URBAN MICRO COMMUTER

- Master Thesis -

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Abstract

Nowadays, one of strong trends is globalization all over the world. That is not a surprising issue anymore and still going on. Furthermore, since many of people are gathering in cities to get jobs and live in convenience, the urban areas are growing wider and more crowded constantly. This fact automatically makes transportation usages and buildings increase. In this environment, the city offers some of public transportations and infrastructures to make citizen transport efficiently. But, lots of people are still driving by private cars despite rising fuel costs. So, traffic jam, lack of parking space and waste of resource are getting serious. If we look around a city, there are many drivers going to work alone by a big commuter. It is a crucial cause of these issues. It aims to create a suitable personal commuter for primarily single drivers, with fascinating look despite its compact size. That will catch the eyes of people, and then make them desire it.

On a rational level, everyone knows that zero-emissions is probably a good thing. If you ask a man if the street he says, “Yes, that’s good”, but if you ask if whether he’s going to buy one he’ll say, “I don’t know, it depends what it looks like”. That’s the story, so it’s our job to make sure that it looks desirable and that people will want it. One day it will be normal.

Adrian van Hooydonk, vice-president of BMW
INTRODUCTION

My initial ideas for this project began with living in Seoul where I have lived. Over 10 million citizens (10,529,000 by 2011) are living in mega city Seoul, and the number is still on the increase. As a result of the high population density, a traffic jam during rush hour became natural. In addition, people driving to work alone are still increasing. These make the traffic condition getting worse and people exhausted. And also, the transportation energy consumption increase. It is having a bad influence on the city environment. Furthermore, when people take a car out, they are always worrying about parking. I do not think that is only Seoul with these problems. For urbanization all over the world, megacities and fast growing cities have the same issues. Therefore, this project is to propose a suitable vehicle to a commute in a megacity.

First Thought

As a trend, Sustainability has become a necessary part to move forward. The word of Sustainability sounds healthy, but also sometimes still makes us feel difficult, boring, uncomfortable and expensive. We need to look at that without burdens. The sustainability is based on proper use. When I looked around, a lot of people are driving to work alone with a too big car for just one person. If they use an appropriate car in size and weight, the energy consumption will naturally decrease. Furthermore, as many of technologies are consistently developing with eco-friendly direction, we will be able to use the technologies easily for our environment, and we will feel free.

Sustainability in a City

Goals & Wishes

Sustainable products are necessary for the future. But, it is not easy to choose those effectively. And someone says “next time”. Sometimes I also still hesitate to buy those if there are no attractive looks and inconvenience in city life. And especially in vehicle field, the small size is useful for urban driving, but also makes us conscious of how I look with that. I argue those are why designers are being.

So, I aim to create a smart concept, for city life, with fascinating look despite a compact size. That will catch the eyes of people, and then make them be persuaded by itself.

This project is my last project at UID and also the trigger to be a professional designer. I want my design to inspire people to achieve our positive future.
By observing the current urban traffic issues, the research is geared towards designing solutions for the future urban environment.

A suitable brand is chosen through a solid research, and the value of the new vehicle is increased by studying and applying the chosen brand’s identity.

Through the process of research and choosing the appropriate brand, a new innovative vehicular architecture and solutions for the cities facing issues caused by the accelerating global urbanization are presented. Moreover, the new vehicle embraces the heritage and identity of the brand, satisfying the needs of the market.

Mood-boards are developed in order to study the upcoming technologies. Applicable technologies are selected to realize and embody the concept.

Sketches are developed based on the collected data and images from the previous processes. Volumes are validated by a clay model which is developed from the sketches. Also, the size, ergonomics, layout and proportions are further modified on the clay after the user-testing process.

After scanning the completed clay model, final design details of the concept are realized in the CAD modelling stage.

