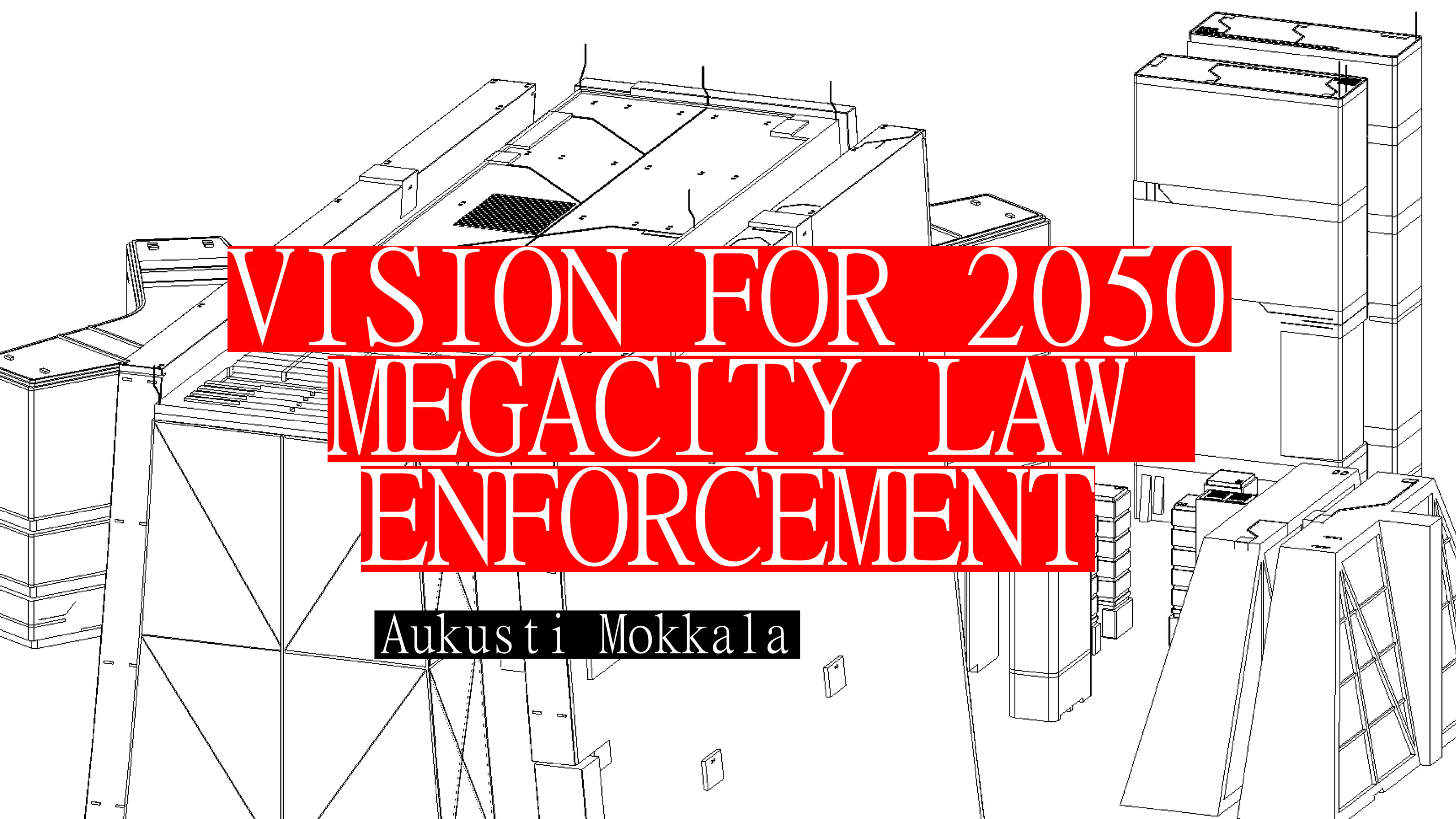

VISION FOR 2050 MEGACITY LAW ENFORCEMENT

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ABSTRACT

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Bachelor of Design

Vehicle Design

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This is a broad project that aims to visualize the function of your everyday police officers in a future megacity. Everything I design will serve the purpose of creating a unique, yet believable scenario that is suitable for games and movies. My focus is the police patrol itself, and that includes a new type of vehicle and various equipment. Most of my research material stretches into the year 2050, which is why I chose that year.

My motivation stems from my neverending interest in cyber-punk and my one year's experience in mandatory military ser-vice as a military police squad leader, which is not something a lot of designers get to utilize in their work.

Research questions:

How will form language and graphics impact the image of law enforcement?

What are the challenges of future law enforcement?

Is designing a new vehicle type even necessary?

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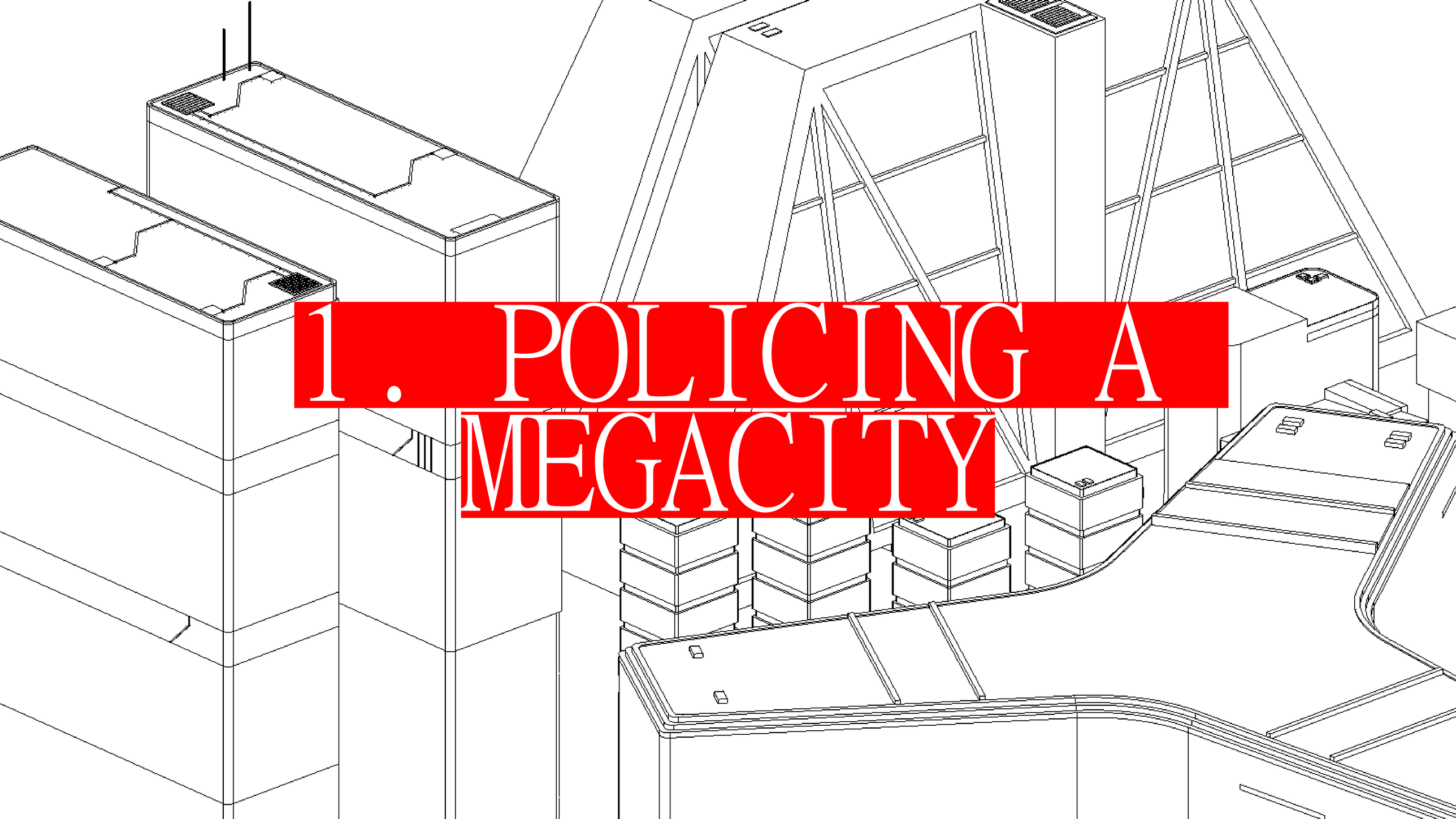


1. POLICING A MEGACITY

1. POLICING A MEGACITY

"Today, 55% of the world's population lives in urban areas, a proportion that is expected to increase to 68% by 2050" (UN DESA 2018.)

