vehicles are supposed to have safety and comfort in order to perform their task efficiently.

Low strength.

Vehicles must be able to survive the climatic changes and the terrain conditions on which it has to perform its duties.

Easy maintenance of the vehicle is a necessity.

State of the art technology has to be incorporated into the vehicles. Visual feed is one of them.

The vehicle has to have a character portraying a police officer and the job they do.

Each vehicle has a purpose and the vehicle should aid the police in achieving that goal.

9. UNMANNED VEHICLES OR DRONES



<https://www.aleksssecurity.com/news/detail/the-evolution-of-drones-in-cyber-electronic-warfar>

Drones were the names given to unmanned aerial vehicles or vehicles which did not have a pilot in it. They were initially used for military purposes as practice targets for aerial combat. But drones had greater potentials, both bright and dark. The innovations in drone technology continued to happen in the field of military application. But the breakthrough came when drones were used to analyse landscape and patterns for the benefit of the community. In the current scenario, Drones have found various applications to put them on use. Some of them are mentioned below:

- Border Patrol by military (both armed and unarmed)
- Wildlife Monitoring
- Aerial photography and Filmmaking
- Construction and real estate monitoring
- Oil and gas pipeline monitoring
- Agricultural pesticide spraying
- Search and rescue
- Pollution monitoring

9.1. LAND DRONES

THE TRANSWHEEL CONCEPT



<http://www.bbc.com/autos/story/20150824-meet-transwheel-the-self-balancing-autonomous-robotic-parcel-delivery-drone>

The Transwheel concept reimagines package distribution as a round-the-clock autonomous service carried out by robotic single-wheel drones that work independently and together to ensure timely, efficient delivery. Each wheel features a self-balancing gyroscopic system, electric arms, and GPS-driven communication capability. Smaller parcels can be handled by a single robot while larger packages will be tag-teamed by an appropriate number of robots that self-configure to the package's unique dimensions.



<http://rynomotors.com/>

THE UNIWHEEL SCOOTER

Ryno motors have developed a uni wheel scooter as a personal transportation solution in an urban context.. The vehicle uses self balancing technology and is a unique segment of scooters which offers great maneuverability and the vehicle is capable of reaching anywhere a pedestrian is able to.

The hub motor and the batteries are enclosed in the wheel. The design is compact and thus reducing volume to a great extend at the same time providing great maneuverability due to the single wheel.



<http://www.telegraph.co.uk/news/2016/04/26/delivery-droids-coming-to-london-pavements-as-soon-as-next-month/>

STARSHIP DELIVERY

Starship technologies have come up with an interesting concept of using slow speed land drones for delivering groceries at the customer's doorsteps. The guys responsible for this idea happen to be the co-founders of Skype.

They will have a fleet of self driving drones ready to deliver items weighing up to 20 pounds within 30 minutes from order time. The owners reveals that these drones will cut down the cost of delivery by 10 to 15 times per shipment. The drones will use GPS system and will travel through the sidewalks of the streets.



<http://www.dji.com/products/phantom-3>

9.2. AERIAL DRONES

DJI PHANTOM 3

DJI is a chinese company founded in 2006 who manufactures commercial and recreational unmanned aerial vehicles for aerial photography and videography. Phantom is a drone series. The phantom 3 is intended for the filmmaking industry. The drone is capable to shoot at amazing angles. The stabilization has been really worked out and recording is possible without any disturbances.

The drone is equipped with cameras capable of recording videos in 4K at 30 frames/second and in 1080p at 60 frames/second. The drone is compatible as it can be controlled through smart phones as well as through hand held remote control.



<http://hiconsumption.com/2016/01/ehang-184-one-seater-drone/>

EHANG 184

EHANG 184 is an autonomous aerial vehicle which is capable of carrying a person with it. The vehicle is intended for medium-short distance personal transportation solution. It is built with aluminium alloy frames making it light and strong. It can stay airborne for about 25 minutes and requires a charging time of 2 hours. It is a low altitude flying drone and can travel up to a speed of 100 km/h and at a maximum height of 3000 m.



Andy Yeung's drone photography captures hong kong's urban jungle

<http://www.designboom.com/art/andy-yeung-hong-kong-drone-photography-urban-jungle-03-09-2016/>

Advantages

First of all, drones are able to get a job done without a human presence.

They are able to reach spaces where humans are not able to and thereby obtaining amazing views and angles.

Despite intuitive decision making, drones can do their job more efficiently and accurately than a human can.

They can travel at a faster rate.

There is a great amount of consistency in the job they do

They can monitor a broader area for a longer time with repetition.

Disadvantages

Human intuition and human interventions are not yet possible in drones.

People's perception of using drones to keep a watch over them might not be agreeable.

Theft and property damage of the drone in logistic applications.

Small drones attract birds.

9.3. INFERENCE

Why land drones.

Surveillance means to keep a watch from above, which all aerial drones does. But this can cause impatience amongst people when they know that some authority is keeping a watch from above.

Sousveillance is observation at human level which is possible through land drones and does not create any discomfort amongst the public as it would be just like another police officer keeping a watch.



Through Land drones it is able to provide more police personals metaphorically.

Genuine information feed is possible.

Can perform the job of patrolling more efficiently with the existing police strength.

Eliminates the problem of fatigue.

Consistency in performance.

Easy and quick maintenance is possible with drones.

Aerial drones can encourage the feeling of police trying to intrude personal lives.

Aerial drones useful for combat and special operations.

Efficiency at work during night shifts is possible in a better way with clarity in sight.

Gives a feeling of safety and assurance to the public when they see these vehicles performing their jobs tirelessly.

DESIGN BRIEF

Design of an unmanned land drone for the Mumbai Police force which will aid them to perform their task of maintaining Law and Order.

Primary functions

Perform the task of patrolling through the city and giving direct and genuine information feed to the control room allowing the police to have more eyes in the city with the existing police strength.

To respond to emergency situations when asked to in a much faster way than the current scenario. This will perform scene investigations and will feed the data to the arriving police force and make them prepare beforehand.

Secondary functions

To have an announcement system in the vehicle to face human interaction when needed to.

To Provide first aid in scenarios such as accidents and other areas whenever required.

Form Intent

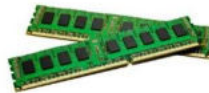
Use of vertical forms in order to get a view of the scenarios like a human does. The intent is to show the presence of the police force. The vertical form makes it visible to the public just like another breathing and living figure.

Sleekness to the form for the vehicle to move through the tight spaces on road and pathways (when required) and thereby achieving a better and smaller/quicker response time.

Robustness in the vehicle form as it may have to face harsh situations. It can be climatic changes, human assault, animal interference etc.

10.1. TECHNOLOGIES BORROWED

Memory for information storage which the police force can refer to at regular intervals and during emergencies.



3D cameras equipped with night vision capabilities for video feed 24x7 if required. 3D cameras provides depth will aid the control room in understanding the scene in a much better manner.

Cloud server for transfer of data between the drones, control room and the vehicles.