Using the rendered images of the CAD data, scenarios in contextual environments along with final materials are realized.
For years, many of people have moved to cities, to get a job or live in the more convenient environment, to give their children better educations and so on. For these reasons, the urban population has been growing. Between 2011 and 2050, the world population is expected to increase by 2.3 billion, passing from 7.0 billion to 9.3 billion. At the same time, the population living in urban areas is projected to gain 2.6 billion, passing from 3.6 billion in 2011 to 6.3 billion 2050. During the period, the population living in urban areas is expected to increase more than the world population increase number at the same time. 3 out of 5 people in 2030 and 70% of people in 2050 will live in cities. Thus, the urban areas of the world are expected to absorb all the population growth expected over the next four decades while at the same time drawing in some of the rural population. Most of the population growth expected in urban areas will be concentrated in the cities and towns of the less developed regions. Asia, in particular, is projected to see its urban population increase by 1.4 billion. As a result, the number of cars is rising. The buildings are being taller and crowded. These make the city system stronger and various. But also those cause difficulties of city life. A traffic jam even in daytime, a lack of parking spaces, air pollution and an increase of living cost would not be what the citizen wants. This trend is speeding up constantly in the world, especially in Asia. Why this is getting a serious issue is that will be even heavier.

The urbanization is an extremely strong stream of times. That will accompany problems. But also that will be an opportunity to improve the future urban life.
People driving to work alone are still increasing. In the U.S. Census Bureau 2009, Among American workers 16 years and over, 86.1% commuted in a car, truck, or van in 2009, and 76.1% drove to work alone. Just about 5% of workers commuted by public transportation, and about 3% walked to work. All other transportation modes were used by less than 1% of workers who did not work at home. Despite rising fuel costs, commuters continued to drive their cars, with most still paying much more for the luxury of sitting alone in traffic. It appears that consumers are less responsive to price, at least when it comes to how they get to work. Because, even if they go to work by public transportation, they are given to other stresses and difficulties that are too crowded passengers, waiting a vehicle in bad weather, travel time and the restricted schedule. Besides, each of people wants to keep themselves in their own space. All these factors make people drive to work alone by a personal car, although all most of the cars that they drive are too big just for one person. That has a bad effect on the urban traffic condition.

Why?

Private automobiles offer safety, security, comfort, convenience, utility, freedom of route and schedule...

Drives Alone

Why?

Private automobiles offer safety, security, comfort, convenience, utility, freedom of route and schedule...

76.1%

Drive alone

U.S. Census Bureau, American Community Survey, 2009

and because of difficulties in public transportation.
Up to Now
Urban Transportation

- Automobile
Dependency Automobile use is obviously related to a variety of advantages such as on demand mobility, comfort, status, speed, and convenience. These advantages jointly illustrate why automobile ownership continues to grow worldwide, especially in urban areas. When given the choice and the opportunity, most individuals will prefer using an automobile. Several factors influence the growth of the total vehicle fleet, such as sustained economic growth (increase in income and quality of life), complex individual urban movement patterns (many households have more than one automobile), more leisure time and suburbanization. Therefore, rising automobile mobility can be perceived as a positive consequence of economic development.

- Challenges Facing Urban Transportation
Traffic congestion and parking difficulties
Congestion is one of the most prevalent transport problems in large urban areas. Since vehicles spend the majority of the time parked, motorization has expanded the demand for parking space. Congestion and parking are also interrelated since looking for a parking space. In central areas of large cities drivers can spend 20 minutes looking for a parking spot. In congested urban areas, about 40% of total gasoline use is in cars looking for parking.

Public transport inadequacy
Many public transit systems are either over or under used. During peak hours, crowdedness creates discomfort for users as the system copes with a temporary surge in demand.

Environmental impacts and energy consumption
Pollution, including noise, has become a serious impediment to the quality of life and even the health of urban populations. Further, energy consumption by urban transportation has dramatically increased and so the dependency on petroleum.

Land consumption
The territorial imprint of transportation is significant, particularly for the automobile. Between 30 and 60% of a metropolitan area may be devoted to transportation.
Future
Urban Transportation

The required conditions of future city transportations will be focused on sustainability and human centred that include no pollution, clean energy sources, safety for all, faster & predictable travel, reduced parking space, access for all and beautiful urban design. To make like the vehicles, technologies will be developed to the sustainability and human centred.

Energized by electricity, Powered electrically by electric motors, Controlled electronically, Connected, Semi/Full autonomous driving, Vehicle tailored to specific use.

Cities in mature countries with a high proportion of motorised individual transport need to fundamentally redesign their mobility systems so that they become more consumer and sustainability orientated. In a report of The future of urban mobility by Wilhelm Lerner by 2050 the average time an urban dweller spends in traffic jams will be 106 hours per year, three times more than today. Cost €829bn per year across the globe, more than four times higher than in 1990. These are serious wastes and disturbances so that cities make a step forward. So, for high performing cities the next step must be to fully integrate the travel value chain, increasing convenience by aggressively extending public transport.
In Seoul where I had lived, when I went to somewhere, it was not uneasy to watch drivers running alone by a big size car, like SUV and Van. Then I felt nothing because that looked natural to me. And at one point, I recognized that is a serious waste of resources and urban space, and also a cause of traffic problems. So, I imagined what the useless parts of the cars would be removed. That is closed to a micro car.