The defining characteristic of a megacity is its population. It can be spread out or dense, wealthy or poor. This creates a multitude of challenges within the city from a policing viewpoint. For Example, Rio De Janeiro is infamous for its inconsistent living standards. Wide slums with high crime rate surround the city centre. This is an unbalanced scenario for law enforcement and its tactics can now longer be consistent throughout the city. In Rio downtown, law enforcement might look like your everyday police duty, but in the slums military police patrol with armoured vehicles and must employ military tactics to gain control over areas lost to gangs. (picture on the right) This leads to police becoming a threatening presence for the slum population. However, this is a situation created by the city's inability to respond to uncontrollable urbanization and merely serves as an example of a non- ideal, but likely scenario for a developing megacity. A 2018 UN report states: *"Many countries will face challenges in meeting the needs of their growing urban populations, including for housing, transportation, energy systems and other infrastructure, as well as for employment and basic services such as education and health care" (UN DESA 2018.)*

Brazil's Military Police unit BOPE utilize heavily armoured vehicles in slum crimefighting. The BOPE insignia also features a skull and a knife that further amplify the menacing image.
www.telegraph.co.uk

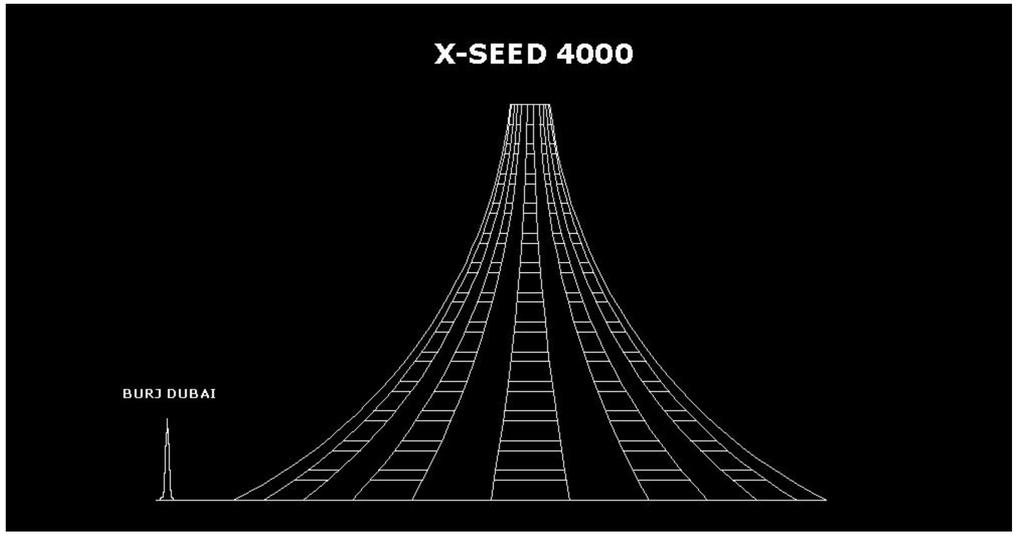
www.wikipedia.org

1. POLICING A MEGACITY

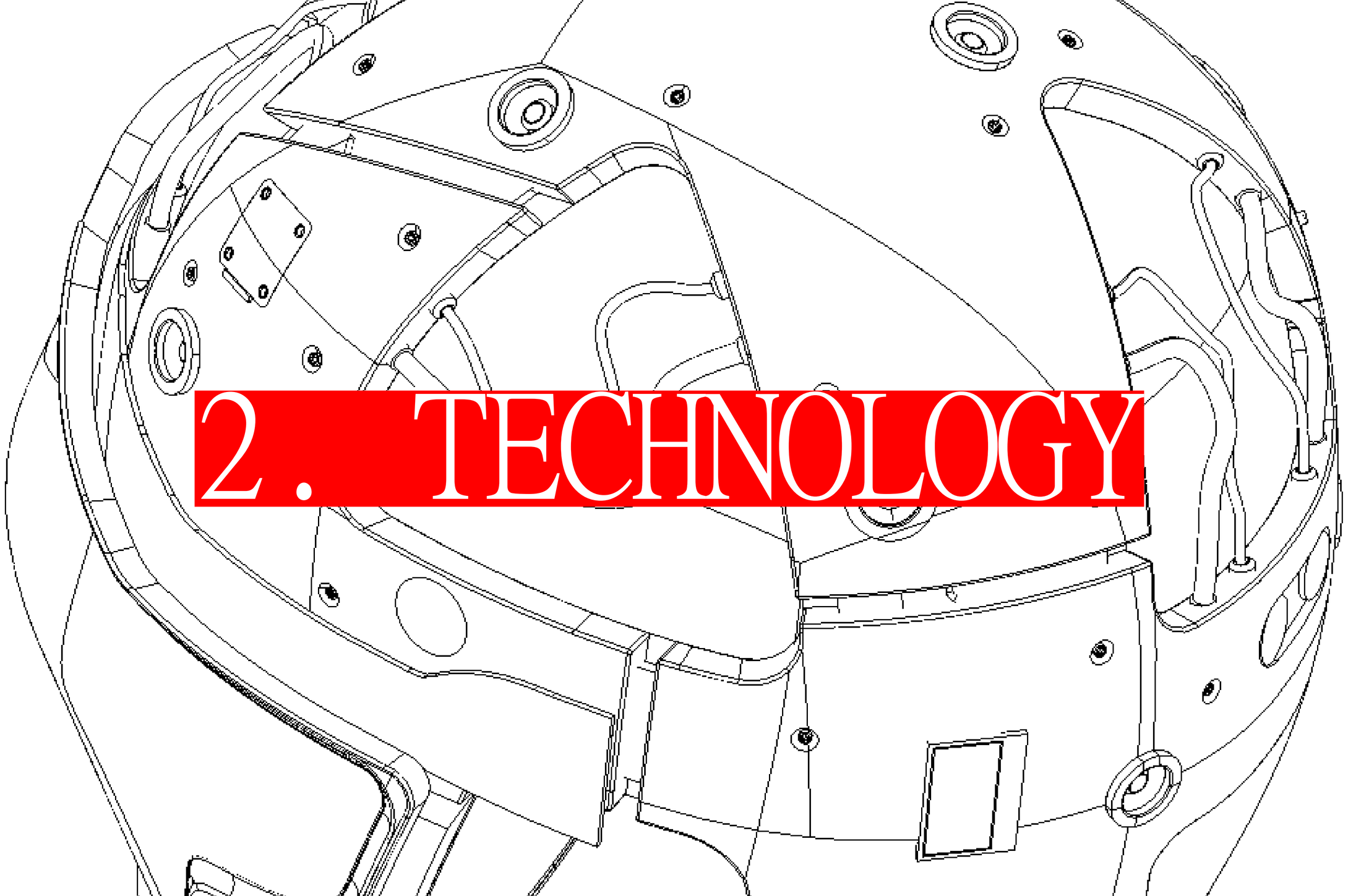
"International terrorism might also originate in fast-urbanizing developing countries (even more than it already does). With their neighbourhood networks, access to the Internet and digital communications technology, and concentration of valuable targets, sprawling cities offer excellent opportunities for recruiting, maintaining, and hiding terrorist networks." (Jack A.Goldstone 2010.)

Heavily crowded urban environments can be unpredictable and even chaotic from an officers' perspective. Dense areas limit mobility and obstruct tasks that require surveillance or even forensics. Worst examples of this can be high-profile mass shootings or terror attacks where the police must not only directly respond to the threat but also to the masses of civilians and emergency staff involved in the scene. This is also where limitations of modern transportation come into play as most emergency and law enforcement units have to navigate through complex infrastructure and traffic to reach their targets.

In terms of mobility, another factor that must be taken into account is architecture. City development often favours buildings that maximizes the use of space in a densely populated city. This will make developing cities vertical in nature. Usually in large buildings like shopping malls or skyscrapers security is handled by private corporations and this could develop even further into more privatized policing as buildings are becoming even larger. The most extreme examples of megacity architecture exist only in science fiction, where huge apartment complexes house a small city's worth of habitants. Concepts of these have been developed for the real world, but they are yet to be realized.



The japanese X-Seed 4000 would have been the tallest building in the history of the world.
www.wikipedia.org



2. TECHNOLOGY

2. TECHNOLOGY

2.1 SURVEILLANCE

Data collection and surveillance are the most controversial topics in policing, as it must be non-intrusive, while being effective at the same time. Law enforcement practitioners and academics suggests that unmanned aerial systems are expected to become a more prominent tool for this. (RAND 2019, 39-52) With technology developing over time, UAS: s become even smaller and better equipped. Combining this with Knightscope -style (picture on the right) automation could enable law enforcement personnel to focus more on tasks that require human interaction. However, police must clearly communicate their objective and intentions with this technology as well as respect citizens' privacy to retain public support.