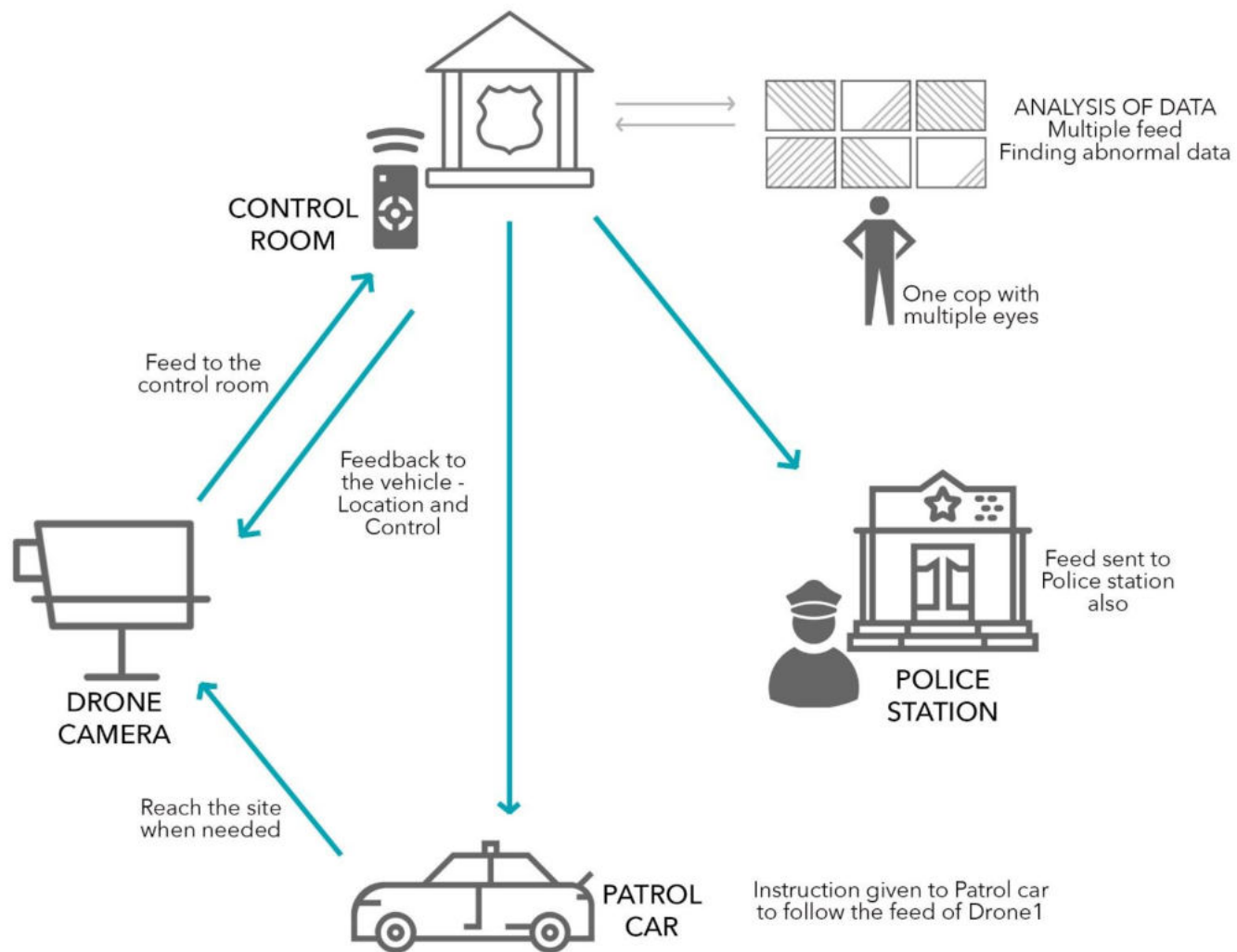


GPS modules for positioning and travel.

Speaker system for emergency announcements to be made when needed.



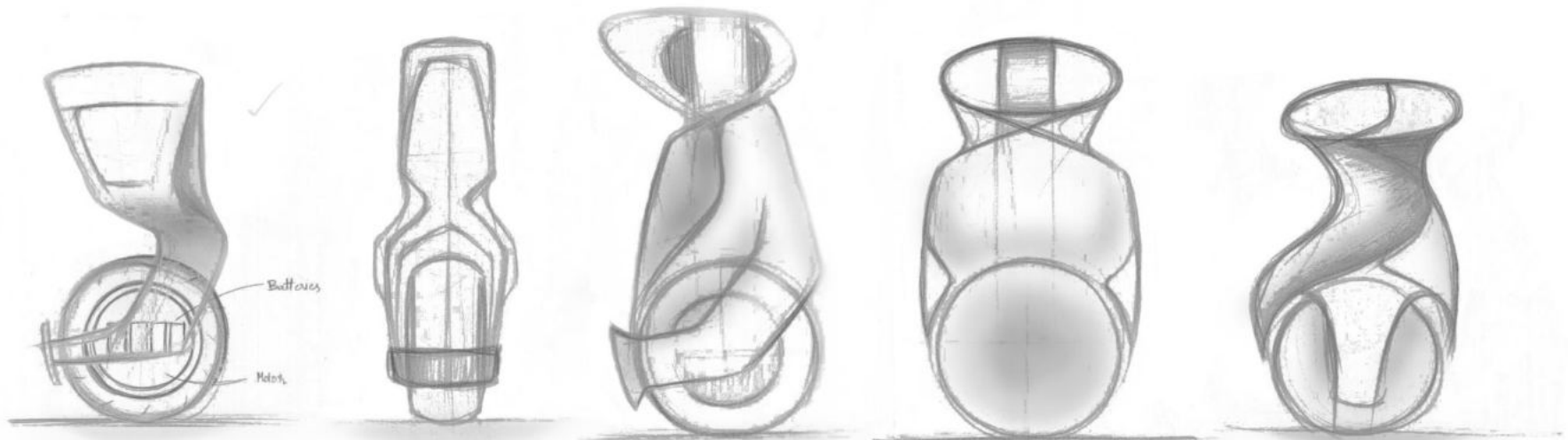
Micro processors to ensure the functioning of the system.

