KICKO

A convenient and hygienic public electric scooter solution

Bachelor of Industrial Design Thesis Report

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Enhancing Public Electric Scooters

by

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Abstract

As the electric scooter industry grows, many people in urban areas have adopted this public electric scooter as a means of transportation, it has become an easy mobility method to get around urban areas. It is a good alternative to pass through heavy traffic in the city. However, as the electric scooter industry expanded, it cultivated problems, specifically safety issues that have not been addressed properly. For example; most public electric scooters have smaller wheels that do not account for speed and lack stability, which causes sudden accidents that can be fatal. According to Korean Transportation Safety Authority, where the government enacted a regulation that all electric scooter riders must wear protective gear while riding an electric scooter. However, only 2.9% of public electric scooter users reported wearing helmets while driving. Therefore, this thesis will explore Korean cities as the main studies for safety in public electric scooter activities. User research, including interviews and observational studies, will provide a clear understanding of current challenges and insights into the users' behaviours and experiences in public electric scooters. Additionally, a one-to-one scale model study will be developed to understand ergonomics and human interactions using references of existing electric scooters to evaluate and analyze the design. Results from this analysis will be able to expand the design possibilities for public electric scooters to maximize safety concerns and lessen the strains and hassles. This thesis project aims to contribute towards the electric public mobility industry in Korea as public electric scooters can reduce heavy traffic and carbon emissions effectively in urban areas.

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CHAPTER 1 Introduction

1.1 Problem Definition

The electric scooter sharing industry has been grown dramatically. Electric scooters are rising in popularity in both children and adults and have the potential to provide an attractive solution to common urban mobility problems (Guiton & Finlay, 2020). As a result, it became easier to access anywhere in urban areas. However, as the electric scooter industry grows, the problems also grow, especially safety issues have been increased dramatically. According to the Korean Transportation Safety Authority, the personal mobility accident rate has risen on average 103.4% from 2018 to 2020 (Kim, 2020). In addition, most public electric scooters have smaller wheels that are not stable at high speed, and it can cause sudden accidents that can be fatal. For those reasons, the Korean government enacted a revised regulation that all electric scooter riders must wear protective gear while riding an electric scooter. However, only 2.9% of public electric scooter users reported wearing helmets while driving (Kang, 2021).

Electric scooter sharing companies are having trouble with the regulation since many users have stopped using their sharing services after the regulation was enacted. Most users hesitate to wear helmets because they do not want to bring their personal helmets or do not want to use shared helmets for sanitary reasons.

Therefore, this topic has the potential opportunity to resolve problems that could be a good business model. This thesis will examine Korean cities as the main studies for safety in public electric scooter activities.

1.2 Rationale & Significance

The public electric scooter industry in Korea is at a turning point in its business. After the revised regulation is enacted, they face a decreasing number of users and try to solve the problems that every stakeholder will satisfy. To understand and gain insights into the current challenge of the public electric scooter, the research requires an understanding of users' behaviours and experience in public electric scooters, knowledge of revised regulations in urban areas, and the experience of the shared scooter business from experts. Additionally, a deep understanding of electric scooters and protective gear in the market will be required.

Several research methods will be identified and utilized in the pursuit of comprehensive understanding within the public electric scooter. They are as follows;

- Literature review
- Secondary research
- Product benchmarking
- Interviews
- Observational studies
- Needs analysis
- Ergonomic studies

These methods will be utilized to identify these questions;

- What are the reasons the user hesitates to use protective gear, and how can encourage the user to wear helmets?
- What other issues does the user find while using public electric scooters?
- How may we elevate the user experience to be more enjoyable and safer while using the service?
- What is the perspective view from public electric scooter business owners?
- How can we mitigate disrupting city operation by electric scooters in the urban area?

1.3 Background / History / Social Context

The chart below is User-Product-Environment of Triangulation, which shows overall trends of demographic, product, lifestyle, and environment.

USER	PRODUCT	ENVIRONMENT OF USE
Urban rider-short term (above 16years old) (Primary) -Ride for short term (10-15mins) -Ride short distance 3km-5km -Use to pass through alleys faster or climb hills -Doesn't have the intention to ride before they find a scooter in an urban area -Beginner for driving the scooter -Lack of knowledge of driving rules -Tend not to wear safety gear	**Triple 8 Dual Certified Helmet** **Pros** -Dual Certified for bike and skate(multiple usages) -Certified US CPSC Safety Standard & ASTM F-14920-08 Safety Standards -Normal(Timeless)design -Fit for longboarding, BMX, derby, and commuting **Cons** -Require user to bring it -Require space while not using it	**Sidewalks** -Users rides on sidewalk very often due to road condition -Having troubles with pedestrians -Cannot drive at fast speed -Can be tripped over a crack in the sidewalk
Urban rider-long term (Primary) -Ride for long term (more than 30 mins) -Expert of riding the electric scooter -More careful for driving -Wears private safety gear	**Lumos Matrix Helmet** **Pros** -Programmable LED Panel at the back of the helmet -Connectivity to App, can share data with Apple Health/Google Fit -Lightweight(580g) -Safety Certification; CPSC/F1492/EN1078/AS2063 **Cons** -Expensive($270-$290)	**Not paved roads** -Uncomfortable for driving -Possibility to be tripped over -Can't ride at high speed -Slippery
Commuter (Primary) -Ride the scooter for commuting -Ride it regularly	**Lazyrolling Armored Hoodie** **Pros** -Casual looking hoodie -Can protect the torso from scratches and bruises -Inner lining is 100% full DuPont Kevlar -Waterproof pockets **Cons** -Expensive than standard gear -Can't protect from a severe accident	**Paved roads** -Good condition for riding -Can raise the speed -Always exposed to an accident by car -Possibilities to go over potholes -Accidents can be severe
Campus rider (Primary)	**Flatland3D Pro E-Skate Gloves**	**Urban areas**

-using in college -often used to attend classes on time -use it for fun -good to use it to climb hills -High utilization in campus	**Pros** -Made it for E-boarders -Patented SPS (wrist bone prone to breaking Protection System) feature -one-directional flexible wrist late **Cons** -User should bring it every time they use -Rough, Rugged design	-Used for short term riding (5mins average) -Hectic area -Used as an alternative way of transportation -Reduce commuting time in the congestion area
Tourist (Primary) -Using it for touring, sightseeing -Not familiar with where to drive -Require supports of GPS -Not familiar with domestic driving rules (if they are from abroad)	**Types: Electric Kick Scooters(Two-Wheeled, Three-Wheeled)** **Pros** -Lightweight -More compact -More practical in crowds and traffic **Cons** -Weak break -Can easily fall off when it hit bump or potholes	**Narrow alleys** -Useful to pass narrow alleys -Hard to react if something pops at the interactions
Shared E-scooter provider (Secondary) -Servicing sharing E-scooter in Urban area - Having an issue that reducing users after the helmet regulation - Still, new competitors are keep showing off	**Types: Fat Tire Electric Kick Scooter** **Pros** -more comfortable while cruising -comes with a seat that provides enormous comfort -Powerful motor **Cons** -Heavier than kickboard type -More expensive -Not portable	**Slops** -Useful to uphill by E-scooter without taking a walk -Dangerous when the user goes downhills -Spend more battery power
Distribution hub, Maintainer (Secondary) -In charge of maintaining the E-scooter in urban -collect, recharge the battery, and distribute -Fix -sometimes hard to find the E-scooter (Some users bring the sharing scooter inside of their house, or they park the scooter at not proper locations)	**Types: Self-balancing Electric scooters(Hoverboards, Unicycles, Self-balancing personal transporters)** **Pros** -Very light, Portable -Fun to ride once user develop riding skills **Cons** -Hard to go over curbs easily -Requires time to practice riding	**Bike lane** -Safer to drive than driving on the sidewalk -Dangerous to ride at night because some e-scooters don't have visible rear red lights or reflectors -Conflict with Bicycle riders

E-scooter producer (Tertiary) - Produce E-scooter - A lot of competitive manufacturers	**Types: Electric Mopeds** **Pros** -Great extended seat post -Can usually accommodate two people -Trunk storage -Rearview mirrors **Cons** -Higher price -Heavy -Not portable	**Rainy, Windy, and Snowy weather (Severe weather)** -Almost impossible to ride -High chances of slip over
E-scooter protect gear producer (Tertiary) -Produce protection gear -Helmet, gloves, jackets -Mostly related to bicycles and skateboard protection gears -No exclusive protection gear for electric scooter	**Neuron Mobility, helmet attached at E-scooter with a locking system** **Pros** -Secured helmet locking system -Make users wearing helmets mandatory **Cons** -User feels uncomfortable sharing a helmet that someone who doesn't know used prior	**Winter ride** -Possibility to be slipped by snow, ice, black ice -Lack of heating system unlike car
Police (Tertiary) -Enforce riders who regulates laws -Grey zone exists to enforce riders who don't wear a helmet while using the sharing e-scooter	**XingXing E-scooter sharing company** **Selling personal helmets at lower prices, including free scooters using coupons** **Pros** -Encourage users to buy a personal helmet -Cheap price compare to regular helmets in the market -Includes free coupons (20times) **Cons** -User should buy their helmet to use the service -User should buy their helmet to use the service	**Off-road riding** -Require some special E-scooter(tires, motor, battery, and suspension) -It gets dirt quickly -Fully hydraulic brakes and ABS options are recommended

Table 1 User-Product-Environment of Use Table

CHAPTER 2 RESEARCH

2.1 User Research

The user research goal is to empathize user experience through user demographics and behaviours by collecting information from in-depth interviews and user observation. Thus, it will offer insights to discovering the thesis topic and provide guidance for further development.

2.1.1 User Profile – Persona

Figure 1 From left: Primary, Secondary, Tertiary Users. Retrieved from http://www.dailycar.co.kr/content/news.html?type=view&autoId=39816, http://www.iconsumer.or.kr/news/articleView.html?idxno=12555, https://www.mk.co.kr/economy/view.php?year=2021&no=570783

Primary, Secondary, Tertiary Users

To aim at improving safety for public electric scooters, primary users can be represented as regular public electric scooter users who live in the urban area. For example, short-term or long-term users, commuters, campus riders, and tourists would fit in the category.

Secondary users include public electric scooter service providers, distribution hubs, and maintainers who directly provide the services to the primary user.

Tertiary users include providers to secondary users and indirectly related to the public electric scooters such as protective gear providers, electric scooter manufacturers, and police who regulate violation.

Persona.

Name: Hyung-Gyu Lee

Age: 31
Gender: Male
Relationship: Married
Occupation: Assistant manager at a furniture design company
Annual Income: $55,000
Education: University graduate
Location: Seoul, South Korea
Social: Busy at work on weekdays, spend time with his wife in his free time, and mostly use public transportation in the city
Activities: Uses public electric scooter average once every 1-2 weeks, ride around 5-10mins per riding

Figure 2 persona image of Hyung-Gyu Lee. Taken by Subin Lim

The persona and target demographic are developed based on secondary research and an in-depth interview with regular public electric scooter users who is fit into the target demographic.

User/Persona Behaviour.

Based on the research, user behaviour can be described below:

“The persona lives a hectic life in a metropolitan city that usually meets heavy traffic, especially in commute time. As other city dwellers do, he mainly uses public transportation to move around inside the city. He prefers using public transit because public transportation is

developed well and easy to access at any time in Seoul. He occasionally uses a private car to go suburbs or when he needs to load heavy stuff.

The persona usually gets a chance to use a public electric scooter near the bus stations or exits of subway stations. Like most electric scooter users, he likes to use the scooter as a last-mile transportation solution. He uses mobility for short-term riding for about 5 to 10 minutes and moves 3 to 5 km per riding. He enjoys riding the scooter occasionally because scooters provide a low-cost, flexible mobility option for short trips, can access anywhere easily and can park anywhere upon reaching a destination. And mostly, it is fun to ride.

He usually rides the electric scooter if he meets available electric scooters on his way to his destination. However, he does not look for an electric scooter intentionally. He also does not want to ride the electric scooter in bad weather conditions.

After the revised regulation enacted by the Korean government, all electric scooter riders must wear a helmet while driving. Since then, he started hesitating to grab a public electric scooter because he does not want to bring a private helmet every time for riding a public electric scooter that is unexpectable to find on his way to his destination. After the regulation, the sharing scooter industry started to offer shared helmets with their electric scooters. However, most users like the persona feel uncomfortable using the shared helmet for sanitary reasons, especially after he dealt with the pandemic, he became more conscious about hygiene.”

Demographics.

Based on the establishing persona, the main target demographic can be described as a city dweller who lives in Seoul, South Korea and regular public electric scooter users. According to the law, adults who are older than 16-year-old are eligible to drive the scooter with a driver’s license. Since it is straightforward to learn how to drive the electric scooter, education level, age and gender would not impact to specify the demographics. Additionally, because the

public electric scooter services charge a reliable ride price, the most class will be able to reach the services. This thesis will set the income level to middle-class that can cover most demographics. See the table below for a summary of demographics

Demographics of Public Electric Scooter Users	
Age	16 – 45
Ethnicity	Asian (Korean)
Income	$35,000 - $60,000
Education	University graduate

Table 2 User Demographics

2.1.2 Current User Practice

The current user practice's goal is to discover the design opportunity through user observation who is performing the workflow of using a public electric scooter. The observation aimed to catch any design opportunity in both regular and non-routine tasks and discover how context changes the user experience. After the observation research, the observer interviewed the user who performed the workflow to correct findings and in-depth understanding.

Based on literature review and interview, the general process of using public electric scooters follows the order:

- Find available public electric scooter
- Download the electric scooter operator application that matches with the available scooter on the smartphone
- Register driver's license and payment method
- Unlock the scooter
- Begin riding up to 25km per hour speed for 10 – 15 mins
- Reach the destination
- Park anywhere
- Open the application on the smartphone and payment

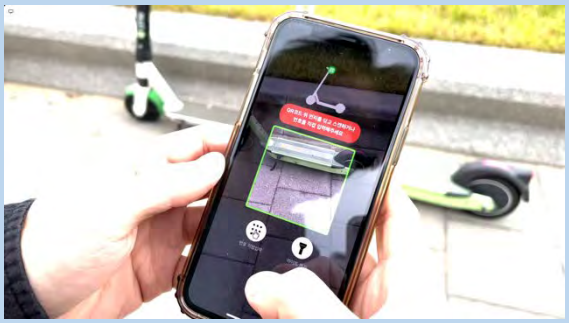
The general process indicates how easy access to public electric scooters with simple tasks is. Most public electric scooter operator offers the same tasks to the user. Thus, regular users are

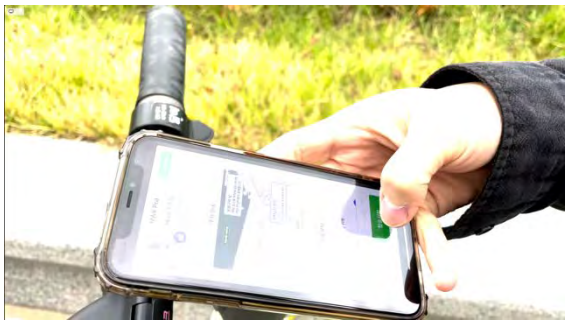
familiar with this process. Additionally, the wearing helmet process can be added in the order depending on the electric scooter operator that offers a shared helmet.

2.1.3 User Observation – Activity Mapping

Activity Mapping will show a more detailed and specified workflow through observational research. The purpose of the user observation is to understand the following steps/ activities the user goes through when using the public electric scooter. Quantitative information will be shown by workflow, and qualitative information is expected to follow by analysis of the user observation.

User Observation workflow

Steps	Description
Find available electric scooter 	• Find available electric scooter on his way to a destination • Choose which provider(brand) he is going to use
Preparation 	• Open the application on his phone that matches with the scooter
Step 1	

	• Scan QR code to activate the scooter • Check the battery status of the scooter • Hear beeping sound that notifies the scooter is unlocked
Step 2 	• Raise kick Stand • Hold the scooter to make it stand
Step 3 	• Place his strong leg onto the scooter deck, hold the handlebars steadily • Gaze direction where he heads to
Step 4 	• Begin riding • Check if the brake and accelerate button works properly
Riding	

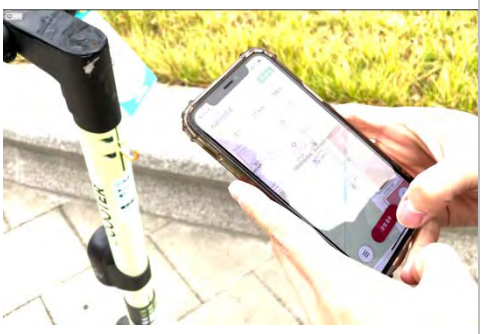
	• Press a button on the right handle with his thumb to accelerate the speed • Hold and press the brake lever on the left handle with his left ring and pinky fingers • Hold tight the handlebar while riding
Step 5 	• Arrive destination, get off the scooter • Lower the kickstand
Step 6 	• Open the application • Click the “Stop Using” button to begin the payment process
Completion 	• Take a photo and upload it to show where he parked the scooter • Make a payment

Table 3 User Observation workflow

Figure 3 User Observation images in Table 3. Taken by Subin Lim

2.1.4 User Observation – Human Factors of Existing Products

Human factors of the existing public electric scooter are discovered based on user observation. The ergonomics of electric scooters is essential since it can be related to safety issues. According to the observation and interview, major human touchpoints can be discovered in the handle and deck. Additionally, the stem that connects the handlebar and body of the electric scooter also affects human factors since the height of the handle is critical for human factors.

Figure 4 Human factors of electric scooter

Human touchpoint is highlighted in red colour which affects major human factors. The width of the deck affects comfort standing while riding, and the height of the deck affects when the user gets on and off, drive and stop, and stability while driving. According to the research, the primary element of ergonomics is the height of the handlebar. If the height of the handle is not suitable for the user's height, the user will have difficulties riding. *(See Figure 5)*

Figure 5 Human factors of the handlebar

Electric scooter handlebar height will affect the user on the following:

- Steering and control
- Comfort while driving
- Safety

The user entirely relies on the handlebar to control the riding. Thus, the ergonomics of the part must be treated carefully. The user must grab the handlebar tight to keep the scooter stable, especially while driving on bumpy roads. The brake lever and accelerate button location will be positioned carefully in terms of human factors. (See *Figure 6*)

2.1.5 User Observation – Safety and Health of Existing Products

Health.

Health for the helmet and electric scooters is mainly considered with manufacturing labours than users. Using more sustainable and less harmful materials can help keep workers' health and nature. For example, basalt fibre can be used for a composite shell and can

substitute for fibreglass that is made from extremely fine fibres of basalt or volcanic rock. It is non-toxic to air and water and non-flammable (Biodome™ , n.d.).

For electric scooters, the most electric scooter has a lithium-ion battery. Exposure to lithium can cause loss of appetite, nausea, vomiting, and abdominal pain. Many electric scooters manufacturers care to protect their battery from any damage because it can be explosive when the battery is damaged.

Safety.

There are many safety concerns for both helmet and electric scooters because electric scooter riders have a higher possibility of getting injuries when they get into accidents. Therefore, many helmet providers mainly provide safety standards such as CPSC Standard, ASTM F1447, ASTM. To satisfy such criteria, the helmets are tested in lab tests. Some brands also set their own standards to differentiate from other competitors. There is also a strap and buckle strength requirement and positional stability or roll-off test to see if the helmet will stay on the user's head when the helmet is yanked.

Electric scooters' standards have not been established as helmet standards because the electric scooter and other micro-vehicles became popular recently. The current safety standards and rules for using the new mobilities differ not only from country to country but also from city to city. Many organizations and governments are trying to establish a global safety standard for mobility.

2.2 Product Research

The purpose of the product research is to understand existing products through benchmarking to identify the semantics of the products that will potentially provide guidance to improve the thesis project. All information is applied to guide the development of the thesis project.

2.2.1 Benchmarking – Benefits and Features of Existing Products

Benchmarking existing products aims primarily for helmets because it is related to the thesis topic, which is improving safety, and current issues in the public electric scooter are the helmet regulation.

Benefits of Existing Products.

Product name	Benefits
Triple 8  *Figure 6 Triple 8. Retrieved from https://www.amazon.com/gp/product/B00M569K6M/ref=as_li_qf_asin_il_tl?ie=UTF8&tag=eskateboar06b-20&creative=9325&linkCode=as2&creativeASIN=B00M569K6M&linkId=cd3dcaed32b36d62f54671d24407dab5*	• Safety Standards • Ideal for biking, skateboarding, scooters, and commuting • Customizable fit • Adjustable chin strap
Lumos Matrix	

Figure 7 Lumos Matrix. Retrieved from https://www.amazon.com/gp/product/B07YWX9J2N/ref=as_li_qf_asin_il_tl?ie=UTF8&tag=e-skateboarder-20&creative=9325&linkCode=as2&creativeASIN=B07YWX9J2N&linkId=60c3ef904e2fc484c5e49345f39f14a7

- Safety certification
- Extremely light
- Cool looks and VIP security
- Customizable display
- Visible at eye level from 360 degrees

Newton Rider

Figure 8 Newton Rider. Retrieved from https://lazyrolling.com/?ref=xyqyoihwiio

- Foldable and easily stored
- Safety standards
- Comfortable fit
- Stylish

Overade Plixi

Figure 9 Overade plixi. Retrieved from https://www.amazon.ca/Foldable-Helmet-Scooter-Skateboard-Overboard/dp/B01N66F8QW/ref=sr_1_5?dchild=1&keywords=foldable%2Bhelmet&qid=1633410996&sr=8-5&th=1&psc=1

- Safe and robust
- Durability and sturdiness
- Comfortable fit
- More Practical
- Compact & Foldable
- Customizable
- Elegant design
- Many colours option

Fend

Figure 10 Fend. Retrieved from https://fend.io

- Foldable by 50% size
- Fold-flat and store comfortably in any bag
- Safety certified
- Durable design
- Comfortable & perfect fit
- Lightweight

Closca

Figure 11 Closca. Retrieved from https://closca.com/products/closca-helmet?variant=17656932139079

- Impact protection and resistance
- Foldable design
- Rear adjustable
- Comfortable
- Lightweight
- Airflow
- Extremely portable

Echo Helmet

- Foldable
- Fully recyclable
- Minimal waste
- Vendable
- Waterproof
- Impact protection

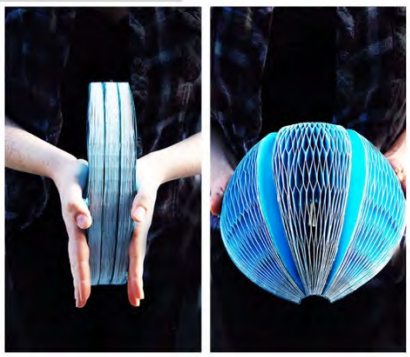


Figure 12 Echo Helmet. Retrieved from https://www.jamesdysonaward.org/2016/project/ecohelmet/

- Conforms to most head sizes
- Less cost

Table 4 Benefits of existing products

Most existing products aim to reduce the helmet's physical size while not in use. For example, *Fend* and *Closca* helmet is designed to be foldable or collapsible. Most helmets also mention that the product satisfies safety standards, comfortable fit, and customizable options. The *Echo Helmet* offers unique benefits compared to other products as the helmet is made out of recyclable paper material. It can be fully recyclable and sold by vending machines by the public shared mobilities with less cost.

Features of Existing Products.

	Triple 8	Lumos Matix	Newton Rider	Overade Plixi	Fend	Closca	Echo Helmet
Price	$35.50 - $83.68	$214.95	$121	$408.91	$159	$189	Under $5
Head sizes	S/M: 55-58cm L/XL: 59-61cm	56-61cm	57-60cm	S/M: 54-58cm L/XL: 49-62cm	S: 54-56cm M/L: 56-61cm	S:51-56cm M:56-58cm L:58-62	One size fit
Weight	400-450g	580g	450-470g	440g	445g	250-290g	Less than 100g
Materials	ABS Shell EPS foam liner	ABS Shell EPS foam liner	Visco-Elastic Non-Newtonian materials	ABS Shell Polystyrene inner	ABS Shell Polycarbonate EPS foam liner	ABS Shell Fabric	Paper (Recycled)
Smart features		Lumos App	NFC Chip API integrated			NFC Chip	
Foldability			✓	✓	✓	✓	✓

Extra features		LED Panel		Removable Accessories		Interchangeable visor	Biodegradable waterproof coating Unique cell structure

Table 5 Features of existing products

Price varies depending on what material and technology are used and the product's features. Most products offer different size options from 55cm to 62cm, except Echo Helmet. Since its unique honeycomb structure, Echo Helmet fits most percentile people. The weight of products is from 400g to 580g depending on what material is used and sized. Most helmets are made out of ABS for the shell and EPS for the inner foam liner. *Newton Rider* is made out of special *Visco-Elastic materials,* allowing lightweight, foldability, and protection. Some products have extra smart features that connect to electronic devices.

2.2.2 Benchmarking – Functionality of Existing Products

All benchmarked products are basically performing one functionality; protect the user's head from accident and prevent fatal injury on the head. Most products presented what helmet safety standards achieved, such as US CPSC, European EN1078, CE Certified safety standards.

Additionally, it is important to fit the helmet perfectly in various head sizes to maximize safety to function as a helmet. Thus, most helmets offer an integrated dial fit system for precise adjustment.

2.2.3 Benchmarking – Aesthetics and Semantic profile of Existing Products

X-Y Graph of Aesthetic Profiles.

Figure 13 x-y Graph of Aesthetic Profiles

The aesthetics and semantics of the helmet are basically following the form of the head to cover a human's skull. The overall form is hardly changeable since it is related to safety and satisfying safety standards. However, many products offer different styles in terms of aesthetics.

(See *Figure 14*) As the x-y graph shows aesthetics of the helmet can be distinguished by traditional helmet style such as *Triple 8* or can be more futuristic style using new materials and technologies such as *Newton Rider*. User can choose their helmet depending on their lifestyle or personal preference. On the y axis, the helmet design is also distinguished by rigid or flexible design. For example, *Triple 8* or *Lumos Matix* has one solid shell that offers rigid protection. On the other hand, other products such as *Fend* or *Closca* offer foldable options while not in use.

2.2.4 Benchmarking – Materials and Manufacturing of Existing Products

Helmet.

General helmets have three distinctive parts: shell, liner, and strap.

Parts and materials	Description
*Shell – **ABS**, PC, PET, carbon fibre, etc.*  Figure 14 Helmet – shell. Retrieved from https://www.explorethousand.com	• Most of the bicycle helmets and skateboard helmets have hard shells made of ABS or polycarbonate, following the moulding manufacturing technic • Some inexpensive helmets shell is made of stamped PET • BMX helmets that require higher protection can have composite hard shells with layers of fibreglass, Kevlar, or carbon fibre laid up in epoxy

*Liner – **EPS**, EPP, EPU*  *Figure 15 Helmet – shell. Retrieved from https://www.lyonequipment.com*	• The liner is the most important part of the helmet because the foam layer manages the energy of the crash • Most liner parts of bicycle helmets are moulded in Expanded Polystyrene (EPS) foam. • Usually made mixture with reinforcement such as nylon, polypropylene or metal
Strap – nylon, PP, leather  Figure 16 *Figure 3 Helmet – strap. Retrieved from https://www.aspli.com*	• Straps are mostly made out of nylon or polypropylene(PP) • The quality of the strap varies in fabric, surface finish, weave and other subtle characteristics depending on market prices • The strap is usually placed between shell and liner when they are glued on • The buckle is added on when the straps are installed. Most buckles are made out of plastic or nylon of the Fastex type(a trademarked ITW/Nexus brand) • Some buckles for BMX helmets use motorcycle-style D-ring buckle

Electric scooter.

Most electric scooters have these parts below:

- Chassis (stem + deck)
- Handlebar

- Battery and Controller
- Electronics and Wires
- Throttle mechanism
- Brake mechanism
- Screen
- Wheels
- Tires
- Fenders
- Lights

The primary materials for the base of the electric scooter are industrial-grade aluminum alloy as bicycles. Additionally, some high-end brands use an aerospace aluminum alloy that is lighter than a normal-grade one, and it can also use a combination of aluminum and carbon fibre.

Everything else that is non-electronic in the scooter is made from:

- Steel or other metals (wheels, rims, disk brakes, screws, nuts and bolts)
- Plastic (fenders, throttle button, brake lever, supplementary parts)
- Rubber or Silicone (surface of the deck, handle covers, tires, caps)

2.2.5 Benchmarking – Sustainability of Existing Products

In terms of sustainability, helmet parts can be manufactured using more recyclable or recycled materials such as recycled EPS, recycled plastic, or water-based paints. According to a study, the global warming impacts of shared electric scooters are dominated by materials, manufacturing, and charging (Hollingsworth et al., 2019). In addition, most shared electric scooters' lifetime cycle is two years, so it will be an opportunity to increase the life cycle of electric scooters for sustainability.

Benchmark Sustainable Initiatives

Many current product developers are trying to reduce carbon footprints while manufacturing. They consider using sustainable materials and enhancing the lifecycle of the products. For example, Strategic Sports LTD (Biodome™ , n.d.) suggests some ways to reduce carbon footprints.

Figure 17 biodome™. Retrieved from https://www.strategicsportsltd.net/biodome

According to their product description, each Biodome™ helmet is created with up to 96% recycled or sustainably sourced materials, including injection-moulded shells and EPS liners made from recycled materials, water-based paints, straps from recycled plastics, and padding made from sustainable bamboo fabric. They insisted that Biodome™ materials reduce carbon output by 75,071kg in 2021.

For the electric scooter, according to the study of electric scooter pollutions (Hollingworth et al., 2019), global warming impacts associated with the use of shared e-scooters are dominated by materials, manufacturing, and automotive use for electric scooter collection for charging. And they found electric scooters were not reducing carbon footprints as they expected. However, they suggested that increasing the lifetime of the scooter, reducing

collection and distribution distance, using more efficient vehicles, and less frequent charging strategies can reduce the environmental impacts.

2.3 Summary of Chapter 2

In conclusion, in Chapter 2, much essential information is gathered through the user research and product benchmark for the thesis topic. The purpose of the study was to empathize with user experience through user demographics and behaviours by collecting information from in-depth interviews and user observation and understanding current product semantics by product benchmark study. As a result, both qualitative and quantitative studies will provide a design opportunity to be improved, inspiration and guidance to the next step.

The key data relevant to thesis problem definition has been gathered that all following the list below:

- Most public electric scooter user does not use safety gear
- The helmet must be satisfied safety standards

In the next step, analysis of the research finding will provide a better understanding and insights into the thesis project. More insightful information will be treated in the next Chapter 3.

CHAPTER 3 ANALYSIS

3.1 Analysis - Needs

The public electric scooter industry has met a significant issue recently. After the helmet regulation, many users hesitate to use electric scooters because the users feel uncomfortable using the helmet. The industry knows the issue but could not compromise regulation and usability. The analysis of user needs will give more insights to discover design opportunities for both industries, and users will be satisfied with

3.1.1 Needs/Benefits Not met by Current products

3.1.2 Latent Needs

Needs	Benefits and underlying needs	Level of importance		
Basic needs	*Physiological*	slight	Moderate	High
Food, water, shelter	• **Shelter** users from environments	✓		
Pleasure, gratification (sensory, compulsive responses)	• Feels **comfortable** while wearing the protective gear • Feels **safer** while wearing the protective gear • **Easy to wear on and off** • Inner liner **feels smooth** and soft to user • Want to drive fast while using an electric scooter			✓
security	*Safety, securing resources*	slight	Moderate	High
State, group, individual	• **Protective gear** for electric scooter riders			✓
Securing resources	• **Price** is important for user			✓
	• **Reliability** of protective gear		✓	

Control over environment (tasks)	• **Ease of use**: Easy to put on and off the gear			✓
	• **Ease to buy**: Easy to buy online, or through the application			✓
	• **Speed**: Less process to wear the protective gear	✓		
	• **Control**: Interactive design to wear/to tight safety straps			✓
Long term security/stability of group	• **Sustainable material** used in protective gear		✓	
	• Durable, **easy to maintain**			✓
Social belonging	*Effort / resources to belong to a 'tribe'*	slight	Moderate	High
Fear of abandonment	• User does not want to wear protective gear since they feel it is **not "cool" to wear it**	✓		
Fear of the enemy	• Fear of get **accidents with cars**			✓
Behaviour cue for social interaction of group	• **Hesitate** to ride public electric scooters without helmets • **Regulation** - All riders must wear helmets while using electric scooters		✓	
Peer pressure	• "It is illegal to ride an electric scooter without a helmet." • "Watch out, the police."			✓
Social expectation	• Riders **must wear to helmet** • Riders should drive safely	✓		
Esteem	*Personal influence in 'tribe'*	slight	Moderate	High
Social status	• Some celebrities use really expensive protective gear	✓		
Sexual attractiveness	• Sharing helmets doesn't look good for sanitary reasons			✓
Self-actualization 'Higher order' Functions/needs	*Needs that are predominantly 'outer cortex'*			
Instinct pleasure	• Aesthetically pleasing (design, shape, colour, functions)			✓
Creative endeavours	• Personalizing unit, Customizable options	✓		
Experiential (extrinsic)	• Fun to ride outdoor (urban area), fear for an accident (by cars, pedestrians)		✓	

emotional	• Empathy: Is the user want to use sharing helmet? Feel comfortable while using it?			✓

Table 6 Linking benefits with needs

3.1.3 Categorization of Needs

Immediate needs.

- Protection from accidents (Basic needs)
- Durable (Security)
- Maintenance (Long term security)
- Easy accessibility to use
- Easy to adjust helmet (Control over environment)
- Must wear the helmets while riding electric scooters

Latent needs.

- Aesthetically pleasing design (Instinct pleasure)
- Customizable options (Creative endeavours)
- Easy to buy
- Easy to store the shared helmet
- Check out the status of the electric scooter

Wants/Wishes.