From a report of the U.S. Census Bureau, Over 76% of workers, who commuted by personal cars, still drive to work alone. That is an enormous number of people. There are also trucks and vans in the vehicles that the people use. If they are still going to drive to work alone, we need to think again obviously about that situation. Is the car size proper for one person? No. that is not.

For healthy commuting in a mega-city, micro car is appropriate in size and energy consumption. Another advantage is the ease of parking. Some microcars can be parked perpendicular, where other cars park parallel.

Why Micro Commuter?

Micro Commuter
too big for one
lack of space
What is a Micro Car?

Micro Commuter

Microcar is a group of cars that are the smallest on the road. The car classifications system lists microcars as their smallest car. Microcars were much more popular in the past, with their peak of existence in the 1940s through the 1960s. There are still some microcars being developed today. The one most people will know is the Smart Fortwo car, since that is a popular selection on the roads. Some do not classify the Smart car as a microcar, but to some, it does fit the qualifications. Depending on where you live, the requirements to be called a microcar vary. Since they’re so small, governments may offer tax benefits for the cars. Generally speaking, here are some of the qualifications to be considered a microcar.

Usual features:
- The engine must be just a one cylinder engine, that is under 500 cc of power (some let it go double that size).
- There can only be a maximum of two seats, one for the driver and passenger.
- The transmission can be just one wheel drive.

The following are not requirements, but are often a part of microcars:
- No reverse shift
- Three wheels
- Smaller than eight feet long
In recent years, small cars are selling big for brands, on pace to capture the largest share of the U.S. auto market since 1993 and driving the best sales month in four years.

Over the past several years, automakers in India, which is the second fastest growing automobile market after China, have continuously strived to offer higher value to their customers, especially for highly competitive small cars.

High gasoline prices coupled with the best crop of compact cars. It is a strong relationship between the price of gasoline and the demand for fuel efficient vehicles. The recent surge in gas prices across the country has brought similar surge in the number of car shoppers seeking fuel efficient vehicles.

Furthermore, in a country, the dearth of public transport has driven demand for small vehicles as city run-arounds, and high fuel prices are pushing compact sales further.

Growing customer preference for higher-priced small cars

The average number of months of income required to purchase a small car in India has remained unchanged at 10 months during the past five years, according to the J.D. Power Asia Pacific 2012 India Sales Satisfaction Index (SSI) StudySM released recently. Although the average income level and transaction price of vehicles have increased in India, the financial stretch made by the customers to own a small car remains unchanged. This is driven primarily by customer aspirations to own higher-priced small cars.

“Traditionally small cars were purchased by people who couldn’t afford anything else,” said Jesse Toprak, an industry analyst for TrueCar.com. “Right now, that’s not the case. We see people choosing them because they find them more appealing.”
Global population is reaching crisis point.
The urban population, which stood at 3.5 billion in 2010, has now surged to almost 5 billion. Resource scarcity, economic and political factors, energy costs and mounting environmental issues are forcing people into ever more concentrated and high-density urban areas. By 2030, urban areas occupy an additional 741,000 sq km globally, relative to 2012. This is equivalent to more than 20,000 new football fields being added to the global urban area every day for the first three decades of the 21st century. Almost $30 trillion has been spent during the last two decades on transportation, utilities and other infrastructure projects.

“Smart grid” technology is widespread in developed nations
By 2030, integrated smart grids are becoming widespread in the developed world, the main benefit of which is the optimal balancing of demand and production. Traditional power grids had previously relied on a just-in-time delivery system, where supply was manually adjusted constantly in order to match demand. Now, this problem is being eliminated due to a vast array of sensors and automated monitoring devices embedded throughout the grid. This approach had already emerged on a small scale, in the form of smart meters for individual homes and offices. By 2030, it is being scaled up to entire national grids.

The majority of new vehicles are electric, or hybrids
As part of the recovery measures being enacted around the globe, a wholesale transition to alternative energy is taking place. Alongside this, a new generation of smaller and more efficient vehicles is emerging. The majority of new cars are now plug-in electric or hybrids, with charging points a common sight in towns and cities.