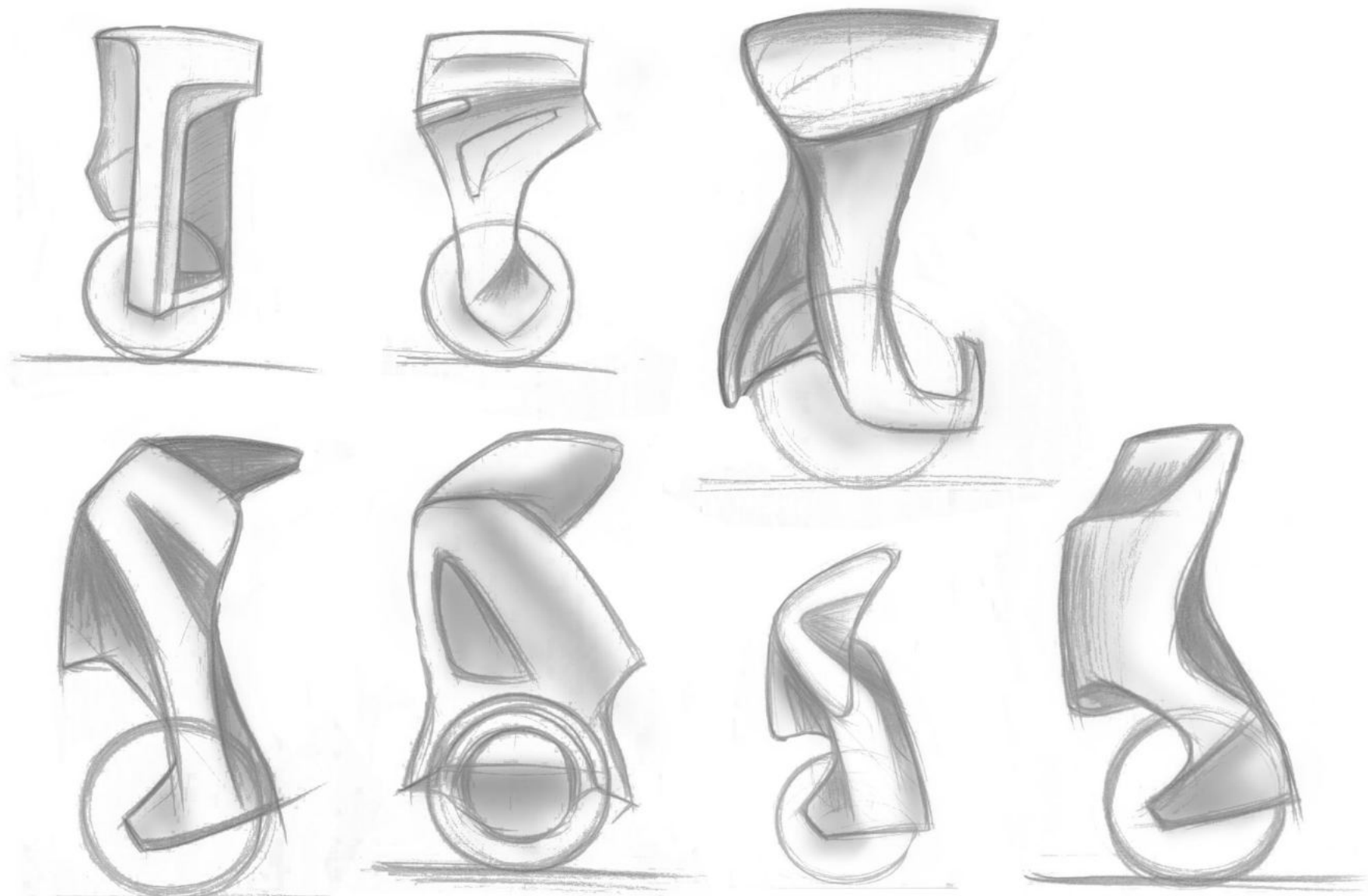


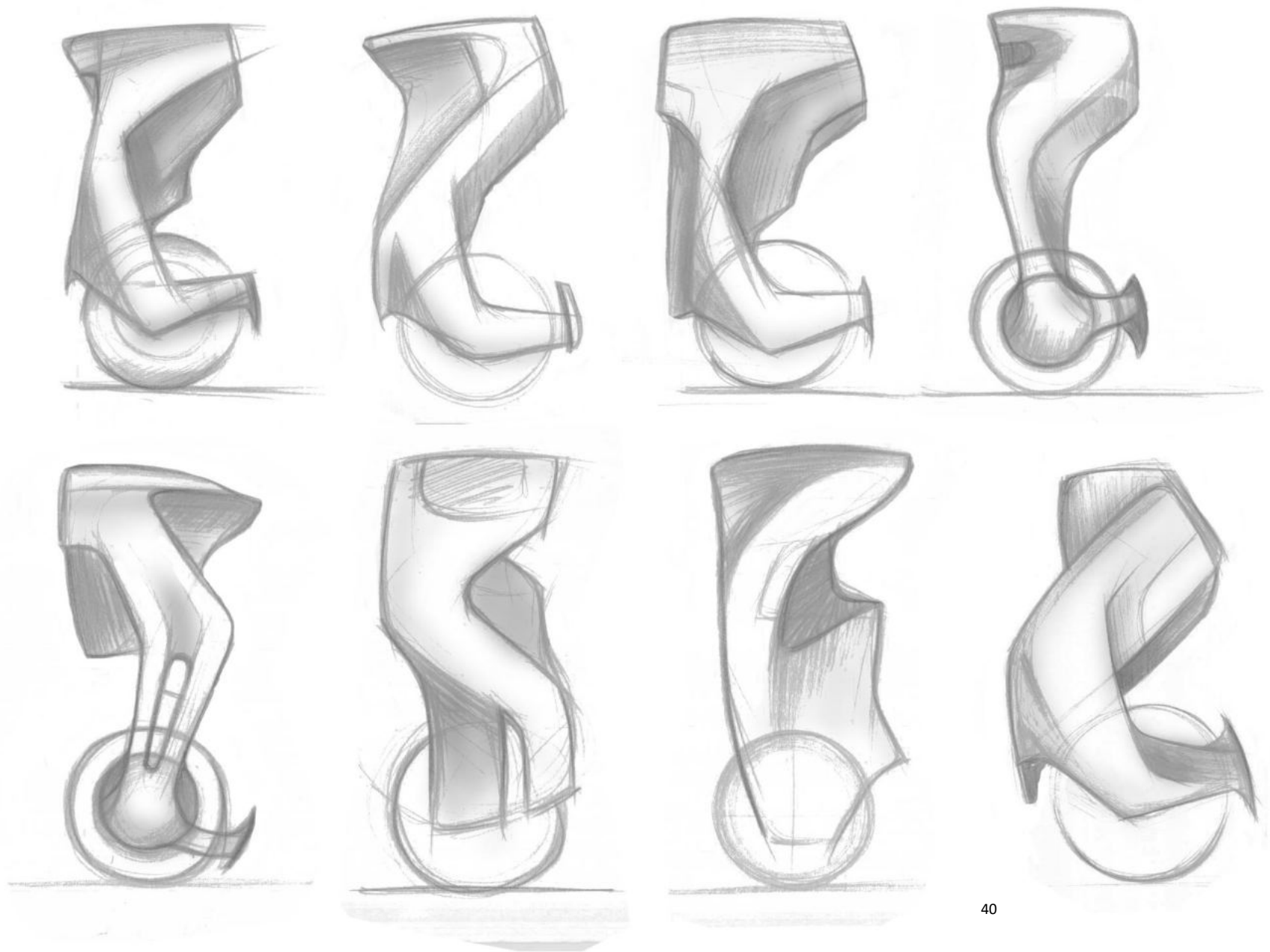


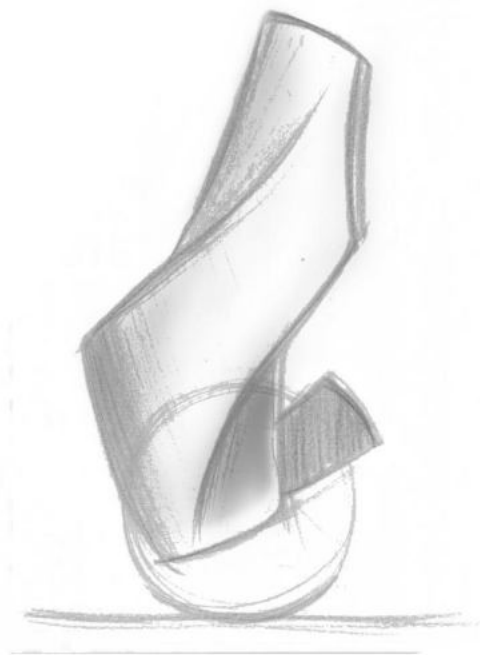
11. CONCEPT 1

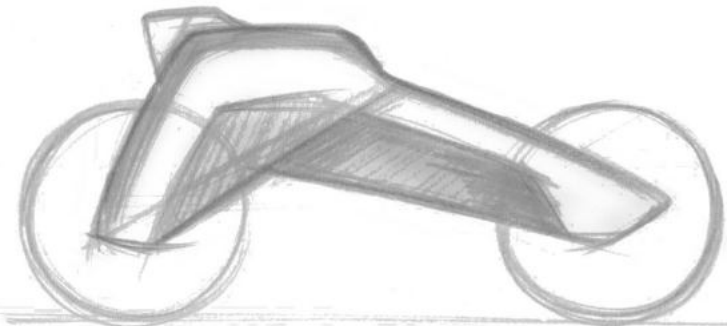
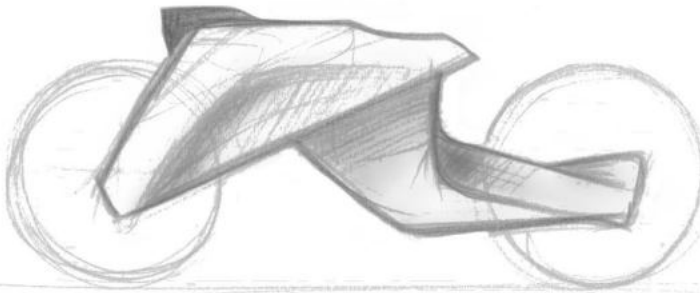
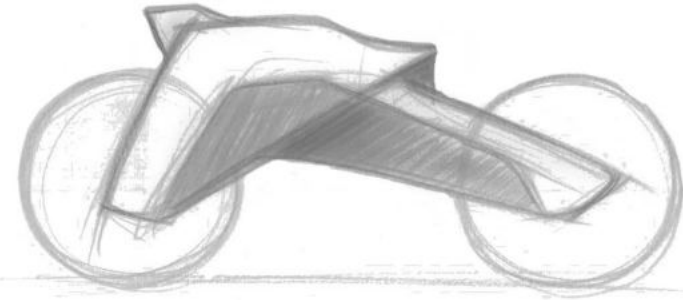
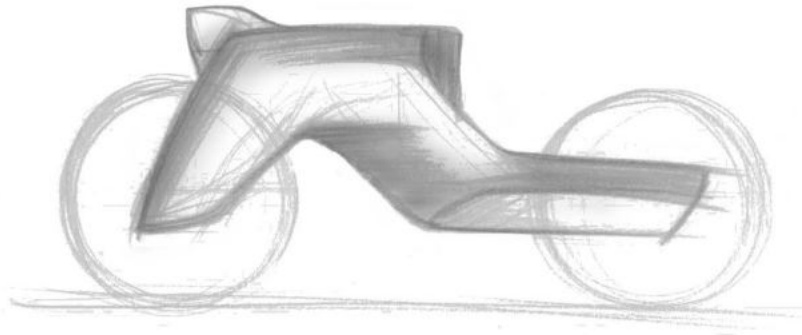
Soft and dynamic expression intended for the vehicle. Single wheel considered for maneuverability and powered by electric hub motors. The vehicle will have self balancing technology.