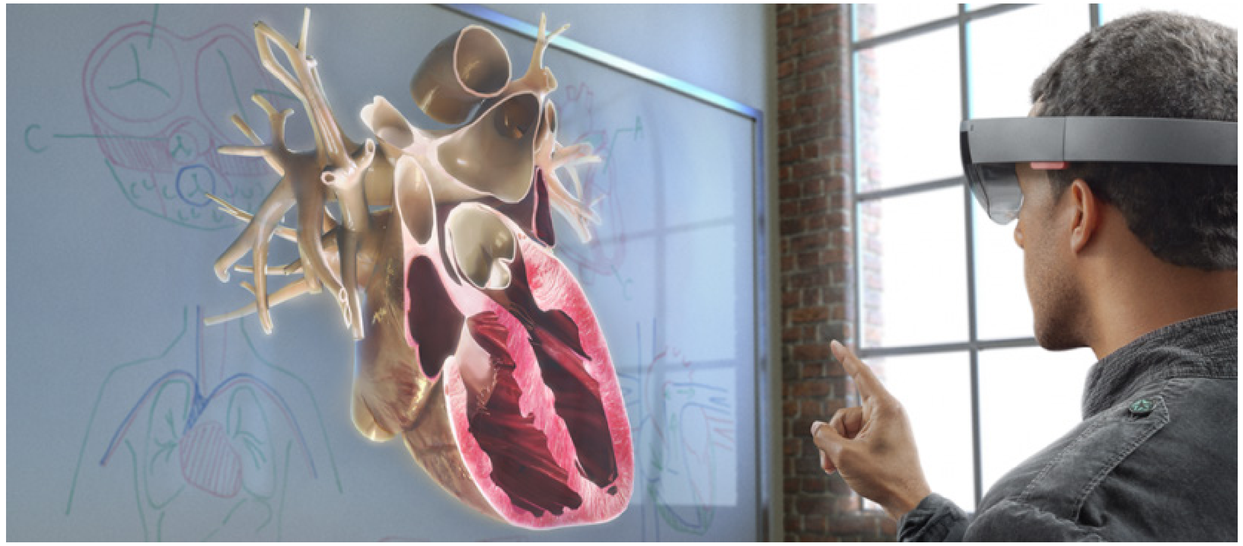
Knightscope is an american security tech corporation. Their robots already provide security in places like malls and warehouse areas. https://www.businesswire.com

2. TECHNOLOGY

2.2 AUGMENTED REALITY

Augmented reality alters the user's perception of his surroundings by adding graphics and audio-visual data. AR uses cameras and sensors to capture information and then the altered image is displayed to the user on a display. AR is usually accessed via wearable glasses, such as google glasses, or via handheld devices like smartphones and tablets.

This technology has already become mainstream with smart filters seen on mobile apps, but its potential is also being recognized in the medical field (picture on the right). Combined with developing sensor and monitoring technologies, this will become a powerful tool for situational awareness and even forensics. In situations where fast and effective decision making is critical, AR could be a helpful tool. Computers can analyse visual information way faster and are not affected by stress. For example, AR could assess the threat level of an armed individual by tracking his weapon movements and overall behaviour, suggesting the proper course of action for an officer who might be under immense pressure. This could mean showing greenlight for lethal use of weapon if lives are under immediate threat.



www.medtechboston.medstro.com

2. TECHNOLOGY

2.3 MOBILITY

The police must have the best possible means of transportation available to be effective. In a megacity their mobility can be hindered by traffic and complex infrastructure. This is often solved in science fiction with airborne vehicles, such as flying cars (most notably blade runner's police spinner)(Picture on the right). While today's helicopters could offer similar mobility, their size and loudness make them unsuitable for low altitude urban flight. This type of aviation is under constant research and development, and prototypes such as Cormorant VTOL show that there's room for innovation.

www.copybook.com

VTOL stands for vertical take-off and landing. Helicopters and even some fixed wing aircraft fall into this category.
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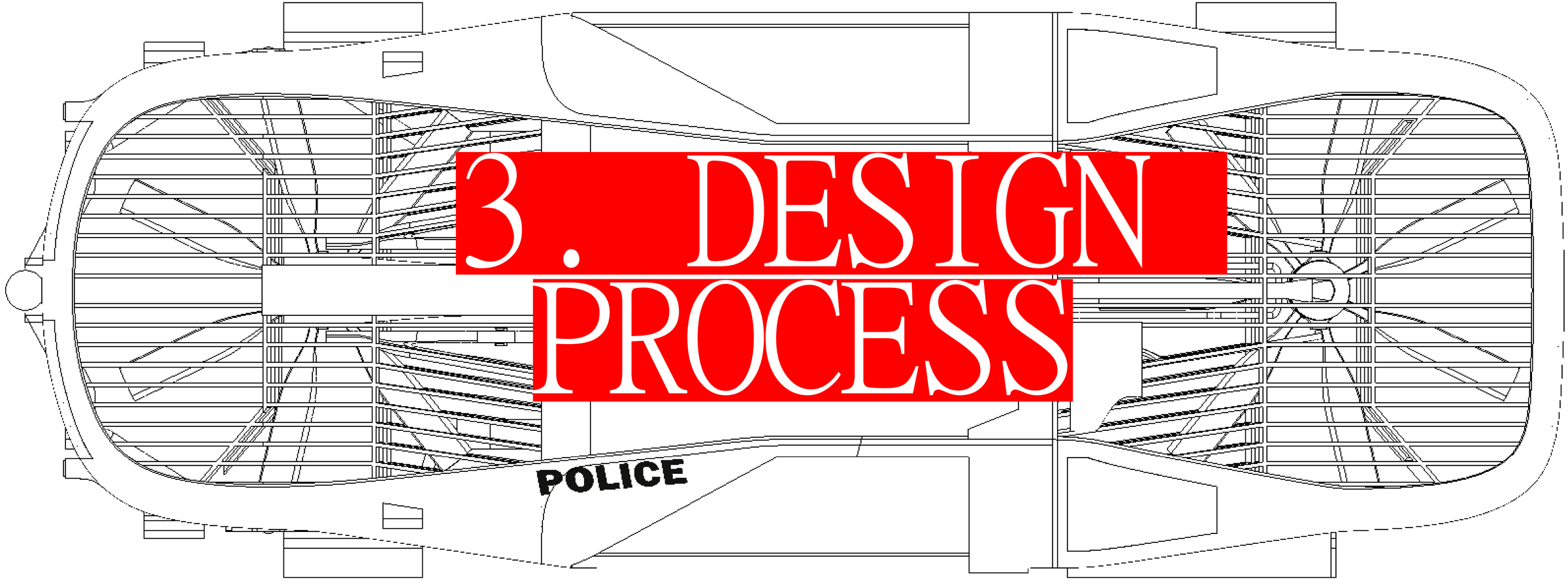
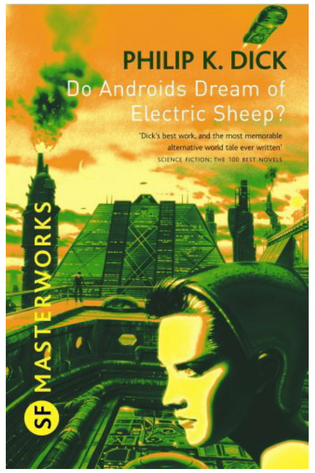


3. DESIGN PROCESS

3. DESIGN PROCESS

3.1 INSPIRATION

Going into this project I already had a lot of inspiration from Science fiction novels by authors such as Arthur C. Clarke, Philip K. Dick and Isaac Asimov. 1980's scifi- films like Blade Runner and even the satirical Robocop added to this pool of inspiration not only with their law enforcement themes, but with their visual style. I delved deeper within 80's cyberpunk by reading an iconic manga series, Akira. This influenced a lot of my design for this project.