- Sanitized and clean shared helmet
- Better solution to protect users than a traditional helmet
- Way to get helped by navigation without using their phone
- A unified method to activate and pay the electric scooters

3.2 Analysis - Usability

3.2.1 Journey Mapping

	FIND A SCOOTER	PREPARATION	STEP 1	STEP 2	STEP 3	STEP 4	RIDING	STEP 5	STEP 6	COMPLETION
USER GOALS	Find available scooter	Open an app that matches with the scooter	Activate the scooter	Get ready to begin riding 1	Get ready to begin riding 2	Get going	Ride to destination safely	Arrive destination	Begin payment process	Make a payment
USER ACTIONS	Look around him	Find the app he wants to use Tap to open the app	Find QR code and scan it Check the status of **battery**	Raise kickstand	Put a leg onto the scooter deck Check out the **break** and **accelerate** button	Begin riding	Operate acceleration and brake Check out navigation	Stop at destination Lower kickstand	Open the application Begin the payment process	**Take photo of the scooter** Finish payment
USER THOUGHTS	*"Where are the electric scooters?" "Which scooter should I take?"* ***"I am not going to ride the one next to the garbage bin"***	*"There are **too many apps** operated by each provider"*	*"There is the QR code" "This scooter doesn't have **enough battery to ride**"*	*"Let's ride" "How long it will take to the destination?"*	*"Okay, which way should I go?" "Wait, this **break works bad, I need to change my scooter.**"*	*"I like to ride the electric scooter" "Yoohoo"*	*"Roads are not a good condition, the scooter is wobbly" "Oh I almost hit the pedestrian" **"Oh I almost hit by the car at the alley"***	*"That was nice ride" "I want to ride again"*	*"Wow it's cheaper/ more expensive than I thought!"*	***"Why do I have to upload the photo?"** "Payments process was fast!"*
USER FEELINGS	Want to find a scooter that is in **good condition to ride**	**Annoyed** to install each app for activating the scooter	Nervous, annoyed if the scooter has low battery	Excited	Excited Nervous if he doesn't know the place he is riding	Excited	Excited, Nervous to avoid any accident while riding, annoying to **stop and check navigation often.**	Relieved, enjoyed	Surprised	Annoyed, Impressed
IDEAS / TAKE-AWAY	Should **maintain scooters in good condition** / The scooters should be **located where many users pass**	Each provider is offering their own app, **user needs to install and sign up each app to use the scooter**	QR code must be found **easily** **Should consider battery status**	Maintain the kickstand in good condition	Better way to **navigate** user to destination		Require **safer way** to ride the electric scooter	Make sure user **park the scooter at designated place**	**Price** affects a lot to users	Better system to keep their scooters safe

Table 7 Journey Map

3.2.2 User Experience

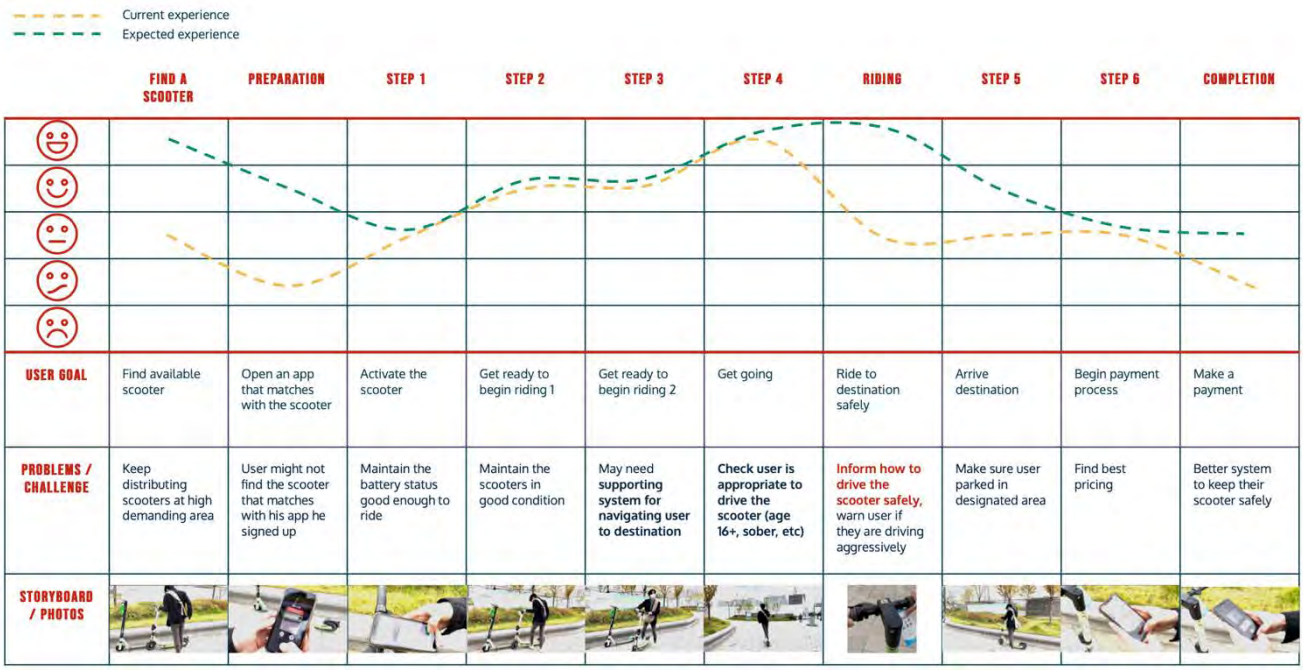


Table 8 User Experience Map

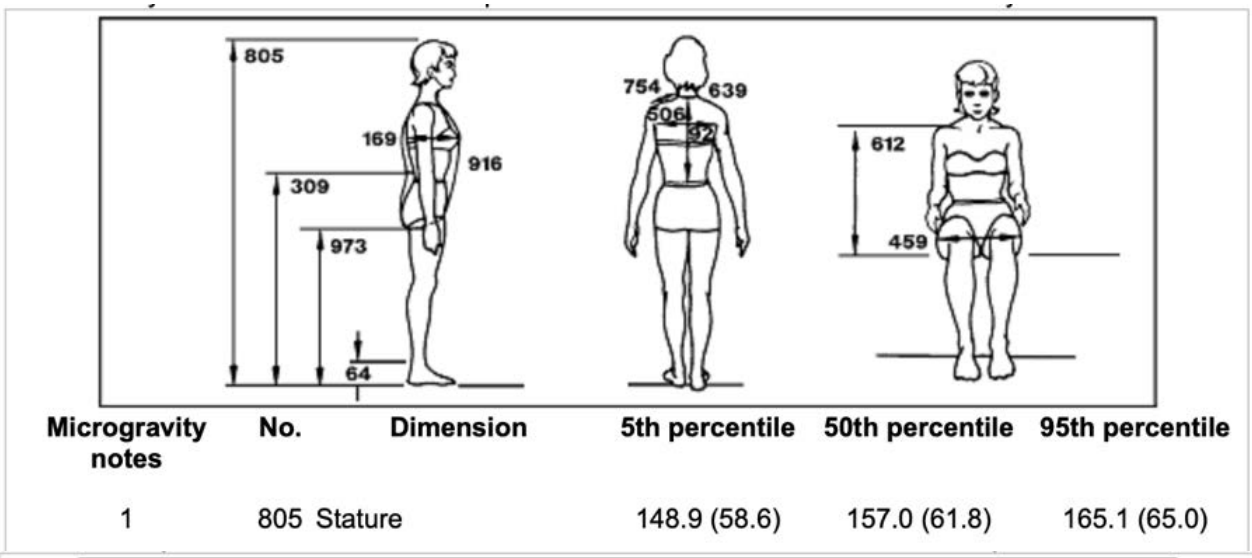
3.3 Analysis – Human Factors

The purpose of the ergonomic study is to evaluate the chosen concept from the perspective of human factors design that covers most of the main users based on human reference with precise anthropometric measurements. Therefore, the interaction between the kiosk, helmet, helmet compartment, electric scooter, and main users will be studied by analyzing a one-to-one scale mock-up. Each mock-up and human model represent interactions when the user activates a public electric scooter and wears a shared helmet from the compartment in the urban area.

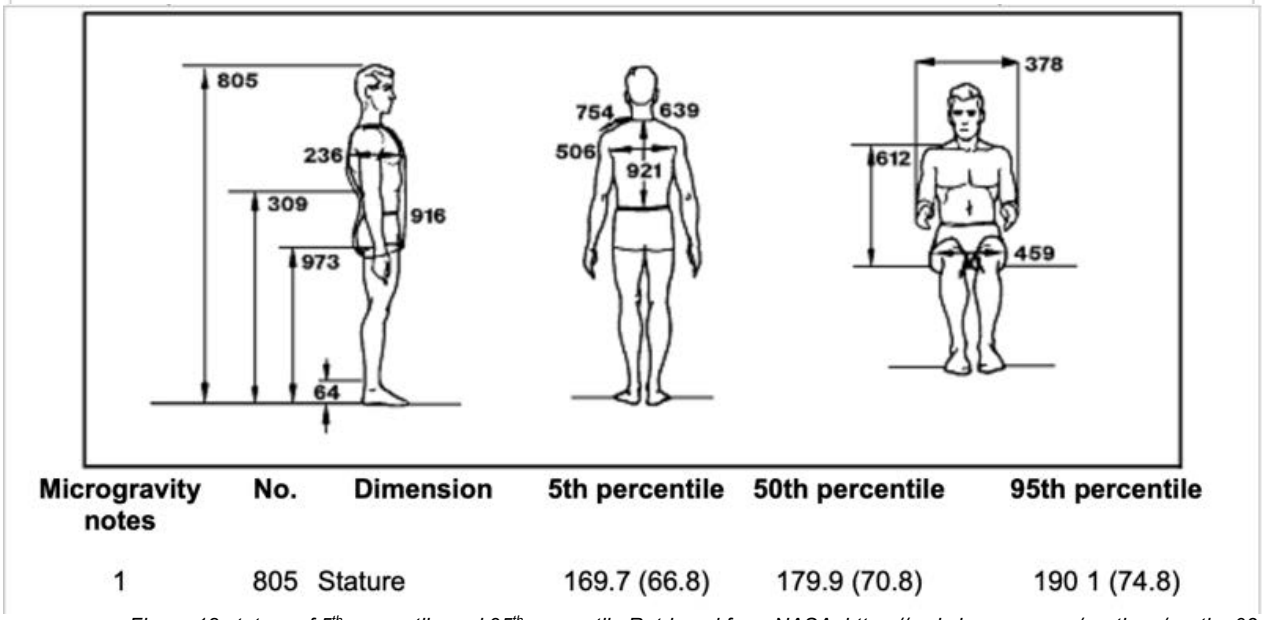
Literature Review.

The human reference is based on the Anthropometry and biomechanics that are researched by *NASA* (NASA, n.d) because it covers a wide range of ethnic and racial backgrounds from 5th percentile Asian females to 95th percentile White or Black American males. For example,

according to the reference, the stature of 5th percentile women is 148.9cm, and the 95th percentile is 190.1cm (See *Figure 15*).



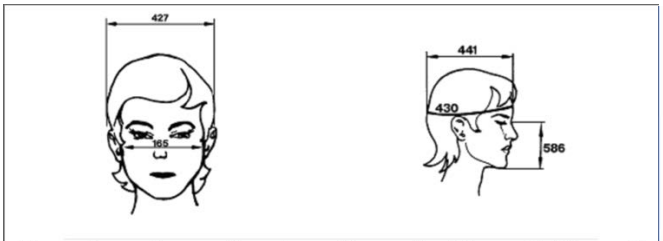
Micrograv notes	No.	Dimension	5th percentile	50th percentile	95th percentile
1	805	Stature	148.9 (58.6)	157.0 (61.8)	165.1 (65.0)



Micrograv notes	No.	Dimension	5th percentile	50th percentile	95th percentile
1	805	Stature	169.7 (66.8)	179.9 (70.8)	190 1 (74.8)

Figure 18 stature of 5th percentile and 95th percentile Retrieved from NASA. https://msis.jsc.nasa.gov/sections/section03.htm

The measurements of stature were used to figure out the optimal height of the kiosk, and measures of Head breadth, length, and circumference were used for the helmet liner and the compartment (*Figure 16*).



Microgravity notes	No.	Dimension	5th percentile	50th percentile	95th percentile
	427	Head breadth	14.4 (5.7)	15.6 (6.1)	16.8 (6.6)
	441	Head length	16.7 (6.6)	18.2 (7.2)	19.6 (7.7)
	430	Head circumference	53.2 (20.9)	55.2 (21.7)	57.2 (22.5)

Microgravity notes	No.	Dimension	5th percentile	50th percentile	95th percentile
	427	Head breadth	14.8 (5.8)	15.7 (6.2)	16.5 (6.5)
	441	Head length	18.8 (7.4)	20.0 (7.9)	21.1 (8.3)
	430	Head circumference	55.5 (21.8)	57.8 (22.8)	60.2 (23.7)

Figure 19 Head measurements of 5th percentile and 95th percentile. Retrieved from NASA. https://msis.jsc.nasa.gov/sections/section03.htm

Methodology.

The one-to-one scale mock-ups are carefully made based on the human measurements for both the 5th and 95th percentile. And the human models that represent 50th percentiles males and 95th percentile males are used for the analysis with the mock-ups. The evaluation was performed by observing step-by-step interaction between the mock-ups and human models. The key aspect of the observation is figuring out any ergonomic obstacles to the touchpoints of the mock-ups. Correct figures and correct relevant measurements will be defined through this study while analyzing the results

3.3.1 Product Schematic – Configuration Diagram

Kiosk Schematic.

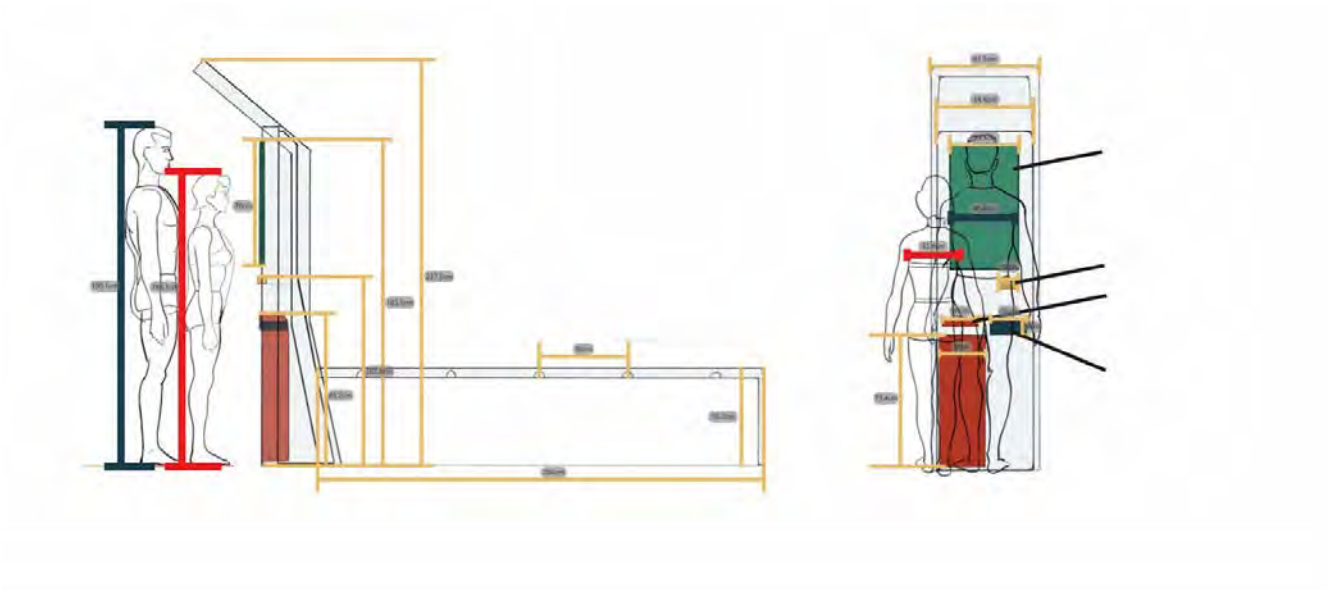


Figure 20 Kiosk Schematic

Electric Scooter and Helmet Compartment Schematic.

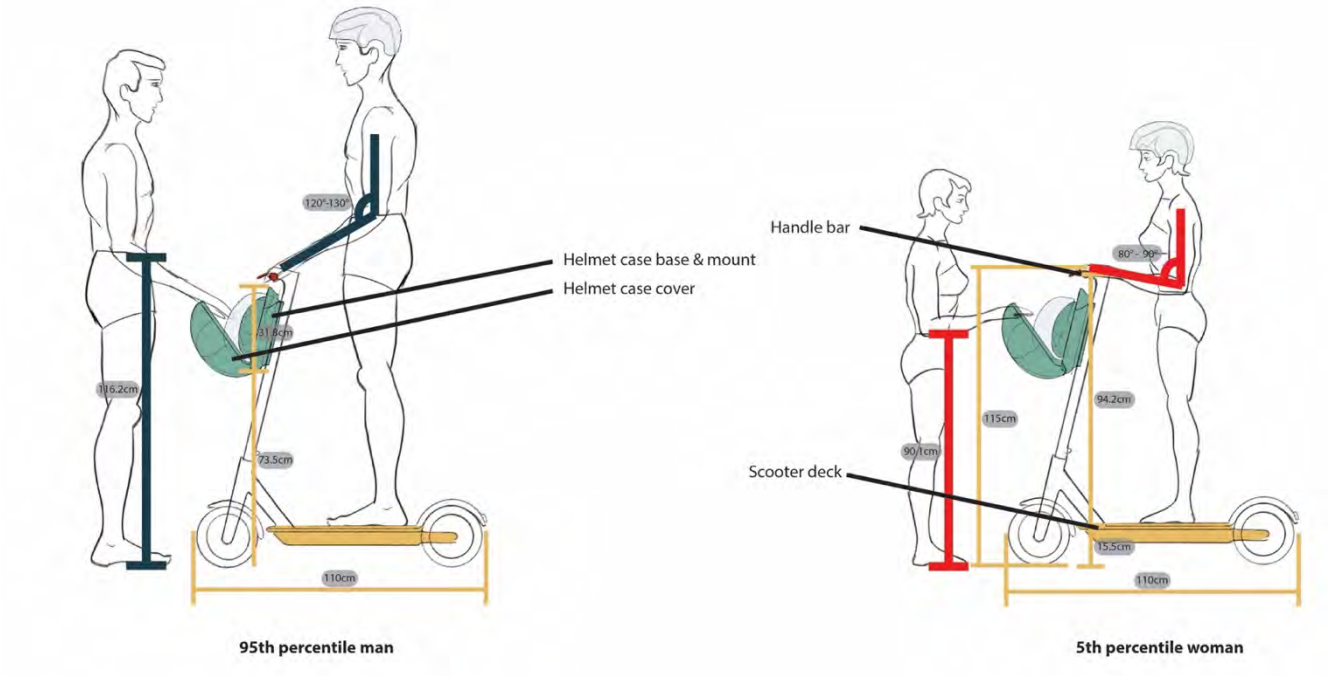


Figure 21 Electric Scooter and Helmet compartment Schematic

Helmet Schematic.

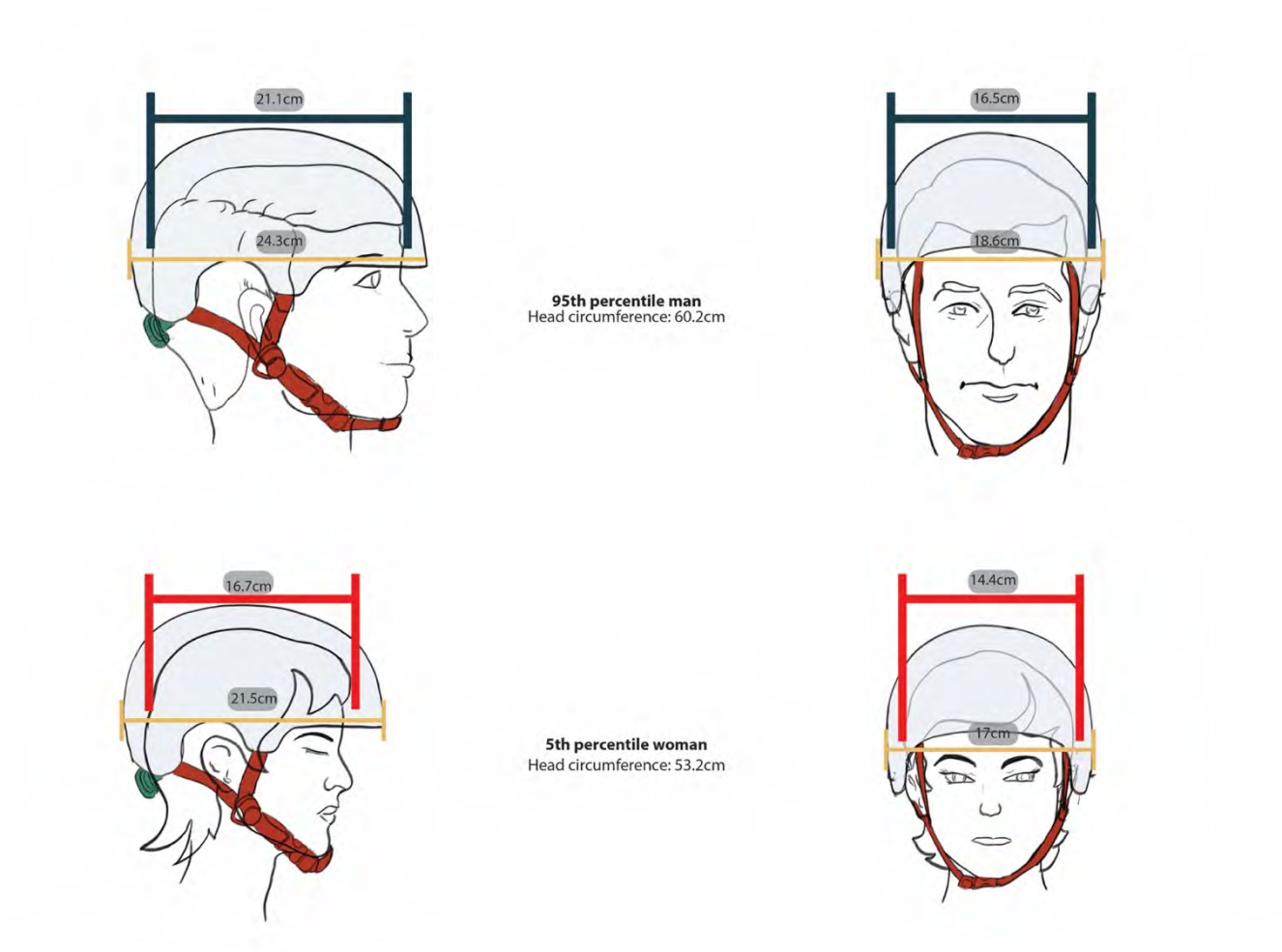
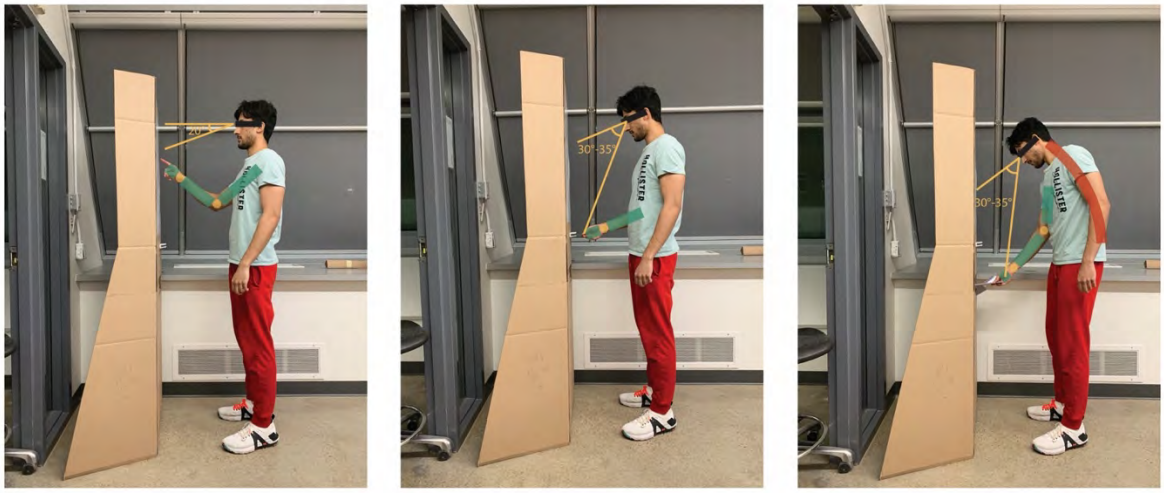


Figure 22 Helmet Schematic

3.3.2 Ergonomic – 1:1 Human Scale Study

Kiosk Ergonomic.

Figure 23 1:1 Human scale study – Kiosk model



Step 1 Step 2 Step 3

Kiosk interactions

95th percentile man

Back view 3/4 view

Figure 24 1:1 Human scale study – Kiosk interactions by 95th percentile man

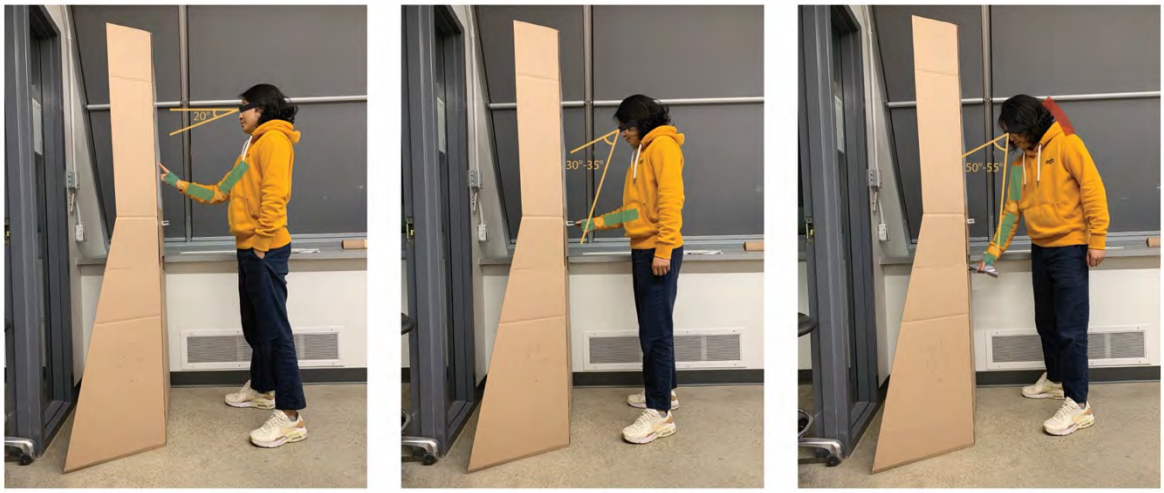


Figure 25 1:1 Human scale study – Kiosk interactions by 50th percentile man

Electric Scooter and Helmet Compartment Ergonomic.

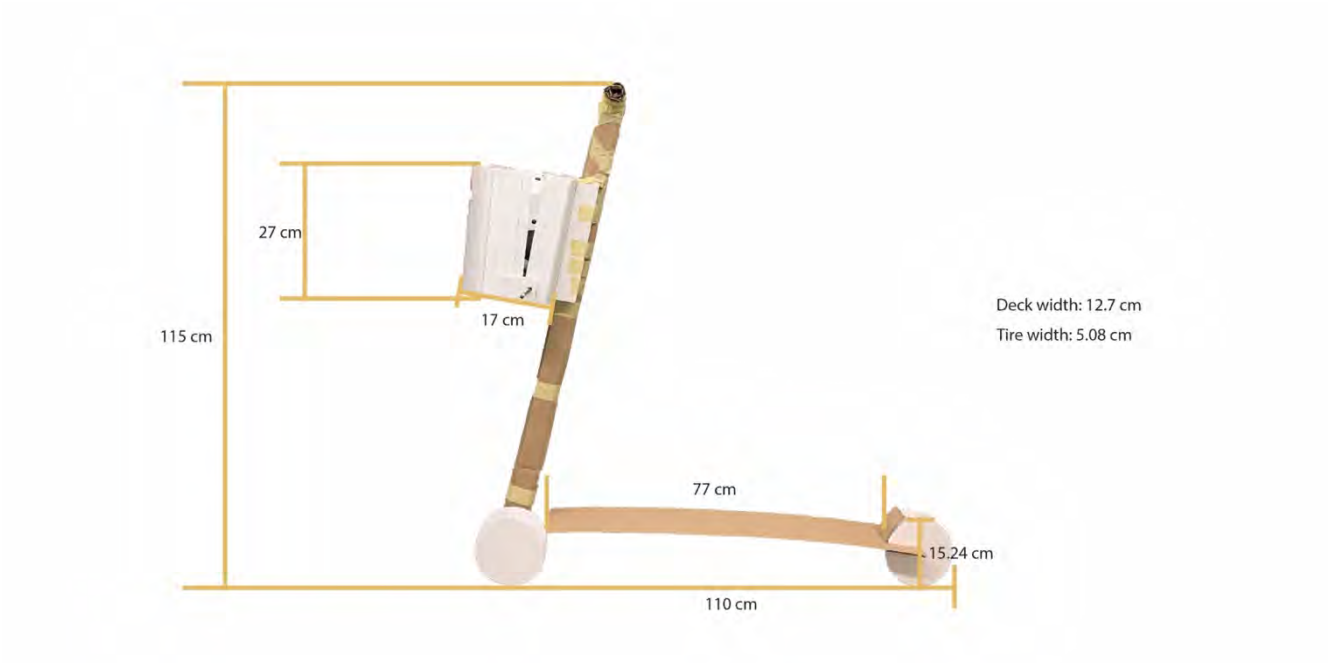
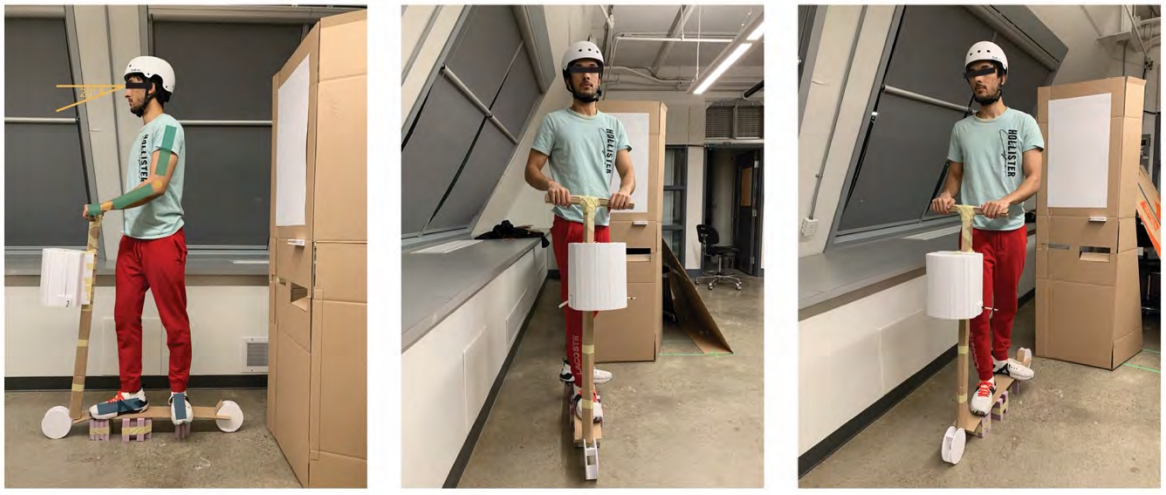


Figure 26 1:1 Human scale study – Electric scooter

Step 1 Step 2 Step 3

Electric scooter & Helmet compartment interactions

95th percentile man



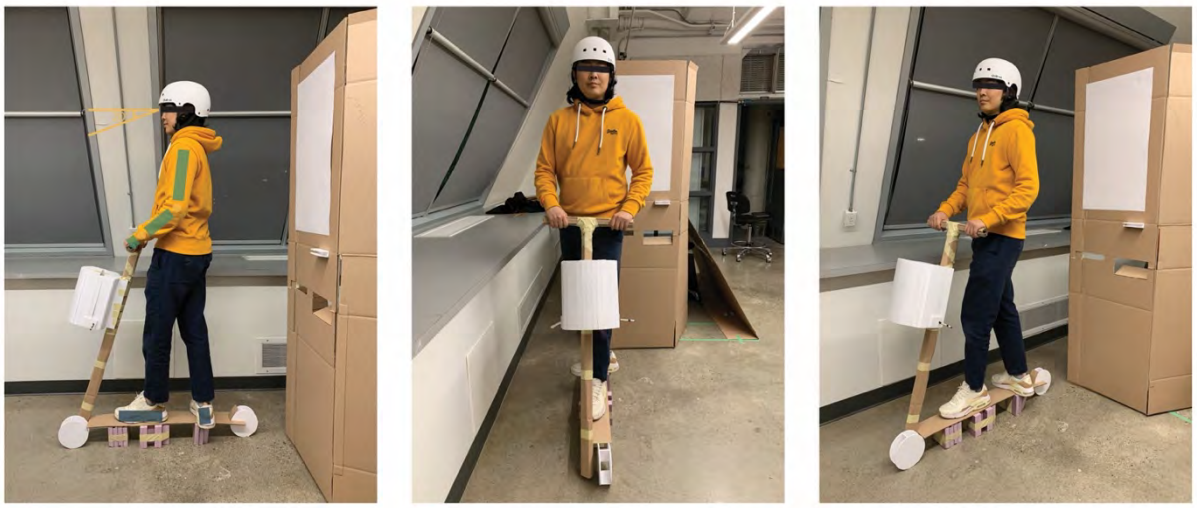
Side view Front view 3/4 view

Figure 27 1:1 Human scale study – Electric scooter interactions by 95th percentile man

Step 1 Step 2 Step 3

Electric scooter & Helmet compartment interactions

50th percentile man



Side view Front view 3/4 view

Figure 28 1:1 Human scale study – Electric scooter interactions by 50th percentile man

Helmet Ergonomic.