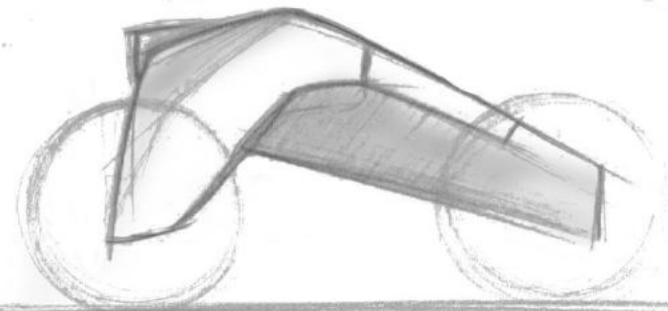
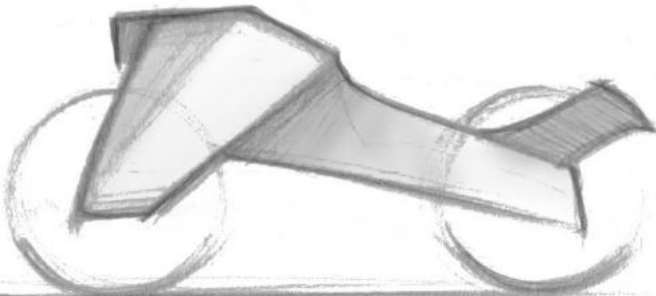
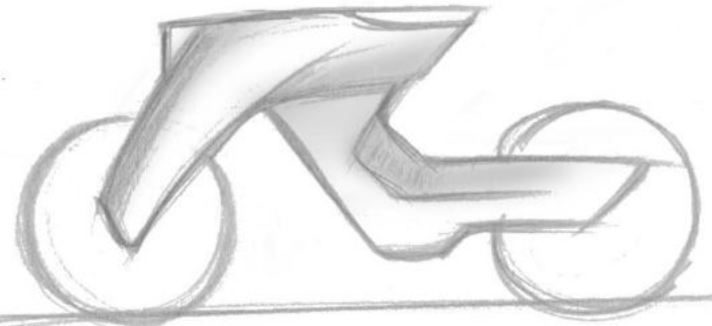
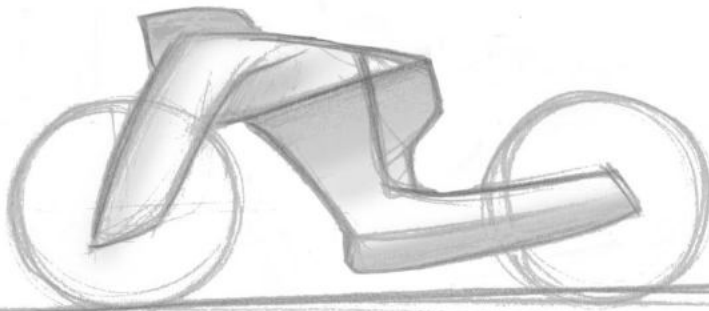
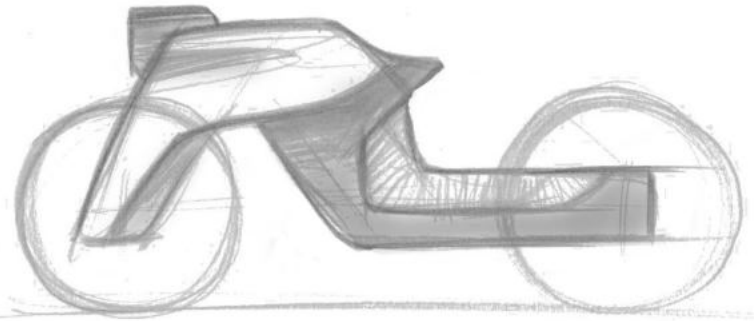
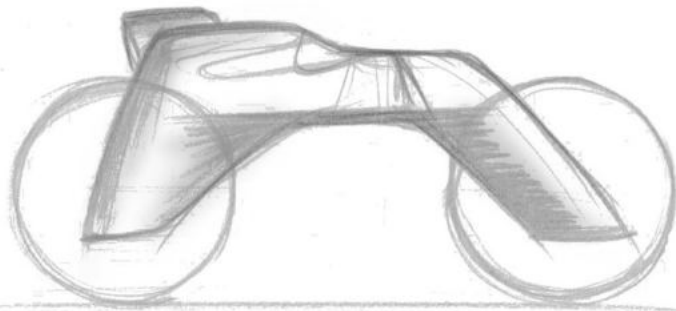


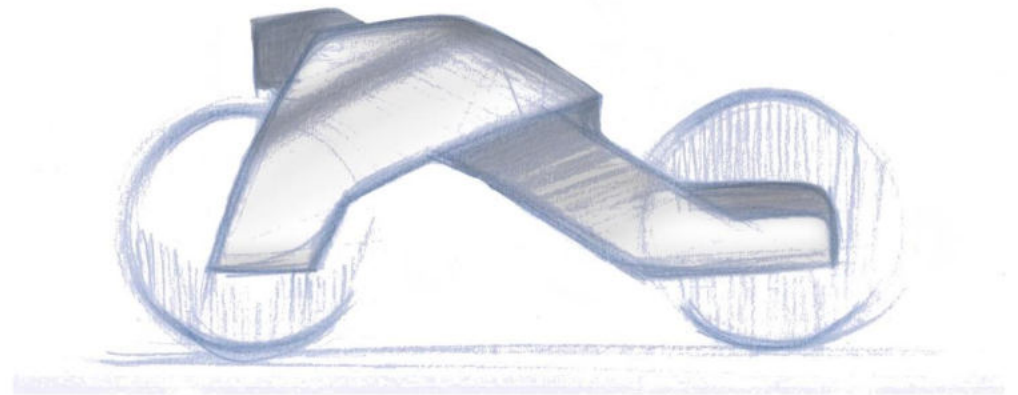
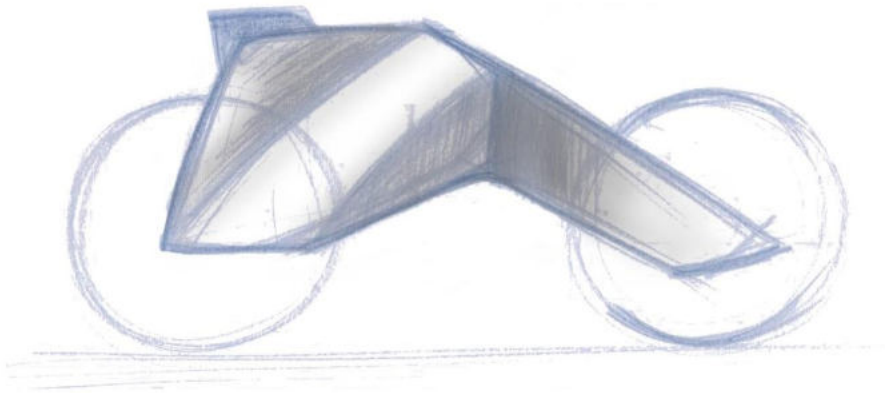