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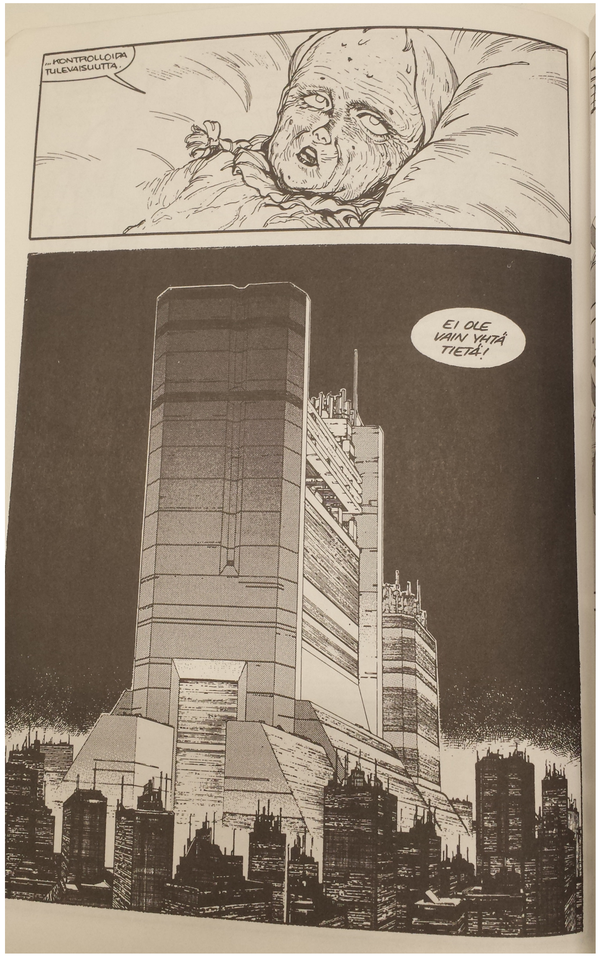
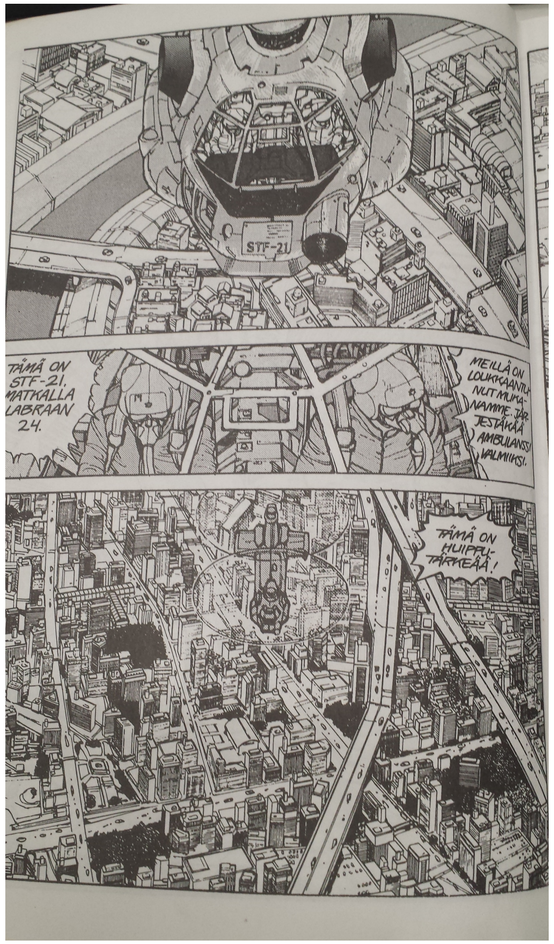


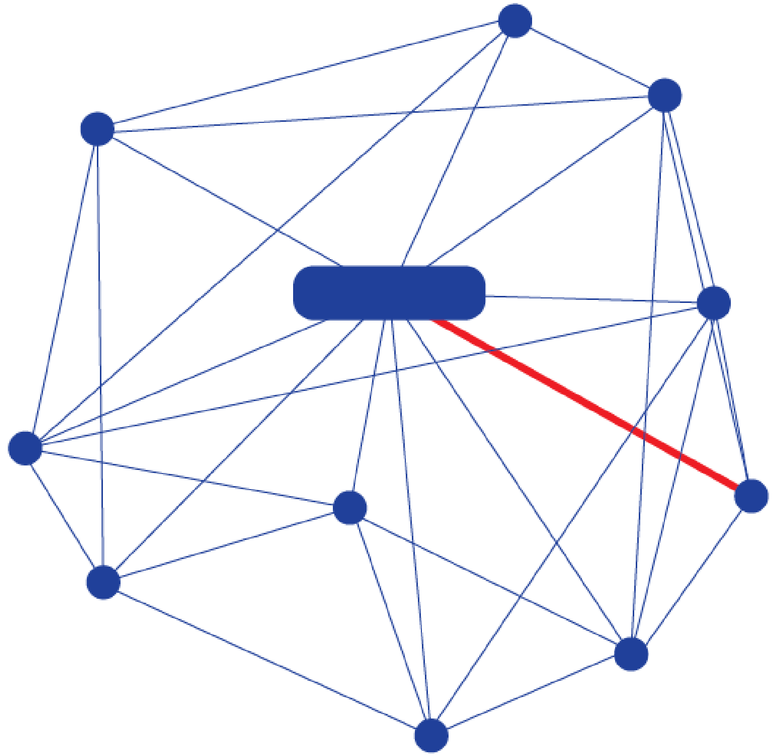


Panels from Katsuhiro Otomo's Akira (1982)

3. DESIGN PROCESS

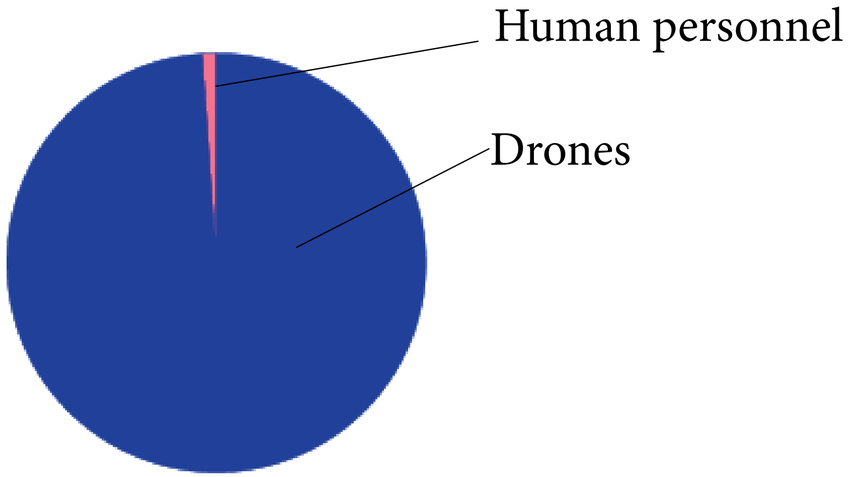
3.2 SCENARIO DEVELOPMENT

Based on my research and inspiration, I created a scenario where policing becomes partly automated via heavy use of drones and bots. The police force consists of a large volume of different types of drones that patrol the city, and a smaller portion of officers, ready to respond when they're needed. This creates a layered system where law enforcement personnel can be allocated to where they are needed the most. It is up to the drones' AI to assess whether a task requires human interaction. For example, a drone may alert nearby officers when it faces a task it can't physically or intellectually handle, such as apprehension of a dangerous person or questioning, where seeing face to face is often required. As the drones are essentially a huge sensor network that gathers information , they can feed data directly to the officers' augmented reality headgear when necessary.



A simple illustration of the network of drones and law enforcement personnel. The blue dots represent the drones and the rounded blue square is the police patrol vehicle responding to an alerted drone (red line).

The actual drone to officer ratio should be something like 100/1, as showcased in the pie chart on the right.