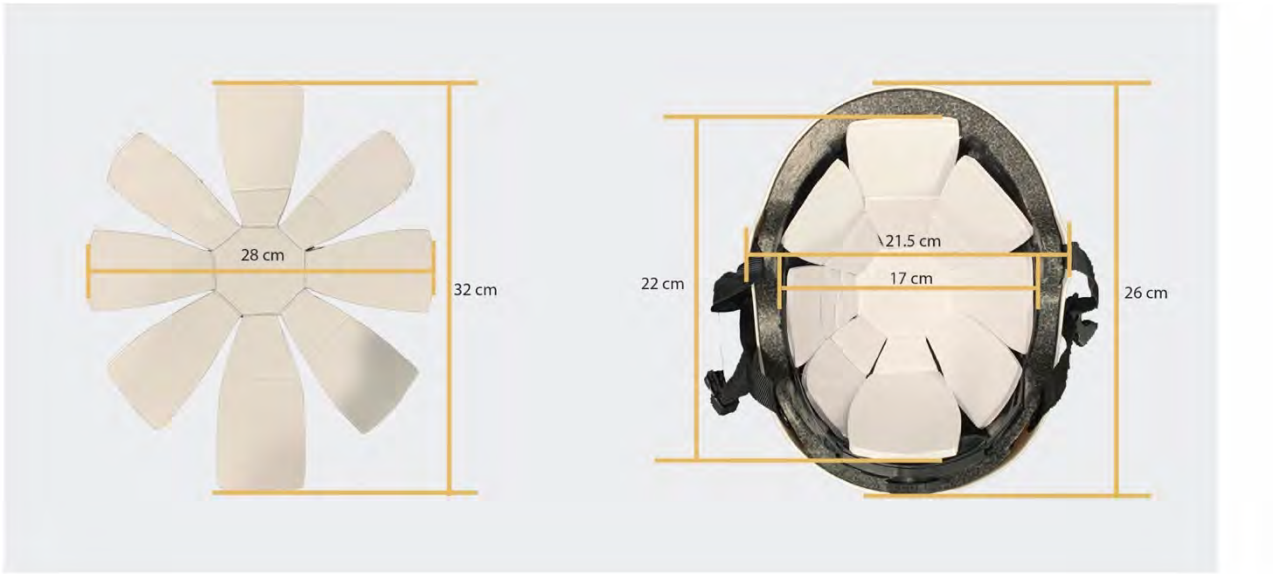


Figure 29 1:1 Human scale study - Helmet

CHAPTER 4 DESIGN DEVELOPMENT

4.1 Initial Idea Generation

To start the design process, aesthetic inspiration and semantic profile were initially explored to decide the design approach. After the aesthetic approach was chosen, a mind map was developed to help brainstorm possible concepts. Then initial idea concept sketches were done to visualize the generated possible concepts through brainstorming.

4.1.1 Aesthetics Approach & Semantic Profile

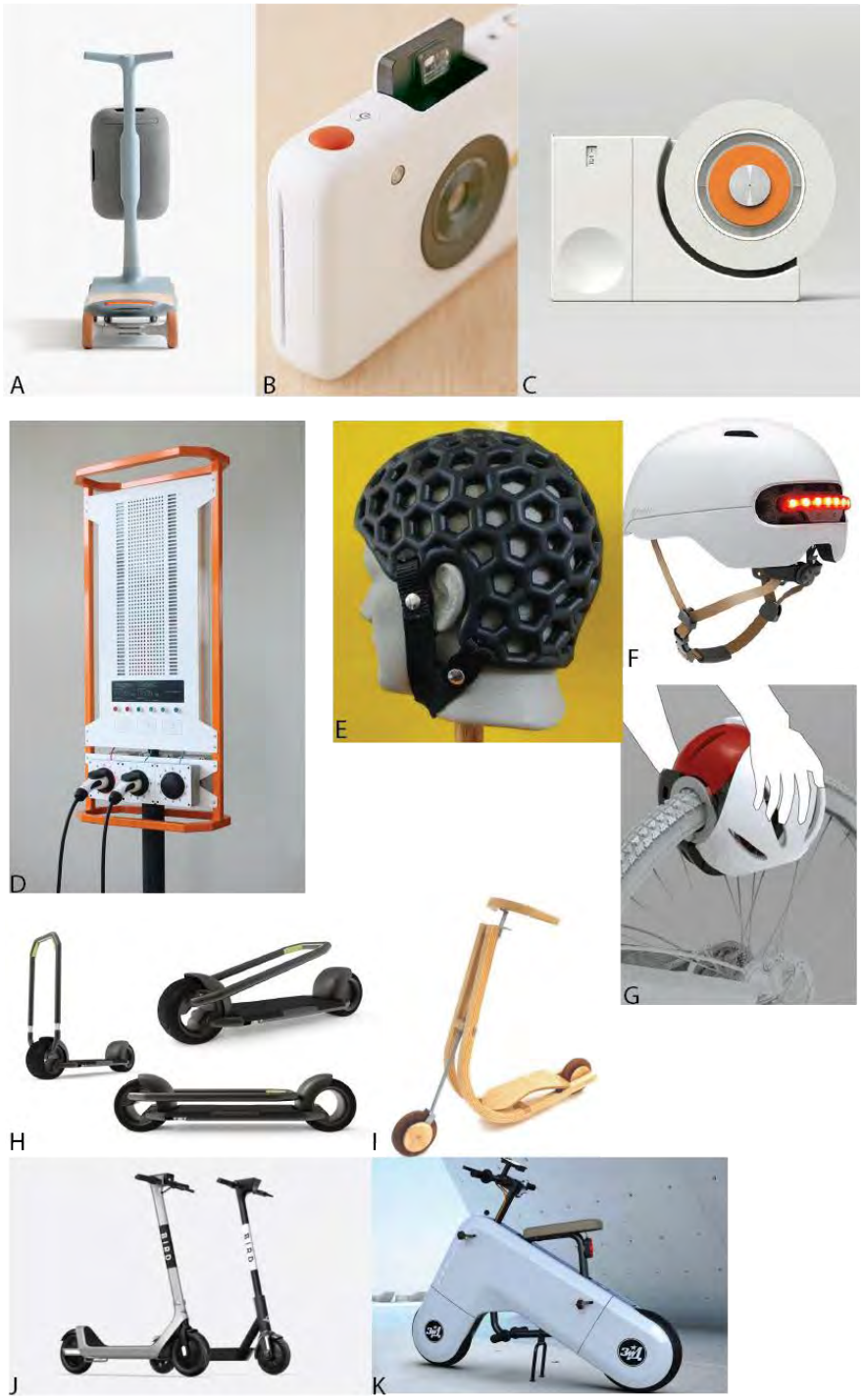


Figure 30 Mood board and inspiration

Images were retrieved from:

A: https://www.dezeen.com/2019/04/26/pal-scooter-layer-nio-electric-autonomous-machine-learning/

B: https://www.pinterest.ca/pin/519391769536574998/

C: https://www.pinterest.ca/pin/AR4XS86KNtS09Jade4MBB3FuwLhiPm18FKlYhxETuvJFxWnOCyc3T8E/

D: https://sid766.tumblr.com/image/621161286539132928

E: https://medicalxpress.com/news/2015-03-footy-knockout-lightweight-helmet-idea.html

F: https://www.pinterest.ca/pin/912893786937438922/

G: https://www.toxel.com/tech/2017/09/14/bicycle-helmet-lock/

H: https://www.yankodesign.com/2020/01/23/future-requires-designs-like-this-flat-packing-electric-scooter-that-comes-with-its-own-automated-storage-system/

I: https://www.pinterest.ca/pin/519391769536574973/

J: https://www.bird.co/

K: https://www.yankodesign.com/2021/07/05/boomerang-shaped-electric-scooter-is-designed-to-be-an-effective-urban-e-bike-for-hire-service/

This mood board/inspiration board was developed to understand design semantics and design approach to the next concept ideation. The concept ideation requires broad exploration of areas such as kiosks, parking spaces, helmet compartments, and electric scooters. The concept ideation will aim to achieve a combination of futuristic aesthetics but modern and simple looking. Furthermore, all parts, including the kiosk, helmet compartment, and scooter, will share a similar design language.

4.1.2 Mind Mapping

Figure 31 Mind Map

Mind mapping was done in an affinity map style. Yellow sticky notes were initially created and organized with similar ideas. Orange sticky notes were named after the yellow sticky notes organized. The major points that were found through the mind mapping are:

1. Most users do not want to wear a shared helmet
    - They feel uncomfortable wearing a shared helmet for sanitary reasons
    - The majority of users do not find shared helmets to be comfortable
    - Service providers are experiencing reducing users after the helmet regulation enacted
2. Users frequently stop to check the navigation on their phone
3. Electric scooters are disrupting city operation

- Many public electric scooters are improperly parked, obstructing pedestrians and the flow of traffic

4.1.3 Ideation Sketches

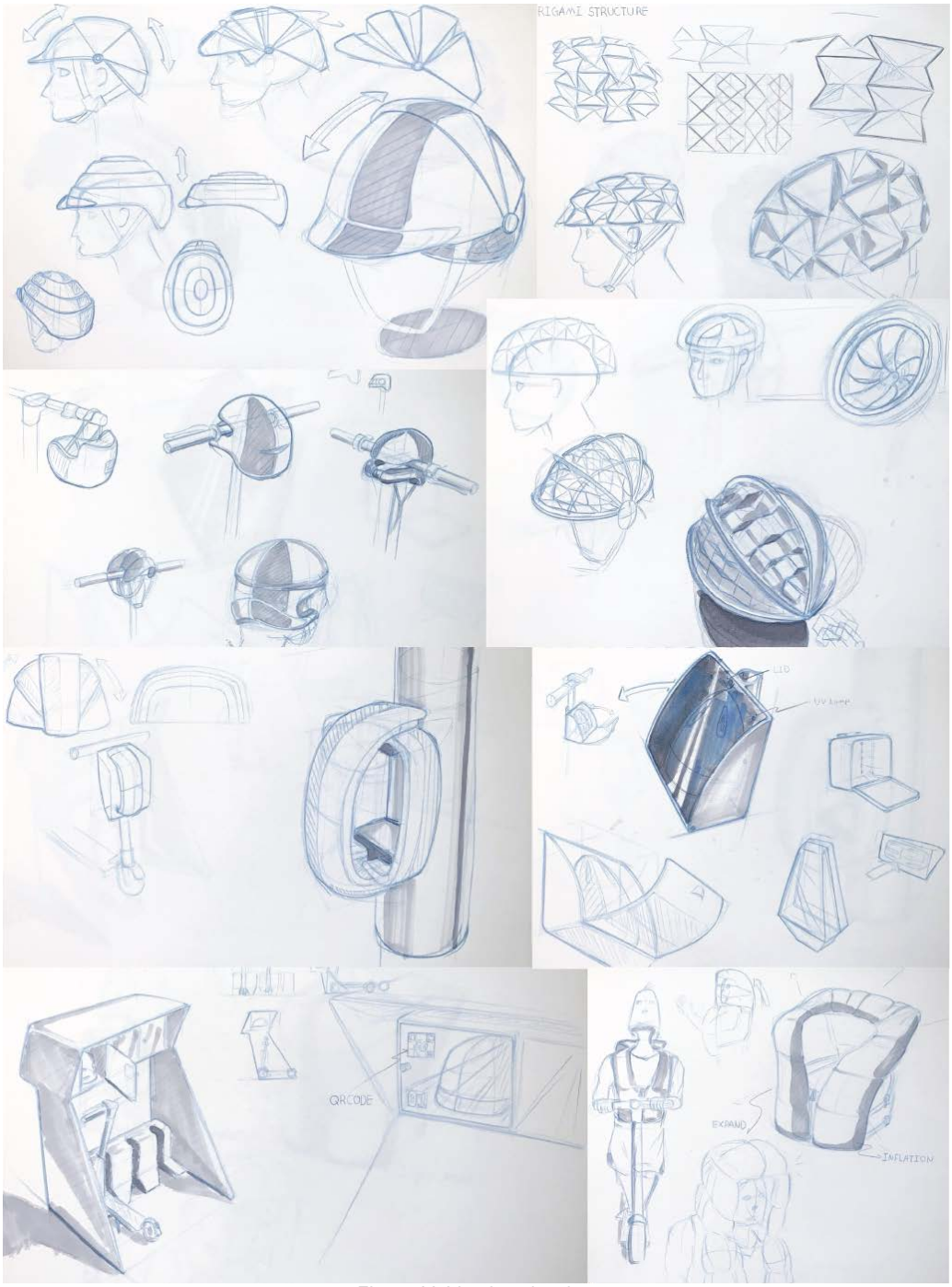


Figure 32 Ideation sketches

Initial ideation sketches were focused on exploring the portability of helmets, helmet compartments that can be accessed quickly and safely, a stationary platform, and other protective gears.

4.2 Concepts Exploration

After the ideation, three distinctly different concepts were decided and iterated.

4.2.1 Concept One

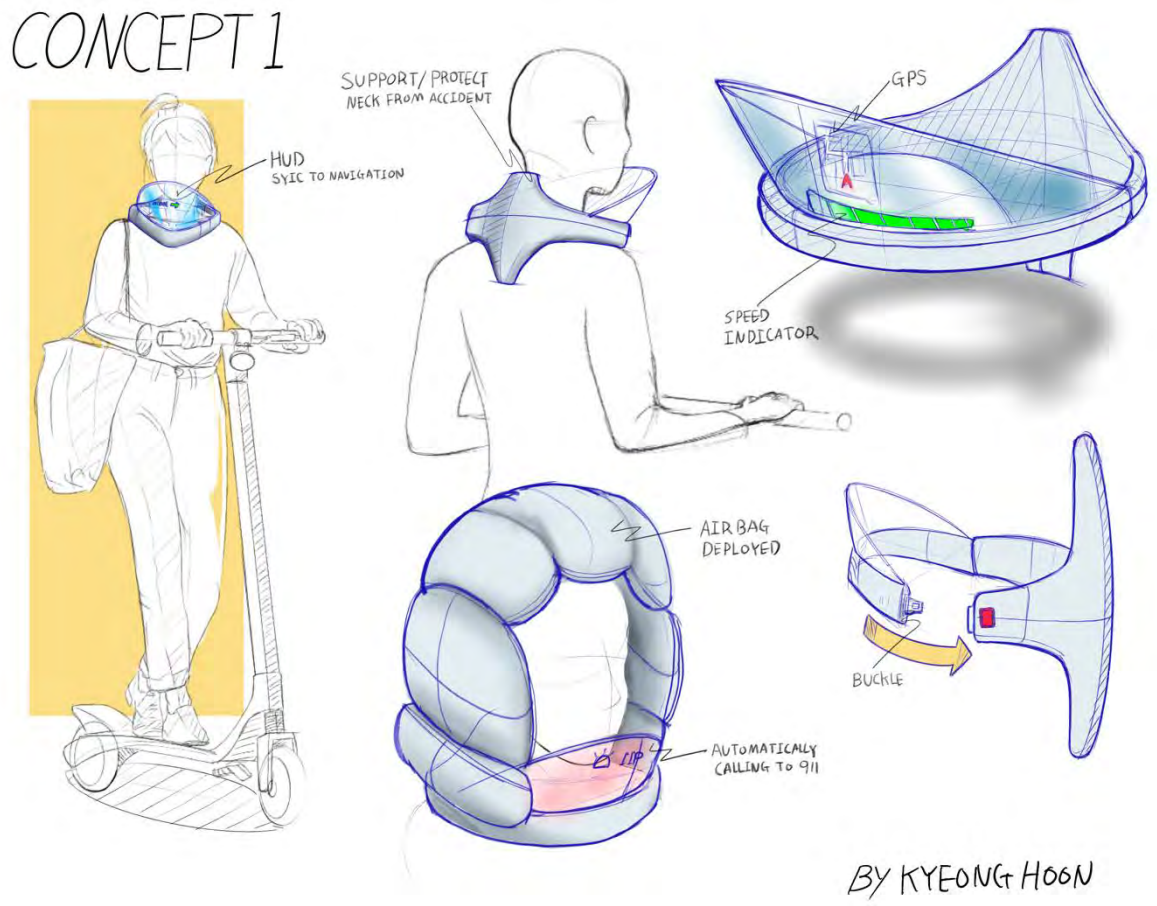


Figure 33 Concept one

The first concept shows a protective gear that is replaceable to the traditional helmet. The main idea is that most people hesitate to wear a public helmet because they feel unsanitary to contact their hair and forehead at the inside of the helmet. However, a protective gear covering their neck on

their clothes would reduce sanitary concerns for public electric scooter users. The gear detects when the user gets an accident and deploys airbags to protect the user's head. On the back of the gear, the neck support is located that can protect the user's neck. Additionally, a HUD(Head-up display) can show speed and navigate the user to their destination.

4.2.2 Concept Two

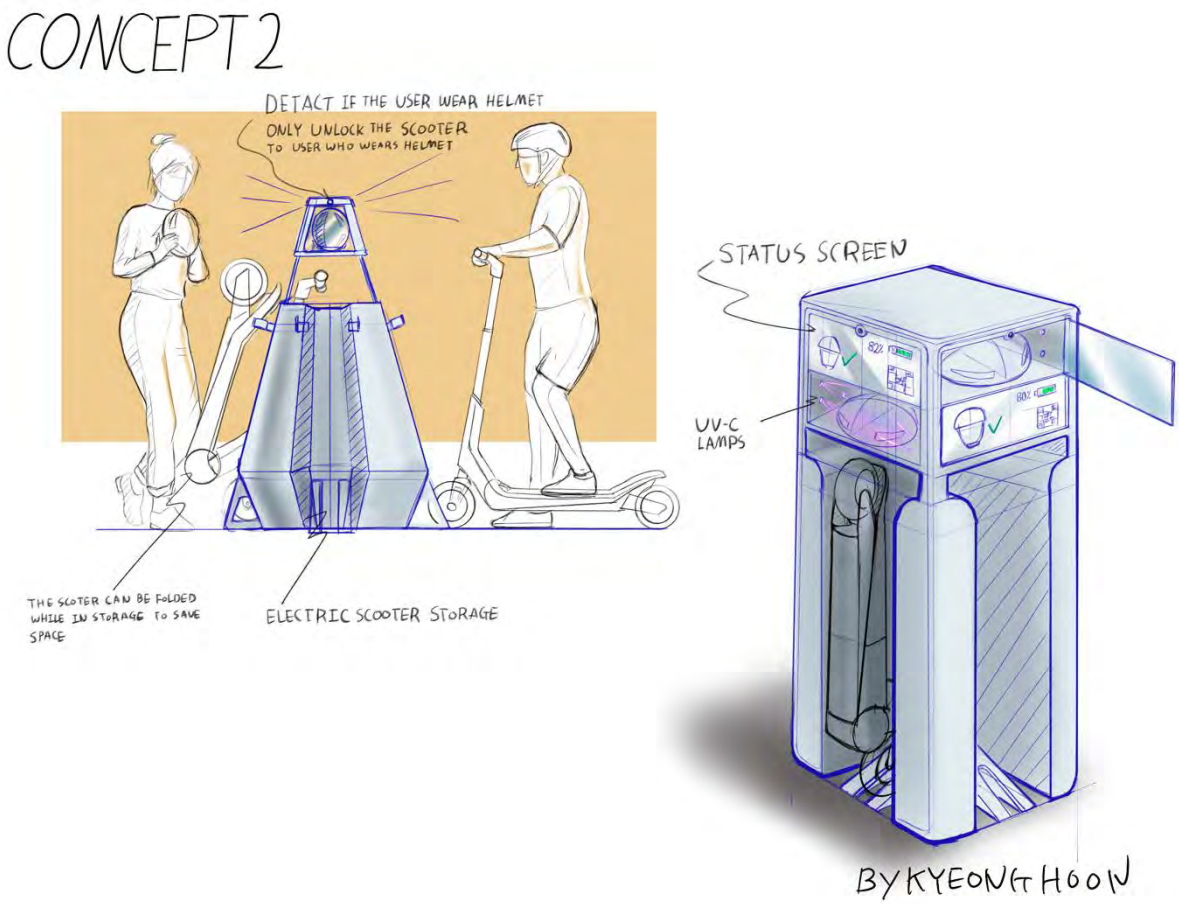


Figure 34 Concept two

The second concept shows a station that can keep electric scooters and helmets in compact storage. The helmet locker can sanitize helmets with UV lights, and cameras on display detect if they wear helmets or not. The electric scooters will be locked until the user wears a helmet.

4.2.3 Concept Three

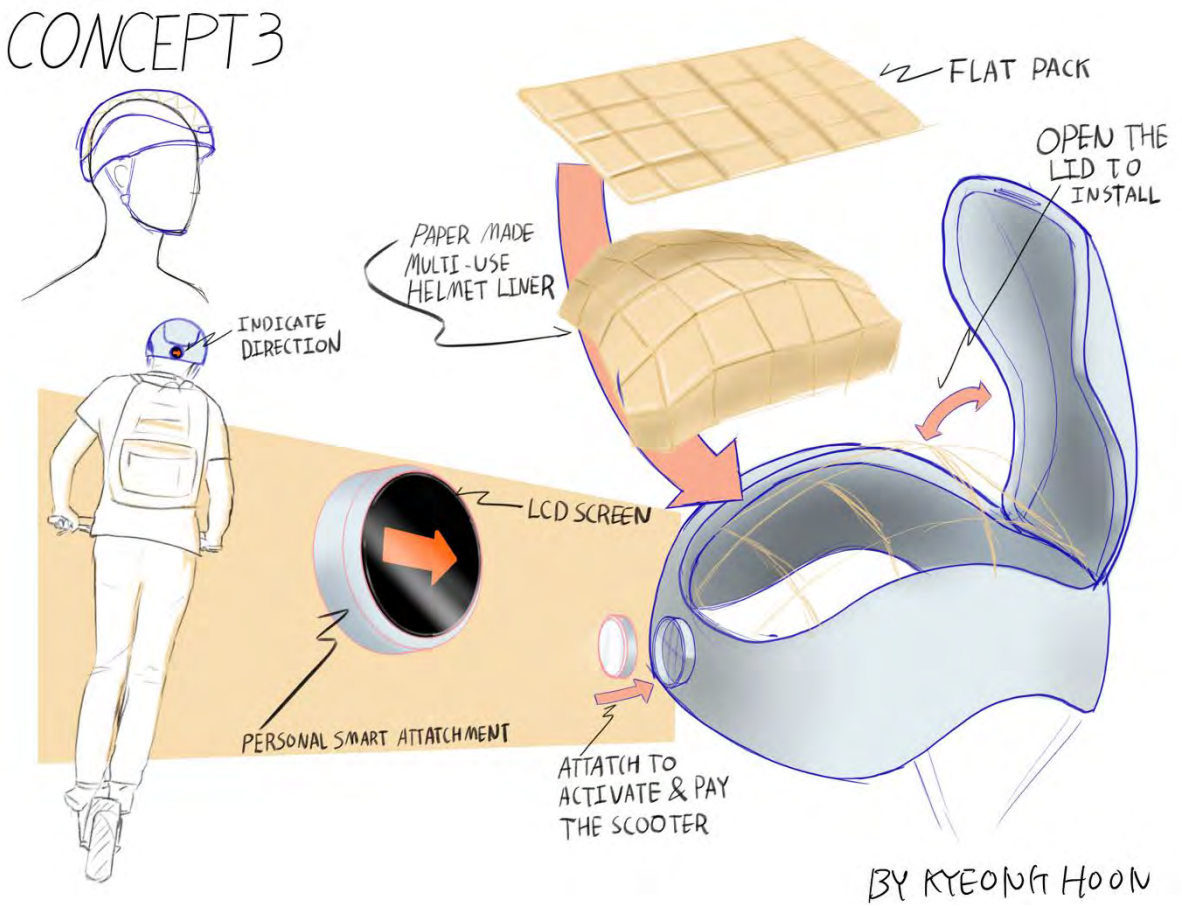


Figure 35 Concept three

The third concept shows a recyclable helmet inner liner that public electric scooter users can purchase. The user can install the inner liner easily, and the liner covers the user's head where they contact the public helmet. Additionally, users can purchase a personal smart attachment attached to the back of the helmet to activate the electric scooter and indicate directions when the user makes turns.

4.3 Concept Strategy

After the three distinctly different concepts were presented, refined concept strategies were made into two directions.

4.3.1 Concept Direction & Product Schematic One

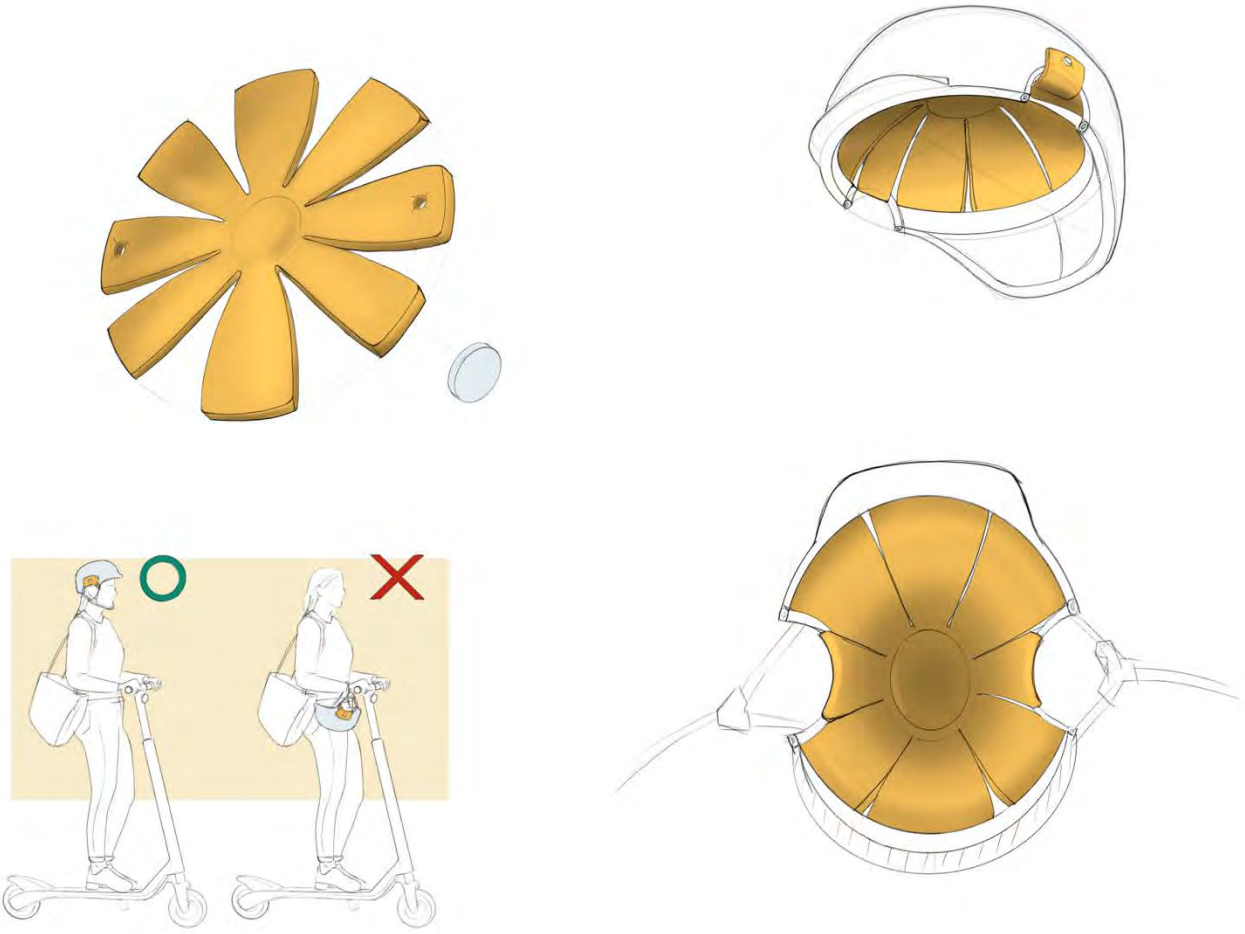


Figure 36 Concept direction one - 1

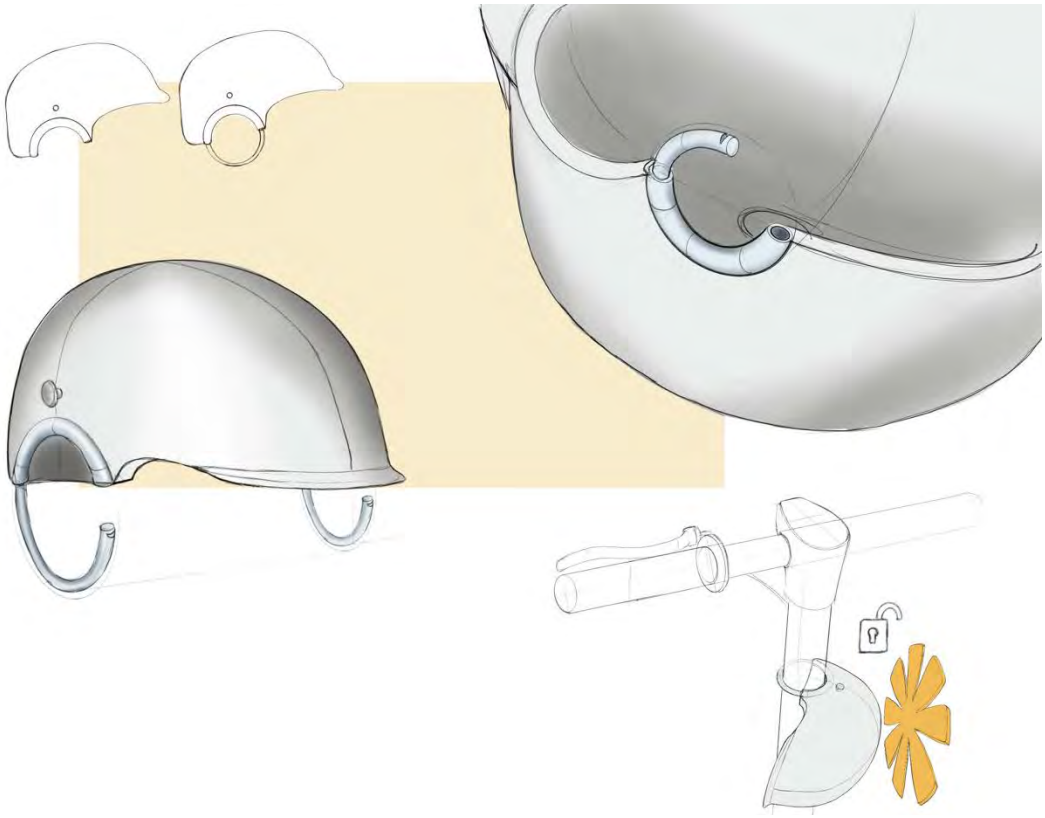


Figure 37 Concept direction one - 2

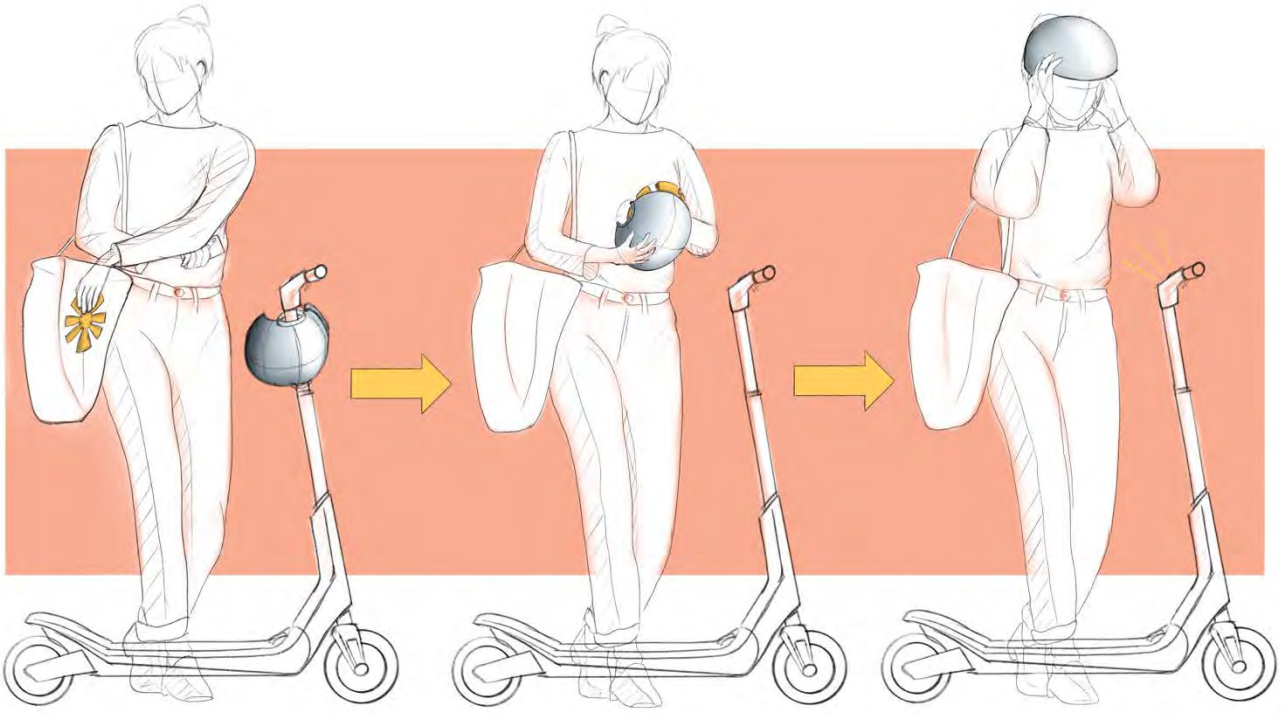


Figure 38 Concept direction one - 3

The concept direction one was focused on how to force users to wear public helmets during their journey. The helmet is attached to the scooter, and the user needs to unlock and wear the helmet to activate the scooter. The scooter will detect if the user wears the helmet properly, and if the user does not wear the helmet properly, the scooter will not move or limit the maximum speed. And the concept also suggests how to separate the user's head and inside the helmet. A personal liner can be used to reach the separation. The liner also can be used as an activation tool for a scooter.