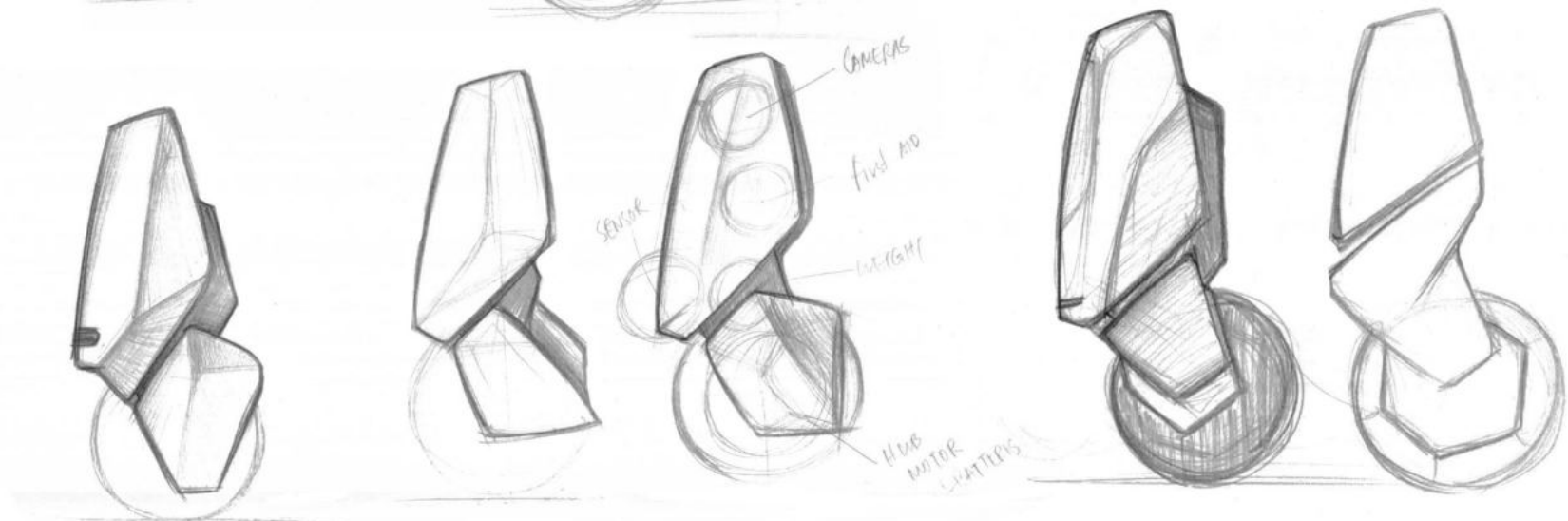
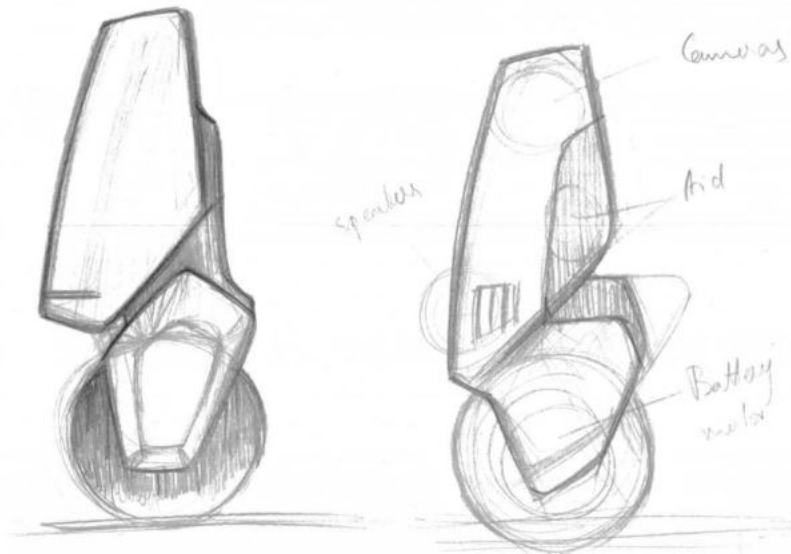