3. DESIGN PROCESS

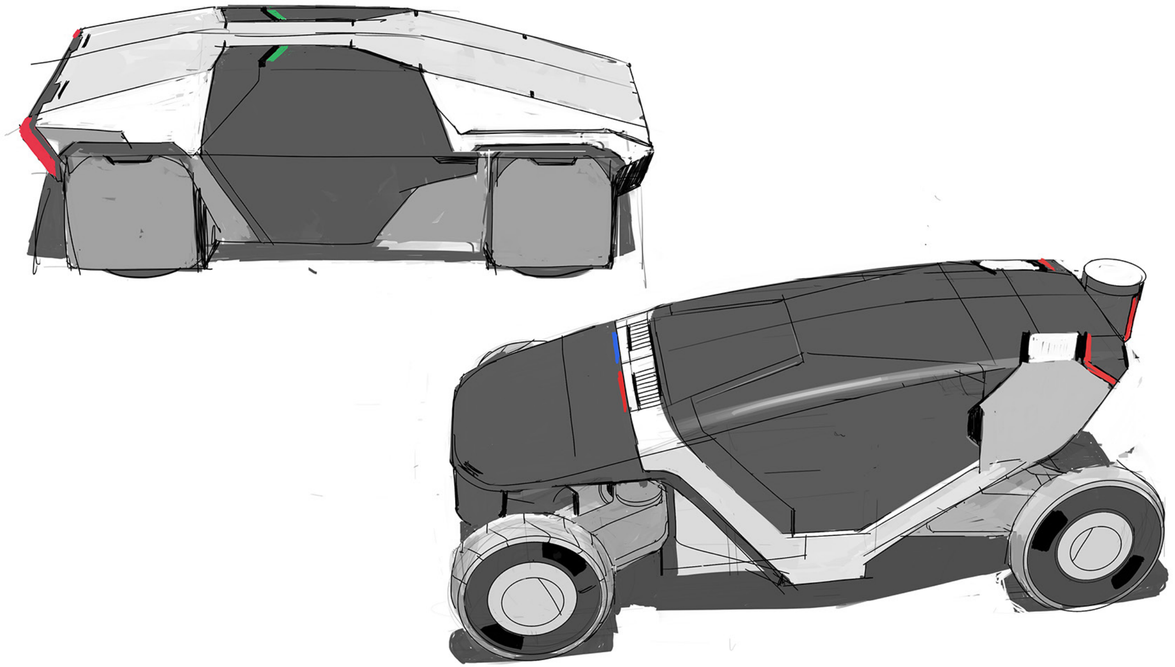
3.3 SKETCHING

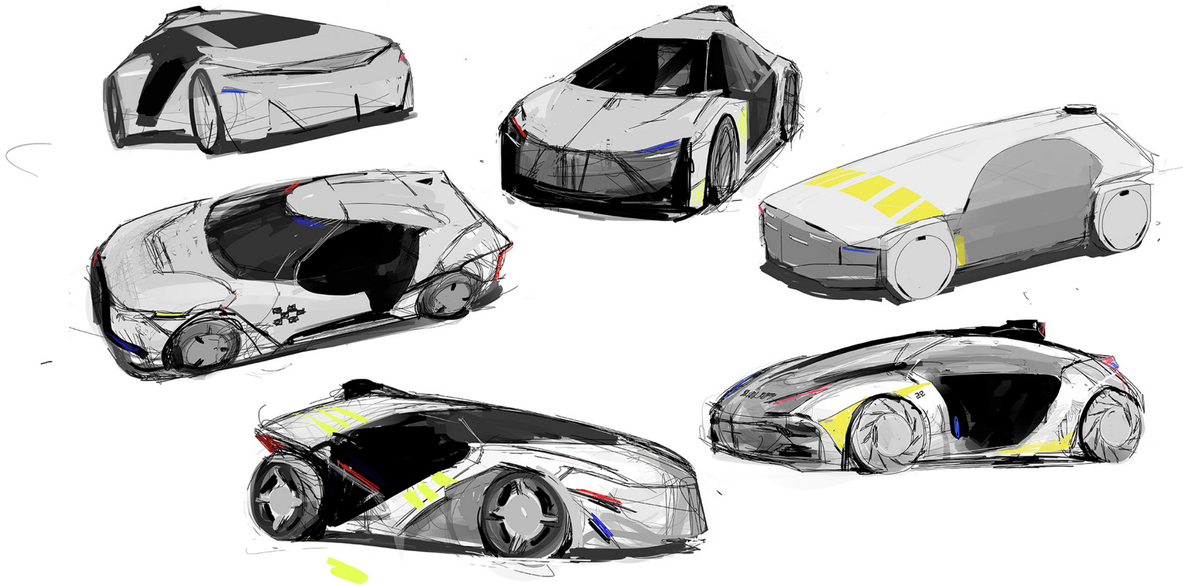
Being heavily inspired by Akira, I started with manga -style character sketches. This was to guide my modelling and photo manipulation process later, as my final presentation would include realistic character designs alongside the main vehicle.

3. DESIGN PROCESS

3.3 SKETCHING

I was unsure what kind of vehicle I was going to design. I only had ideas for its features but couldn't even decide if it's an automobile or an airplane. I often found myself thinking of a helicopter -type vehicle as it fits my megacity scenario perfectly. As research went on, this proved to be the right path to take.



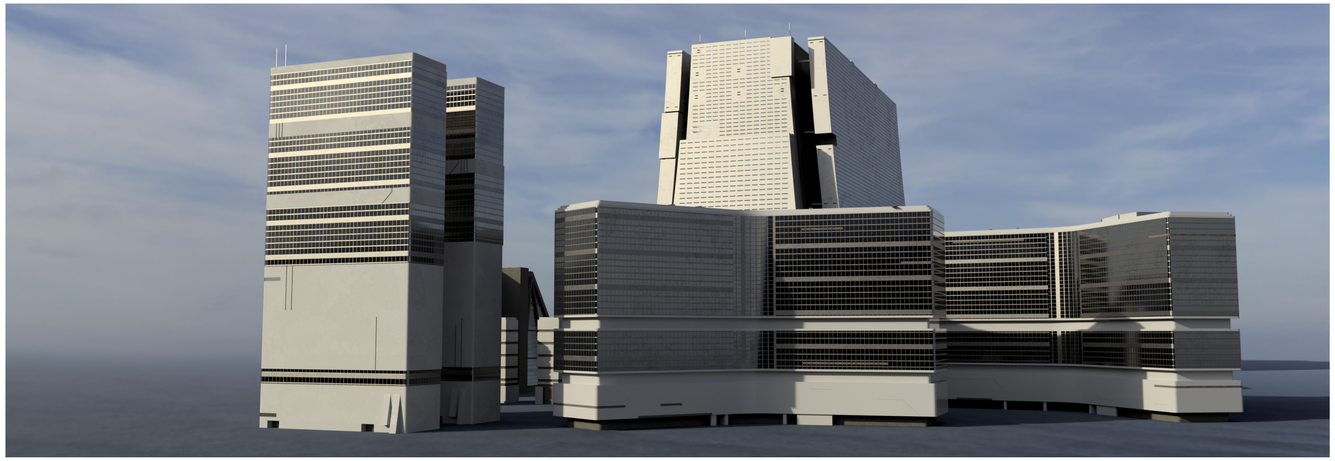


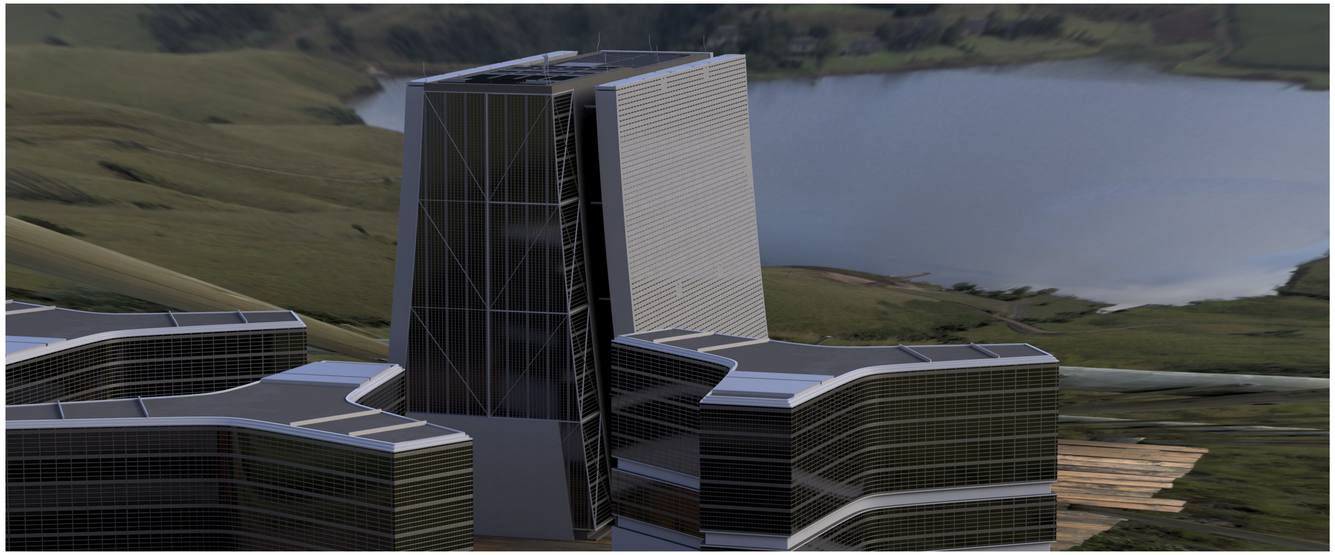
3. DESIGN PROCESS

3.4 MODELLING

Another personal goal with this project was to improve my CAD modelling skills. I started rather ambitiously modelling several objects that I could use on this project, but only ended up finishing the most important one, the VTOL aircraft. My idea is to bring these together for my personal portfolio, but after my graduation work.

I initially made some basic building assets that I could use later in my renders of the final vehicle.



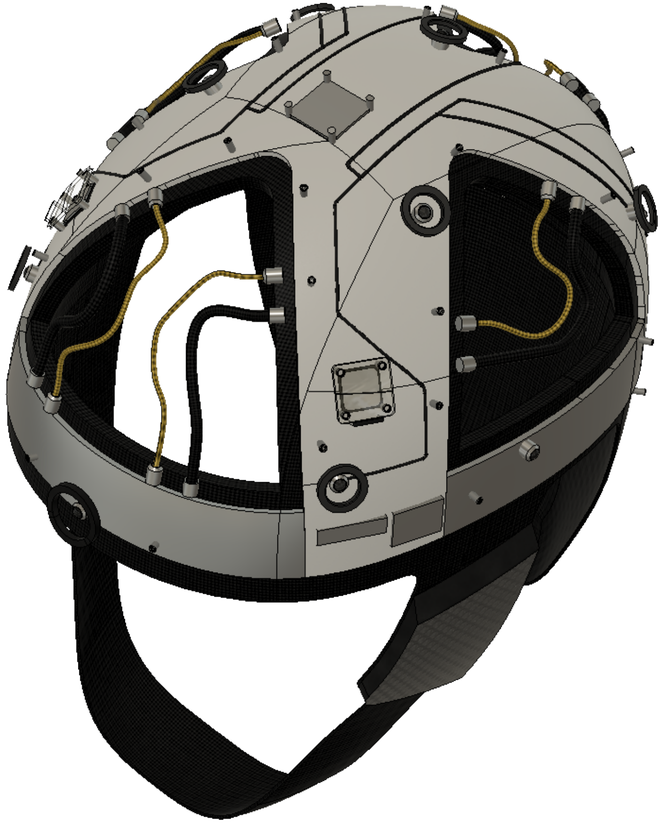


3. DESIGN PROCESS

3.4 MODELLING

My first task was to design a new type of helmet for my scenario. This design should include advanced reality support and sensors while maintaining the protective attributes of a ballistic helmet. The helmet will define the officers' overall image, so the design should not be aggressive looking.