4.3.2 Concept Direction & Product Schematic Two

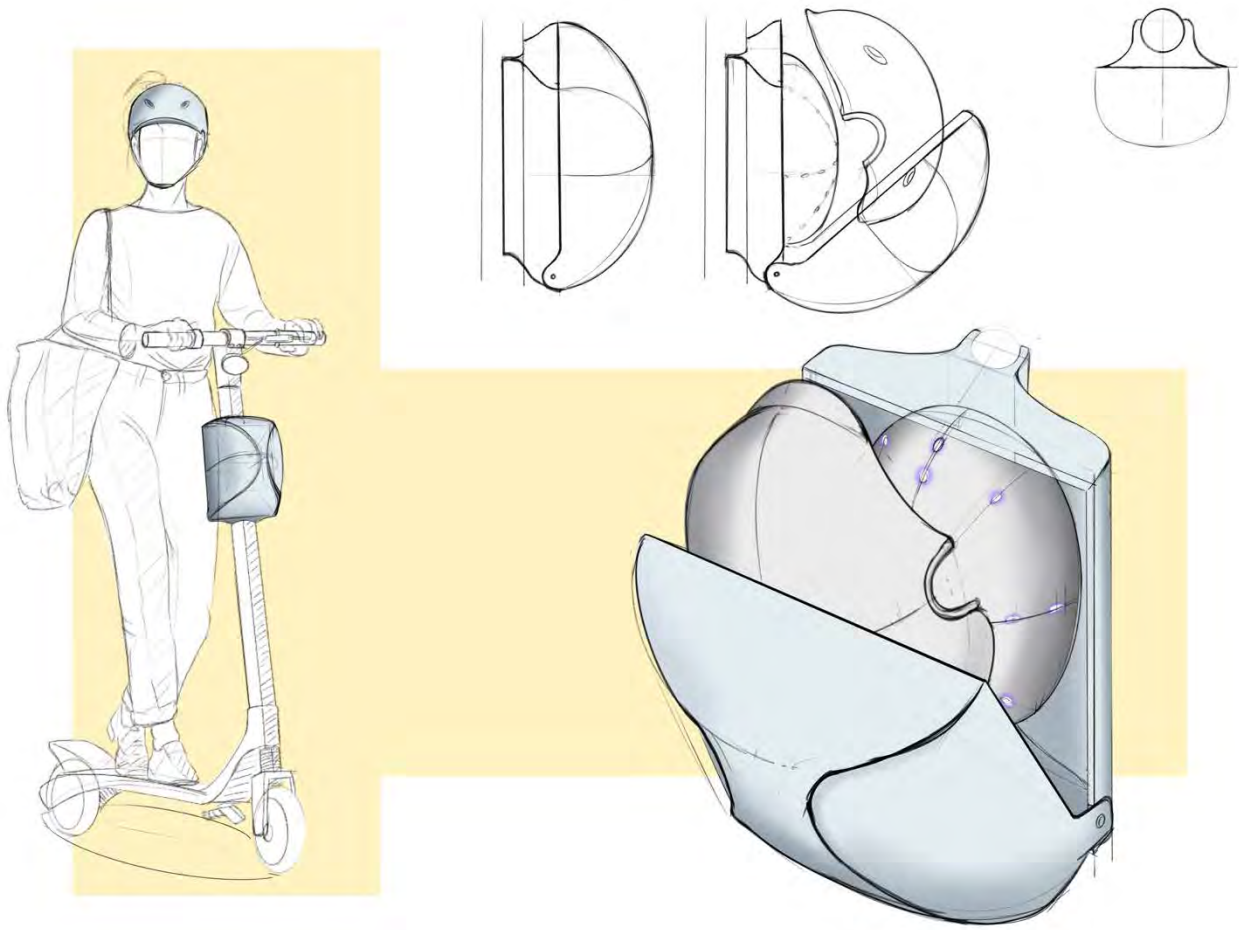


Figure 39 Concept direction two -1

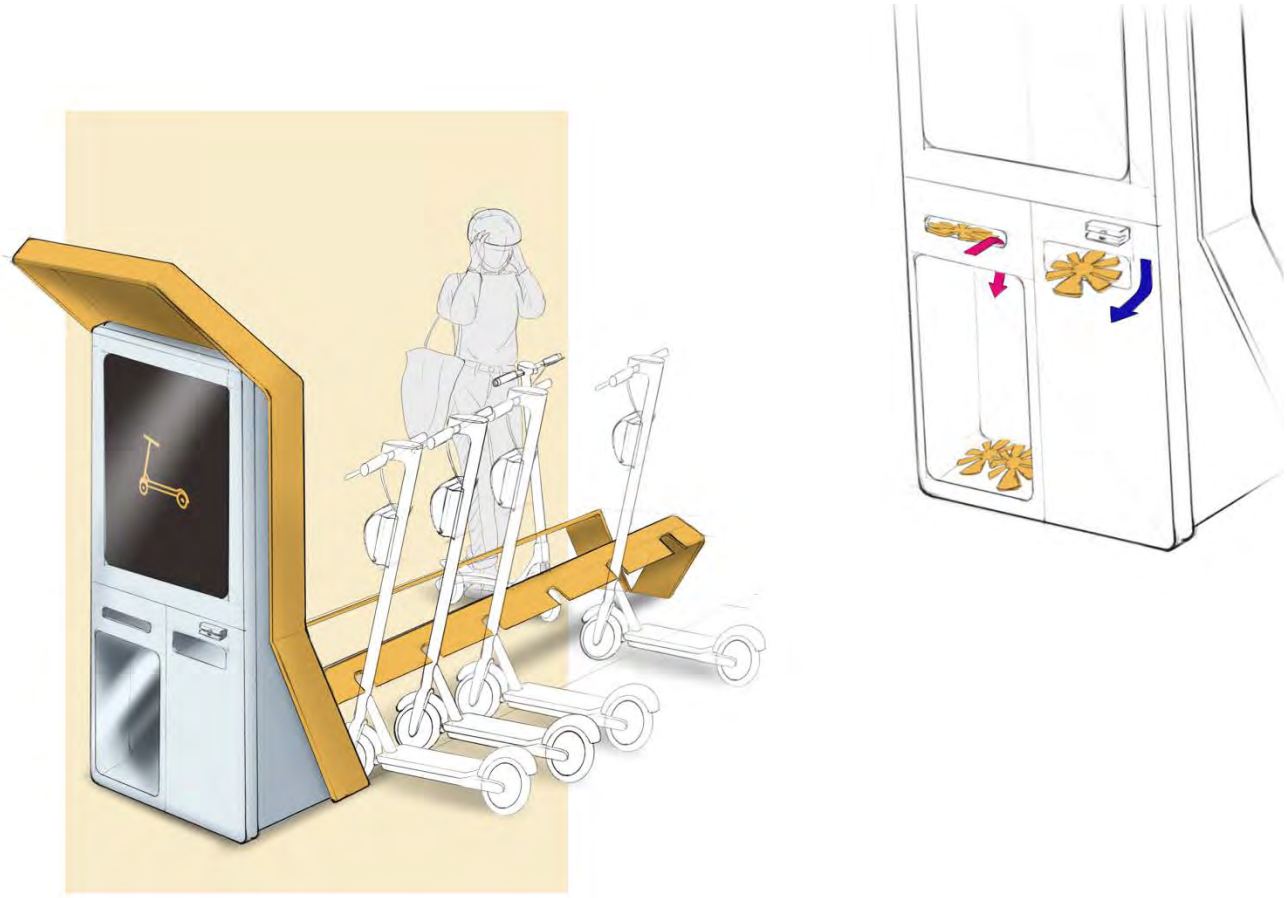


Figure 40 Concept direction two - 2

Concept direction two is focused on keeping public and helmets in a designated area so that scooters do not block the path of pedestrians whose space is already limited. A Kiosk and parking station is suggested in the concept that sells hygienic helmet liner and a parking-charging station for the scooter.

4.4 Concept Refinement & Validation

4.4.1 Design Refinement

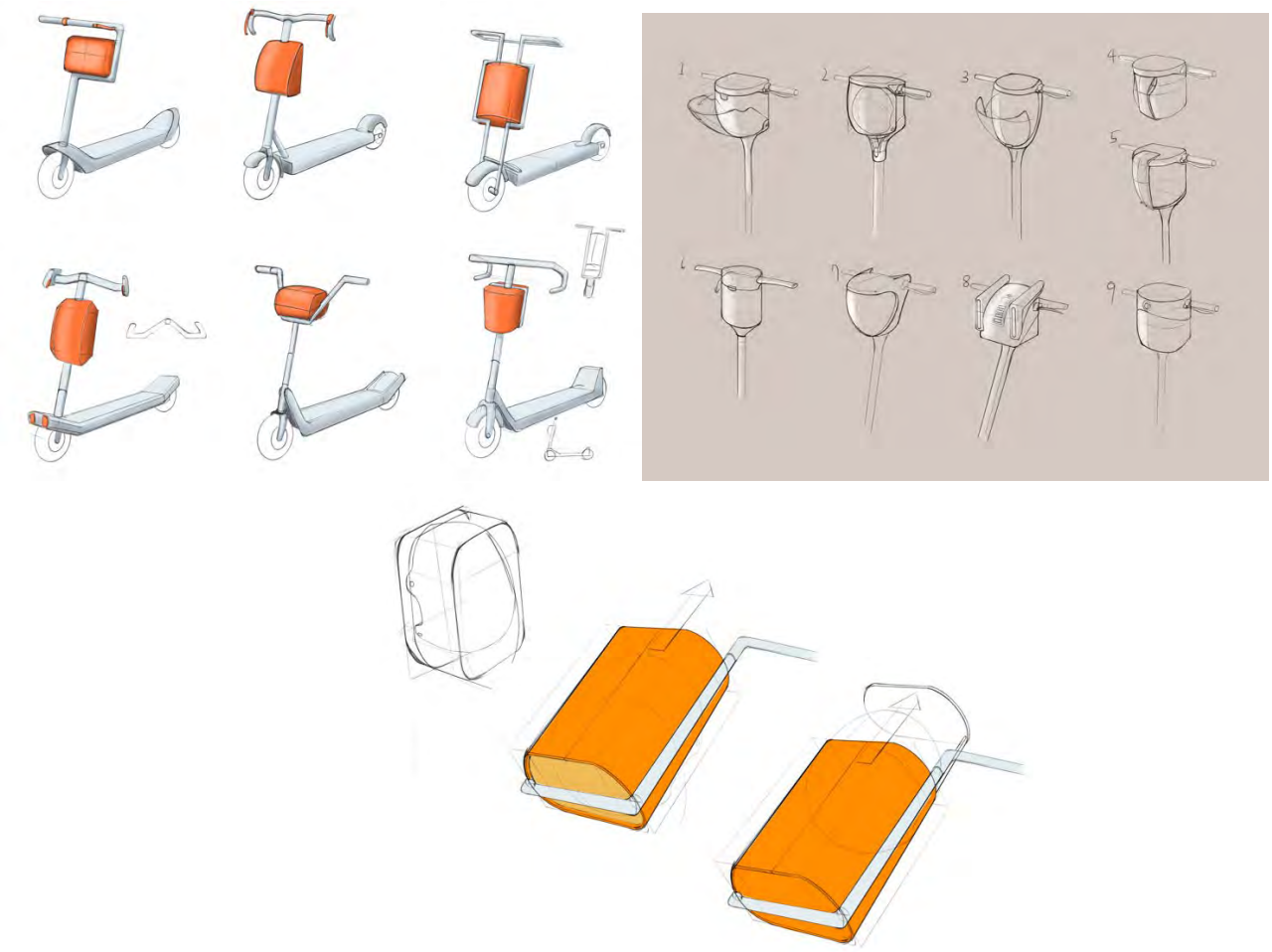


Figure 41 Design Refinement -1

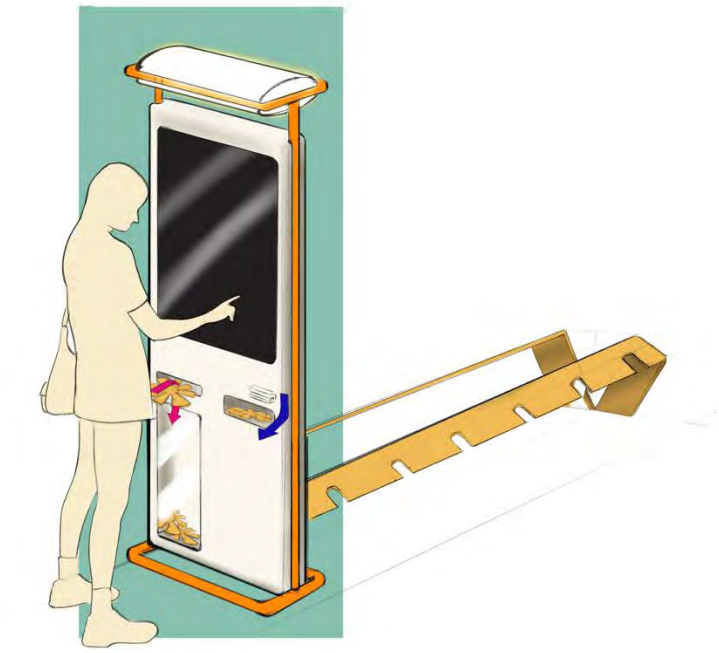


Figure 42 Design Refinement -2

The concept is chosen that has a helmet compartment on the scooter and also comes with a kiosk concept. Many iteration sketches had been done for combining the helmet compartment and the scooter into one product that pleased aesthetically.

4.4.2 Detail Development

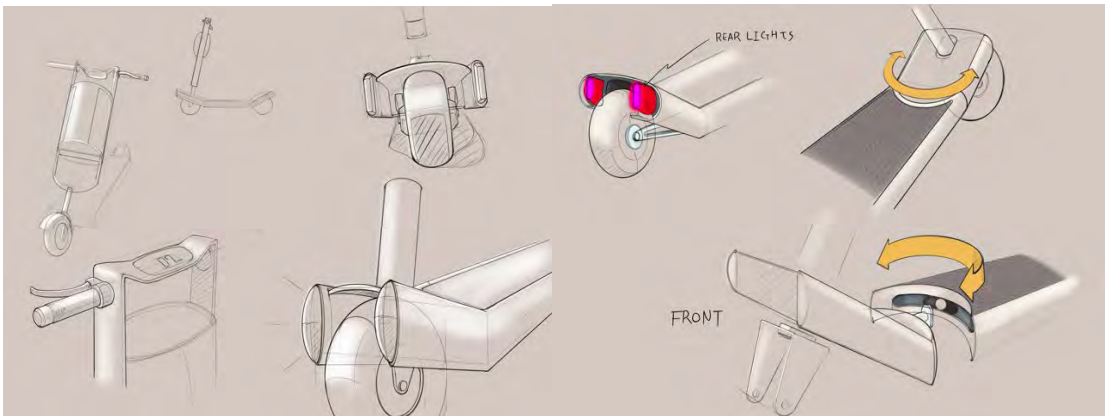


Figure 43 Detail Development -1

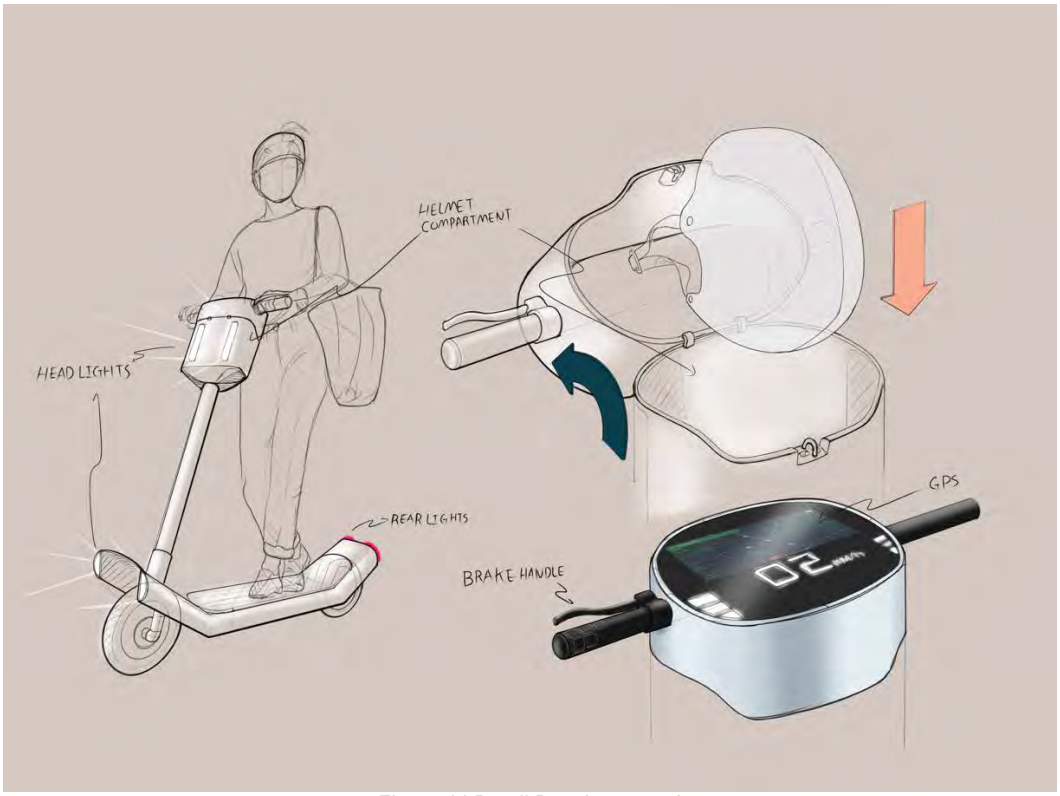


Figure 44 Detail Development -2

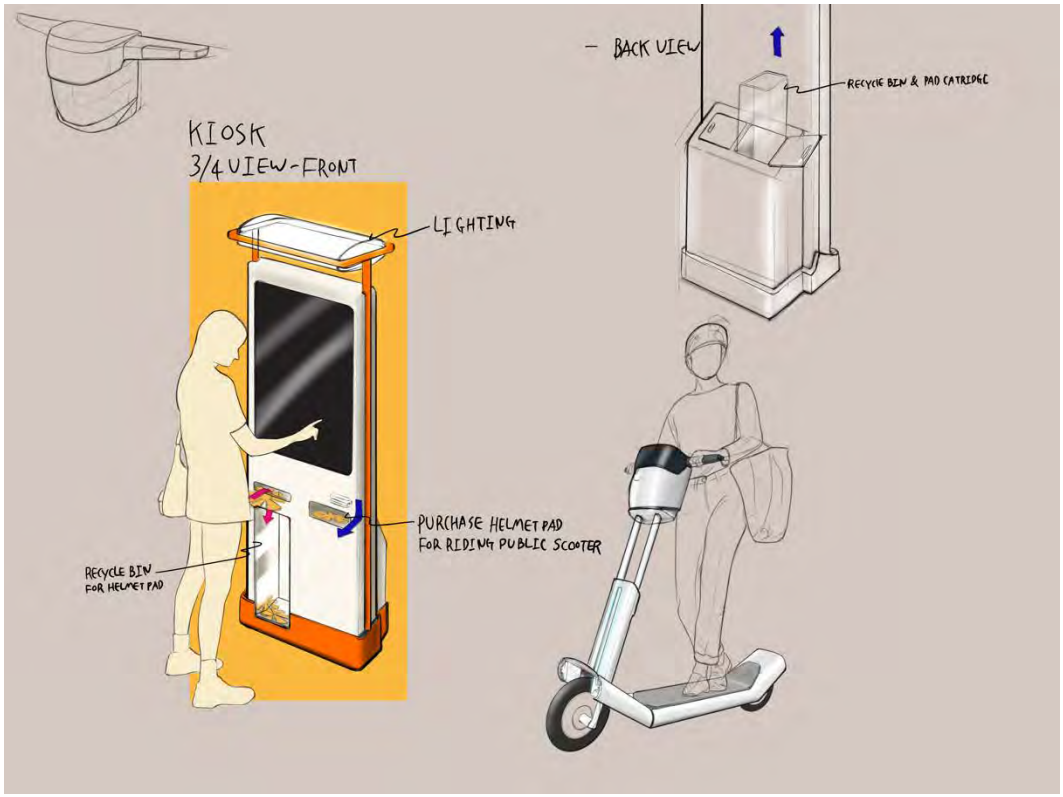


Figure 45 Detail Development -3

4.4.3 Refined Product Schematic & Key Ergonomic

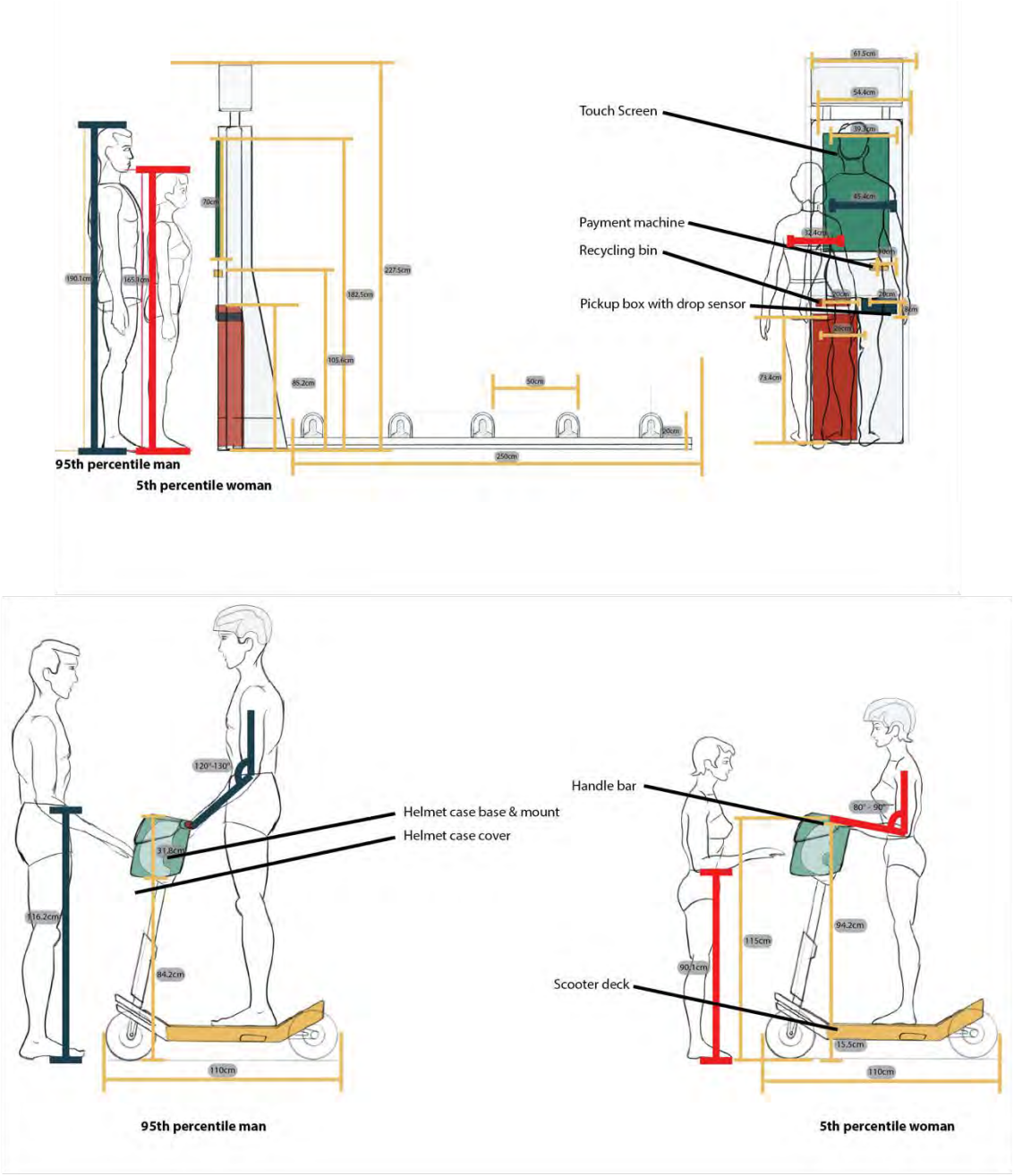


Figure 46 Refined Schematic

4.5 Concept Realization

After many iterations of design refinement and detailed development, the concept has been improved and finalized. Design refinement helped the concept aesthetically pleasing, and the detailed development helped to figure out detailed measurements in terms of the ergonomics of the concept.

4.5.1 Design Finalization

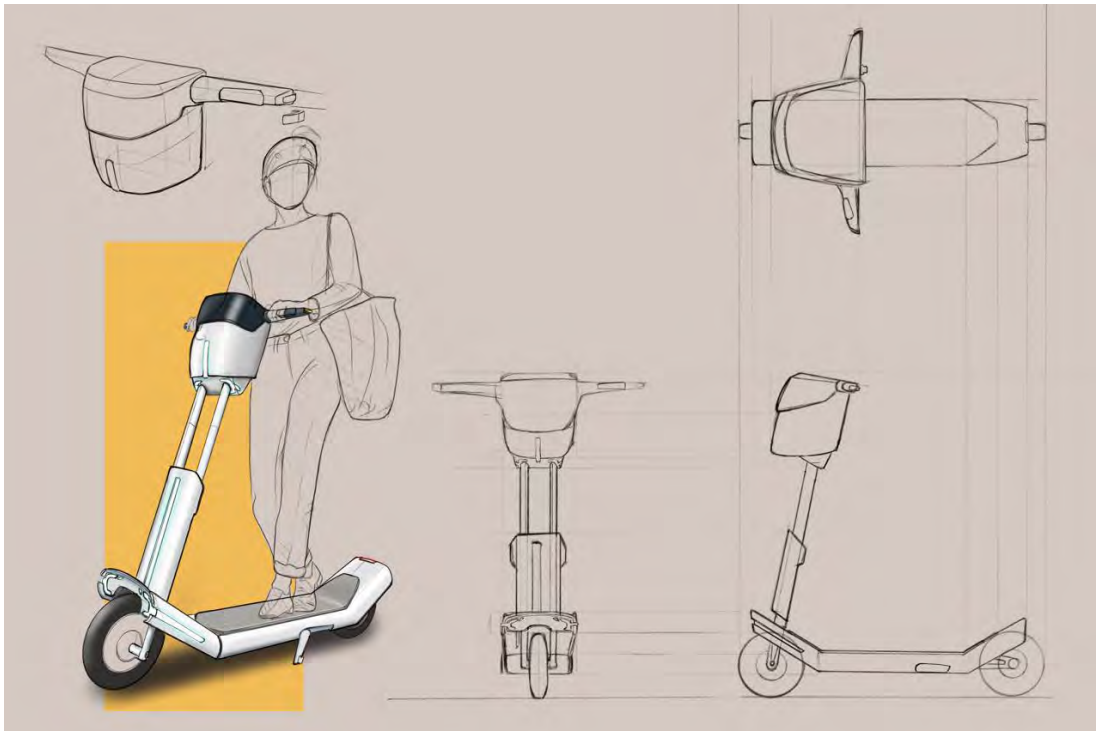


Figure 47 Design Finalization – Electric scooter 1

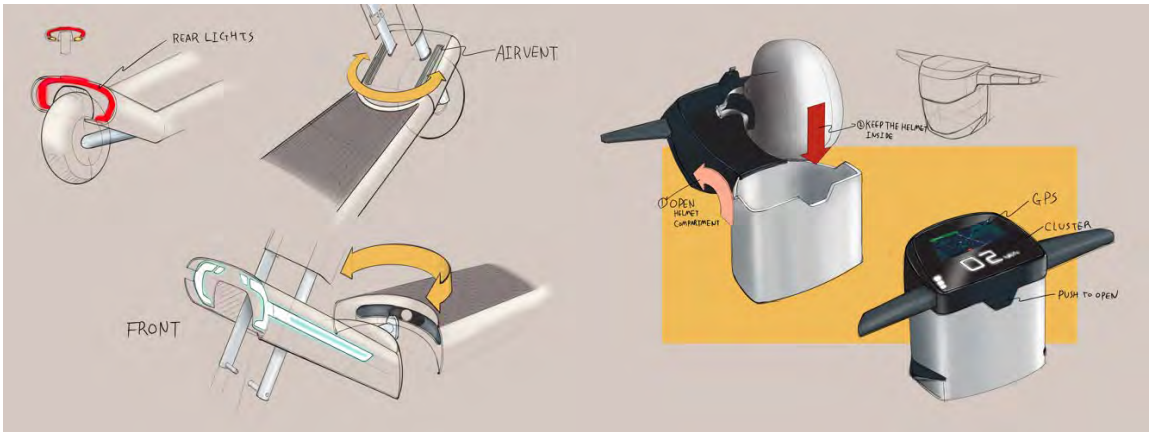


Figure 48 Design Finalization – Electric scooter 2

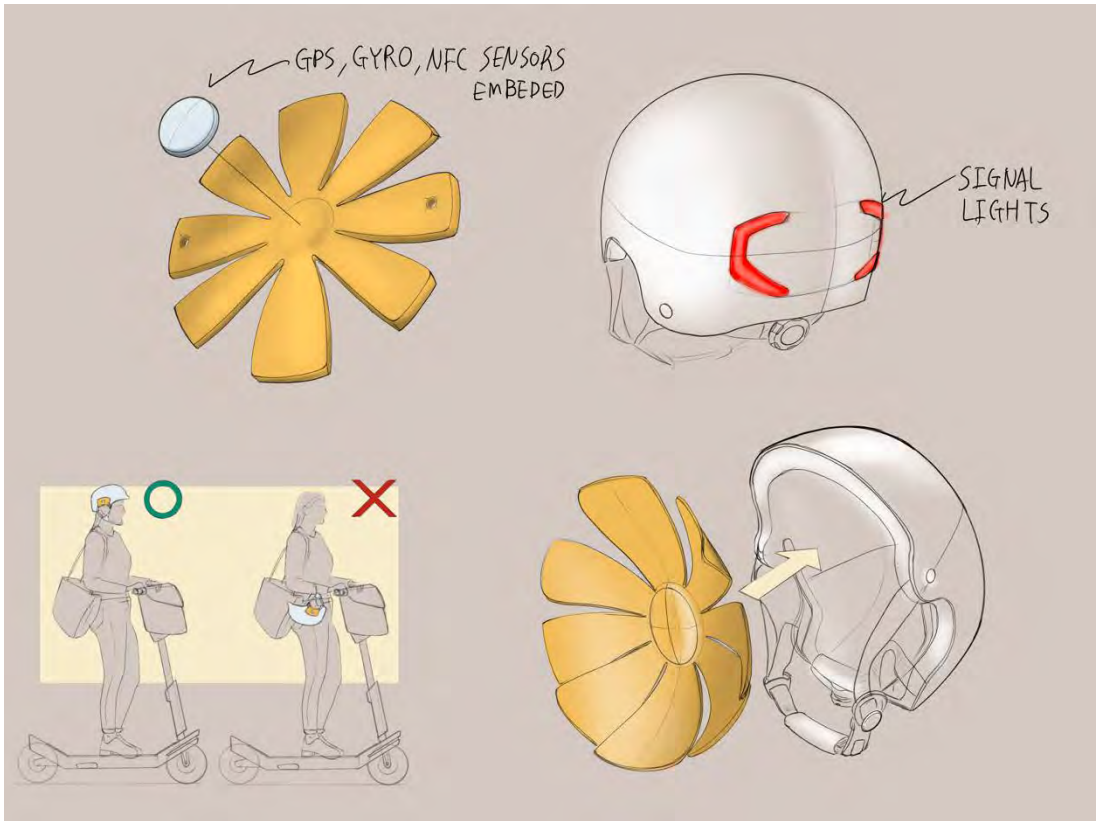


Figure 49 Design Finalization – Helmet and helmet liner

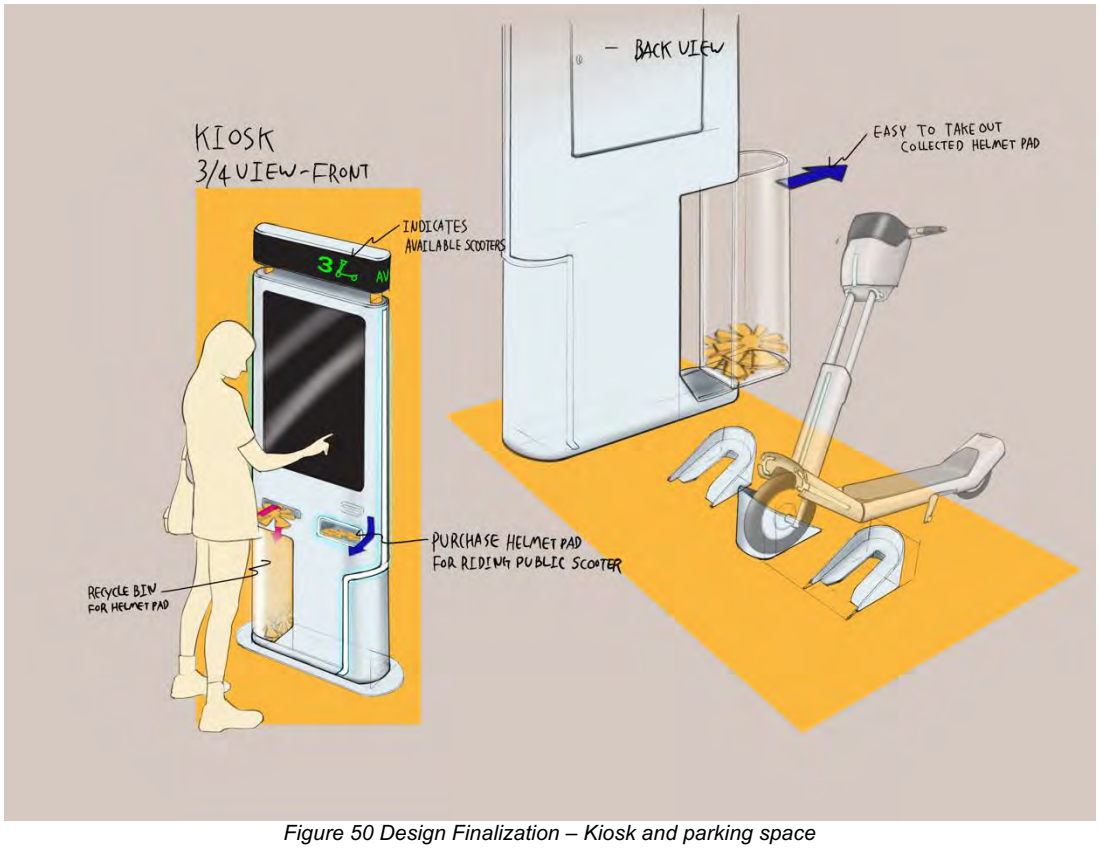
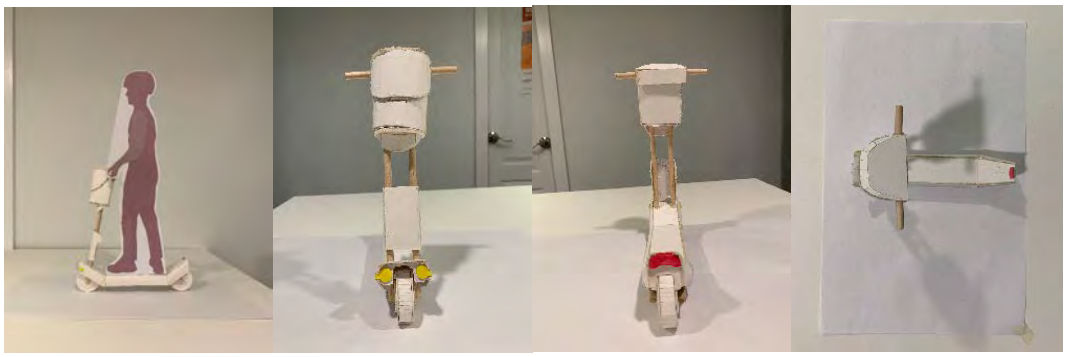


Figure 50 Design Finalization – Kiosk and parking space

The concept design is finalized and resolved in terms of overall product semantics, aesthetics, human factors and benefits. As a next step, a physical model study will be done to check the correct measurements and ergonomics for final detailing before CAD development.