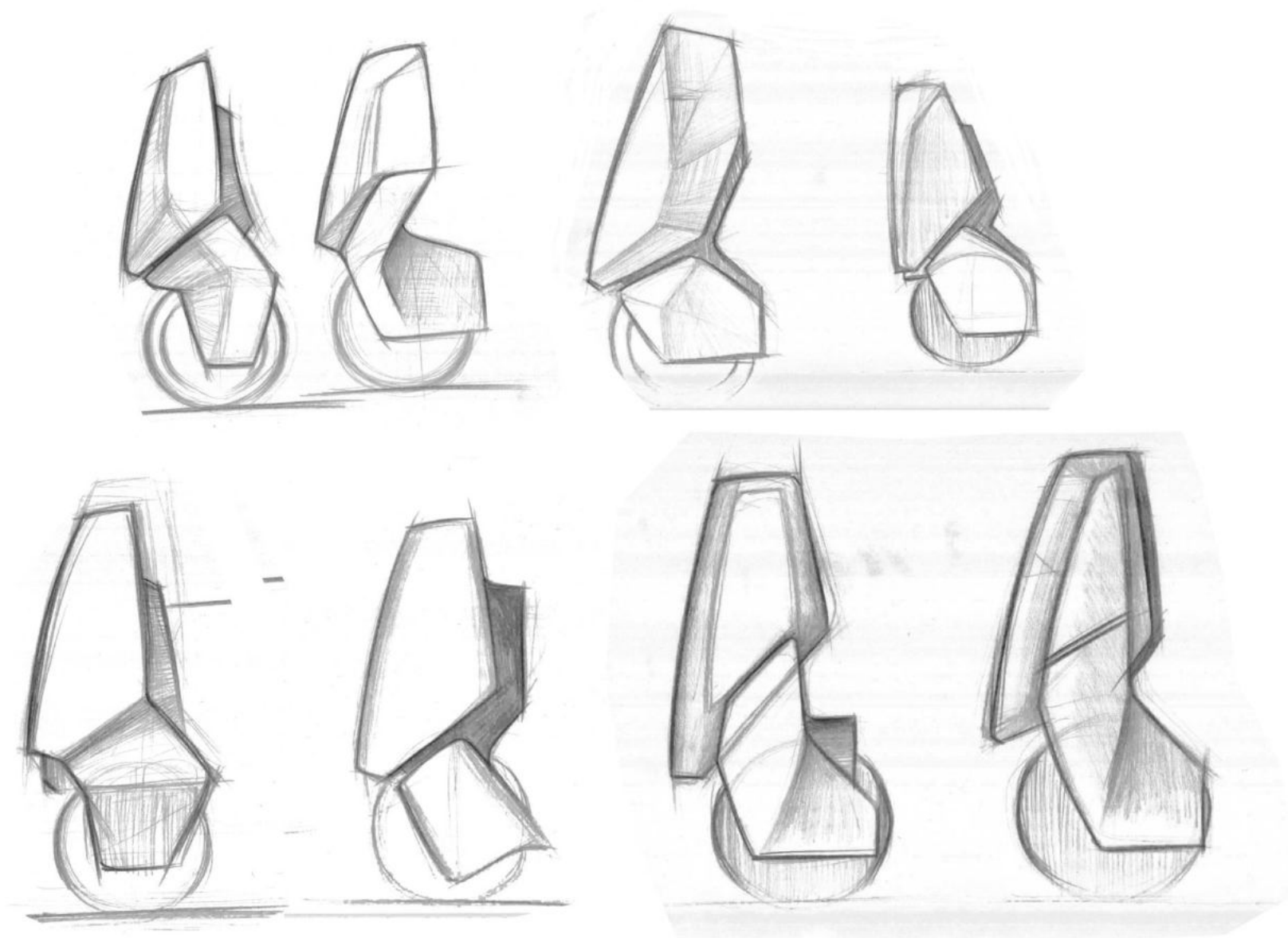
12. CONCEPT 2

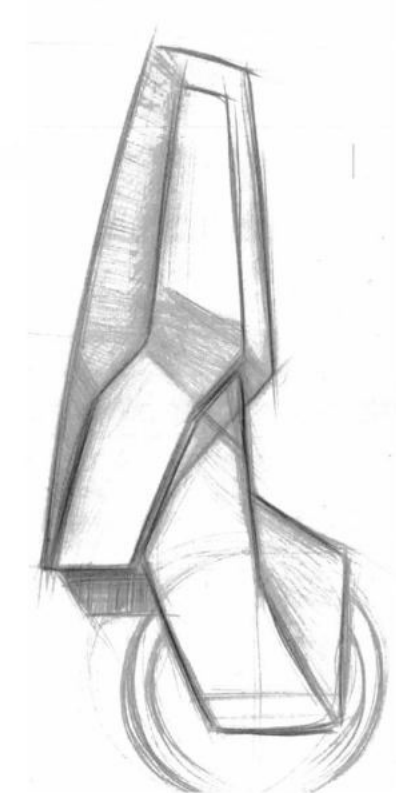
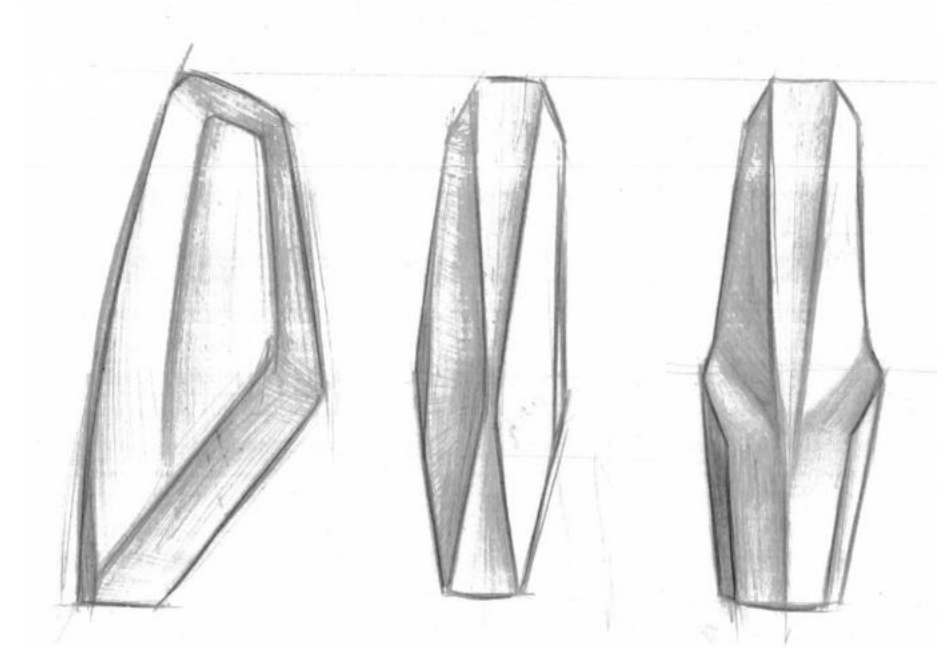
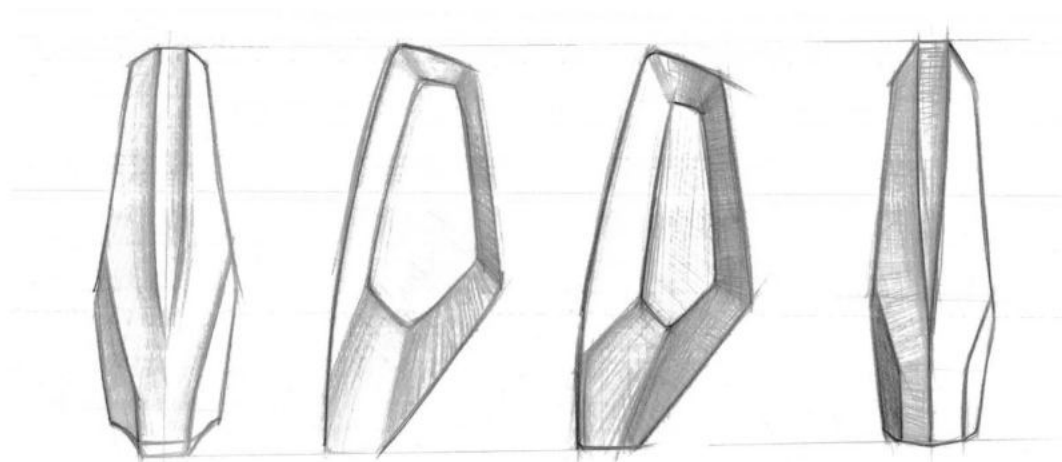