I downloaded a digital 3d mesh of a human head and started testing different ideas based on my design parameters. I constructed the helmet layer by layer and wanted to emphasize the integrated components with the design. Later on, I switched my focus more on the vehicle by the suggestion of my teachers.

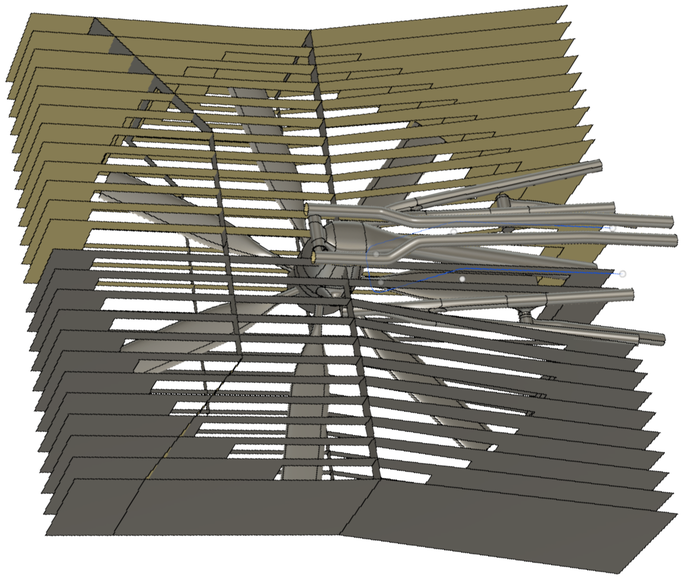


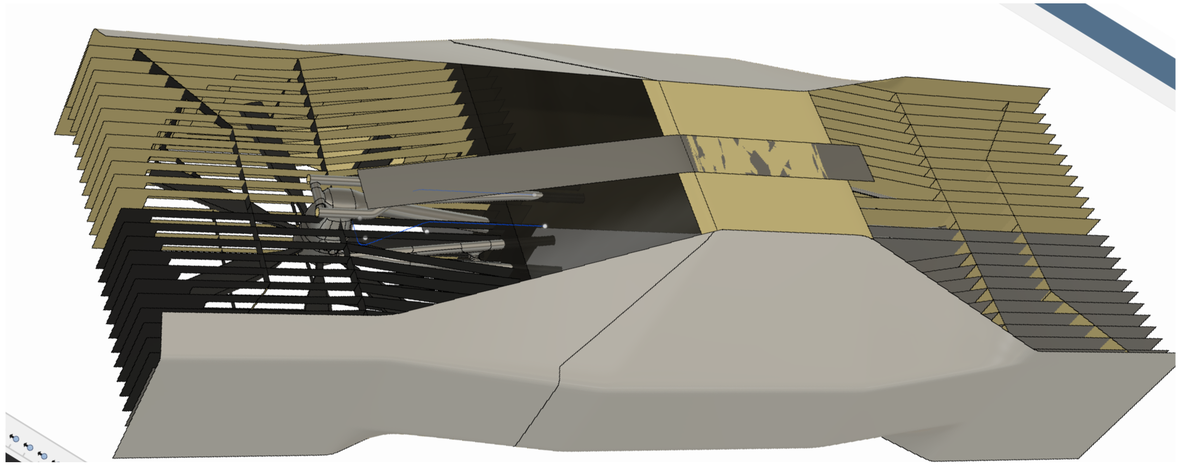
3. DESIGN PROCESS

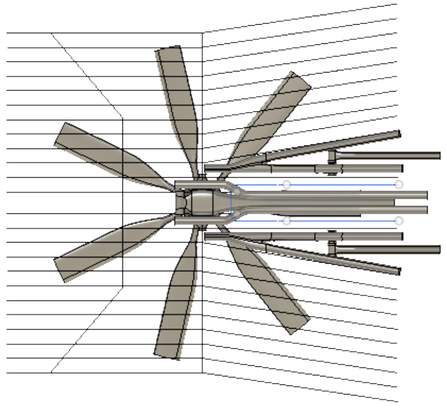
3.4 MODELLING

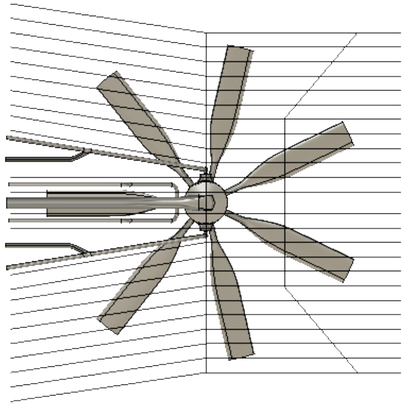
During my research I ran into an interesting aircraft design. The cormorant VTOL (featured in 2.3) would become my main inspiration for my vehicle and I would borrow its rotor configuration. However, I had a different Idea for the exterior.

As with the helmet, I started to design around the main components of the vehicle (in this case the rotors). My inspiration for the visual style came from 70's-90's concept cars and sci-fi.







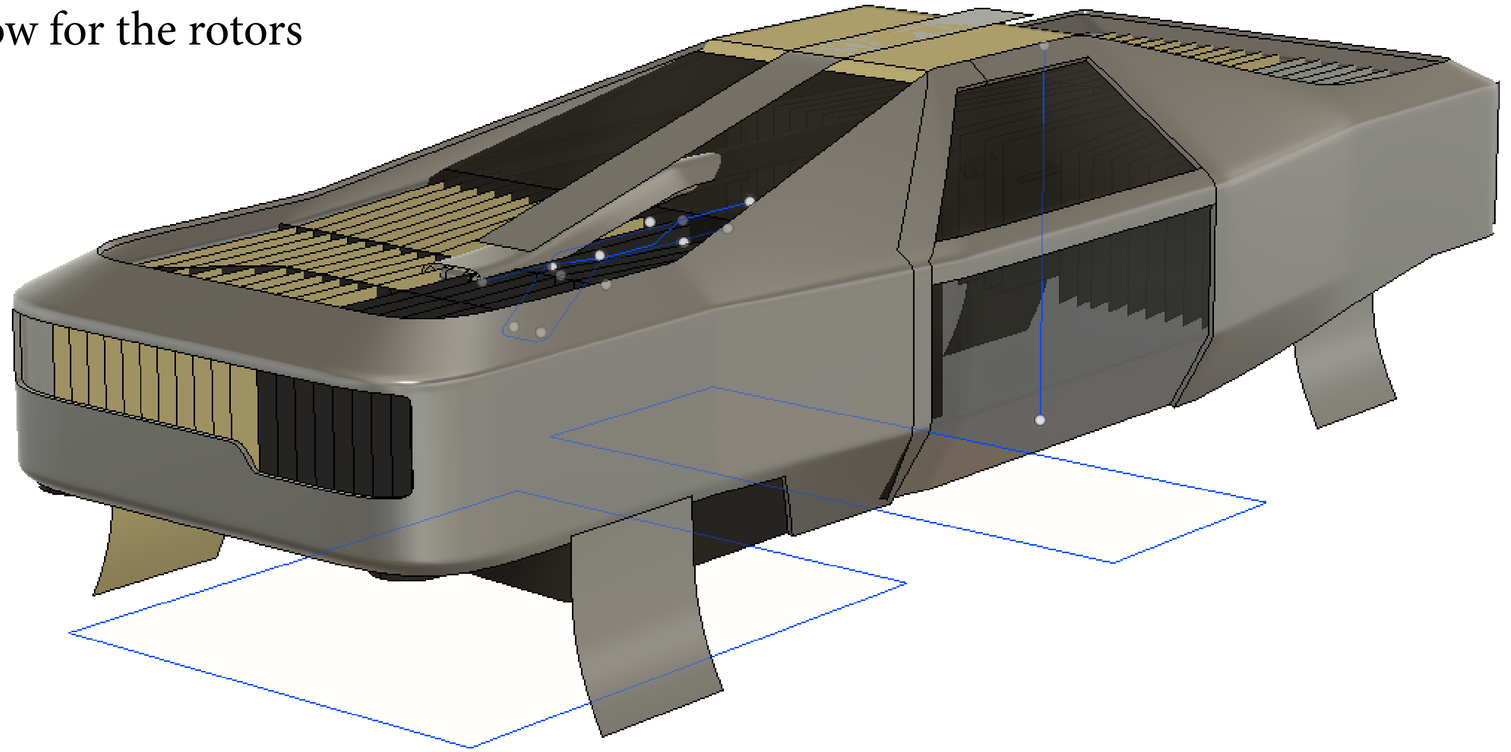


3. DESIGN PROCESS

3.4 MODELLING

My plan was to make a 4- seater, borrowing the structure of modern cars. Even though the piloting would be automated, I wanted to give the passengers windows. This was also a choice to make the design more interesting.