4.5.2 Physical Study Models



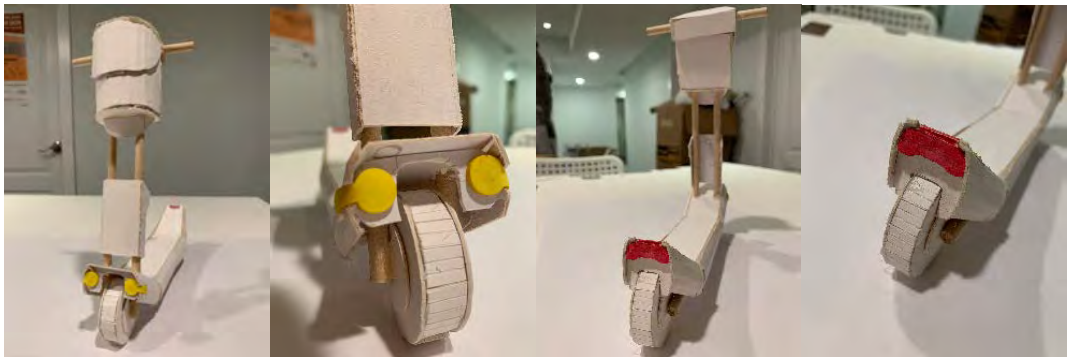


Figure 51 1:5 Scale physical model – Electric scooter

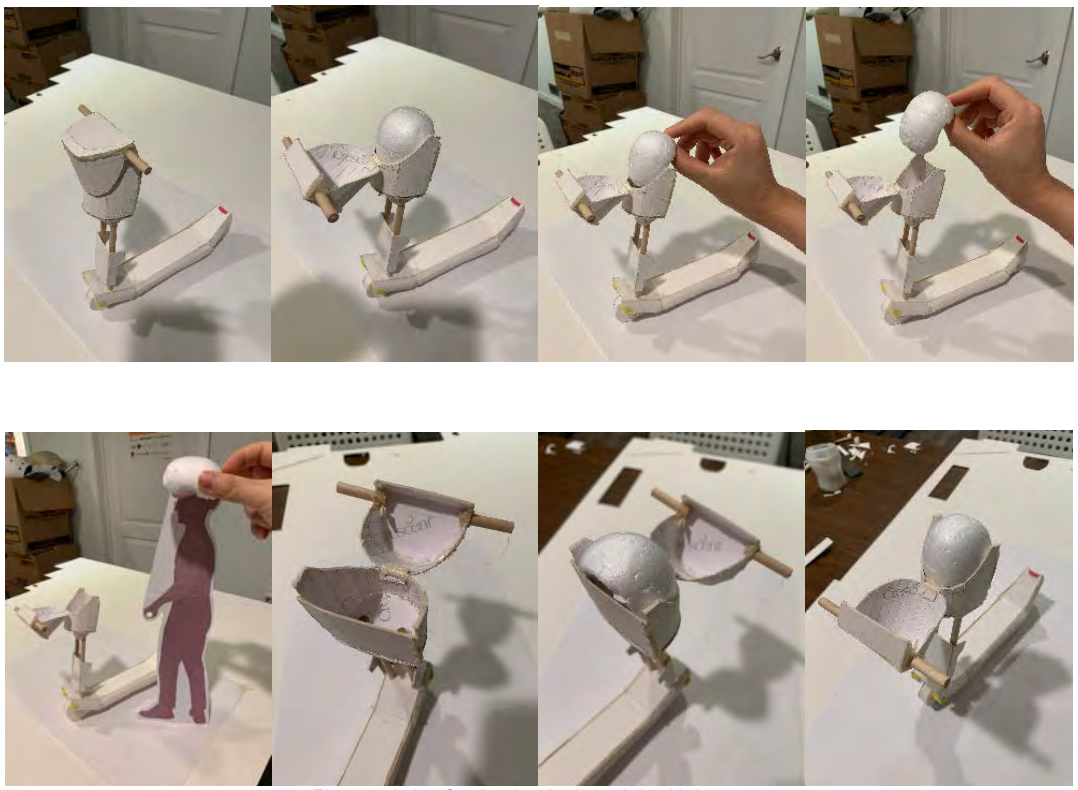


Figure 52 1:5 Scale physical model – Helmet compartment

Overall, most of the measurements were correct as planned during concept finalization. However, the width of the handle was not wide enough for users. Additionally, handle height adjustment may be required to satisfy various percentiles.

4.6 Design Resolution

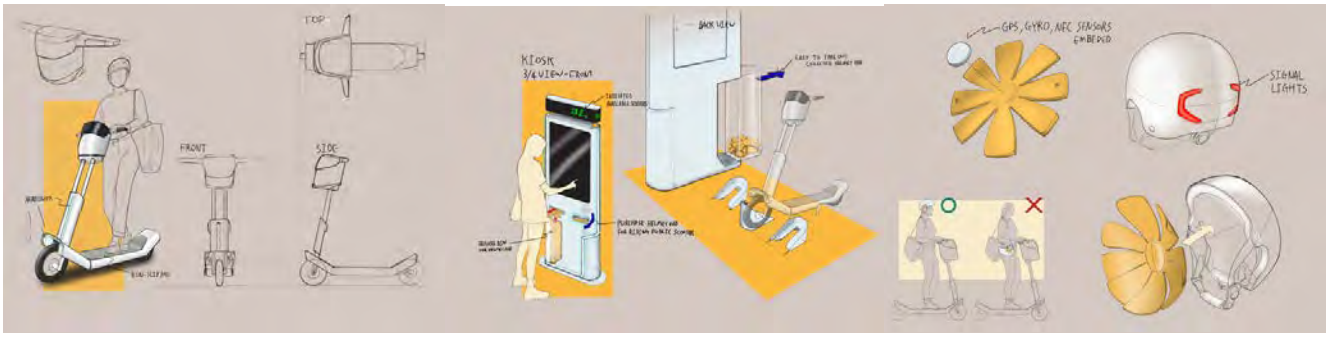


Figure 53 Design Resolution – Final sketches and rendering of the design

After the concept realization, the design is finalized and resolved. Final detailing was determined through a 1:5 scale mock-up study. Handle width was a bit narrow for users to grab handles stable, and easy height adjustment might be required for better ergonomics. Most of the main parts of the scooters and kiosk will be made out of recycled aluminum, and hard plastic will be used for detail parts such as the helmet compartment lid and non-slip footpad on the deck. The recycling bin attached to the kiosk will be made out of frosted plastic. The helmet liner will be made out of recycled Ethylene Vinyl Acetate (EVA) foam. The used helmet liner will be collected at the recycling bin so that maintenance workers can switch out bins and collect the used liners for recycling.

4.7 CAD Development

Figure 54 CAD Development – Electric scooter

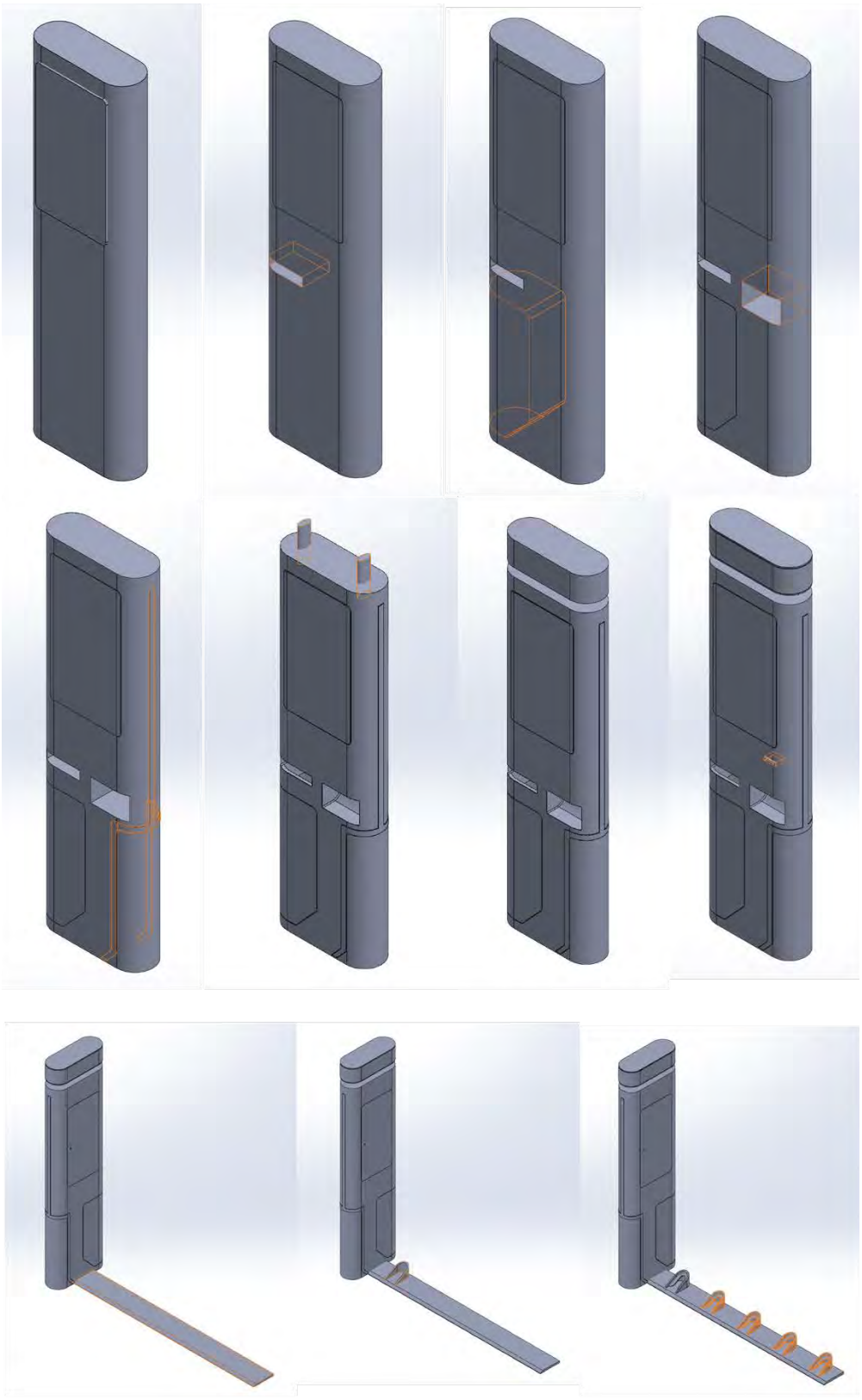


Figure 55 CAD Development – Kiosk

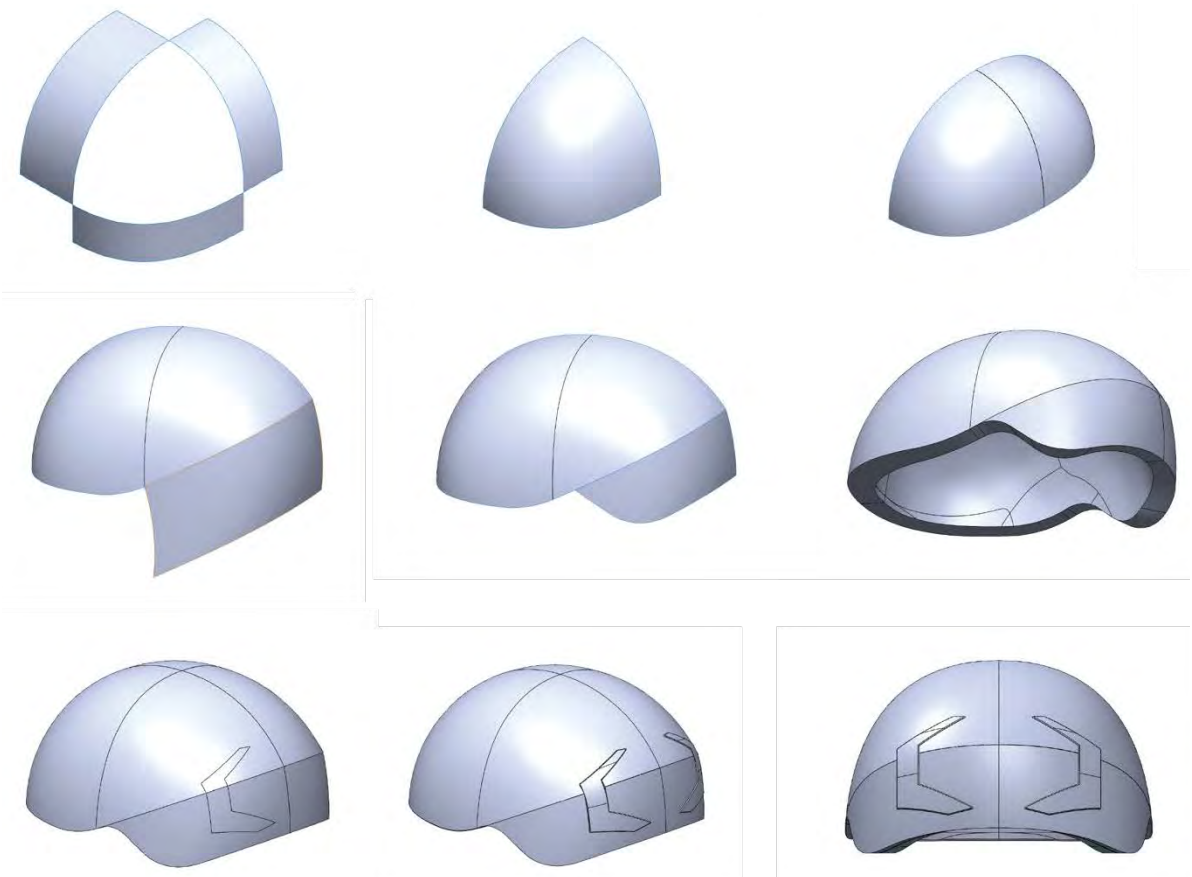


Figure 56 CAD Development – Helmet

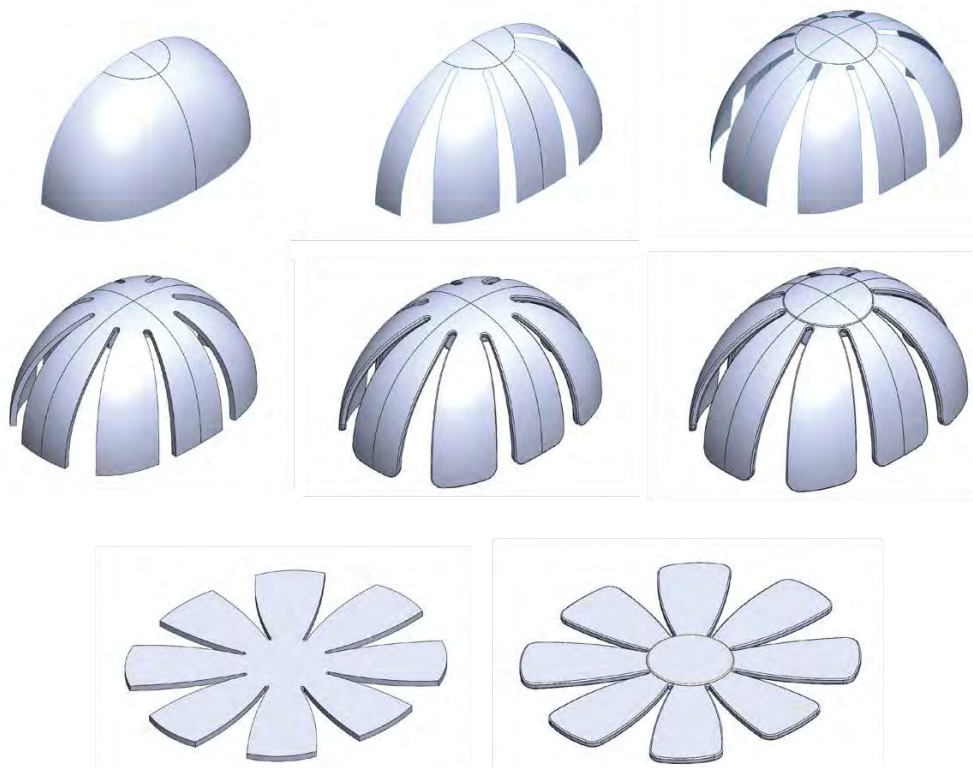


Figure 57 CAD Development – Helmet liner

The CAD modelling was done in Solidworks software. Initially, helmet modelling was done using the surface of scaled head models. Then both folded and flattened helmet liners were modelled using the helmet model as a reference. The Helmet model was also used as a reference for building helmet compartments for electric scooters. The electric scooter took most of the time for CAD modelling because there were many intricate parts. The kiosk model has been done as planned, but a modular concept for the parking pad was added additionally during the CAD process.

4.8 Physical Model Fabrication

Figure 58 Physical Model Fabrication – Electric scooter

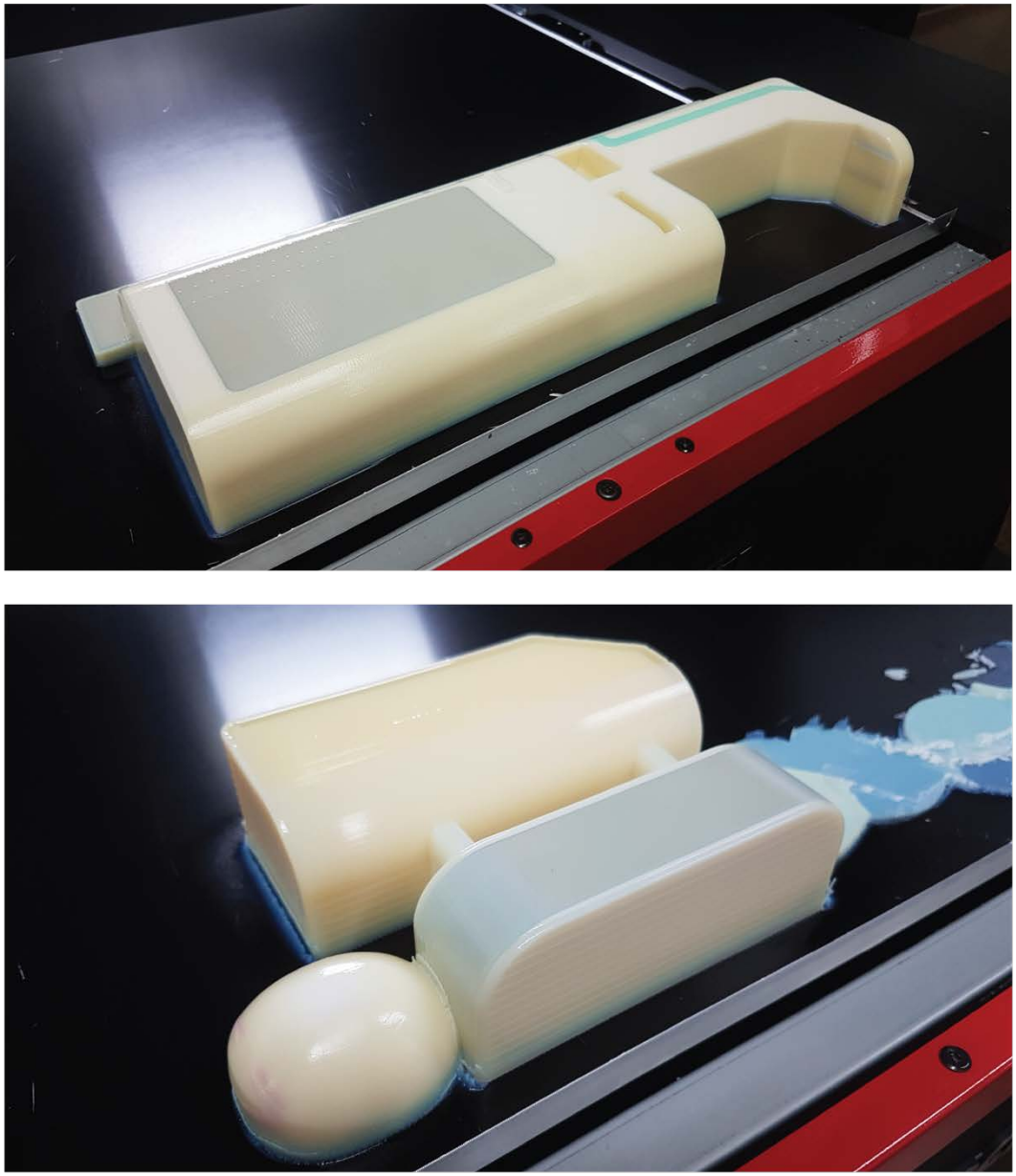


Figure 59 Physical Model Fabrication – Kiosk & helmet

All model parts are printed from 3D printers and printed with different methods depending on the parts required. For example, the main body of the electric scooter and tires are printed by raisins printing, and Steering poles are printed out of SLS (nylon), The Kiosk, parking station, and helmets are printed from Mimaki colour 3D printer that can print the model in colour using UVA ink.

CHAPTER 5 Final Design

5.1 Summary

In Korea, a wearing helmet is strictly enforced by law. According to research, the number one reason why users avoid using public electric scooters is because they feel uncomfortable sharing helmets. KICKO is designed to allow users a safe and convenient way to achieve their last mile mobility needs in order to arrive at their destination where the public transit vehicle may not reach in a busy urban environment. KICKO's kiosk is designed to be recognized easily by users even from a distance because of its aesthetic appeal and emissive lighting located at the side of the kiosk. Users can purchase a liner at the kiosk and activate the electric scooter by tapping the liner to open the helmet compartment. Users can simply attach the liner on the inside of the helmet to create a barrier between their head and inner surface of the helmet. After their journey, users can simply return the scooter at any kiosks near them.

5.2 Design Criteria Met

5.2.1 Full Bodied Interaction Design

KICKO satisfies full-bodied interaction design when users interact with the KICKO's systems; kiosk, scooter, helmet, and helmet liner.

Users are required several steps to ride, and each step requires human interactions.

Figure 60 Full Bodied Interaction Design – Step 1

Step 1: Find a Kiosk and Purchase Liner

The user interacts with a kiosk to purchase a liner.

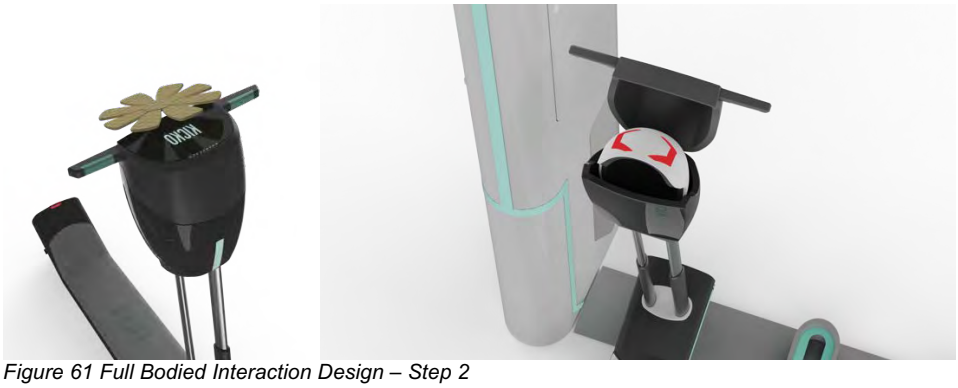


Figure 61 Full Bodied Interaction Design – Step 2

Step 2: Unlock a scooter and Take Out Helmet

Users activate a scooter by tapping the liner to open the helmet compartment

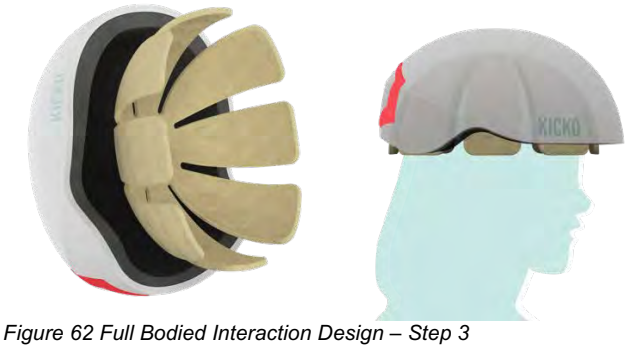


Figure 62 Full Bodied Interaction Design – Step 3

Step 3: Attach Liner Inside of Helmet

Users interact with the helmet and the liner. The user should attach the liner on the inside of the helmet before embarking on their journey

Figure 63 Full Bodied Interaction Design – Step 4

Step 4: Ride to Destination and Park at a kiosk

Users mainly interact with the scooter. For example, users can adjust the height, and see an LED screen on the top of the helmet to check relevant information such as speed, battery percentage, and navigation.

5.2.2 Materials, Processes and Technology

This part is mainly considered helmets and electric scooters to study materials and manufacturing processes to make final decisions for KICKO.

According to Bicycle Helmet Safety Institute's guidelines (Bicycle Helmet Safety Institute, 2020), general helmets mainly have three distinctive parts: liner, shell, and strap. The liner is the most important part because it is the part that manages most of the energy of the crash. Most liner (The liner in this part means a part of the helmet) is made out of moulded Expanded Polystyrene (EPS) foam. EPS technologies are pretty standards, granules of EPS are placed in a mould and expanded with steam and pressure. However, EPS in linear foam is usually made by mixing with reinforcements to improve better quality. The shell is the part that determines the overall appearance of the product. The shell of cheaper helmets is just stamped PET. However, other materials such as ABS and PU are used more to provide better protection. The straps are generally made out of nylon and polypropylene. It looks similar, but the qualities and finishings are varied depending on the price

points. Some high-end brand uses leather for straps for the genuine quality of their products. Most products are made and assembled in Asian countries because of cheaper labour costs. However, there are still at least four million products made in the US and Europe due to the high shipping costs. Additionally, most helmets have a dial that can adjust the proper fit for various users.