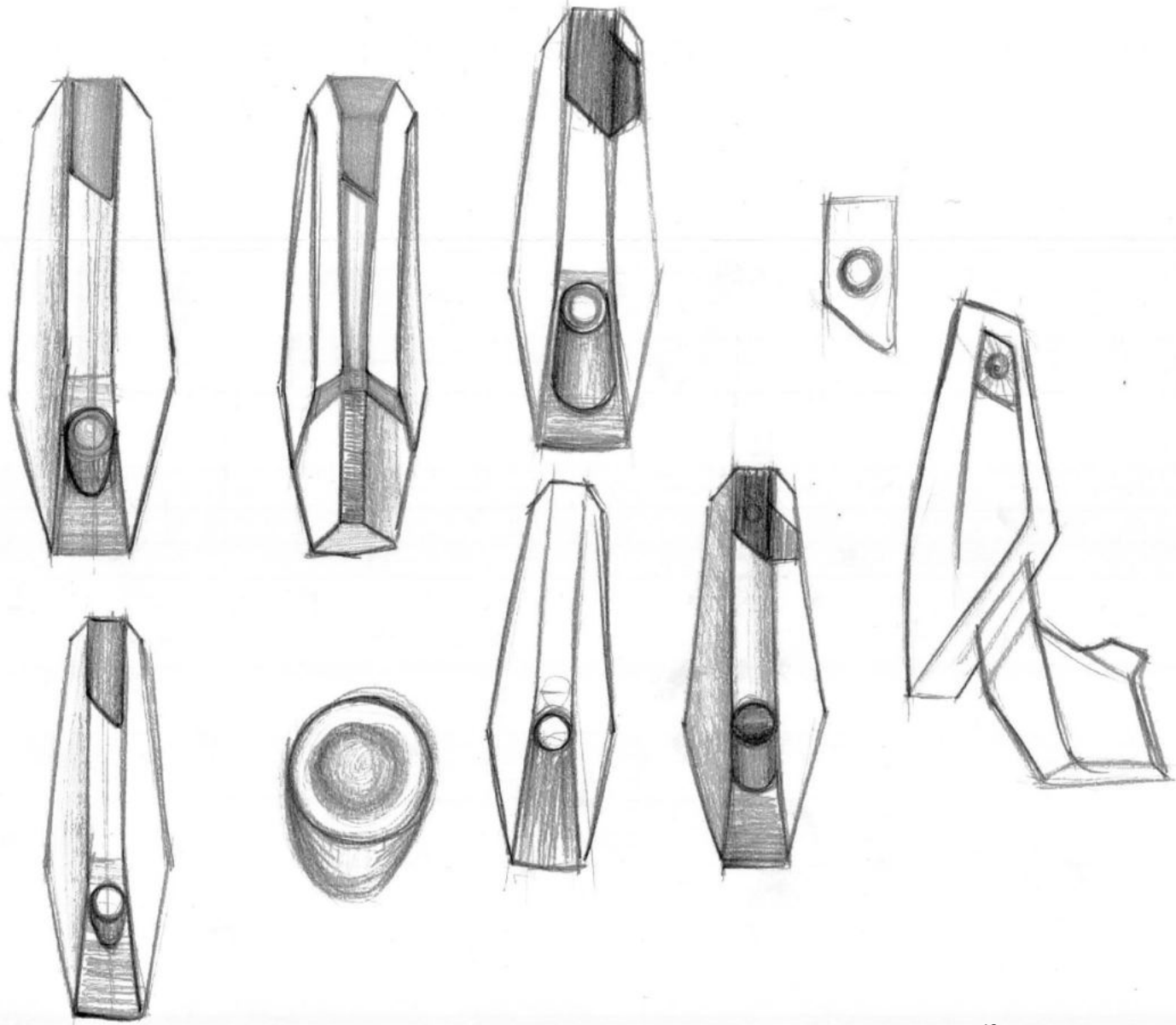


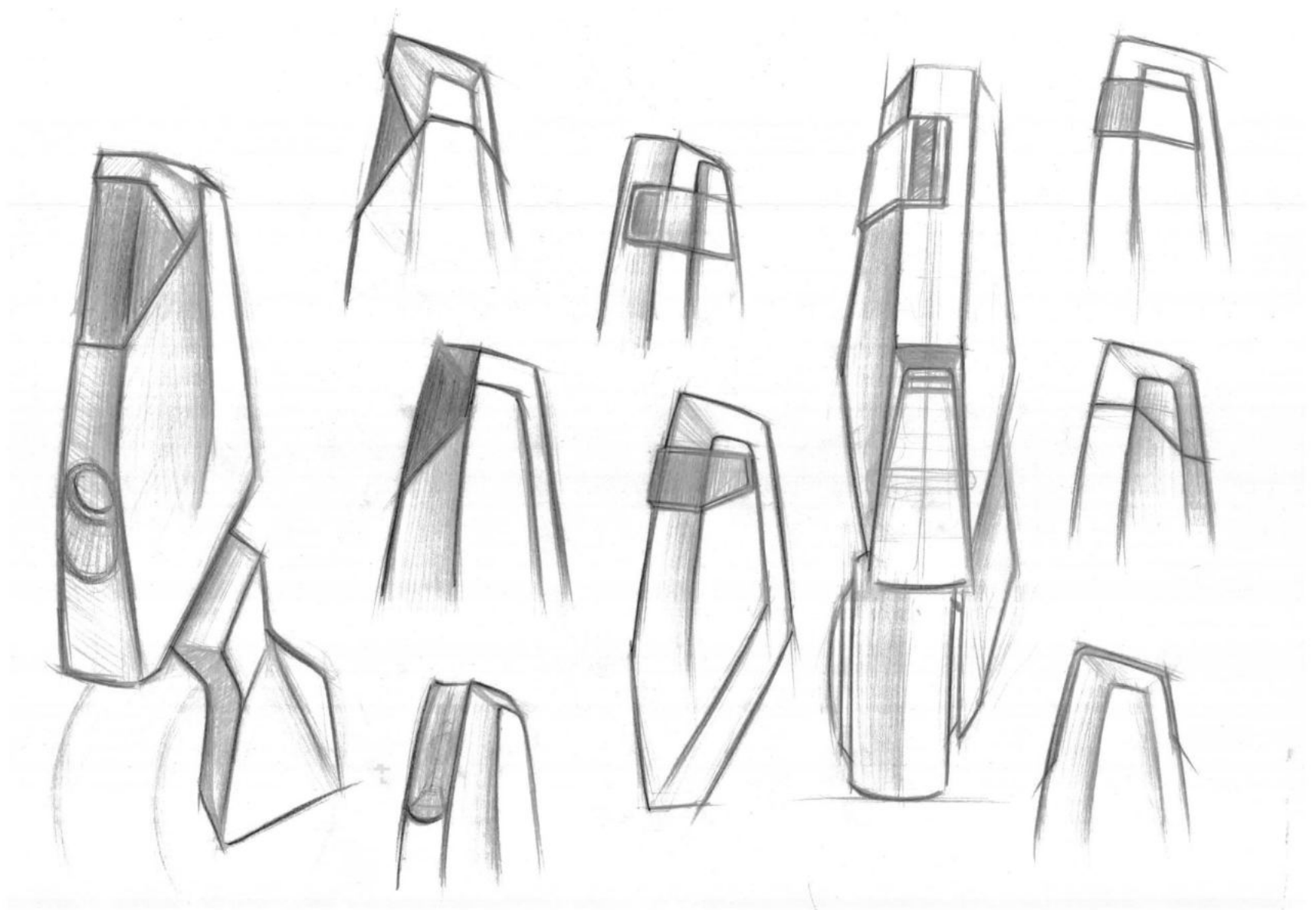
13. CONCEPT 3

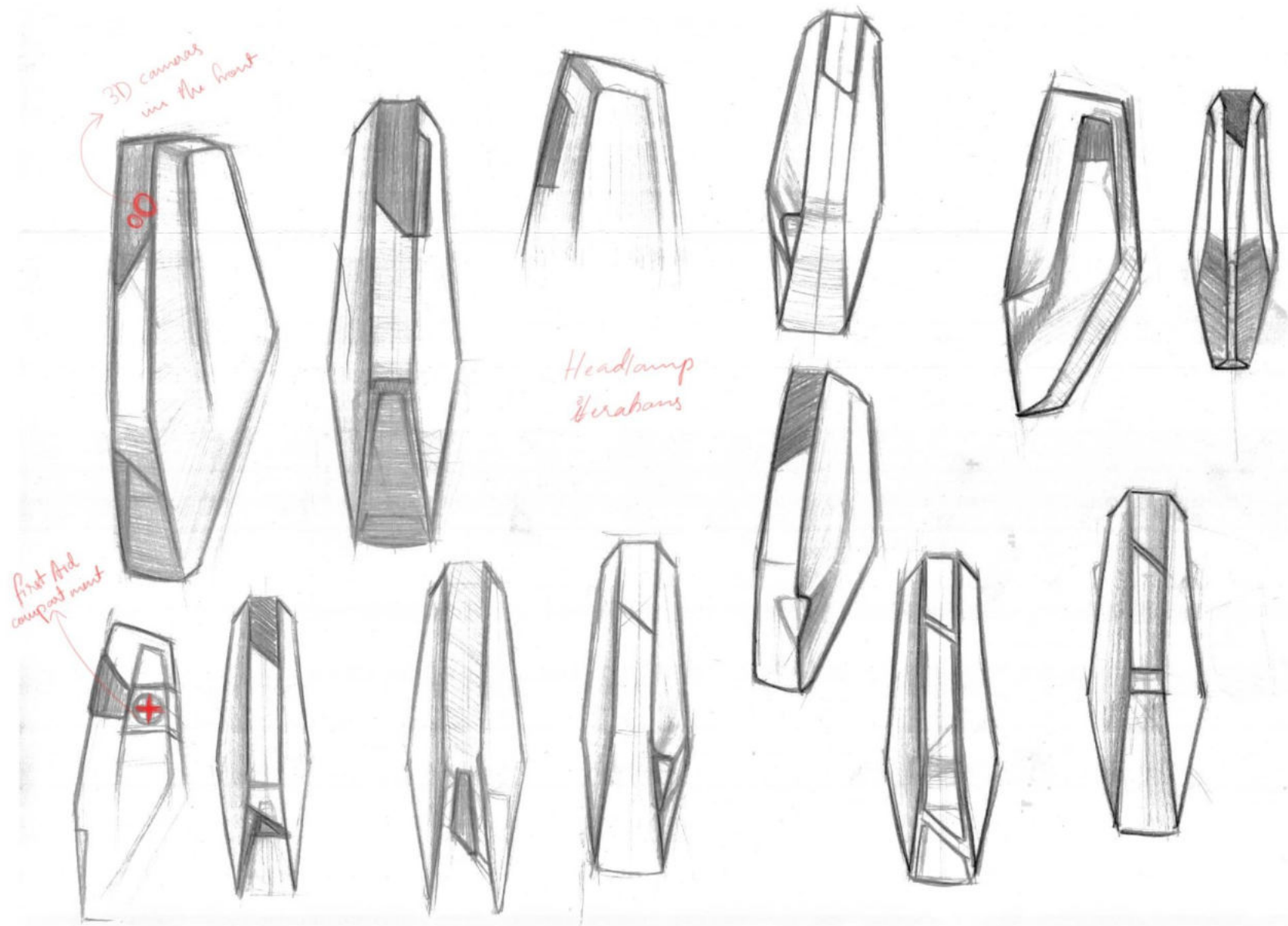










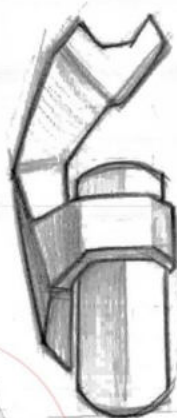
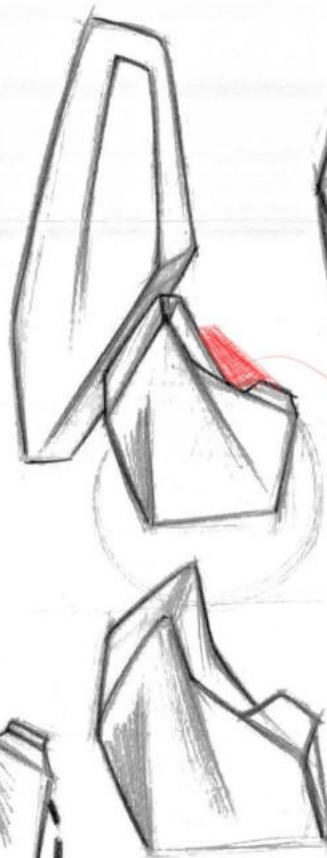
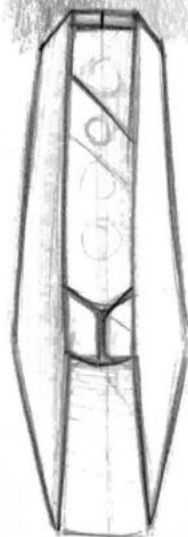


FIRST AID
SPEAKERS
SELF BALANCING UNIT