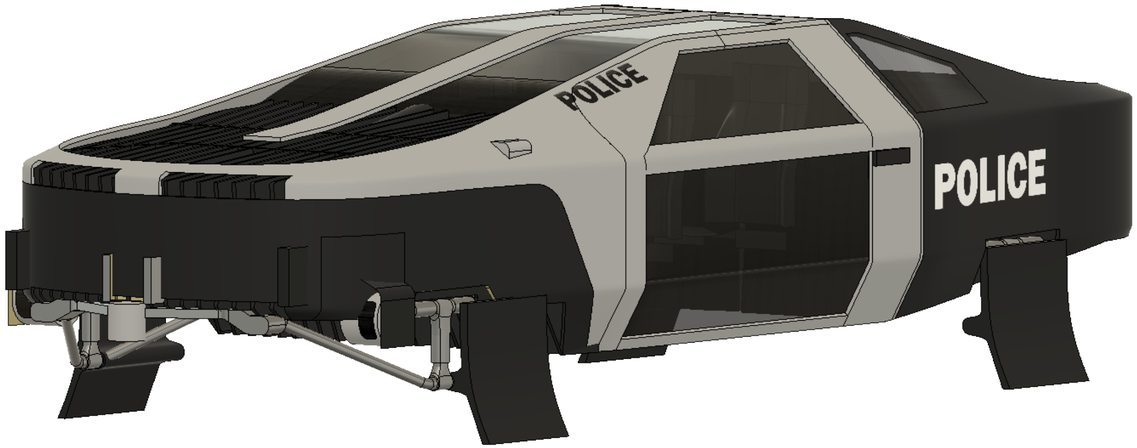
Maintaining aerodynamics as well as free airflow for the rotors was a challenge.



3. DESIGN PROCESS

3.4 MODELLING

The Design seemed a bit too boxy, so I rounded the main surfaces and angled the rotors towards the centre. This resulted in a more dynamic appearance. I also started experimenting with the graphics.



3. DESIGN PROCESS

3.4 MODELLING

The boxy appearance of the design was bothering me again. The landing gear was a huge factor in this, and after many failed attempts, I managed to design something that looked better and was more functional. After this I still wanted to do a facelift and introduced some grill -type elements to the front, while removing some unnecessary clutter. The vehicle was transforming into something even weirder, but in a good way.

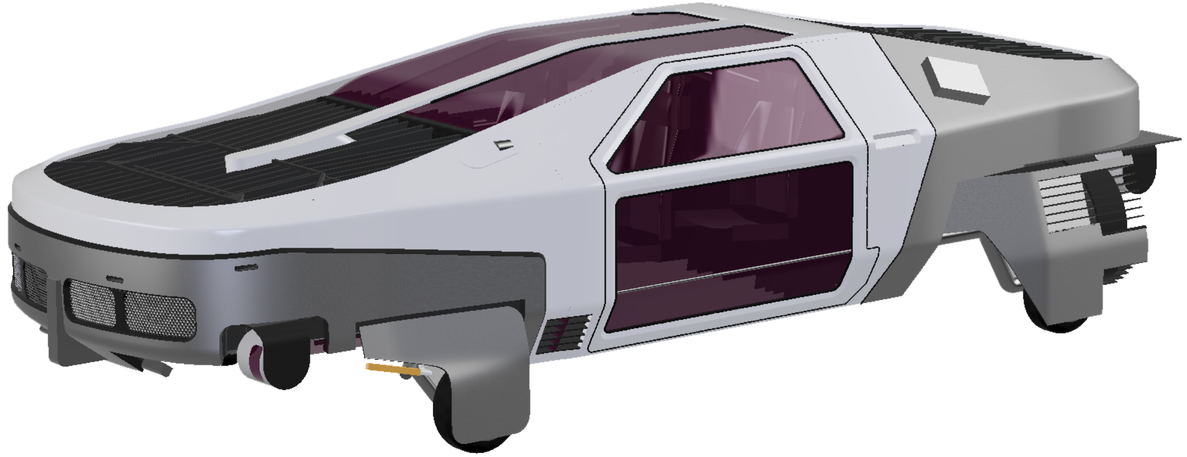
Another whole day was spent figuring out where I'd fit the auxiliary rotors. I lifted the rear main rotor up, solving two problems; the emptiness behind the cockpit, and where I'd fit the two thrust providing rotors. I decided to Integrate the auxiliary rotors into to the rear landing gear to make the design as streamlined as possible. This again made the vehicle more dynamic and realistic.

3. DESIGN PROCESS

3.5 COLOUR & GRAPHICS

One of my initial research questions considered the effect colour and graphics have on police. My goal was to find a colour scheme to make the police appear more friendly as well as design an insignia specifically for the futuristic law enforcement branch, which I rather cheekily named “air police”.

The color palette should feel futuristic and friendly. Electric blue, turquoise, and bright orange felt like happy colors that could counterbalance dark gray tones. I know silver and black are very safe choices for a futuristic look but combining this some bright colors makes it a bit more unique.



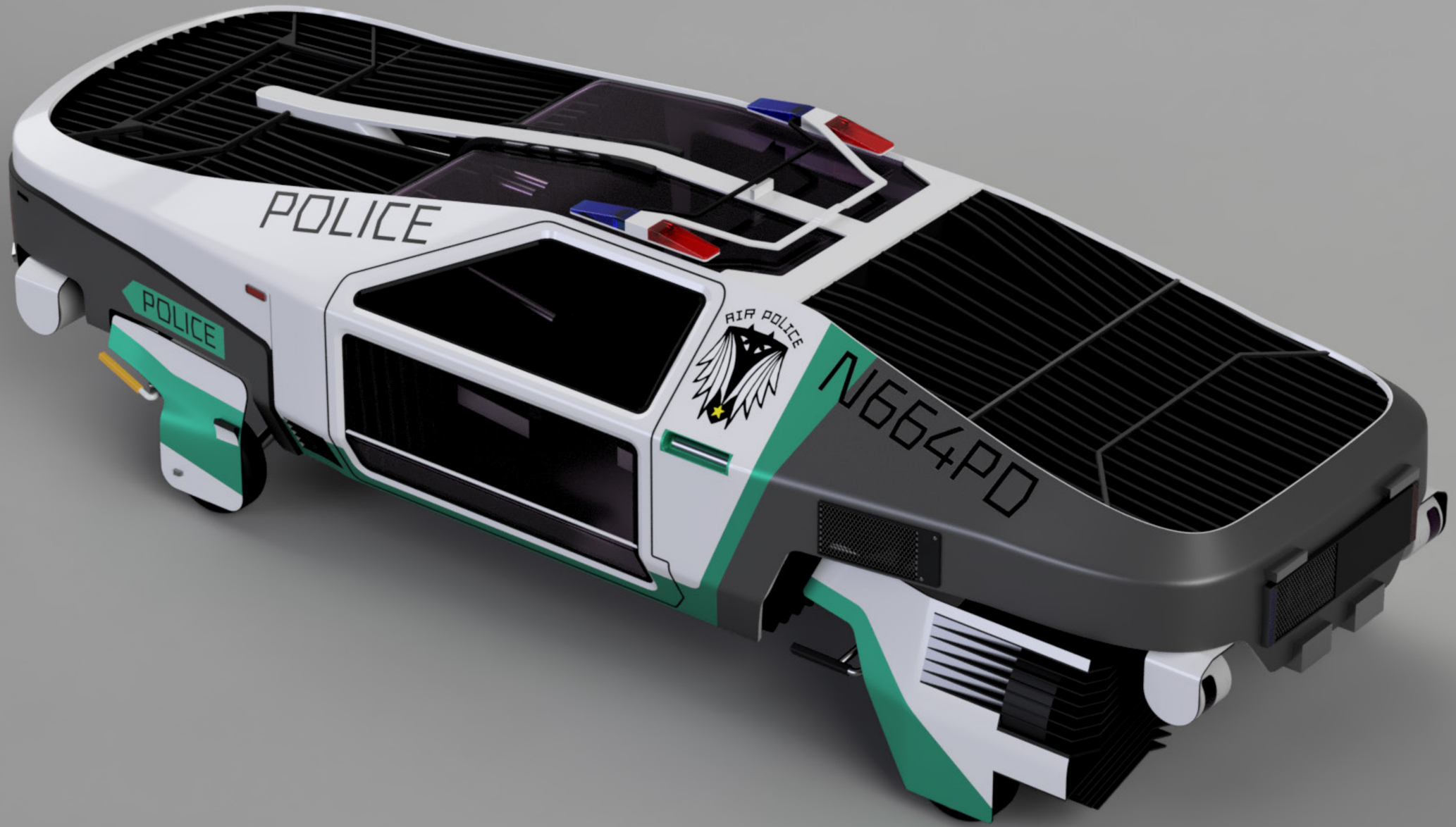
3. DESIGN PROCESS

3.5 COLOUR & GRAPHICS

I always like to create some additional graphics for my designs, just for extra flavour. Shields are often represented in police insignias as they symbolize protection. I chose to combine the shape of a shield with an owl for its friendly appearance, but hunter nature. It was hard to decide whether I'd go for a more realistic or a more cartoony, even surreal look. The cartoony one looked stranger and thus more futuristic.