Electric scooters have more complicated parts than helmets. The e-scooters have a chassis (stem + deck), handlebar, electric motor, battery and controller, electronics and wires, throttle mechanism, brake mechanism, screen, wheels, tires, fenders, and lights (Trajkovski, 2021). Most electric scooters use an industrial-grade aluminum alloy for the base. High-end electric scooters can use the same materials as inexpensive scooters, but differences are noticeable at the finishing and feel more rigid and stable. Everything else that is non-electronic in the scooters is made from:

- Steel or metals (wheels, rims, disk brakes, screws, nuts and bolts)
- Plastic (fenders, throttle button, brake lever, supplementary parts)
- Rubber or Silicone (surface of the deck, handle covers, tires, caps)

5.2.3 Design Implementation

Electric scooter			
Concept Item	Material	Manufacturing Method	Estimated Cost
Electric scooter frame	Aluminum alloy	Various (extrusion, cast)	$324
Wheel hub motor	Various	Sourced	$241
Battery	Lithium-Ion Batteries	Sourced	$130
Brake mechanism	Various	Sourced	$110
Screen	Various	Sourced	$80
Wheels	Various (rubber, aluminum)	Cast	$73
Electronics and wires	Various	Sourced	$68
Throttle mechanism	Various	Sourced	$27
LED Lights	Various(resin, aluminum)	Sourced	$26
Deck pad	Silicone	moulding	$25
		Total estimated cost	$1,104

Table 9 Bill of Materials – Electric scooter

Kiosk			
Concept Item	Material	Manufacturing Method	Estimated Cost

Kiosk frame	Aluminum alloy	Cast	$1,951
Parking module	Aluminum	Cast	$780
Screen panel – main	Aluminum	Sourced	$300
Screen panel – top	Aluminum	Sourced	$150
Recycling bin	Polycarbonate	Moulding	$70
Electronics	Various	Sourced	$65
		Total estimated cost	$6,497

Table 10 Bill of Materials - Kiosk

Helmet and helmet liner			
Concept Item	Material	Manufacturing Method	Estimated Cost
Outer shell	ABS	Moulding	$25
Inner Liner	EPS	Moulding	$20
Strap	Nylon	Sourced	$7
LED Lights	Aluminum	Sourced	$70
Liner padding	Polycarbonate	moulding	$25
Sensors (GPS, Gyro, NFC)	Various	Sourced	$25
		Total estimated cost	$172

Table 11 Bill of Materials – helmet and helmet liner

5.3 Final CAD Rendering

Figure 64 Final CAD Rendering – In-situation shot

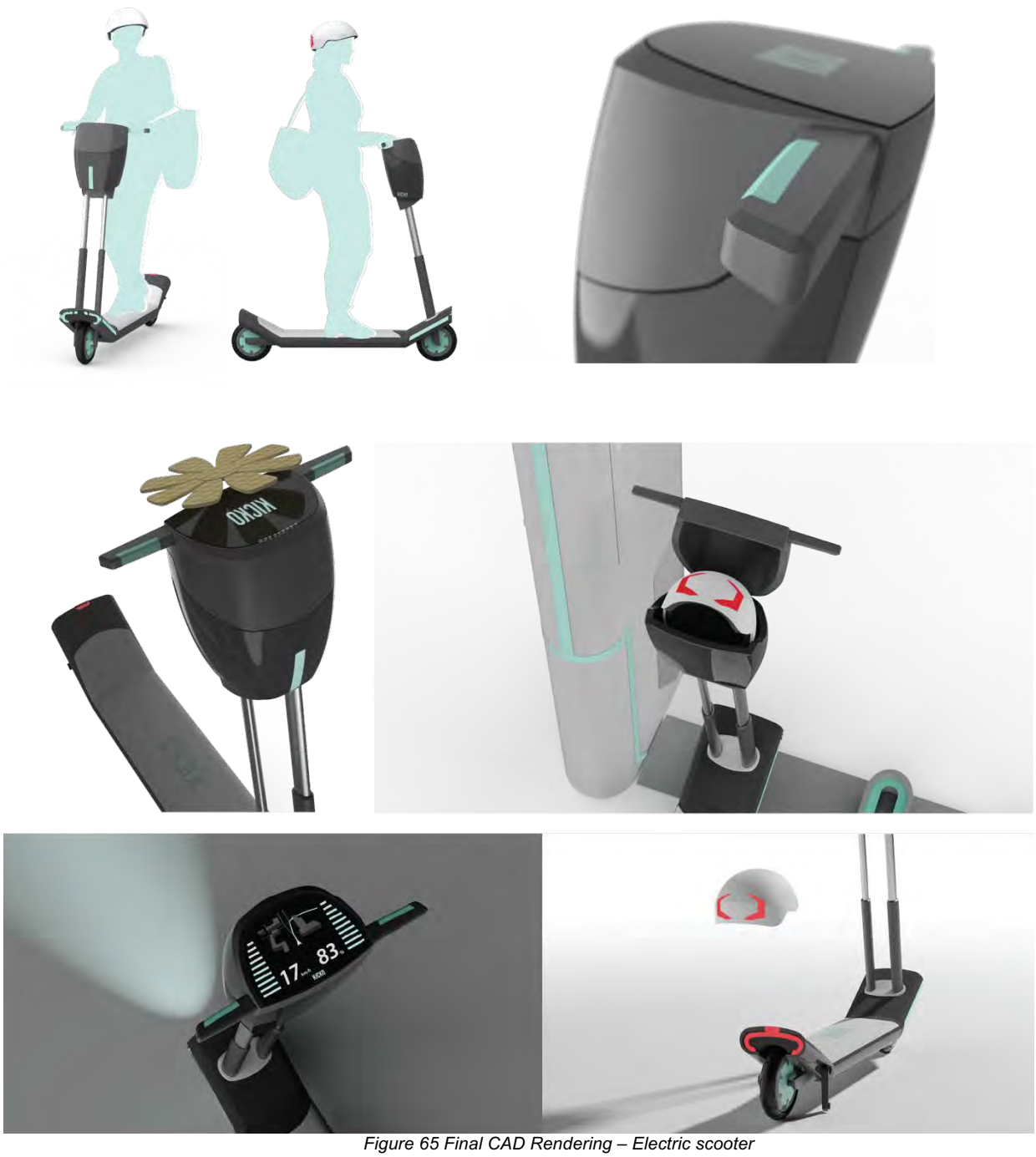


Figure 65 Final CAD Rendering – Electric scooter

Figure 66 Final CAD Rendering – Helmet & Helmet liner

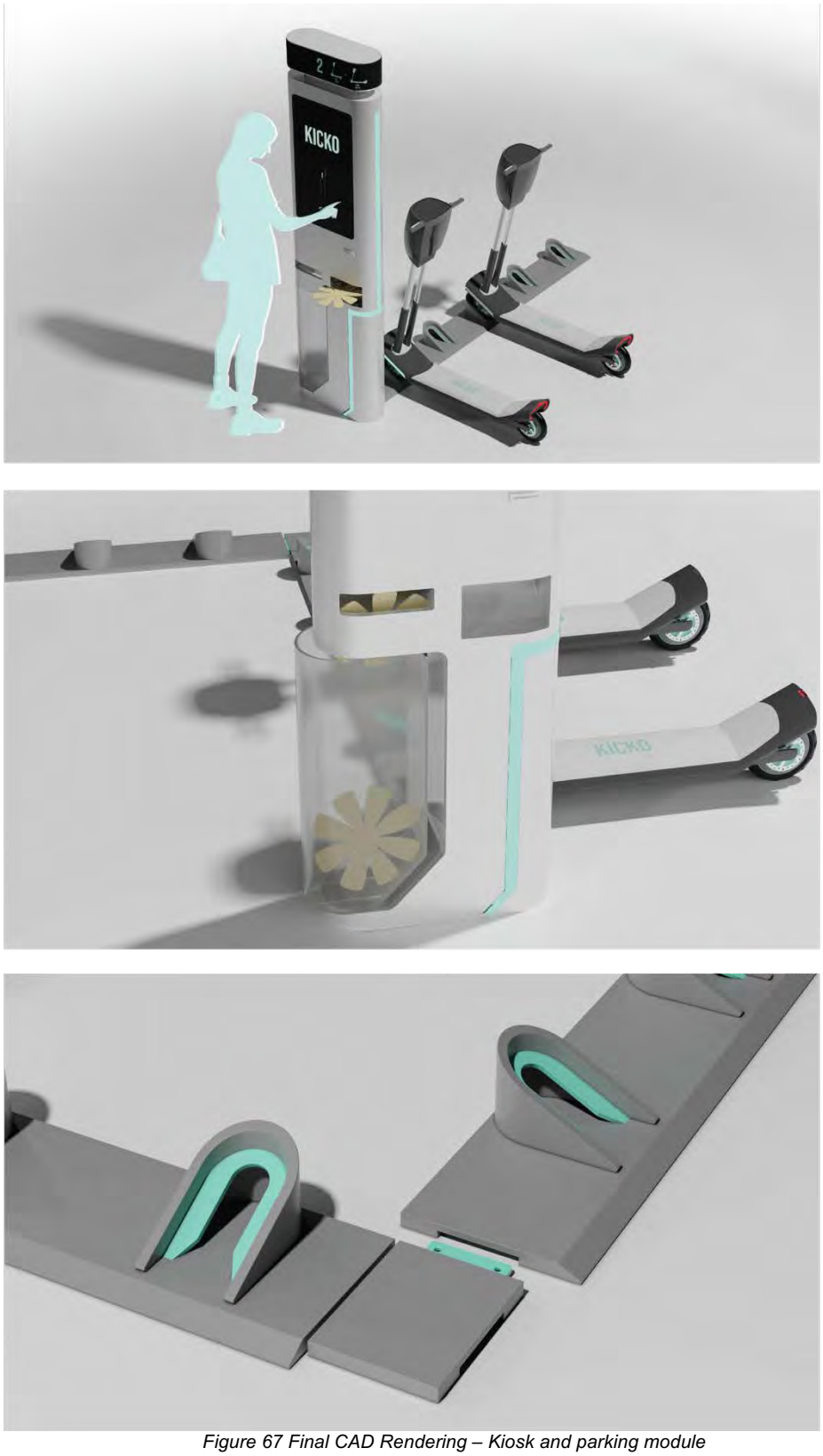


Figure 67 Final CAD Rendering – Kiosk and parking module

The CAD rendering process was done in Keyshot 11 to produce high-quality renders and retouched in photoshop.

5.4 Physical Model

Figure 68 Physical Model – Kiosk

Figure 69 Physical Model – Electric scooters

Figure 70 Physical Model – Helmet, scooter, and parking module

3D printed parts are sanded and spray painted. Stickers are printed and applied on the surfaces of the models to present the logo and interfaces. Laser-cut human figures have been set up as a reference.

5.5 Technical Drawings

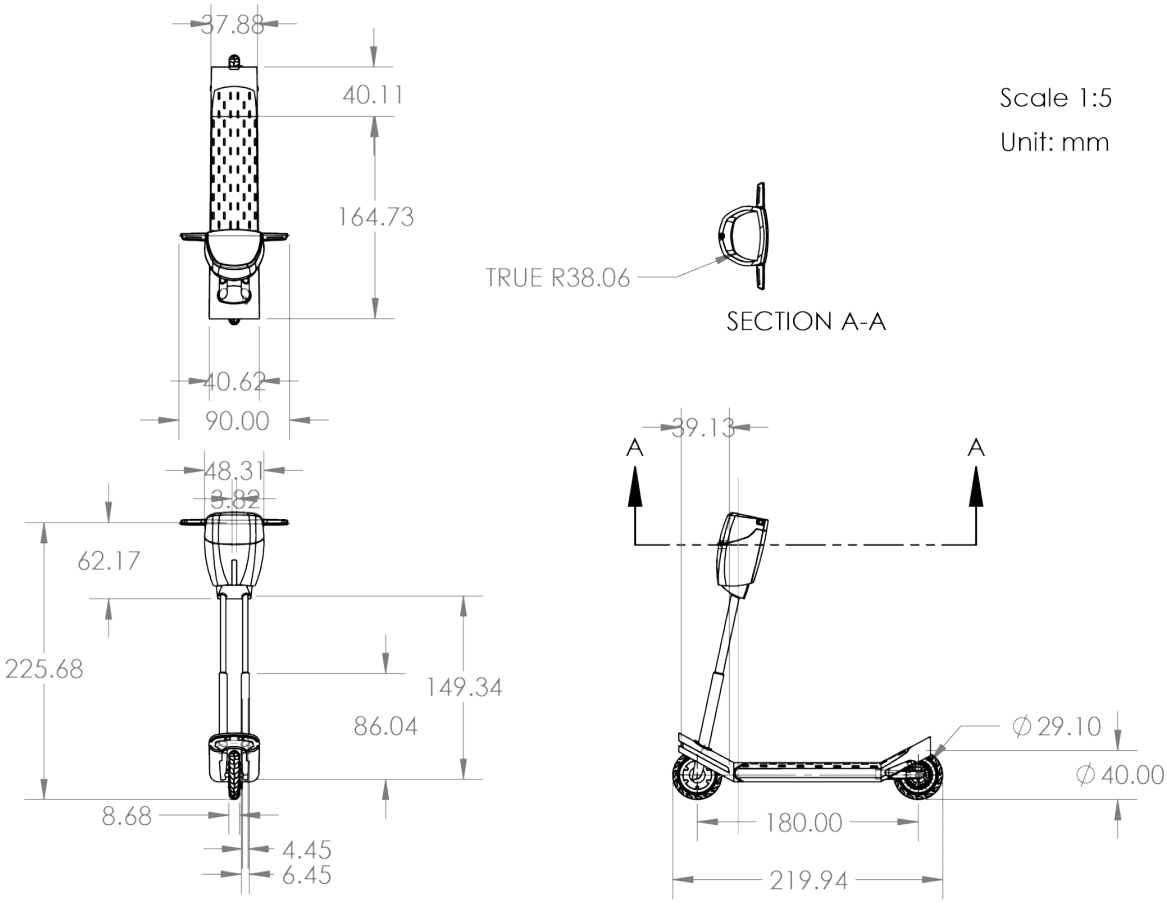


Figure 71 Technical Drawing – Electric scooter

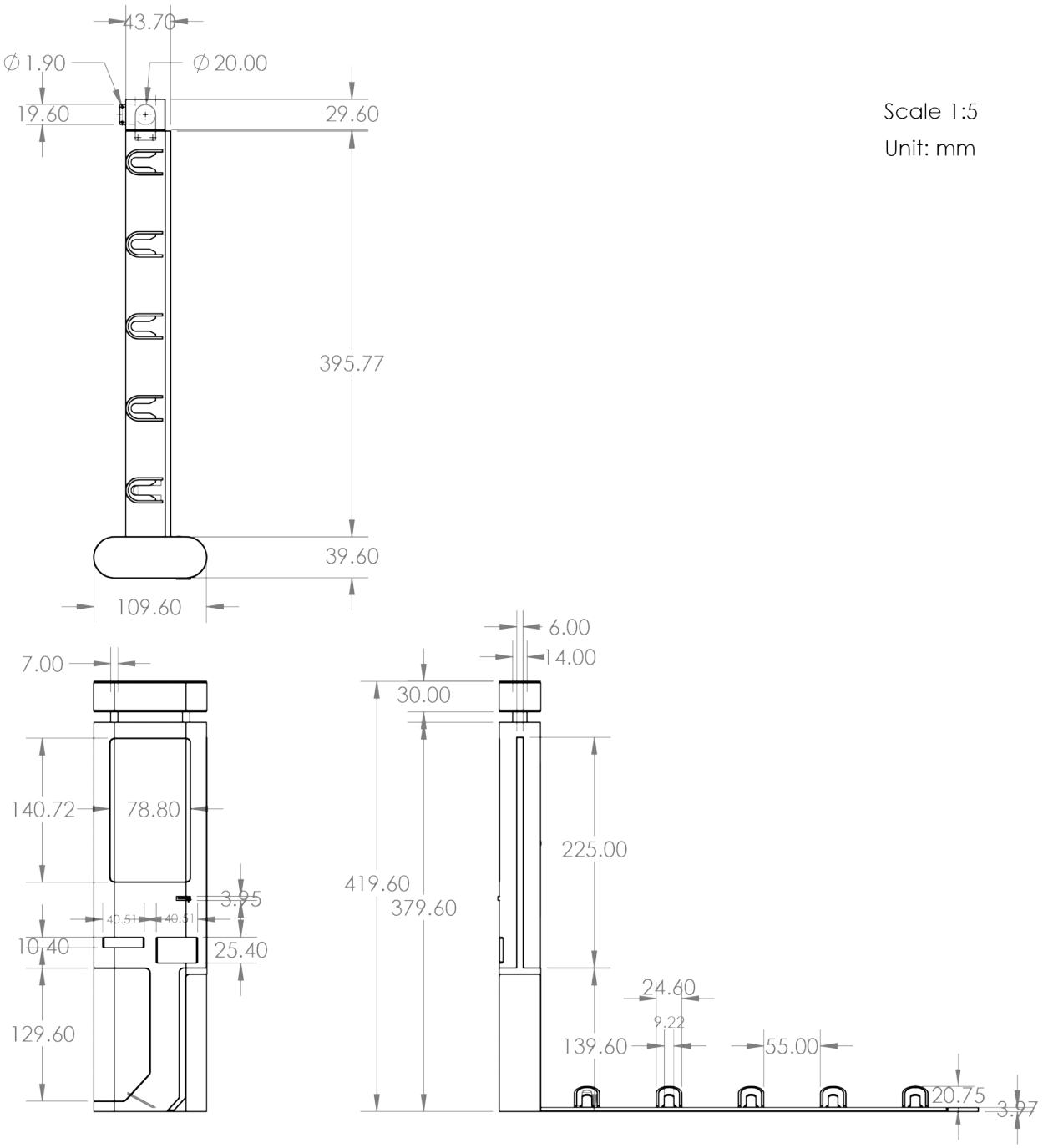


Figure 72 Technical Drawing - Kiosk

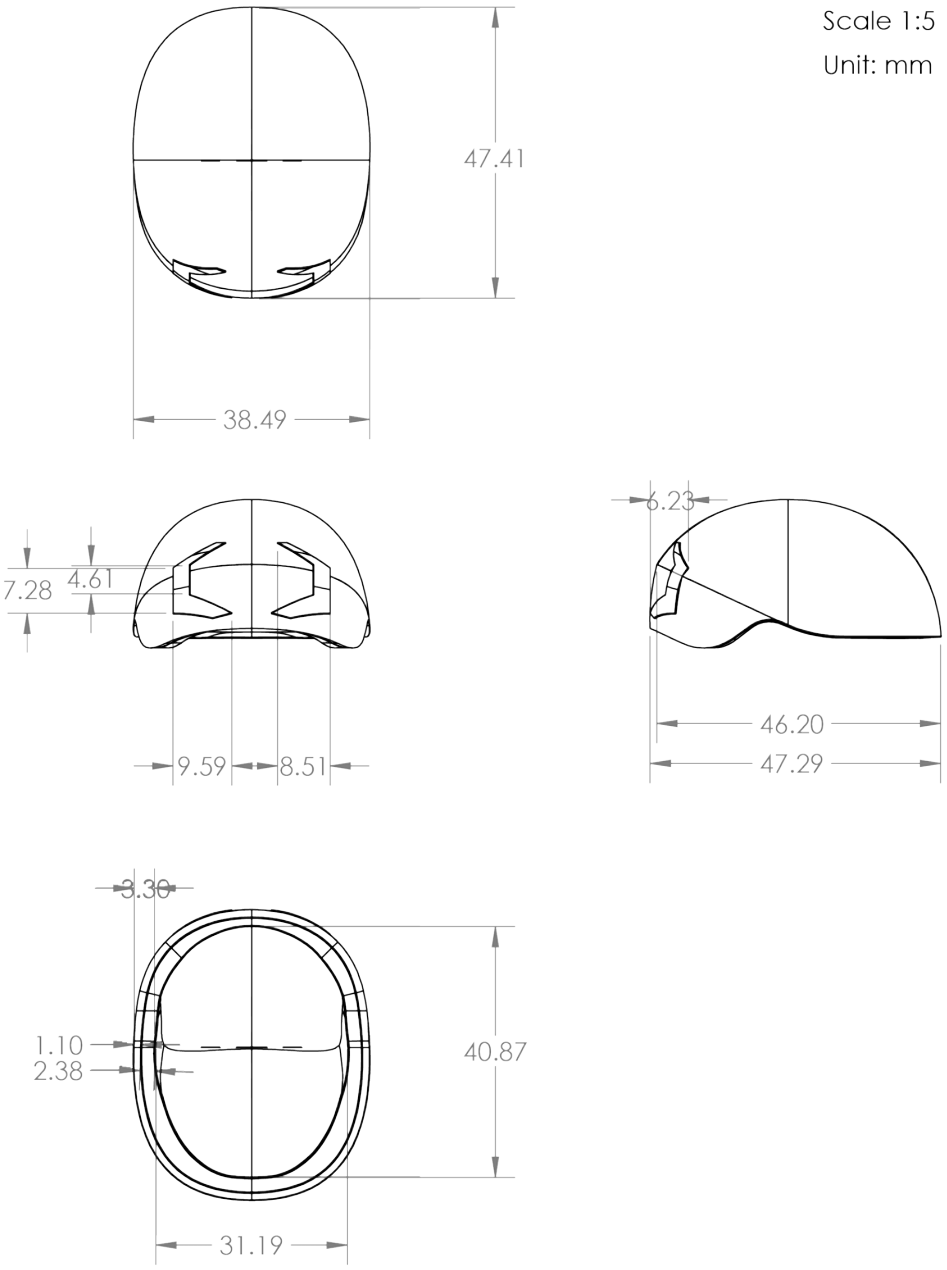


Figure 73 Technical Drawing - Helmet

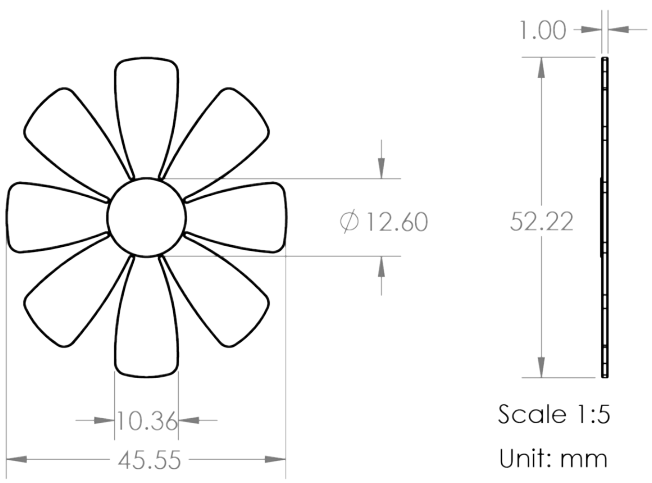


Figure 74 Technical Drawing – Helmet liner

5.6 Sustainability

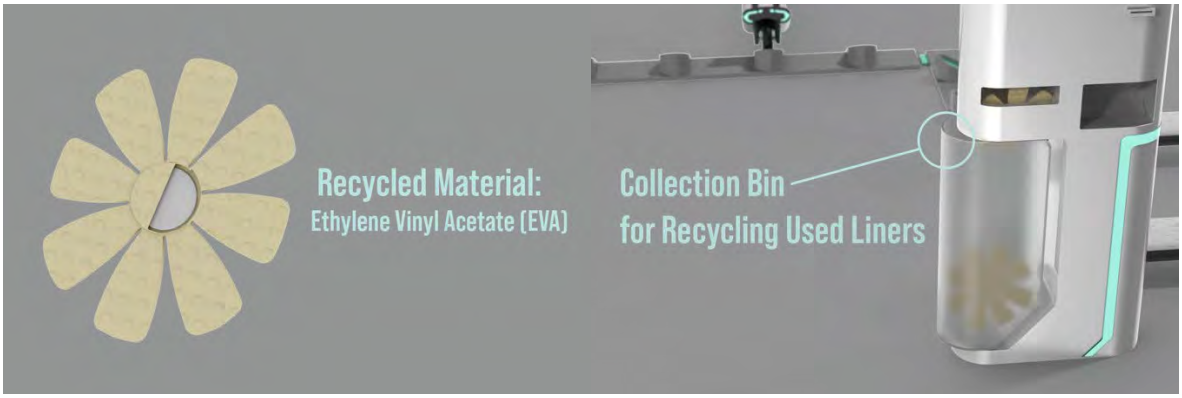


Figure 75 Sustainability – Recycling helmet liner

The helmet liner pad is made out of recycled ethylene vinyl acetate (EVA) foam. The sensors are embedded at the center of the liner, and users can reuse the liner for their next rides or simply return it to the recycle bin that is located at the lower half of the kiosk. Maintenance workers can easily switch out bins and collect the used liners for recycling.

CHAPTER 6 CONCLUSION

KICKO is designed to provide a convenient and hygienic public electric scooter solution in the urban environment. Users can find KICKO's kiosk easily because of its unique aesthetic and purchase a liner that allows activating the scooter by tapping the liner to the LED screen. The liner is attached to the inside of the helmet to separate the user's head and the public helmet's inner surface. After a user's journey, they can park at any kiosk near them, and users can choose to keep their liner for future usage or simply return to the recycling bin that is attached to the kiosk.

KICKO has the potential to lead the next generation of urban public mobility systems by addressing common issues that still exist today such as crowded pedestrians path, disregard for the user's safety, and encouraging reckless riding all due to the unawareness that the current public electric scooter industry has in identifying their user's true needs.

Figure 76 In-situation rendering

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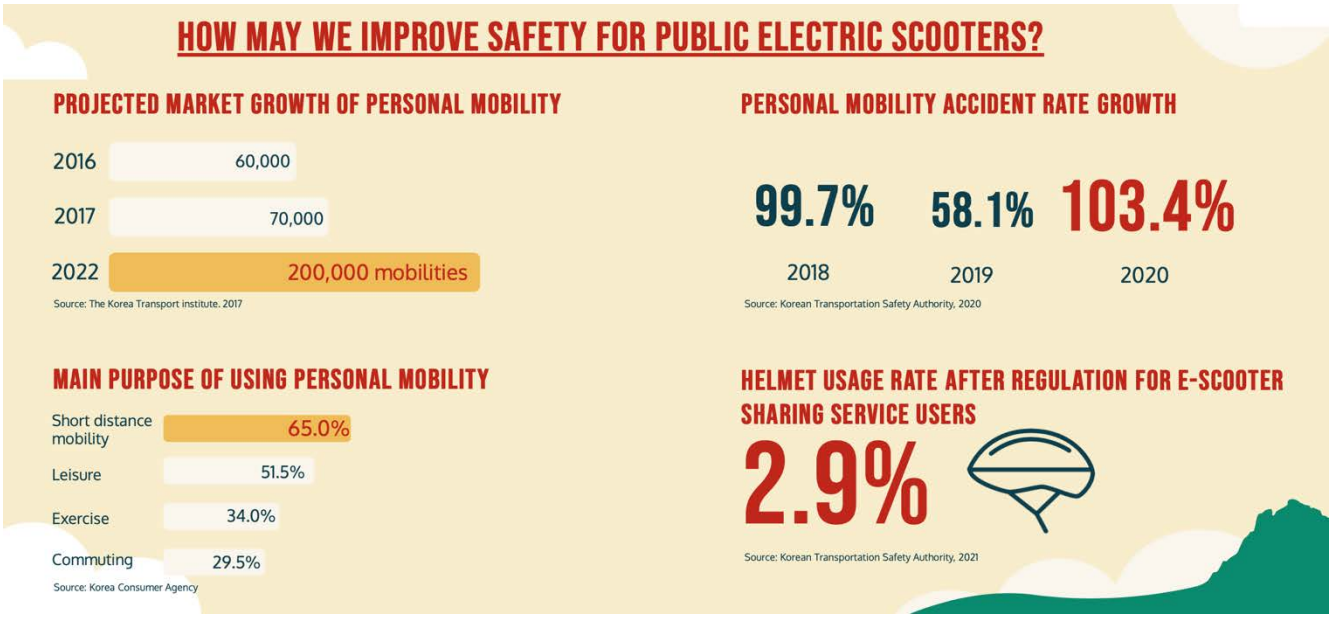
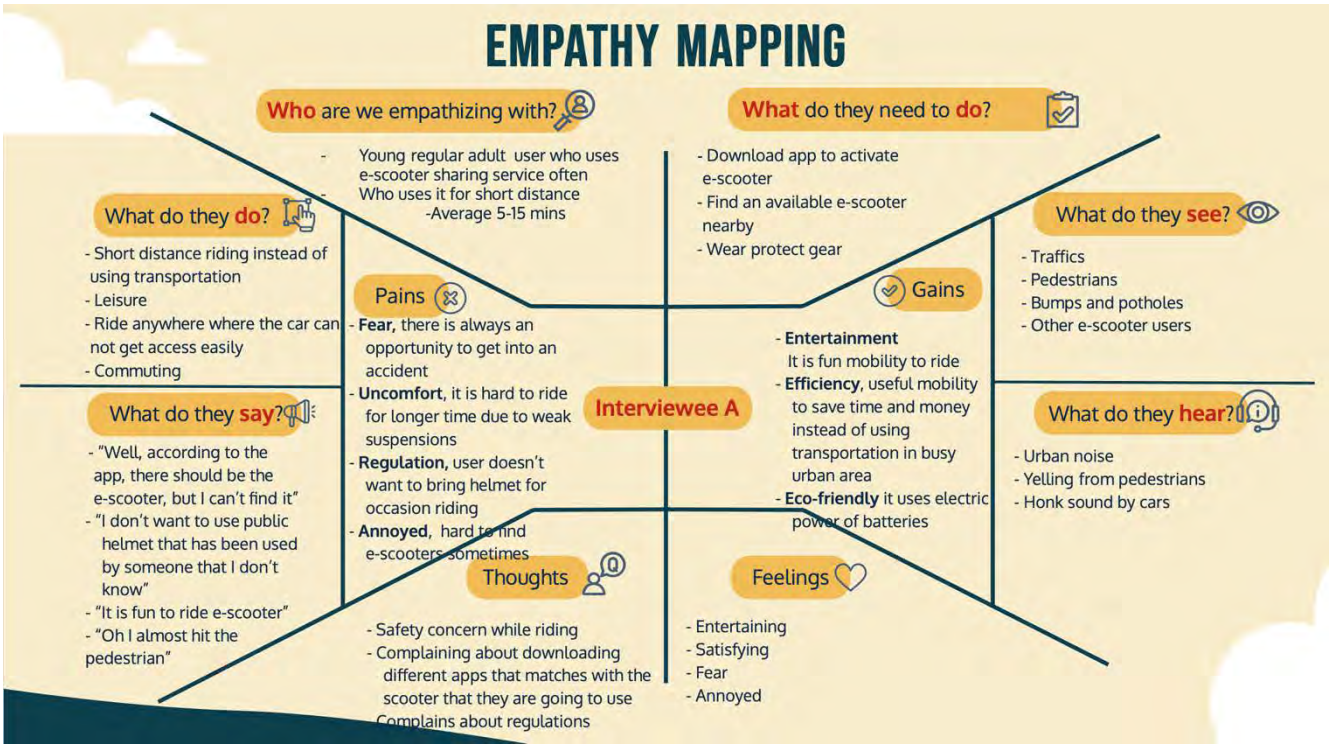
Appendix A – Discovery

Exploratory research



Empathy mapping



Appendix B – Contextual Research (User)

Interview with Hyung-gyu Lee (User)

INTERVIEW CONTEXT (Interviewed in Korean)
참석자 1 0:00:20
첫 번째. 왜 사람들이 공유 자전거를.
아니 공유 킥보드를 쓴다고 생각하십니까

참석자 2 0:00:30
그건 일단 두 가지 정도의 이유가 있겠지 한글로 해도 되지

참석자 2 0:00:39
일단 첫 번째는 재미로
참석자 1 0:00:45
재미
참석자 2 0:00:47
킥보드를 타는 게 굉장히 재미가 있어
참석자 1 0:00:50
응
참석자 2 0:00:51
그래서 굳이 탈 필요가 없을 때도 여기 킥보드 타고 갈까 하고 그런 식으로 재미가 좀 모티베이트 되는 경우가 있고

참석자 2 0:01:01
일단 두 번째는 이제 내가 주로 이제 요즘 사용하고 있는 이유인데 어정쩡한 거리를 순식간에 갈 수가 있거든.
시간을 아낄 수가 있는 거지. 저렴한 가격에.
택시보다
참석자 1 0:01:13
택시보다 저렴하고 대중교통보다는 장점이 뭐지.

참석자 2 0:01:18
바로 대중교통 이렇게 정해진 시간을 기다려 가지고 가야 되기 때문에 아무래도 내가 그 시간을 컨트롤하기가 쉽지 않은데 일렉트릭스쿠터 같은 경우에는 이제 있으면은 바로 거기서 내가 여기까지 도달할 수 있는 접근성이 되게 좋으니까.
시간 압비기에 굉장히 좋은 것 같아.
참석자 1 0:01:39
시간 아끼기도 다
참석자 2 0:01:40
가격도 굉장히 좀 합리적인 편.
참석자 1 0:01:42
가격도 합리적이고 오케이. 괜찮았는지 대답이 없군

참석자 2 0:01:49
네
참석자 1 0:01:51
그렇게 하는데 디비콜 서비스 그런 쪽이 안 좀 말겠지.
뭐 실명을 거론해도 되고. 요즘 한국에 무슨 무슨 회사들 있지.

참석자 2 0:02:01

깐만 잠깐만. 내가 좀 받아놓은 어플들이 있는데 일단 내가 쓰는 내가 깔아놓고 쓰는 거는 키 꼬인

참석자 2 0:02:12
지쿠터
참석자 1 0:02:13
지쿠터
참석자 2 0:02:15
라임
참석자 1 0:02:16
라임
참석자 2 0:02:17
이렇게 세 개 정도고. 요즘 뭐 엄청 많아.
버드라는 것도 새로 나왔고 한 내가 요즘 새로 나온 거 본 것만 해도 한 세네 개가 되는데.

참석자 1 0:02:30
다. 다르게 생겼냐
참석자 2 0:02:33
다. 디자인이랑 컬러 컬러가. 컬러가 다르지 컬러가.
사실 형태는 사람들이 다 비슷하다고 인식을 하니까

참석자 1 0:02:40
응 그러면 그 세 개 쓰는 서비스가 다 비슷한가.
과정이
참석자 2 0:02:46
기본적으로 승차감에서는 좀 많이 다른데

참석자 1 0:02:50
승차감이 달라
참석자 2 0:02:51
어 기종이 내부에서 뭔가 조작부에서 뭔가 좀

참석자 2 0:02:59
고급스러움이라고 해야 되나
참석자 2 0:03:02
이런 것들이 다 브랜드마다 조금씩 달라.
신기하게
참석자 1 0:03:06
뭐가 좋냐. 네가 써본 것 중에
참석자 2 0:03:10
내가 써본 것 중에 제일 그랬던 거는 라임이었고

참석자 1 0:03:14
음
참석자 2 0:03:15
그래서 라임은 지금 내가. 어플을 가지고 고 있는데도 라인은 웬만해서는 잘 안 타.
너무 덜컹거리고. 서스펜션이 단단하다 그래야지 차는 서스펜션 단단하면은 재미있는지 모르겠는데 스쿠토는 서스펜션이 단단하면 조그만한 요철만 있어도 거의 이제

참석자 2 0:03:32
어 내가 제일 좋아하는 거는 이거 키구인.

참석자 1 0:03:37
기공이 전통의 기공이지
참석자 2 0:03:39
키 보잉이 승차감은 제일 좋더라고
참석자 1 0:03:42
순차가
참석자 2 0:03:43
그리고 얘네는 기기를 계속 변경을 해가지고

참석자 1 0:03:47
아 그래
참석자 2 0:03:48
기기가 계속 업그레이드가 돼요. 그래서 요즘 거를 타면 탈수록 승차감도 좋고 되게 조작하는 그런 반응 속도도 좋아

참석자 1 0:03:57
보면 뭐가 달라졌냐. 옛날에 비해서
참석자 2 0:04:02
일단 토크부터 다른 것 같아.
참석자 1 0:04:07
아 그래
참석자 2 0:04:08
토크도 다르고
참석자 1 0:04:10
더 빨라
참석자 2 0:04:12
아니 빠르지는 않은데 반응하는 힘이 다른 게 느껴져

참석자 1 0:04:17
음
참석자 2 0:04:18
어차피 제한 속도를 걸어놨기 때문에 일정 속도 이상으로 가지 않는 건데 좀 더 부드럽고 안정적으로 이렇게 쭉 주행이 된다고 해야 되나.

참석자 1 0:04:26
근데 보니까 좀 내 이제 규정을 찾아보니까.
지금 우리 규정이 25 킬로미터더라고.
파워 딱 그 정도야. 옛날에는 그거보다 더 빠르지 않았나.

참석자 2 0:04:39
근데 실상 나도 뭐 제 본 적은 없어서 모르겠는데 한 25 에서 30 왔다 갔다 하지 않을까 싶어.

참석자 1 0:04:45
옛날에 비해 속도 차이는 없냐. 우리 집 샀을 때랑 비해서 그냥 느끼기에.

참석자 2 0:04:51
옛날에 비해서도 딱히 없어
참석자 1 0:04:53
그냥 딱 그 정도인가 보네 속도감은
참석자 2 0:04:56

왜냐하면 이 이상으로 이제 달리면은 사람이 그 쪼끄만한 스쿠터 타고 달리기에는 후달리는 속도거든.