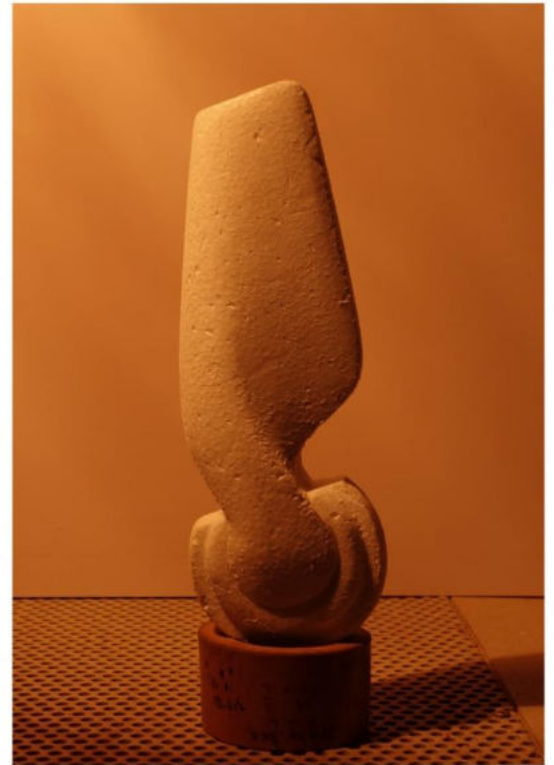
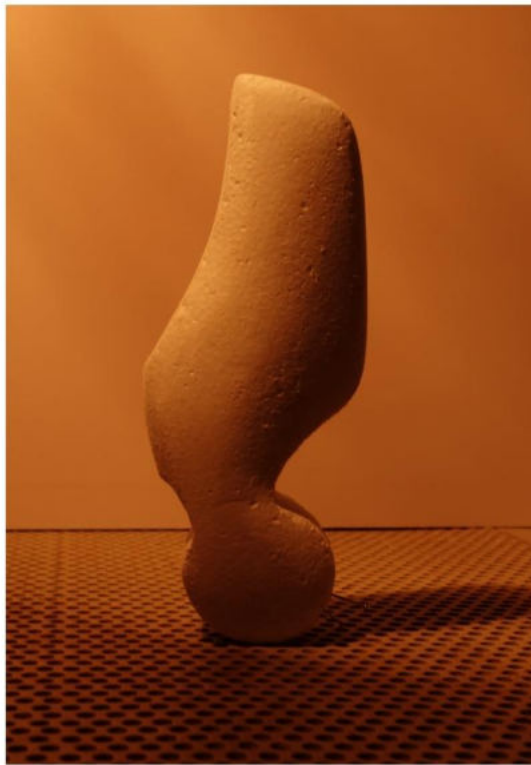
→ Rear Camera

MOD. TLRP



→ Counter weight for balancing

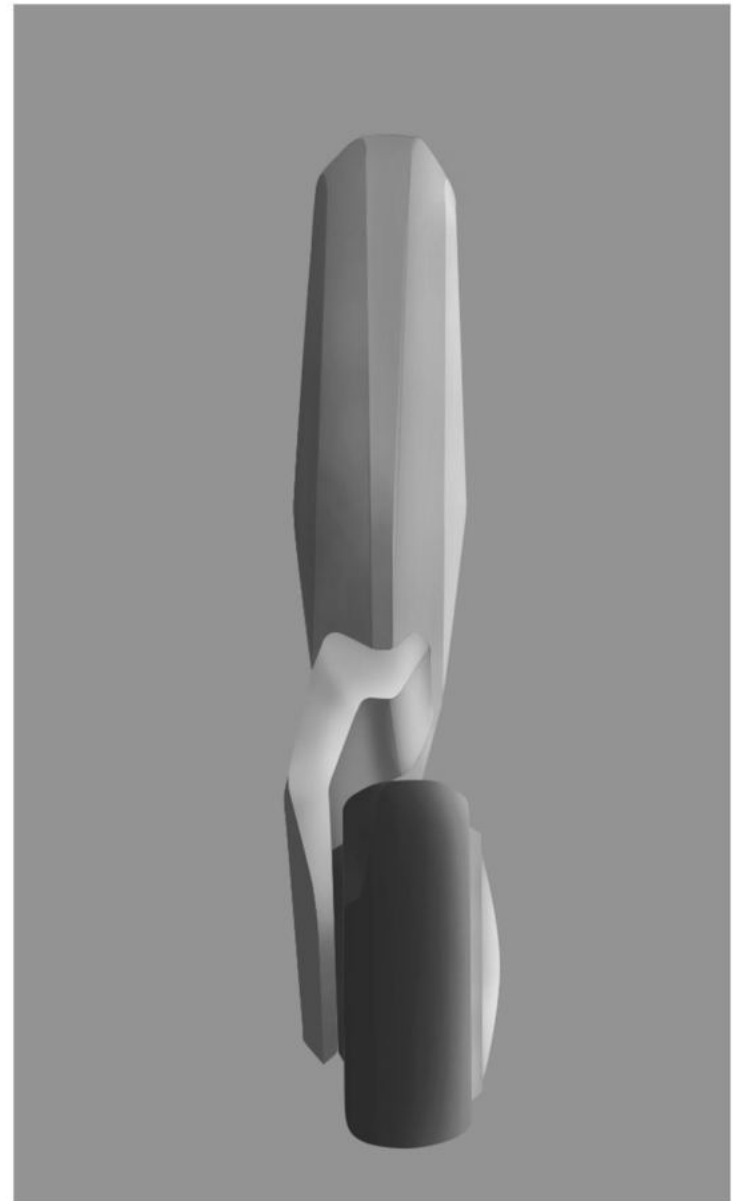
INITIAL MOCKUPS





FINAL MOCKUP







FINAL MODEL







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