4. THE CONCEPT

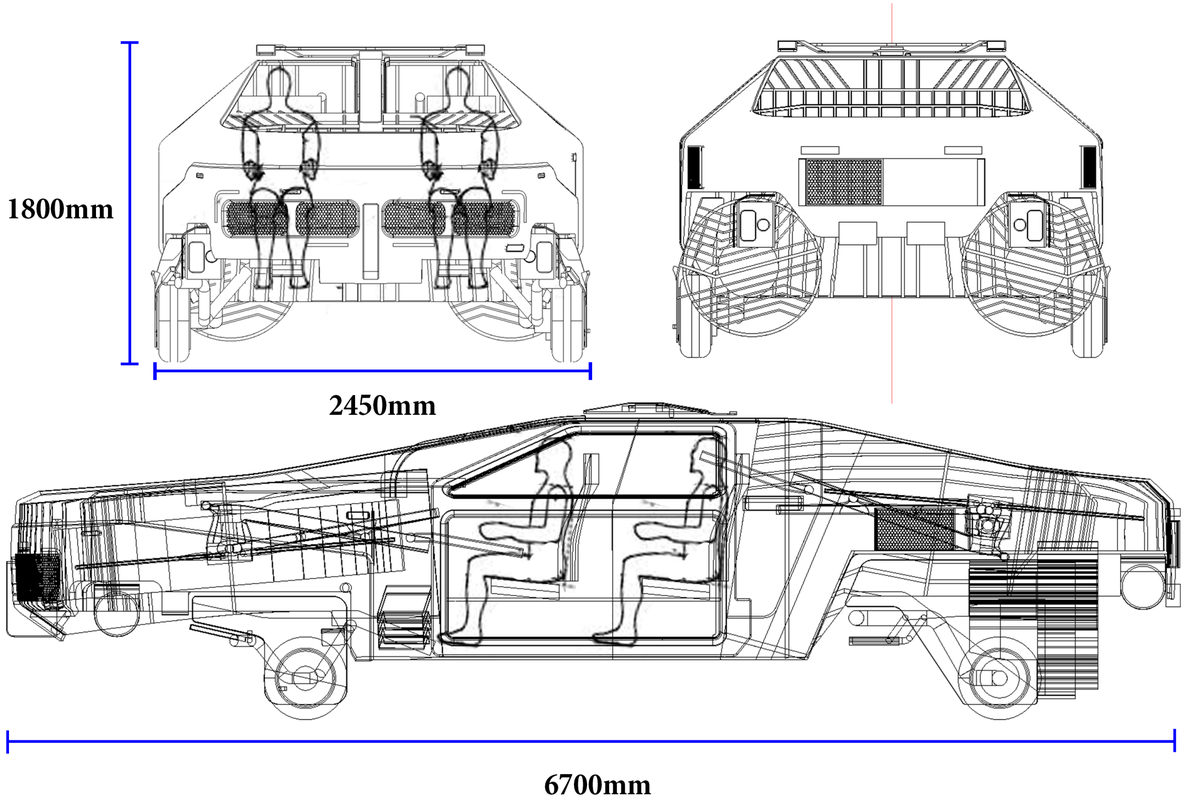
4. THE CONCEPT

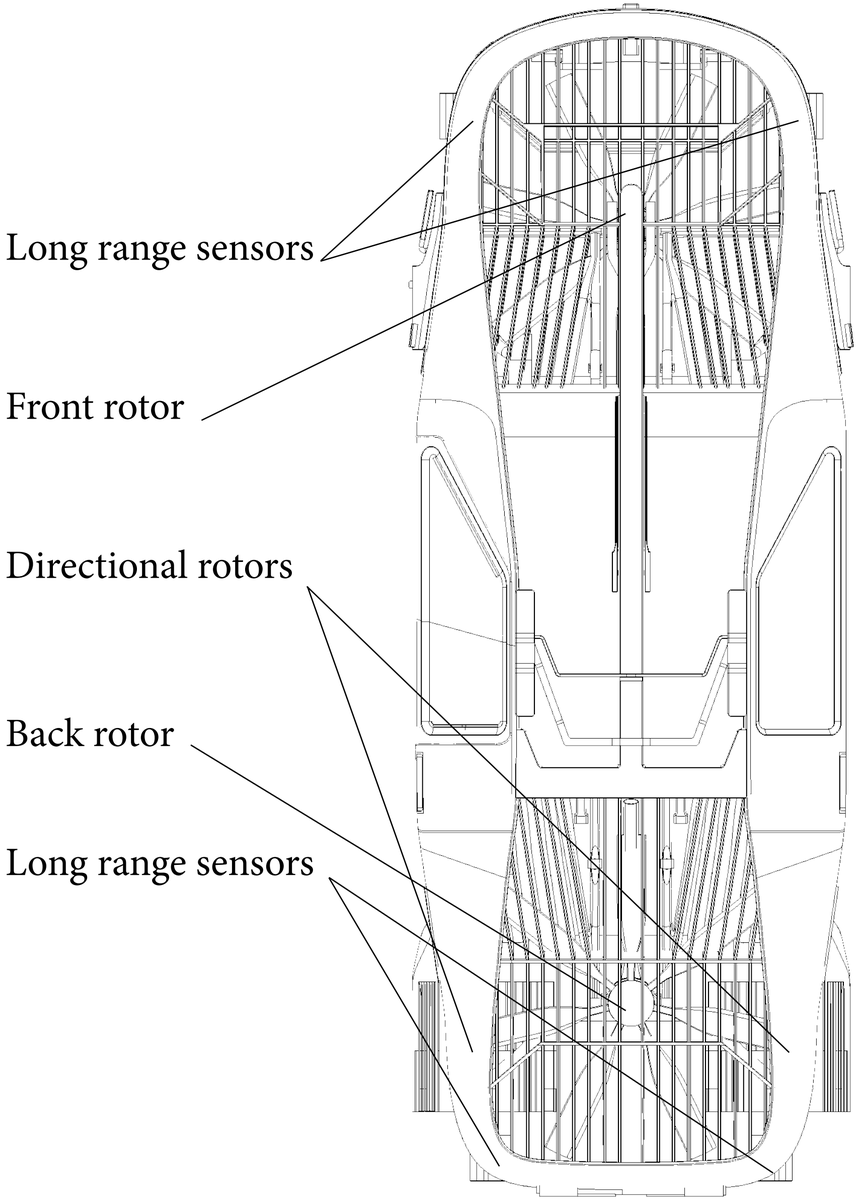


4. THE CONCEPT

4. THE CONCEPT

This is a VTOL -aircraft designed for rapid deployment of up to four Law Enforcement officers. It takes the manoeuvrability of a helicopter and combines it with the structure of a car. The compact design allows it to manoeuvre and land in within the narrowest spaces of a megacity. It features twin rotors for vertical lift and two auxiliary rotors for thrust, as well as a wide variety of short to long range -sensors for monitoring its surroundings. The bright colours ensure visibility and bolster a strong but friendly presence.





5. EVALUATION

Going into this project I had immeasurable ambition and goals. At the time I truly felt like I could accomplish those goals but now I realize it was better to focus on one thing at a time. This gave me better results than what I expected for the vehicle design itself, which after all is my what my study programme is about.

My original plan was to make this a concept art project, with emphasis on illustrating a unique scenario by building 3d assets and painting, but this turned into a full-on design project. Had I tried to do all that I planned at once, I might have just ended up with a variety of mediocre designs. Not that I shouldn't design helmets and build-ings, but if that's what I'm inspired to do, I should give them the time they deserve. I want to finish those designs later, without the pressure of a deadline.

Overall, I am happy with the vehicle I designed. This was truly the best solution to my initial research questions. The design strikes me as authoritative but friendly, as the police should be. It's a practical solution to my megacity scenario as it's nimble and fast and unlike anything in today's law enforcement. It's believable enough to be featured in games and movies, which is what I initially wanted to design for.

I knew very early that I wanted to design an aircraft, but it took a long time to con-firm that it would be the most interesting and also practical concept for future law enforcement. And even if that's been done multiple times already in movies and games, I got to execute my own vision.

I'm now focusing on the degree show. My plan is still to produce more refined renderings of the vehicle, hopefully with the rest of the assets that I've designed with this project. So, the vision for the 2050 Law Enforcement is ever expanding.

Thanks to my teacher Lee Walton, my opponent Tomi Vartiainen, and the rest of my AMU friends for their guidance and support to this project!

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3. Design process

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