AI is widespread
By 2030, the pace of change is so great that it seems as if an entire century of progress has already occurred in the first three decades of the 21st century. Workplaces are becoming highly automated, with tremendous improvements in speed, productivity and efficiency. Many companies are downsizing their administrative departments and replacing them with AI. This is particularly true of call centres and other service-based roles, where customers often deal face-to-face with “virtual employees” based on automated software. Research and development into artificial intelligence (and related hardware/software) increases greatly during this period.
The main Users are urban workers who will drive to work alone in a mega-city. Some of them will live in the city, the others will be living around urban areas. Especially, in the urban area the people, who use personal vehicles mainly as a commuter, are the target.
During my internship at BMW Designworks in Munich, I had gotten inspired a lot from the designers working there. They were thinking out of the box. That is why the brand has been leading a car industry up to now. From my view, they still show endless innovation with consideration for the environment and human. The innovation inspires the car industry and also the other areas. The atmosphere made me decide the brand for my thesis.

In addition, the brand already had ISETTA before. That has been an iconic micro car by this time. If BMW has new one which is appropriate for the coming urban life and environment, that will lead the pleasant commuting in a future mega city, and that will be also a good opportunity to succeed to the iconic micro car of Isetta.

“Perhaps the best proof that the microcars of the past are influencing the cars of the future comes from BMW, which reportedly is considering various designs for an updated Isetta.”
Chuck Squatricilia, wired.com journalist

“Maybe we’ll come up with something in-between a motorcycle and a car. Probably for a city, all of these mobility services will have to be zero emission - electric.”
Adrian van Hooydonk, vice-president of BMW
BMW AG originated with three other manufacturing companies, Rapp Motorenwerke and Bayerische Flugzeugwerke (BFw) in Bavaria, and Fahrzeugfabrik Eisenach in Thuringia. Aircraft engine manufacturer Rapp Motorenwerke became Bayerische Motorenwerke in 1916. The engine manufacturer, which built proprietary industrial engines after World War I, was then bought by the owner of BFw who then merged BFw into BMW and moved the engine works onto BFw’s premises. BFw’s motorcycle sideline was improved upon by BMW and became an integral part of their business.

BMW became an automobile manufacturer in 1929 when it purchased Fahrzeugfabrik Eisenach, which, at the time, built Austin Sevens under licence under the Dixi marque. BMW’s team of engineers progressively developed their cars from small Seven-based cars into six-cylinder luxury cars and, in 1936, began production of the BMW 328 sports car. Aircraft engines, motorcycles, and automobiles would be BMW’s main products until World War II. During the war, against the wishes of its director Franz Josef Popp, BMW concentrated on aircraft engine production, with motorcycles as a side line and automobile manufacture stopped altogether.

After the war, BMW survived by making pots, pans, and bicycles until 1948, when it restarted motorcycle production. Meanwhile, BMW’s factory in Eisenach fell in the Soviet occupation zone and the Soviets restarted production of pre-war BMW motorcycles and automobiles there. This continued until 1955, after which they concentrated on cars based on pre-war DKW designs. BMW began building cars in Bavaria in 1952 with the BMW 501 luxury saloon. Sales of their luxury saloons were too small to be profitable, so BMW supplemented this with building Isettas under licence. Slow sales of luxury cars and small profit margins from microcars caused the BMW board to consider selling the operation to Daimler-Benz. However, Herbert Quandt was convinced to purchase a controlling interest in BMW and to invest in its future. Quandt’s investment, along with profits from the BMW 700, brought about the BMW New Class and BMW New Six. These new products, along with the absorption of Hans Glas GmbH, gave BMW a sure footing on which to expand. BMW grew in strength, eventually acquiring the Rover Group (most of which was later divested), and the license to build automobiles under the Rolls-Royce marque.
BMW has its own strong identities. I recognize there are unique proportions which are short overhangs, big wheels and really sporty stance. The combination of these shows sportiness and elegance. Besides, The Hofmeister kink, which is which consists of a low forward bend at the C-pillar or D-pillar, is an automobile design feature seen on modern BMWs. The fore-end angle is one of BMW features. The front profile comes into the body direction. These make the front overhang look shorter and more dynamic.

“I think we’re always going to stick to the idea of one family, different character – I think this is important. Every BMW particularly still needs to look like a BMW even when we’re extending the line.”