참석자 1 0:05:03
응 그러면 뭐 그 기계가 지금 뭐 서스펜션 뭐 이런 게 달라졌나.
좀
참석자 2 0:05:11
서스펜션도 조금 더 안정적이고 이제 흡수가 잘 되는 그런 서스펜션 쪽으로 이제 업그레이드가 되면은 그렇게 가는 것 같고

참석자 1 0:05:19
그게 보여. 이렇게 막
참석자 2 0:05:21
이런 거 넘을 때도 부드러워.
참석자 1 0:05:22
용술 같은 게 달려 있는 게 보이냐.
뭐 이렇게
참석자 2 0:05:25
맞아 그런
참석자 1 0:05:26
서스펜션이
참석자 2 0:05:27
그런. 게. 있어.
참석자 1 0:05:29
그렇구마다 앱 쓰는 거에 다 비슷하지 뭐.
결국에 가서 이렇게 찍고
참석자 2 0:05:36
앱은 다 비슷하지.
참석자 1 0:05:38
그러니까 쓰는 그 과정에는 다 비슷한 거고 그냥 기종 차이네 거의

참석자 2 0:05:42
거의 그렇다고 볼 수 있고. 내가 요즘 새로 나온 브랜드들은 안 써봐서.
그런 애들은 디테일하게는 모르겠다.
참석자 1 0:05:49
응 오케이
참석자 2 0:05:53
근데 그게 있어. 지금 뭐 이거 질문이 순서가 이게 뭐 건너뛰고 막 말하는 이거 되나 이거.

참석자 1 0:06:00
뭐
참석자 2 0:06:01
네 그 뒤에 있는 질문에 미리 대답하고 막.
내가 지금 그러고 있는 거 아닌가
참석자 1 0:06:06
그런가 몰라. 나 그냥 일단 순서 따라 가기는 할 건데.
그래도 여기 얘기하다가 나 궁금한 거 있으면 그냥 물어보게.
어차피 정리는 나의 몫이니 그러고 자
참석자 2 0:06:19
어
참석자 1 0:06:23

댐 사고. 프럼 누구 아들 이건 뭐 말한 거 같은데

참석자 2 0:06:27
찍고 있니. 어떻게 다른가
참석자 1 0:06:30
킥고잉이 조금 기종을 계속 업그레이드 해서 다르고 서시면서도 좋아진 거고 캔유 아이덴티파일 리센트랜스 인더 멀게 플레이스

참석자 2 0:06:41
최근 동향 이게 내가 사용자 입장에서 동양 어떻다라고 말하기는 좀 뭐할 것 같은데

참석자 2 0:06:52
뭔가 있는 것 같긴 해. 왜냐면은 요즘도 계속해서 생겨나고 있는 걸 보면은.
이게 뭔가. 사업자 입장에서 접근할 만한 빈틈이 있으니까 계속 생겨나는 것 같단 말이지 뭔가 트렌드가 있고

참석자 1 0:07:08
이게
참석자 2 0:07:09
요즘 가장 주된 이슈는 이 일렉트릭스쿠터가 법규가 개정이 돼 가지고 그렇지.
안전모를 안 하면은
참석자 1 0:07:19
불법이지. 2 만 원. 과태료
참석자 2 0:07:22
근데 사실 이게 사람이 길 가다가 일렉트릭스 붙어 있으면 그냥 타고 가니까.
편해서 타는 건데.
참석자 1 0:07:30
그렇지 근데 하이바를 친구들이
참석자 2 0:07:33
아니면 그. 타는 거지. 그걸 타려고 나가서 그런 의도를 가지고 나가가지고 막 헬멧을 미리 챙기고 다니고 이러진 않는단 말이지.
사람들이 그래서 요즘은 좀 이게 많이 죽은 것 같아 옛날에 비해서.

참석자 1 0:07:50
그런데도 이렇게 새 그게 생기네
참석자 2 0:07:54
그래서 내가 요즘 요즘 본 것 중에 어떤 브랜드는 이름은 잘 모르겠는데

참석자 1 0:07:59
응
참석자 2 0:08:00
아예 스쿠터에다가 헬멧을 이렇게 걸어놔

참석자 1 0:08:04
그게 아마 약간 주황색으로 생긴 그거 아니냐

참석자 2 0:08:08
뻘건색인지 주황색인지 아마 그런 걸 거야

참석자 1 0:08:11
걔네는 이제 헬멧 쓰면은 헬멧 이렇게 인증하면은 할인을 해주고 막 이런다던데.
그거에 잠금 해제가 되고 근데
참석자 2 0:08:22

근데 참 웃기더라고. 그거 솔직히 남이 막 땀 흘리면

참석자 1 0:08:25
그게. 지금 내가 생각한 이슈가 그거야.
더럽잖아 남이 쓰던 건데. 자기 머리에 써야 되니까.

참석자 2 0:08:33
야. 무슨 훈련소에서 구모 쓰는 것도 아니고 그걸 누가 쓰냐고.

참석자 1 0:08:36
누가 뭘 막. 특히 코로나 시국에 누가 뭘 어떻게 했을지도 모르고.

참석자 2 0:08:42
뭔가 거기서 뭔가 더 개선될 여지가 있는 것 같아.
난
참석자 1 0:08:47
어. 분실도 많이 된다고 하더라고. 분실도 많이 되고

참석자 2 0:08:51
분실도 법나 많이 되겠지
참석자 1 0:08:52
우리 사람들이 그것 때문에 잘 안 쓰려고 그러고 그래서 싱싱인가.
그 노란색 걔네는 헬멧을 팔더라고 싸게

참석자 1 0:09:05
그래서 아직 얘네들이 정확한 해답을 못 찾게 한 것 같은데 걔네는 헬멧을 한 2 만 원에 파는데 대신 그걸 사면 이제 이용권 10 회 20 회를 줘.
그냥 공짜 이용권 그렇게 해서 좀 증진을 시켜보려고 하는데

참석자 2 0:09:20
그것도. 근데 내 생각에는 이거는 진짜 어려운 문제인 게 방금 말했던 것처럼 가다가 있으니까 타는 거지 타려고 나가는 게 아니니까 이게 접근 방식이 완전히 달라.
헬멧 준다고 해서 이거를 탈 수 있는 게 아니야.

참석자 1 0:09:35
그렇지 있으니까 타는 거지. 그걸 굳이 내가 찾아서 타려고.
헬멧까지 가지고 나갈 정도는 아니지.
참석자 2 0:09:44
그냥 직관적으로. 길가다가 얘 발견했는데 헬멧까지 내가 새것처럼 깔끔하게 이용할 수 있다.
이러면 탈 만한 여유가 조금은 생기는 거지.

참석자 1 0:09:59
그래서 요즘 사람들이 좀 확실히 줄긴 이용자는 줄었다고는 하던데.

참석자 2 0:10:05
줄었어. 나도 학교 막 지각할 것 같으면 이제 어차피 그런데 스쿠터를 주로 타고 다니는 게 이제 사람들 많이 다니는 대로변의 인도나 이런 데서는 스쿠터를 잘 안 탄다고.
그 맛. 그렇지
참석자 2 0:10:20
빌라들 막 모여 있고 막 이런 막 골목길들 있잖아 차들이나 이런 거는 접근이 쉽지 않은데 스쿠토로는 그런 데를 다 가로지르면서 갈 수가 있으니까 시간도 절약되고 하는 거고 또 그런 데는 경찰이 없으니까

참석자 1 0:10:34
그렇지. 대로변보다는
참석자 2 0:10:36
이거 타면 막 5 분밖에 안 걸리는데 그냥 탈까.
이러고 그냥 확 타버리는 경우도 있는 것 같은데

참석자 1 0:10:42
응
참석자 2 0:10:44
사실 옛날에 비해서는 많이 힘들어 타기가

참석자 1 0:10:48
그렇구먼 6 번 질문이 이게 이게 맞는 그건지 모르겠네.
이 버켓이 니시 프로덕트가 있다고 생각

참석자 2 0:11:00
새로운 틈새 제품이 있으니까
참석자 1 0:11:04
뭐 헬멧 그거를 했다는 그런 게 이슈라고 해야 되나.
없지 사실
참석자 2 0:11:13
리치 한 건 헬멧 달아준 거지. 근데 그게 제대로 겨냥을 하지는 못한 것 같은데

참석자 1 0:11:19
아직 해결책이 제대로 된 게 아니지
참석자 2 0:11:21
그 의도는 뭐 니치마켓 노리고 들어오는 애들이겠지.

참석자 1 0:11:25
나름 내가 잘 골랐구먼. 주제를 어떻게 풀어나갈지 모르겠지만.
문제는 문제니까.
참석자 2 0:11:32
이거 좀 어려울 거만 테던데
참석자 1 0:11:37
빼도박도 못한다. 이제
참석자 2 0:11:40
아 이거 이건 거의 발명 수준의 상당한 고뇌가 따를 것 같은데

참석자 1 0:11:47
그러니까. 모르겠어 어떻게 해야 될지.

참석자 2 0:11:55
플러스트레이션
참석자 1 0:11:56
뭐. 맞지 뭐. 니가 아까 얘기한 거지.
아니면 운전. 지금 스쿠터 타보면서 느꼈던 안전 위험 같은 거나 경험이나 보고 들은 거

참석자 2 0:12:10
안전 위험

참석자 1 0:12:11
아니면 뭐가 불편하더라 했었던가. 뭐 이런 거

참석자 2 0:12:16
일단 지금 제일 이용하는 데 불편함이 있는 거는 헬멧이고 그리고 이럴 때가 있어.
업체가 너무 많아.
참석자 1 0:12:31
응
참석자 2 0:12:32
업체가 좋나 많은데 솔직히 가격도 다 비슷비슷하거든 근데 내가 지금 급해가지고 막 스쿠터를 타면은

참석자 2 0:12:42
좋을 것 같아 그런데 내 옆에 있는 스쿠터가 내가 깔려 있는 내가 가지고 있는 어플의 스쿠터가 아니야.

참석자 1 0:12:49
그것도 다시 다운 받아야지.
참석자 2 0:12:51
그거 언제 다운받고 있냐. 그냥 걸어가지.
그러면 이것도 불편이라고 할 수 있고 이게 통합이 안 돼 있는 거.
그거는 소비자 입장에서 확실한 불편일 수 있을 것 같아요.
그래서 이거를 다 모아놓은 플랫폼 같은 게 좀 활성화가 되면 좋겠다라는 생각도 들어

참석자 1 0:13:06
음
참석자 2 0:13:08
서비스를 모아놓은 어느 스쿠터나 그냥 쉽게 접근이 가능하다 왜냐하면 이거 새로운 스쿠터 하려면 또 운전면허증 스캔해서 쉽고 카드 등록해서 하고.
이거 하면은 한 10 분 15 분 잡아먹거든

참석자 1 0:13:22
도 씨 응 하이버 같은 거를 어떻게 잘

참석자 1 0:13:31
평소에도 들고 다닐 수 있을 다른 용도로 쓸 수 있을.
만약에 잘 접힌다든지 아니면 막 가방 같이 쓸 수 있다든지 그런데 그거를 가지고 어느 스쿠터에나 가서

참석자 1 0:13:48
뭐 인식을 하면 그냥 바로 되는 거예요.
그럼 아주 좋겠지
참석자 2 0:13:52
그리고 지금. 지금 떠오른 건데 이런 것도 괜찮을 것 같아 스쿠터 물론 사람들이 스쿠터를 이용하고 그냥 아무 때나 내려놓지만

참석자 1 0:14:06
응
참석자 2 0:14:06
사실 원래 키보인. 처음 나왔을 때만 해도 주차장이라는 개념이 있었거든

참석자 1 0:14:11
있었지
참석자 2 0:14:13

아무도 안 지켜서. 그게 좀 희석되기는 했는데 스테이션이라는 개념이 있었다고 그러면 스테이션을 진짜로 아예 만들어주는 거야.
좀 자금을 투입을 해서
참석자 2 0:14:24
그리고 스테이션에 가면은 헬멧이 좀 있어

참석자 1 0:14:28
응 그렇지
참석자 2 0:14:32
그런 식으로 헬멧을 제공해 주는 거는 나는 괜찮을 것 같긴 한데 문제는 더러움이잖아

참석자 1 0:14:38
그렇지. 누가 관리를 해줘야 되겠네
참석자 2 0:14:40
이 디자인으로 풀 수 있을 것 같아.
안에 소화보만 이렇게 교체하는 식으로 소모품을 만들어 준다던가.
그런 것들을 이제 스테이션에서 이제 500 원이나 아니면 같이 이제 qr 을 결제하면 이제 상용품을 하나 더 줘서

참석자 2 0:14:56
새로 이제 헬멧 안에다가 새로운 커버 교체할 수 있게 제공을 해준다든지 자판기로

참석자 1 0:15:02
응
참석자 2 0:15:04
그러면은 조금 더 접근성이 괜찮아지지 않을까

참석자 1 0:15:08
거의 통합 시스템이구먼
참석자 2 0:15:10
아예 좀 시스템이 만들어 져야지 좀 이용을 할 수 있지 않을까

참석자 1 0:15:17
진
참석자 2 0:15:18
경찰 피하려면 그거밖에 없으니까
참석자 1 0:15:22
그렇구만. 안전 같은 거는
참석자 2 0:15:26
안전. 어쨌든 이거는 근데 좀 리스가.
리스키하긴 해 나도 작년인가. 한번 퇴사하기 전에.

참석자 2 0:15:35
나 혼자 조금 멀리 가 가지고 국밥 먹고 온다고.
스쿠터 타고 회사에서 쭉 가다가 요철에 쿵 해가지고 날아갔거든

참석자 1 0:15:44
어
참석자 2 0:15:45
그래가지고 막 다리에 살 빼고 막 피 철철 흘려가지고 점심 먹고 회사로 복귀를 못하고 집으로 갔어.
잠깐 쉬워요. 거리로
참석자 1 0:15:54

심한 정도로
참석자 2 0:15:56
그는 내가 그 도보에서 아무도 없는 데서 그냥 혼자 날아가서 다쳐가지고 그나마 이제 괜찮은 건데.
만약 내가 날아간 곳이 차도였다거나 이러면은 거의 진짜 큰일 날 수도 있었을 상황이고

참석자 1 0:16:10
그냥 요철 요만한 턱 같은 데 딱 걸린 거야 아니면

참석자 2 0:16:16
그치 보도가 이제 블록이 이렇게 따다다다 있잖아.
그런데 블록이 이렇게 공사가 잘 잘못돼가지고 이렇게 쭉 이렇게 튀어나와 있던 거지.

참석자 1 0:16:24
그럼 보도 블록에 걸리는 거네. 옆에 연돌이 아니고.

참석자 2 0:16:27
사람 사람 부어 불러. 거기서 조그만 거 통 치니까 25kg 30kg 이바이 당기고 가다가.
그런데 딱 걸리면은 하면서 거기서 이제 내가 손잡이를

참석자 2 0:16:39
꽉 잡고 있지가 않고 이렇게 느슨하게 자꾸 이렇게 바람을 막 느끼면서

참석자 1 0:16:42
어
참석자 2 0:16:43
그럼 이제 딱 놓치면서 이제 휘청휘청하고 날아가는 거지.
그래서 이거 탈 때는 주의를 꽤 해야 돼

참석자 1 0:16:52
그럼 다친 부위 어디를. 제일 많이 다칠 거 같아.
다리 아니면 팔
참석자 2 0:16:58
이거는 거의 차 사고기 때문에. 어디를 제일 많이 다치고 없어.
이거는 일단 날아가면은 좋대
참석자 1 0:17:07
하 이거 쉽지 않네 분명히 위험한데.
브레이크도 잘 안 듣는다 그러던데. 생각보다 급정거를 못한다고

참석자 2 0:17:20
응 그래서 좀 주의를 항상 하면서 타긴 해야 돼 사실 급 브레이크 기능을

참석자 2 0:17:29
업체 입장에서는 넣을 수가 없을 거야.
근데
참석자 1 0:17:31
넣으면 날아가니까
참석자 2 0:17:33
그게 그게 더 위험하거든. 내
참석자 1 0:17:34
응 그렇지. 그프리 확 자가 확 날아가니까

참석자 2 0:17:39
이게 운동 신경이 좋고 이런 거 타는데 아이 익숙한 사람이 이렇게 조절하면서 그 브레이크까지 사용을 하는 거면 모르겠는데 사실 이거는 숙련도를 판단하고

참석자 2 0:17:52
나눠주는 게 아니라 그냥 시장에 맡겨서 내놓은 스쿠터잖아.
근데 여기에 뭐 좀 운동신경이 떨어지는.
뭐 여성이 탔다고 치자. 근데 이 사람이 당황을 해서 그 브레이크를 잡았어요 25km 달리다가.
그럼 이 사람 날라가고 분명 크게 다칠 거라고.

참석자 1 0:18:09
그것도 그럴래 쉽지 않은데. 이거
참석자 2 0:18:18
내 생각에 이 부분은 그냥 넘어가는 게 좋을 것 같아.
이거는 컨트롤하기가 쉽지 않아. 뭔가 디자인 여기서 여기서 그렇다고 손목보호구랑 막 무릎 보우고 이런 거 다 차고 타라고 할 수도 없는 노릇이고.

참석자 1 0:18:32
그러니까 그걸 어떻게 하느냐가 문젠데
참석자 2 0:18:35
최소한의 안전 장치로 그냥 헬멧을 이제 법규로 이제 규제를 해준 것 같아요.
나는
참석자 1 0:18:42
팔다리는 날아가도 되니까. 머리라도
참석자 2 0:18:46
머리만 지키면 죽진 않으니까
참석자 1 0:18:49
쉽지 않구만
참석자 1 0:19:01
지금 뭘 하고 있지 않은데. 뭘 해야 되나

참석자 2 0:19:05
깔끔한 헬멧 제공해 주는 게 난 답인 것 같아.

참석자 1 0:19:09
깔끔한 헬멧 깨끗한 헬멧 위생적인 헬멧

참석자 2 0:19:13
ux 측면에서는 플랫폼 통합해서 내가 한 번 주민 면허 운전면허증이랑 카드를 등록하면 그걸로 여러 브랜드를 그냥 동시에 다 이용을 할 수 있어야 되고

참석자 1 0:19:26
응
참석자 2 0:19:27
난 그것도 중요한 것 같긴 하고
참석자 1 0:19:30
이게 조건이 휴먼 센트릭 디자인이어야 돼.
그리고 인간의
참석자 1 0:19:45
인간이 직접 만져서 뭔가를 해야 돼.

작동하는 것 부위도 세 부위 이상 써야 돼.

참석자 2 0:19:51
어거놈이
참석자 1 0:19:55
팔이나 팔 하면 손 손목 어깨 세 보이잖아 그걸 이렇게 쓰거나.
뭐 등 뭐 하면 등도
참석자 1 0:20:06
등에도. 뭐 뭐가 들어가니까. 이런 식으로.
일단 몸에 뭐가 돼야 돼 몸으로 인간이 뭔가를 움직였어.
그래서 앱 같은 건 안 되고 사실상
참석자 2 0:20:20
야 이거 이거 주제 니가 부른 거냐
참석자 1 0:20:24
어 9 개 중에. 이거 올랐다
참석자 1 0:20:30
원래 내가 하고 싶은 건 약간 고양이.
막 그런 거였는데 그건 인간이 하는 게 아니잖아.
그래서 바로 마음
참석자 2 0:20:38
얘. 전체적인 큰 토픽이 어고노믹이었구나

참석자 1 0:20:42
일단 휴먼 인간이 쓰는 거여야 돼
참석자 2 0:20:45
어
참석자 1 0:20:46
그래서 모빌리티가 될 수도 있고 뭐 그렇긴 한데.
하 쉽지 않구만 그다음 뭐냐
참석자 2 0:20:59
나는 이거 헬멧 해결 못하면은 그냥 이 업계는 그냥 사라질 것 같아.

참석자 1 0:21:04
이게 약간 따릉이도 옛날에 그거 했었다고 그러더라고 헬멧 규제.
근데 망했대. 서울에서 따릉이도 헬멧 그거까지 해서 했는데 이용률이 헬멧 쓰는 사람이 3 프로도 안 돼 가지고

참석자 1 0:21:22
그래서 그게 안 됐다고. 지금 법으로도 막.
아무튼 복잡하더라고. 이게
참석자 2 0:21:27
그러니까 이게 뭐. 법을 고쳐야 되는 게 사실 나는 맞는 것 같긴 한데 그러니까.
근데 다른이는 사실 서울시에서 이제 하려고 지자체에서 시작한 사업이니까 이용률이 낮으면 이제 법을 개정할 수 있는 여건이라도 있지

참석자 2 0:21:46
일렉트립스쿠터는 다 민자 사업인데 이거를 고쳐주겠냐고.

참석자 1 0:21:50
이거는 이제 시작되는 거라 이게 복잡하더라고 다른 해외도 지금 뭐가 많아.

뭐 헬멧 의무화인 데도 있고 아닌 데도 있고.

참석자 1 0:22:02
그리고 이거를 아직 사고가 났는데. 그러면 사고가 난 이 킥보드랑 만약에 트럭이 사고 났으면 이게 대물이냐

참석자 1 0:22:11
운전자들 운전자의 사고냐 아니면은 보행자로 칠 거냐

참석자 2 0:22:17
쉽지 않네
참석자 1 0:22:19
그 두 가지 케이스가 다 있어. 두 가지로 인정된 게 하나는 트럭이랑 부딪쳐가지고.
얘는 보행자다 하나는 사람을 사람이랑 그 킥보드랑 사고가 나서

참석자 1 0:22:30
이거는 자전거로 드라이버로 치고 막 이렇게 막 아직.
그러니까 이게 새로운 종류의 이동 수단이다 보니까 이 이거를 찾을 법을 아직 못 만들었어.
이거에 대한
참석자 1 0:22:45
이걸 어디에 속해야 되는지에 대한 다 그래.
지금 전 세계가
참석자 2 0:22:52
애매하다
참석자 1 0:22:54
그래서 이거 이거 헬멧 하이버 해결 못하면 이거

참석자 2 0:22:58
이건 진짜 하이버 해결해야 돼. 근데
참석자 1 0:23:04
10 번 간다
참석자 2 0:23:06
하이바의 경도나 그런 하이바가 갖춰야 될 최소 요 물리적인 요건 이런 거 찾아서 그것만 아슬아슬하게 충족시키면서

참석자 1 0:23:17
근데 아무튼 쓰긴 써야 되잖아. 어
참석자 2 0:23:20
가능한 그거를 네가 만들어야 될 것 같아

참석자 1 0:23:23
근데 아까 전에 내 친구가 타 보니까 무슨 종이 헬멧이 있대.

참석자 1 0:23:30
잘 엮으면 또 될 것 같기도 하고 뭐 뽑아서 쓰든지.

참석자 2 0:23:39
어렵다
참석자 1 0:23:41
그거 생각해 봐야지 1 년 동안 생각해 봐야지

참석자 2 0:23:45
네 1 년 1 년짜리야 이거

참석자 1 0:23:48
지금 2 학기짜리 지금부터 시작해서 졸 자까지 하는 거야 이게 다음 학기까지

참석자 2 0:23:55
뭐 목업까지 나와야 되는 거냐
참석자 1 0:23:58
모든 게 쌌다
참석자 2 0:24:00
아
참석자 1 0:24:01
그리고 논문까지 써야 되고 그러니까 딱 졸작이야 논문 쓰고

참석자 1 0:24:10
뭐라고 해야 되냐 영어랑 한국 말도 다 생각이 안 나네.
논문 쓰고 그 프로토 타입 나오고 피지컬 프로토 타입 나오고 인터뷰 같은 거 다 설명하는 비디오도 만들고

참석자 1 0:24:25
근데 웹사이트 같이 올리는 그런 것도 만들고 뭐 다 싹 다 그래서 끝나면 전문가지 이제

참석자 2 0:24:36
그러겠네
참석자 1 0:24:38
우리나라 기공 이런 데 뭐 전화 이메일 해가지고 담당자랑 이런 거 인터뷰 뭐 이런 거 할 수 있냐 쉽나

참석자 2 0:24:50
글쎄. 근데 뭐 기꼬임 업체들이 다 뭐야.
스타트업이니까 해줄 수도 있나. 전화하면 해 줄 수 있지 않을까.
특히 완전 신생업인 업체들은
참석자 2 0:25:06
시장 조사는 이빨이 돼 있을 텐데. 솔직히 두 세 명이서 사무실 차려놓고 하는 경우가 꽤 있을 거란 말이지

참석자 1 0:25:12
그런 애들은 오히려 인터뷰
참석자 2 0:25:14
애들은 잘했을 거야 아마.
참석자 1 0:25:16
걔네들 인터뷰도 해보고 그 업체. 그 사람 인터뷰도 해야 되고 그다음에 수거하는 사람들 있잖아.
관리하는 사람들. 그 사람들도 인터뷰하면 뭔가 좀 나올 것 같긴 한데

참석자 1 0:25:29
뭐 했든 메일을 한 번 보내보고 화상회의를 해보던가 해야 되겠네.

참석자 2 0:25:35
그런 사람들은 안 봐도 뻔해 도둑놈들이랑 이상한 데 숨겨놓는 인간들.
이런 거에 대한 애로사항이 아마 넘쳐날 거야.

참석자 1 0:25:45
그렇겠네. 사실
참석자 2 0:25:47
나도 키코잉 내배는 잡히는데 이게 도저히 어디 있는지.

건물에 숨겨놨는지. 보이질 않아가지고 못한 적이 꽤 있거든.

참석자 1 0:25:55
맞아. 나도 그랬어. 싱싱인가 그거 하라고 그랬는데 없어.
안 보여.
참석자 2 0:26:00
이건 딱 보면은 100% 이 새끼 집에 들고 갔어.
이거
참석자 1 0:26:03
보니까 막 화단 저거 막 안에 막 던져놨더라고

참석자 2 0:26:07
그러니까 막 집 안에 들고 가고 막 이런 애들이 꽤 있어 이상한 놈들 많아.

참석자 1 0:26:14
그다음에 유저빌리티 휴먼 팩터 나오네.
이
참석자 2 0:26:20
이성희 교수
참석자 1 0:26:23
뭐 썼을 때 불편했던 점이라든가 이용하는데 물리적으로 뭐 핸들이 불편하다든가 뭐 잡는 위치가 좀 이상하다던가

참석자 2 0:26:40
일단 일단 헬멧 얘기는 더 이상 안 할게.
이거는 너무 이제 당연한 거고. 고정된 터백이고 이게

참석자 2 0:26:50
라임을 아까 말했던 라임을 예로 들면 사람이 이렇게 딱 잡고 타잖아.

참석자 1 0:26:56
응
참석자 2 0:26:56
근데 이 위치도 진짜 중요해
참석자 1 0:27:00
그 핸들 높이
참석자 2 0:27:02
라임은 이게 이렇게 올라가 있어
참석자 1 0:27:05
아 조절이 안 되고
참석자 2 0:27:08
이제 올라가 있으니까 이렇게 틀릴 때 이 회전축도 안 맞아가지고 좀 불편하고 힘이 온전하게 내가

참석자 2 0:27:17
이렇게 꽉 잡고 있는 게 아래로 잡을 때보다는 좀 불안정하다 보니까 요철 같은 거 더 취약해 그래서 이게 적당히 안정적인 높이에 있는 게 되게 중요한 것 같았어.

참석자 1 0:27:28
핸들 높이 그거 괜찮은 포인트는 핸들 높이

참석자 1 0:27:36

응 뭐 타는 데 작동 조작하는 데는 뭐 그렇게 어렵진 않지.
사실
참석자 2 0:27:49
어려운 건 없지. 이거 옛날에 이거 킥보드 그냥 발로 땅 차고 가는 거.
그거 탈 수 있으면. 웬만하면 탈 수 있을 거야.

참석자 1 0:27:58
그지. 직관적이기도 하고. 브레이크 브레이크가 이건가.
이게 엑셀이지
참석자 2 0:28:05
요즘은 그냥 자전거 브레이크처럼 바뀌었어 다

참석자 1 0:28:08
그냥 브레이크는 이걸로 하고
참석자 2 0:28:10
옛날에는. 그러니까 꽤 옛날도 아니지.
원래는 이게 브레이크 방식이 업체마다 다 좀 다르고.
식구이는 심지어 뒤에서 뒷발로 이렇게 묶는 방식이랑

참석자 1 0:28:23
그렇지 그렇지
참석자 2 0:28:24
뒷바퀴에 이렇게 뭔가 패드 같은 게 있어서 그거 누르는 방식이랑 이거랑 막 같이 쓰고.
또 언제는. 중간에 나온 모델은 니 말처럼 이렇게 버튼처럼 이렇게 누르면은 막 멈추는 그런 브레이크도 있었고

참석자 1 0:28:38
과도기구먼
참석자 2 0:28:40
그런 게 있었는데 요즘은 이제 이거 자전거 데이트로 다 통일된 것 같아요.

참석자 1 0:28:45
아 그게 아무래도 가장 직관적이지
참석자 2 0:28:48
어
참석자 1 0:28:49
브레이크를
참석자 2 0:28:50
새로운 방식의 브레이크는 사실 사람들이 익숙하지가 않으니까 급할 때 제대로

참석자 1 0:28:54
반응을 못할 수 있으니까
참석자 2 0:28:56
할 수가 없어
참석자 1 0:28:58
엑셀이 엑셀은 아직도 버튼이냐 이거
참석자 2 0:29:05
일부는 내가 이렇게 오토바이 엑셀처럼 하는 것도.
타
참석자 1 0:29:08

돌리는 것도 있어
참석자 2 0:29:10
어
참석자 1 0:29:11
뭐가 더 편하려
참석자 2 0:29:15
나는 그냥 이렇게 엄지손가락으로 누르는 게 편한 것 같아

참석자 1 0:29:20
엄지도 못 누르고 브레이크는 이걸로 잡고.

참석자 2 0:29:24
왜냐하면은 오토바이는 당겨도 내가 사용자가 일단 앉아 있고 기체가 크기 때문에

참석자 2 0:29:32
손이 이렇게 돌아가는 거에 대해서 크게 영향을 안 받거든.
이 자체가 안정적이기 때문에 근데 스쿠터는 서가지고 손님으로 이렇게 앞 바퀴의 위치를

참석자 1 0:29:44
좀 버텨줘야 되는 게 있는데
참석자 2 0:29:46
좀 버텨주면서 하는 건데 얘가 한쪽이 이렇게 돼 있으면은

참석자 1 0:29:50
약간 이렇게
참석자 1 0:29:52
음
참석자 2 0:29:53
그래서 이 엄지손가락으로만 하는 게 훨씬 낫지.
그렇구나
참석자 1 0:30:01
괜찮구먼 아파. 리슨 트랜드인 스타이어 그런트 프로젝트

참석자 1 0:30:08
약간 좀 미적인 좀 디자인이 좀 잘 빠져 요즘 스타일이 뭐 좀 다른가.

참석자 1 0:30:17
요즘 킥보드랑 뭐. 옛날 킥보드랑 비교하면

참석자 2 0:30:22
일단 옛날 킥보드라고 해봤자 얼마 되지 않았지만 일단 거의 초기 업체인 쥐쿠터는.
아니 키코잉은 키코인은 하드웨어가 좀 구조적이고

참석자 2 0:30:36
있을 것만 있고. 되게 뭔가 좀. 인테리어로 따지면 뭐 오프트 인테리어 같은 느낌이랄까

참석자 1 0:30:46
그냥 딱 달릴 것만 달렸다고
참석자 2 0:30:49
어 근데 요즘 나오는 버드 이런 거 보면은 자동차처럼 막 껍데기를 좀 해놨어.
그래

참석자 2 0:30:58
찾아봐야 되겠네. 내가 지금 지금 한번 봐봐 그러니까 막 엄청 으리으리하게 해놓은 건 아닌데.

참석자 2 0:31:06
좀 몸통이 좀 헤비하더라고
참석자 1 0:31:10
버드 이름이 버드야
참석자 2 0:31:14
어. 키보드 지금
참석자 1 0:31:20
세계 최초의 공유 전동 킥보드 업체 미국 버드라는데.

참석자 2 0:31:24
그래
참석자 1 0:31:25
우리나라 거 아니야. 근데 이게 한국에 착륙했대.
8 월 국내 서비스. 출시 얼마 안 됐네.

참석자 2 0:31:32
그러니까 이게 보면은 껍데기가 있어요.
이렇게 뭔가 이렇게 좀 세련되게. 외관을 싹

참석자 2 0:31:42
이렇게 밀어놨어
참석자 1 0:31:43
뭐야. 내가 먹는 거 그냥 그대로인데.
뭐지 다를 게 없는데 껍데기가 어디 껍데기를 말하는 거야

참석자 2 0:31:54
잠깐만 내가 일단 카톡으로 이미지를 한번 보내볼게.
이게 버드고
참석자 1 0:32:04
어 이렇게. 뭐가 이렇게 싹
참석자 1 0:32:10
뭐지
참석자 2 0:32:11
외관이 깔끔하잖아
참석자 1 0:32:12
외관이 이렇게 뭔가 있구먼 약간 미래적이네.

참석자 2 0:32:18
그리고 이게 기고인이지
참석자 1 0:32:23
도대체 깔끔
참석자 2 0:32:30
그러니까 버드가 외관이 뭔가. 이렇게 프레임을 이렇게 겉에다가 좀 덧대놓은 느낌이라 그래야 되나.
안쪽으로 하드웨어를 좀 깔끔하게 숨기고

참석자 1 0:32:42
그러네. 그

참석자 2 0:32:44
외관은 그런 느낌이 들더라고
참석자 1 0:32:46
좀. 예쁘게 생겼네. 버스가 이거 오히려 캐드로 만들기도 쉽게 생겼네.
얘네는
참석자 2 0:32:53
지 버드는 그냥 이렇게 라인으로 쭉 뽑어버려

참석자 1 0:32:59
약간 전기차 같은 느낌이. 좀 맞아 들면서.
실현됐네
참석자 1 0:33:06
이 정도면 캐드 할 수 있겠구먼 좋아 그게 문제가 아니지.
아무튼
참석자 1 0:33:13
또 뭐가. 뭘 물어봐야 될까. 나
참석자 2 0:33:18
11 번은 뭐냐
참석자 1 0:33:21
11 번이 방금 물어본 거야.
참석자 2 0:33:23
아
참석자 1 0:33:24
리센스 트렌드 인 스타일 버드가 약간 좀

참석자 2 0:33:29
우리가 미국에서 온 거였구나.
참석자 1 0:33:31
그렇다네
참석자 1 0:33:36
보통 이용하는 거리를 따지면 10km 반경 정도 해놔

참석자 1 0:33:45
한 번 쓰는데
참석자 2 0:33:47
한 어
참석자 1 0:33:49
50k 대충 어느 정도 일 거 같냐
참석자 2 0:33:54
내 생각에
참석자 1 0:33:56
아니면 이용.
참석자 2 0:33:58
너무 달라 가지고. 이거는 업체 업체 데이터를 내가 모르니까 나 같은 경우는 진짜 딱 기본요금 거리

참석자 1 0:34:07
기본요금 거래 한 어느 정도 되는데
참석자 2 0:34:12
이게 거리가 아니라 그 시간

참석자 1 0:34:15
응 시간이 어느 정도 쓰냐
참석자 2 0:34:19
기본 시간이 5 분인가 10 분인가 그럴 거야.