Karim Habib, BMW Head of Design
What’s next for BMW design? “I think in the future the aspect of different character will be played up and also the values of BMW will be important, precision and emotion and some soul to the car.”

“For us as a brand it is important that we evolve with the times as well. We can’t be stuck in our own perspective, but it’s not about selling out, it’s really about trying to find the market segment that needs more customers who want the values that our BMWs can provide.”

Karim Habib, BMW Head of Design

The evolution of the BMW brand can aim to pick a premium with sportiness and elegance. One thing that remains is the special individual character each vehicle possessed. They will always strive to think out of the box, explore the unknown and create vehicles that experiment with our perceptions. This idea will evolve to create vehicles that inspire other vehicles in the BMW range and indeed in the automotive industry.
For my thesis project, I will design an urban micro-commuter to be suitable for city life and environment. Mega-cities have always had space restraints with a high population density and restricted space. In the future being more intensified, a personal vehicle which can be used in limited space efficiently will be necessary. Besides, it needs a smart layout and proportion to use the vehicle for personal purposes after work, such as shopping.

To appeal to the general public, the attractive appearance is also important. It needs to refute stereotypes that a micro car is cute, looks weak and so on. So, my degree project will show an urban micro commuter fitted in well with mega-city environments with dynamic looks that BMW pursues.

By reinventing the automobile and the ownership model, it is possible to preserve its benefits (safety, security, comfort, convenience, utility, freedom of route and schedule) while significantly reducing the side-effects in urban use (energy, environment, safety, congestion, parking, affordability)

Concept

够 enough for 1 driver?

Attributes
- Private 1+1 tandem urban commuter
- Premium downsizing with premium brand BMW
- Micro architecture for the socially aware group
- Flexible layout for ergonomics and comfort
- New form language for BMW identity
Parking Situation

Concept

Parallel Parking
2.5m
6m

90 Degree Parking
2.7m
5.5m
Although small cars have many merits to use in a city, the sales volume has been strongly affected by energy costs. Nowadays, the sales of small automotives have been increasing by the rising fuel price. But micro cars need to rise their own value more in order to get interests constantly even during the period of low energy costs. Therefore, it should be a premium in itself, to satisfy users with car ownership.

Micro cars have various monetary advantages that are free and low taxes, parking fees, tolls, congestion fees and high energy efficiency. Those are good backgrounds to rise the value of cars with high technologies and materials.

The whole company, and our CEO, has said that in the future, ‘premium’, which is what BMW offer, will be more and more defined by sustainability. At first, it will be something new, but over ten or fifteen years from now it will be expected and if you don’t have it you can no longer be a premium brand. So for us, it is of strategic importance. In the design department, we wanted to give it a creative spin.

Adrian van Hooydonk, vice-president of BMW
INSPIRATION

Visual tension and boldness

Logical and firm structure and flowing
Designing tension with wires
Wireless Charging System

Electricity is applied to coils on the ground transmission unit in order to generate magnetic flux, which works to transmit electricity to the other coil on the vehicle receiver unit.

Lithium-Air Battery

Improved performance of rechargeable lithium-air batteries brings them a step closer to powering cars. Lithium-air batteries are a viable option for use in vehicles due to their high energy-to-weight ratios, or energy density giving them a capacity for energy storage that could be five to 10 times greater than that of Lithium ion batteries.

IBM researchers, since 2009, set out to develop lithium-air battery technology capable of powering a family-sized electric car for approximately 500 miles (800 km) on a single charge.
Road Train

This train allows a group of cars to follow one another along any road autonomously. Guided by a lead truck driven by a professional driver, the group of autonomous autos can communicate wirelessly via advanced software, cameras, laser sensors, radar, and GPS-based technology in order to mimic the lead truck’s driving behavior. The drivers turn, the following cars turn. The driver slows down, the following cars slow down. All while maintaining appropriate distance and speed.

Autonomous Parking

The autonomous parking function will allow drivers to exit their vehicle before instructing the car to find and park itself in a roadside or garage space.
The concept is probably the most revolutionary of them all as it incorporates all of the car’s key components into the wheel itself. While only suitable for electric cars, the Active Wheel System houses the engine, the suspension, the gearbox and the transmission shaft.