참석자 1 0:34:22
보통 5 분에서 10 분 정도 쓴다고 너는 평균 이용 시간을 한번 알아봐야 되겠네

참석자 2 0:34:29
만약에 그 이상 탈 때는 옛날에 너랑 이제 막 여기도 막 타면서 그렇게 타는 거지 이제.

참석자 1 0:34:36
그때 얼마 안 나오긴 안 나왔던 거 같은데

참석자 2 0:34:38
그때도 그렇게 많이 타지 않았어. 생각해 보면

참석자 1 0:34:41
그지 워낙 빨라서
참석자 2 0:34:45
온 몸을 그냥 노면에다가 맡기는 게 이제 전동스쿠터의 특징이니까 이거 하나 1 시간 하면 온몸이 뻑적지근할 거야.

참석자 1 0:34:53
그건 맞는 것 같아
참석자 2 0:34:55
어 애초에 진드컨이 오래 탈 수 있는 건 아니야.
그게
참석자 1 0:35:01
그러 왜 또 생각해 보니까 그러네. 자기 개인이 좀 좋은 걸 사서 타는 게 아닌 이상

참석자 2 0:35:09
그렇지
참석자 1 0:35:10
그건 그건 어때 요즘. 그러면 공유 킥보드 말고 개인으로 쓰는 사람이 늘었나

참석자 1 0:35:23
그거는 네. 자료는 아무튼 법 시행하고 나서.
그래도 한 56%로. 는 핸들을 쓴다고 하더라고.
개인
참석자 1 0:35:35
장비 등 개인 타고 다니는 사람들은 그 사람들은 어차피 챙기고 다니니까 뭐

참석자 2 0:35:42
그런데 그 사람들은. 지들이 이제 그거 사면서 자기가 돈 100 만 원 200 만 원 주고 스쿠터를 샀을 텐데

참석자 1 0:35:49
그렇지 탈라면 탈라면 뭐 개인으로
참석자 2 0:35:54
나라도 헬멧을 사겠지
참석자 1 0:35:56
그게 또 맞지 개인 스쿠터를 할 생각은 없고

참석자 2 0:36:04
응
참석자 1 0:36:12
나는 한 번 살까 생각을 했었었는데
참석자 2 0:36:15
왜냐하면 개인 스쿠퍼가 돈이
참석자 1 0:36:18
어
참석자 2 0:36:19
싼 것도 있긴 하지만 좀 괜찮고. 속도도 나오고 그러니까 쉽게 말해서 그냥 어플로 탈 수 있는 그런 길거리에서 탈 수 있는 스쿠터 수준의 푸크랑 이런

참석자 2 0:36:34
성능을 가진 거를. 타려면은 살려면 꽤 비싸.

참석자 1 0:36:38
그때 한 50 했던 것 같은데. 샤워미 거는

참석자 2 0:36:42
응 그 돈이면 사실 스쿠터가 아니라 전동 자전거를.
전동 자전거나 스쿠터나. 진짜 그런 걸 사지.

참석자 1 0:36:48
거기 앉아서 타는 뭐 그런 거. 전동
참석자 2 0:36:51
어차피 공간 차지하는 거는 그렇게 많이 차지하거든.
전동 스쿠터도
참석자 1 0:36:55
응
참석자 2 0:36:57
킥보드도
참석자 1 0:37:00
그렇지. 사서 타는 거보다는 개인이 쓰면 약간 좀 더 돈을 자리 업그레이드를 하는 게 아닐 수도

참석자 2 0:37:09
응 그게 뭐 재밌어서 타는 거면 모르겠는데 아예 재미로만.
나는 지금 이게 좀 있었으면 좋겠어.
놀이기구처럼 이렇게 사는 거면 모를까
참석자 1 0:37:21
응 2 주 살 때 그래도 한 몇 명은 그거 앉아서 타는 거 좀 많이 타던데.

참석자 2 0:37:33
앉아서 차는 걸 좀 많이 타더라
참석자 1 0:37:36
응. 그건 뭐 헬멧까지 장착하고
참석자 2 0:37:37
네 소프트에 안장만 이렇게 쭉 뽑아올린 것처럼 생긴 그런 것들이 꽤 있더라고

참석자 1 0:37:42

어어 맞아. 그런 것도 본 것 같고 그거 장 보고 이렇게 할 때도 괜찮은 것 같던데.
출퇴근하거나
참석자 2 0:37:49
맞아
참석자 1 0:37:51
맞지. 출퇴근으로 좀 쓴다고도 하더라고.
외국은 우리나라는 모르겠는데. 우리 우리나라 야 그런 거는

참석자 1 0:38:04
회사에 물어봐야 되겠다 용도라
참석자 2 0:38:09
나도 상암에서 출퇴근할 때 스쿠터 타고 출근 꽤 했던 것 같아.

참석자 1 0:38:14
근데 내려서 지하철 내려서
참석자 2 0:38:18
아니 그냥. 집 앞에서.
참석자 1 0:38:20
가까운 엄마
참석자 2 0:38:23
걸어서 한 20 분 걸리니까. 스쿠트 타면 지하철이랑 비슷한 속도로 갈 수 있어.

참석자 1 0:38:28
검 타볼 만하지. 시원하고 날씨 좋으면

참석자 2 0:38:33
지하철 타나 스포터 타나 시간은 비슷해요 사실.
그 정도 거리면.
참석자 1 0:38:40
그럼 스쿠터 타겠다. 나 같아도 날씨 좋으면

참석자 2 0:38:45
있으면 타는 거지. 그러니까 집 앞에 있으면 땡큐.
이런 거 타는 거지.
참석자 1 0:38:49
그것이 작정하고 타는 용도가 거의 아니지.
사실
참석자 2 0:38:55
네 어쨌든 있어야 사는 거.
참석자 1 0:38:57
주변에 있으면은 땡큐 오고 잡아서 타는 건데 그걸 이제 잡아스 탈려고.
헬멧을 들고 다니기는 좀
참석자 2 0:39:08
그치

Transcripted by clover

Appendix C – Field Research (Product)

Benchmarking – Benefits Table

Triple 8	• Safety Standards • Ideal for biking, skateboarding, scooters, and commuting • Customizable fit • Adjustable chin strap
Lumos Matrix	• Safety Certification • Extremely light • Cool looks and VIP security • It is fun • Customizable display • Visible at eye-level from 360 degrees
Newton Rider	• Foldable and easily stored • Safety standards • Comfortable fit • Stylish
Overade Plixi	• Safe and robust • Durability and sturdiness • Comfortable • More practical • Compact-Foldable • Customizable • Elegant

	• Many colours
Fend	• Foldable by 50% • Fold-flat and store comfortably in any bag • Durable design • Safety certified • Comfortable • Lightweight • Perfect fit
Closca	• Impact protection and resistance • Foldable • Rear adjustable • Comfortable • Lightweight • Airflow • Extremely portable
Echo Helmet	• Foldable • Fully recyclable • Minimal waste • Vendable • Waterproof • Safer • Conforms to most head sizes • Fold smaller

	• Less cost

Benchmarking – Features table

	Triple 8	Lumos matrix	Newton rider	Overade plixi	fend	closca	Echo helmet
Price	$35.50 - $83.68	$214.95	$121	$408.91	$159	$189	Under $5
HEad sizes	S/M: 55 - 58cm L/XL: 59-61cm	56-61cm	57-60cm	S/M: 54-58cm L/XL: 49-62cm	S: 54-56cm M/L: 56-61cm	S: 51-56cm M: 56-58cm L: 58-62cm	One size fit
Weight	400-450g	580g	450-470g	440g	445g	250-290g	Less than 100g
Materials	ABS Shell EPS foam liner	ABS Shell EPS foam liner	Visco-Elastic Non-Newtoniam materials	ABS Shell Polystyrene Inner	ABS Shell PC EPS inner	ABS Shell Fabric	Paper(Recycled)
Smart features		Lumos App	NFC Chip API integrated			NFC Chip	
Foldability			O	O	O	O	O
Extra features		LED Panel		Removable Accessories		Interchangeable Visor	Biodegradable coating

							Unique cell structure

Appendix D – Result Analysis

Linking befits with needs (helmets)

Needs	Benefits and underlying needs	Level of importance		
Basic needs	*Physiological*	Slight	Moderate	High
Food, water, shelter	• Shelter user from environments	O		
Pleasure, gratification (Sensory, compulsive responses)	• Feels comfortable while wearing the protective gear • Feels safer while wearing the protective gear • Easy to wear on and off • Inner liner feels smooth and soft to user • Want to drive fast while using an electric scooter			O
Security	*Safety, Securing Resources*			
State, Group, Individual	• Protective gear for electric scooter riders		O	
Securing Resources	• Price is important for user			O
	• Reliability of protective gear		O	
Control over environment(Tasks)	• Ease of use: Easy to put on and off the gear			O
	• Ease to buy: Easy to buy from online, or through the application			O
	• Speed: less process to wear the protective gear	O		
	• Control: Interactive design to wear/to tight safety straps			O
	• Sustainable material used of protective gear		O	

Long term security/Stability of group	• Durable, easy to maintain			O
Social belonging	*Effort / Resources to belong to a 'Tribe'*			
Fear of Abandonment	• User does not want to wear protective gear since they feel it is not "cool" to wear it	O		
Fear of the enemy	• Far of get accidents by cars			O
Behaviour cue for social interaction of group	• Hesitate to ride public electric scooter without helmets • Regulation – All rider must wear helmet while using electric scooter		O	
Peer pressure	• "It is illegal to ride electric scooter without helmet" • "Watch out the police"			O
Social expectation	• Riders must wear to helmet • Riders should drive safely	O		
Esteem	*Personal Influence in 'Tribe'*			
Social status	• Some celebrities use really expensive protective gear	O		
Sexual attractiveness	• Sharing helmets do not look good for sanitary reasons			O
Self-Actualization 'Higher order' functions/needs	*Needs that are predominantly 'Outer Cortex'*			
Instinct pleasure	• Aesthetically pleasing (Design, shape, colour, functions)			O
Creative endeavors	• Personalizing unit, Customizable options	O		

Experiential (Extrinsic)	• Fun to ride at outdoor (urban area), fear for accident (by cars, pedestrians)		O	
Emotional	• Empathy: Is user want to use sharing helmet? Feel comfortable while using it?			O

Needs Statement

Statement of need – 1 (Before research)

- Protective gear from accidents while riding a shared electric scooter

Statement of need – 2 (Benchmarking benefits)

- Protective gear that is essential to wear while riding a shared scooter to secure users from fatal injuries
- Further needs include Ease of use, Ease of buy, and aesthetically pleasing design

Statement of need – 3 (Benchmarking benefits and linking with fundamental needs)

- Protective gear needs protection based on basic needs
- It needs easy to put on and off (Ease of use), Easy to buy on online (Ease to buy), durable, easy to maintain (Long term security) by the category of Security
- To fit in the social belonging, user must wear protective helmet because it is regulated by the government
- Some young user thinks wearing helmet is not cool, it gives fear of abandonment from their social belonging, user think shared helmet does not look good for sanitary reasons (Esteem)
- User needs to be less hesitated to use shared protective gear (Behaviour cue for social interaction of group)

Appendix E – Physical Model Photographs









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KICKO

Appendix E – Approval Forms & Plan

Thesis Topic Approval

IDSN 4002/4502
SENIOR LEVEL THESIS ONE AND TWO

Humber ITAL / Faculty of Applied Sciences & Technology
Bachelor of Industrial Design / FALL 2021
Catherine Chong / Sandro Zaccolo

THESIS TOPIC APPROVAL:

Student Name:	KyeongHoon / Kim
Topic / Problem Definition:	How may we improve safety for public electric scooters?

TOPIC DESCRIPTIVE SUMMARY (Preliminary Abstract)

As the electric scooter industry grows, many people in urban areas have adopted this public electric scooter as a means of transportation, it has become an easy mobility method to get around urban areas. It is a good alternative to pass through heavy traffic in the city. However, as the electric scooter industry expanded, it cultivated problems, specifically safety issues that have not been addressed properly. For example; most public electric scooters have smaller wheels which do not account for speed and lack stability which caused sudden accidents that can be fatal. According to Korean Transportation Safety Authority, where the government enacted a regulation that all electric scooter riders must wear protective gears while riding an electric scooter. However, only 2.9% of public electric scooter users reported wearing helmets while driving. Therefore, this thesis will explore Korean cities as the main studies for safety in public electric scooter activities. User research, including interviews and observational studies, will provide a clear understanding of current challenges and insights into the users' behaviours and experience in public electric scooters. Additionally, a one-to-one scale model study will be developed to understand ergonomics and human interactions using references of existing electric scooters to evaluate and analyze the design. Result from this analysis will be able to expand the design possibilities for public electric scooters to maximize safety concerns and lessen the strains and hassles. This thesis project aims to contribute towards the electric public mobility industry in Korea as the public electric scooters can reduce heavy traffic and carbon emission effectively in urban areas.

Student Signature(s):	
Date:	07 / 10 / 2021

Instructor Signature(s):	
Date:	07 October 2021

Thesis Design Approval

IDSN 4502
SENIOR LEVEL THESIS TWO

Humber ITAL / Faculty of Applied Sciences & Technology
Bachelor of Industrial Design / WINTER 2022
Catherine Chong / Sandro Zaccolo

CRITICAL MILESTONES: APPROVAL FOR CAD DEVELOPMENT & MODEL FABRICATION

Student Name:	KyeongHoon / Kim
Topic / Thesis Title:	**ENHANCING PUBLIC ELECTRIC SCOOTERS**

THESIS PROJECT – DESIGN APPROVAL FORM

Design is reviewed and approved to proceed for the following:	X	**CAD Design and Development Phase**
Comment:	- Initial CAD started well as of week #7/February 22nd, continue with detailing and refinement. - Refinement CAD for the scooter progress well as of week #8/March 8th. - Still need to develop CAD for the Kiosk, continue with refinement and finishing. - CAD completion in week #12.	

Design is reviewed and approved to proceed for the following:	X	**Model Fabrication Including Rapid Prototyping / 3D Printing and Model Building Phase**
Comment:	- Cannot approve of model fabrication until CAD development at 90% completion of all components > advised completion latest by week #9 (March 17th). - Once CAD is completed can move forward to model fabrication from week #10 onward. - Model fabrication in progress.	

Instructor Signature(s):	Catherine Chong Sandro Zaccolo
Date:	5th April, 2022

Chong, Kappen, Thomson, Zaccolo

Proof of TCPS-2 CORE certificate

PANEL ON RESEARCH ETHICS
Navigating the ethics of human research

TCPS 2: CORE

Certificate of Completion

This document certifies that

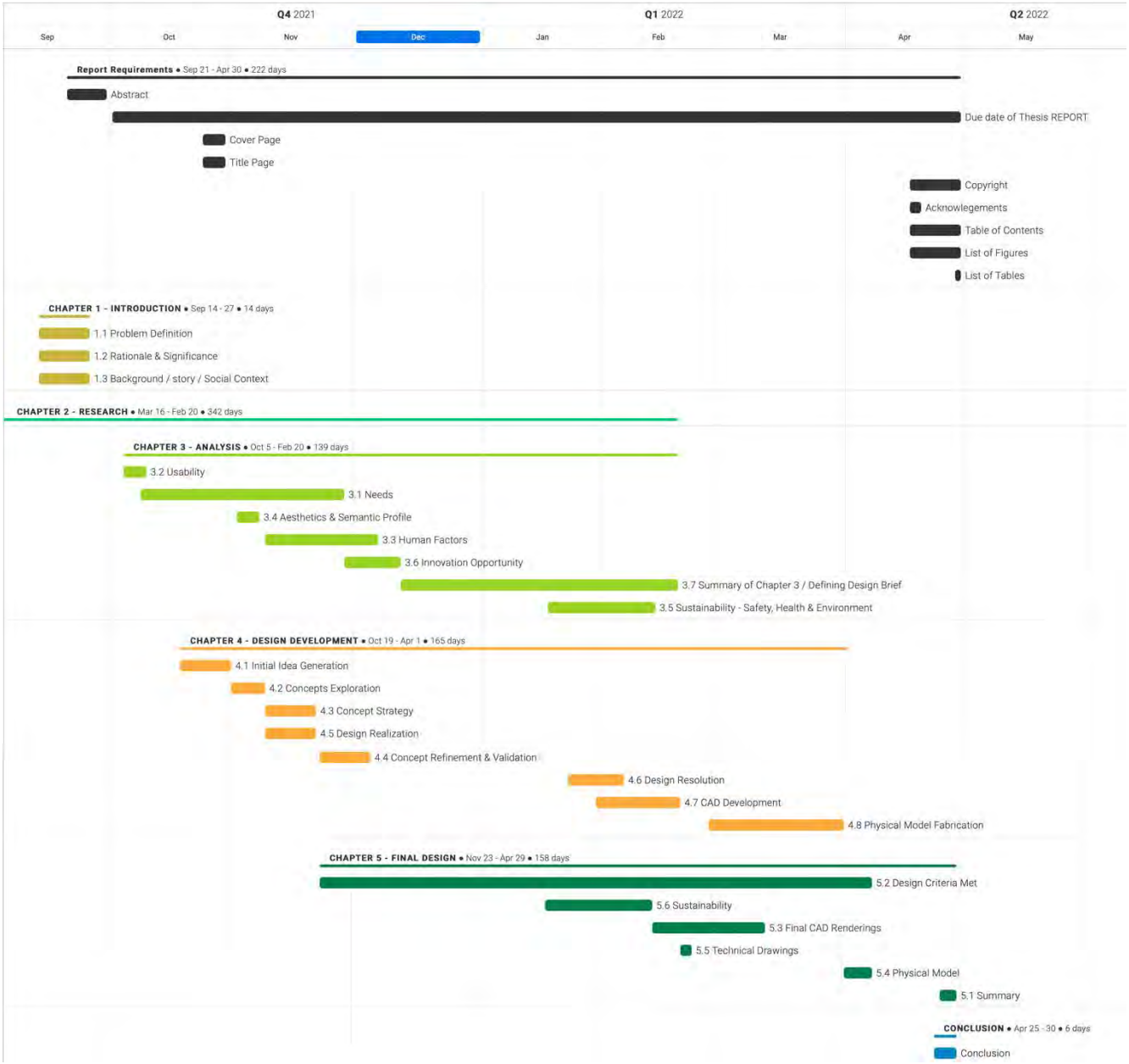
KyeongHoon Kim

has completed the Tri-Council Policy Statement:
Ethical Conduct for Research Involving Humans
Course on Research Ethics (TCPS 2: CORE)

N01384684

Date of Issue: **25 September, 2021**

Project Timeline



Appendix F – Advisor Meetings & Agreement Forms

Informed Consent Form

IDSN 4002 / 4502
SENIOR LEVEL THESIS ONE & THESIS TWO

HUMBER
Faculty of Applied Sciences & Technology
Bachelor of Industrial Design / FALL 2021 & WINTER 2022

INFORMATION LETTER

Research Study Topic: Improving safety for public electric scooters

Investigator: KyeongHoon Kim (김경훈) / +01 647-806-0179 / kyeonghoon218@gmail.com

Sponsor: Humber ITAL, Faculty of Applied Sciences & Technology (IDSN 4002 & IDSN 4502)

Introduction

My name is KyeongHoon Kim (김경훈), I am an industrial design student at Humber ITAL, and I am inviting your participation in a research study on various problems that the public electric scooters users deal with. These problems include safety, accecibility, and ergonimics. The results will be contributed to my Senior Level Thesis project.

Purpose of the Study

This study is being conducted as an aid in designing a better solution that improves accessibility in providing safety gear to the user when riding a public electric scooter in an urban area. Other areas of interest may include user experience, and ergonomics when a user interacts with the product. The product to be designed is inspired by the unwillingness of users to wear protective gear due to sanitary and lack of comfort that comes with sharing helmets after the Korean government enacted a regulation that all electric scooter riders must wear protective gears while riding an electric scooter. With your help, I plan to address these problems that public electric scooter riders face when they use the sharing mobility services in an urban This study is primarily based on understanding ergonomics, human interaction design activities, and user experience aspects of the research area.

Procedures

If you volunteer to participate in this study, your knowledge and experience in the sharing electric mobility industry will be documented. Your knowledge and experience will be documented by means of a digital screen recording and transcript during the study. You will also be asked questions pertaining to the sharing electric mobility services and your personal experience with working in the industry.

Confidentiality

Every effort will be made to ensure confidentiality of any identifying information that is obtained during the study. In the case of being recorded visually, your face will be masked /blurred or hidden. The information and documentations (photographs) gathered are all subject to being used in the final presentation of the study.

Participation and Withdrawal

Your participation in this study is completely voluntary and you may interrupt or end the study and the session at any time without giving a reason or fear of being penalized.

If at any point during the session, you feel uncomfortable and wish to end your participation, please let the moderator know and they will end your participation immediately.

Humber Research Ethics Board

This research project /course has been approved by the Humber Research Ethics Board. If you have any questions about your rights as a research participant, please contact Dr. Lydia Boyko, REB Chair, 416-675-6622 ext. 79322, **Lydia.Boyko@humber.ca**

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HUMBER
Faculty of Applied Sciences & Technology

IDSN 4002 /4502
SENIOR LEVEL THESIS ONE & THESIS TWO
Bachelor of Industrial Design / FALL 2021 & WINTER 2022

INFORMATION LETTER

Conditions of Participation

- ✓ I understand that I am free to withdraw from the study at any time without any consequences.
- ✓ I understand that my participation in this study is confidential. (i.e. the researcher will know but will not disclose my identity)
- ✓ My identity will be masked.
- ✓ I understand that the data from this study may be published.

☒ **I have read the information presented above and I understand this agreement. I voluntarily agree to take part in this study.**

Click or tap here to enter text. YOUN PARK (박윤) — Participant's Name
Participant's Signature
2021-11-01 — Date

Project Information

Thank you very much for your time and help in making this study possible. If you have any queries or wish to know more about this Senior Level Thesis project, please contact me at the followings:

Phone: +01 647-806-0179

Email: kyeonghoon218@gmail.com

My supervisors are:

Prof. Catherine Chong, **catherine.chong@humber.ca**

Prof. Sandro Zaccolo, **sandro.zaccolo@humber.ca**

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HUMBER
Faculty of Applied Sciences & Technology

IDSN 4002 /4502
SENIOR LEVEL THESIS ONE & THESIS TWO
Bachelor of Industrial Design / FALL 2021 & WINTER 2022

PARTICIPANT INFORMED CONSENT FORM

Research Study Topic: Improving safety for public electric scooters

Investigator: KyeongHoon Kim (김경훈) / +01 647-806-0179 / kyeonghoon218@gmail.com

Courses: IDSN 4002 & IDSN 4502 Senior Level Thesis One & Two

I, YOUN PARK *(First Name/Last Name)*, have carefully read the Information Letter for the project "Improving safety for public electric scooters", led by KyeongHoon Kim. A member of the research team has explained the project to me and has answered all of my questions about it. I understand that if I have additional questions about the project, I can contact KyeongHoon Kim at any time during the project.

I understand that my participation is voluntary and give my consent freely in voice recording, photography and/or videotaping; with the proviso that my identity will be blurred in reports and publications.

Consent for Publication: Add a (X) mark in one of the columns for each activity

ACTIVITY		YES	NO
Publication	I give consent for publication in the Humber Library Digital Repository which is an open access portal available to the public	☒	☐
Review	I give consent for review by the Professor	☒	☐

Privacy

All data gathered is stored anonymously and kept confidential. Only the principle investigator /researcher, KyeongHoon Kim and Prof. Catherine Chong or Prof. Sandro Zaccolo may access and analyze the data. All published data will be coded, so that visual data is not identifiable. Pseudonyms will be used to quote a participant (subject) and data would be aggregated.

I also understand that I may decline or withdraw from participation at any time, without negative consequences.

I understand that I can verify the ethical approval of this study, or raise any concerns I may have by contacting the Humber Research Ethics Board, Dr. Lydia Boyko, REB Chair, 416-675-6622 ext. 79322, **Lydia.Boyko@humber.ca** or KyeongHoon Kim (김경훈) / +01 647-806-0179 / kyeonghoon218@gmail.com.

Verification of having read the Informed Consent Form:

☒ I have read the Informed Consent Form.

My signature below verifies that I have read this document and give consent to the use of the data from questionnaires and interviews in research report, publications (if any) and presentations with the proviso that my identity will not be disclosed. I have received a copy of the Information Letter, and that I agree to participate in the research project as it has been described in the Information Letter.

Click or tap here to enter text. YOUN PARK — Participant's Name
Participant's Signature
2021-11-01 — Date

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HUMBER
Faculty of Applied Sciences & Technology

IDSN 4002 /4502
SENIOR LEVEL THESIS ONE & THESIS TWO
Bachelor of Industrial Design / FALL 2021 & WINTER 2022

INFORMATION LETTER

Conditions of Participation

- ✓ I understand that I am free to withdraw from the study at any time without any consequences.
- ✓ I understand that my participation in this study is confidential. (i.e. the researcher will know but will not disclose my identity)
- ✓ My identity will be masked.
- ✓ I understand that the data from this study may be published.

☒ **I have read the information presented above and I understand this agreement. I voluntarily agree to take part in this study.**

Click or tap here to enter text. YEO Dong Yeop — Participant's Name
Participant's Signature
2021-11-01 — Date

Project Information

Thank you very much for your time and help in making this study possible. If you have any queries or wish to know more about this Senior Level Thesis project, please contact me at the followings:

Phone: +01 647-806-0179

Email: kyeonghoon218@gmail.com

My supervisors are:

Prof. Catherine Chong, **catherine.chong@humber.ca**

Prof. Sandro Zaccolo, **sandro.zaccolo@humber.ca**

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HUMBER
Faculty of Applied Sciences & Technology

IDSN 4002 /4502
SENIOR LEVEL THESIS ONE & THESIS TWO
Bachelor of Industrial Design / FALL 2021 & WINTER 2022

PARTICIPANT INFORMED CONSENT FORM

Research Study Topic: Improving safety for public electric scooters

Investigator: KyeongHoon Kim (김경훈) / +01 647-806-0179 / kyeonghoon218@gmail.com

Courses: IDSN 4002 & IDSN 4502 Senior Level Thesis One & Two

I, YEO Dong Yeop *(First Name/Last Name)*, have carefully read the Information Letter for the project "Improving safety for public electric scooters", led by KyeongHoon Kim. A member of the research team has explained the project to me and has answered all of my questions about it. I understand that if I have additional questions about the project, I can contact KyeongHoon Kim at any time during the project.

I understand that my participation is voluntary and give my consent freely in voice recording, photography and/or videotaping; with the proviso that my identity will be blurred in reports and publications.

Consent for Publication: Add a (X) mark in one of the columns for each activity

ACTIVITY		YES	NO
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Privacy

All data gathered is stored anonymously and kept confidential. Only the principle investigator /researcher, KyeongHoon Kim and Prof. Catherine Chong or Prof. Sandro Zaccolo may access and analyze the data. All published data will be coded, so that visual data is not identifiable. Pseudonyms will be used to quote a participant (subject) and data would be aggregated.

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Click or tap here to enter text. YEO Dong Yeop — Participant's Name
Participant's Signature
2021-11-01 — Date

3

Record of correspondent

공유 킥보드 안전문제 개선 방안 멘토링 문의드립니다. 받은편지함 ×

KyeongHoon Kim <kyeonghoon218@gmail.com> 10월 4일 (월) 오전 1:31

n01384684, 숨은 참조: business, 숨은 참조: help, 숨은 참조: help, 숨은 참조: people, 숨은 참조: help, 숨은 참조: help, 숨은 참조: support-kr, 숨은 참조: help, 숨은 참조: hello, 숨은 참조: help, 숨은 참조: kmi765, 숨

안녕하세요 저는 현재 캐나다 토론토 Humber College에 재학중인 산업디자인 전공 4학년 김경훈 이라고 합니다.

제가 4학년 졸업작품을 시작하게 되었는데요,

제가 조사한 바로는 현재 많은 사람들이 아직 공유 헬멧착용을 많이 하지 않고 있고, 헬멧 도난문제나 위생문제 해결을 찾는 방안을 고심중이라고 들었습니다. 저도 공유킥보드를 많이 이용해 보아서 평소에 관심이 많았고, 이 문제가 잘 해결 되어서 대한민국 공유킥보드 산업이 더 발전되는데 기여하고 싶은 마음이 있어서

"헬멧 의무 착용 규정 이후 공유 킥보드 안전 문제 개선 방안"을 주제로 선정하게 되었습니다.

저희 졸업작품 과정중에는 반드시 그 분야의 전문가에게 자문과 멘토링을 받아야 하는데요,

졸업작품 진행 초기에 가끔 몇 주에 한 번씩 자문과 조언을 받을 수 있는 멘토가 되어주실 수 있는분의 연락처를 알 수 있을지 문의드립니다.

*혹시 힘드시다면 도움을 주실 수 있는 다른 분을 소개해 주실 수 있는지도 문의드립니다.

바쁘신데 시간 내어 읽어주셔서 감사합니다. 좋은하루 되세요!

김경훈 KyeongHoon Kim
Industrial design student at Humber college

박여진 <yj.park@olulo.io>
나에게

안녕하세요.
킥고잉 대외협력 담당 박여진입니다.

공유전동킥보드와 킥고잉에 관심을 가져 주셔서 감사합니다.
졸업작품 주제 관련하여 편하게 문의주시면 최대한 답변 드리겠습니다.

감사합니다.
박여진 드림,

olulo | KICKGOING
박여진 External Affairs
M 010-2061-2583 E yj.park@olulo.io W olulo.io
서울시 강남구 테헤란로 116 동경빌딩 4층, 주식회사 올룰로

---------- Forwarded message ---------
보낸사람: **KyeongHoon Kim** <kyeonghoon218@gmail.com>
Date: 2021년 10월 4일 (월) 오후 2:31
Subject: 공유 킥보드 안전문제 개선 방안 멘토링 문의드립니다.
To: <n01384684@humbermail.ca>

여동엽 <dongyeop@hikick.kr>
나에게

안녕하세요.
하이킥 공유킥보드 여동엽 입니다.

관련 건 도움 드릴 수 있을 것 같습니다.
어떤 부분 도움이 필요하신지 말씀주시면 저희 쪽에서 최대한 데이터와 의견 공유 드리겠습니다.

2021년 10월 4일 (월) 오후 2:31, KyeongHoon Kim <kyeonghoon218@gmail.com>님이 작성:

여동엽 드림.

여 동 엽 | Yeo, Dong-Yeop
Connection HIKICK
LUKAS IT 대표 | 소프트웨어 상품 기획 전문 업체
엔넷로 부대표 | 청소년 활동 문화 확산 단체
오렌지족(株式会社) 이사 | 퍼스널모빌리티 전문업체
TEL. 1899 - 0835 (직통 02-868-6743)| MOBILE 010-9873-6741
FAX. 0504-278-6741 | E-MAIL. dongyeop@lukasit.kr (dongyeop@hikick.kr)
서울 본사 | 서울특별시 강남구 테헤란로 78길 14-8, 10층

본 메일의 전문 및 첨부파일 중 발부는 루카스아이티와 관계 업체의 소중한 자산입니다.
제 3자에게 복사, 전달 또는 외부 반출, 배포시 루카스아이티와 상의해주시길 부탁드립니다.

KyeongHoon Kim <kyeonghoon218@gmail.com>
박여진에게

안녕하세요 박여진님.

답변 감사합니다.

처음 메일 보낸것과 같이 학기를 진행하면서 제 프로젝트 진행사항에 조언이나 피드백을 받아야하는것이 필요한데요,

다른 업무로도 바쁘시겠지만 학기 중 (10월 - 4월) 1-2주에 한번씩 편하신 시간에 잠깐이라도 진행사항에 조언을 주실 수 있는지 궁금합니다.

가능하시면 학교에서 받아야하는 멘토링 동의서에 서명을 받아야하는데 가능하신지도 문의드립니다.

동의서는 간단히 제 주제에 관한 설명과 목적, 그리고 익명성 보장에 대한 내용입니다.

감사합니다.
김경훈 드림

2021년 10월 4일 (월) 오후 9:51, 박여진 <yj.park@olulo.io>님이 작성:

박여진 <yj.park@olulo.io>
나에게

안녕하세요.
킥고잉 대외협력 담당 박여진입니다.

물론 가능하며 최대한 협조 드리겠습니다

감사합니다.
박여진 드림,

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여동엽 <dongyeop@hikick.kr>
나에게

안녕하세요.
하이킥 여동엽 이사 입니다.

사전 일정 조율을 통하면 얼마든 도움 드릴 수 있을 듯 합니다.
또한 하이킥 공유킥보드는 스마트 헬멧 케이스 및 락커를 활용하여 실제 고객들에게 헬멧을 제공하고,
관련 데이트를 보유하고 있어 조금 더 도움을 드릴 수 있지 않을까 싶습니다.

동의서는 송부 먼저 주세요.
감사합니다.