Laser light, of course, is a sharp beam. It is dangerous to look into it. So it need to put some filters and lenses in front of it. And through some mirrors, those can direct this laser beam precisely. So the laser beam comes out of the piece in the center and then, you can direct it towards the outside and you can also change the color of the light. You can turn it into various colors. The advantage is that it’s even more energy-efficient, uses less energy. It’s actually built even smaller than an LED.
Solar Glass

The windows can come in slightly hazy to really hazy opacities, but they do bring up the idea of solar mapping, which we recently reported on. People can now map their buildings to see where the most sunlight hits, and install very opaque solar windows in those areas in order to optimize the sun's rays.

With these solar windows one could generate electricity not on the roof of an electric car, but through the sun roof or the window pane. This solar glass would be perfect for greenhouses, capturing light from the sunlight and not directly from the sun.

Electrochromic Glass & Film

Electrochromic Glass could change from opaque to clear with a flick of switch. It gives you a total privacy when you need it. This specified structural glass has a nickname “electric-control curtain glass”, produced with the multi-development of electronics and glass techniques.
First Ideation

The following pages show some of the very early thought process which aims to visualize basic ideas. I took some key elements to develop into a more focused theme.
Direction 1

**bold** aggressive

Side panels stretch to shoot the laser light.

Combine with motorcycle appearance to emphasize dynamic look.
Direction 2

Frames sticking out from inside pushes the skin. It shows tension.

urban clean
Sketch Development
When drivers want to guard their privacy like makeup, nap, meal and rest in a car, then they can turn on and off the window transparency.
Rails to slide the seat back. Drivers can stretch out their legs comfortably on the whole seat during the autonomous driving.
Sliding Seat
During the autonomous driving, the seat can be sliding backward to make more comfortable seat position.

Dashboard & Steering wheel
Steering wheel is integrated with the dashboard.
Development with Clay
Front-end Refining
Check from Different Perspectives
3D-Scanning

Reference for the CAD modelling
3D Modelling on the scanned data
Name: Anton  
Occupation: Engineer  
Age: 35 years  
Result Scenario  
Home to the airport
Call a car by a mobile device.

The car automatically comes from a parking lot.
Suitcase to an extra trunk

Getting in
Sliding Seat
The seat can be sliding backward to make more comfortable seat position.
Turn on the window transparency
Drivers can turn on and off the window transparency for their privacy.
Stop beside BMW X5 for the crossing

4666mm

2330mm

4666mm
Getting out

Going on a business trip

Headlamps on inside out frame & Sub door hinge
Automatic parking

Charging a battery

If the driver wants to charge a battery, Quart can connect to a wireless charging system.
Result
Application to urban background
The result is a 1+1 urban commuter with bold aesthetics of future BMW identity. A desirable vehicle to respond to the needs of future market trends. The market has been shifting from large luxury segment to a more sensible and smaller segment which has less impact on the environment.

A micro-commuter which breaks the stereotype of personal transportation, and evokes emotions from the general public. Functional solutions such as modular trunk and variable driving position layout further promote the flexibility of this vehicle.
A micro-commuter which breaks the stereotype of personal transportation, and evokes emotions from the general public.
Conclusions

At the beginning of this project, I expected that designing a micro car would be relatively easy because of small size. However, I realized that was not true. I needed to think about not only the premium expression of the vehicle and also the effective usage of space.

The result I have presented in the form of a model and visualization of a micro car is for urban commuting with single drivers, in the closed future. For many years, people were used to driving big commuters even though they are alone. This fact makes traffic difficulties worse, especially in urban areas. Fortunately, the market preference has been changing to premium compact vehicles. I aimed to satisfy their desires with new technologies and premium brand designs.

New technologies will push the boundaries of what can be achieved and help maximize the flexibility and practicality of micro vehicles.

In short this project aims to provide a suitable personal commuter for primarily single drivers, with fascinating looks despite the micro size. Through this project, I hope that it can inspire people to feel comfortable in daily commuting situations in the more improved future.

Personally, through this project I have learned valuable insight to vehicle packaging and the importance of crystal clear objective. Also, I realized the role of transportation designer for the future requires holistic and critical thinking - more specifically raising awareness of social responsibility. Relationship with my peers and tutors have matured my designs and helped broaden my knowledge of a vehicle’s role in society.

In conclusion, my years in UID have been a great chapter in my life, and I believe that the foundations I have learned here will steer me in terms of career and personal choices that I will have to make in the future.