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DESIGN OF THE DELIVERY VEHICLE FOR ONLINE GROCERY PORTALS

Design Project II

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Mobility and Vehicle Design
Guided By Dr. Sugandh Malhotra

DECLARATION

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

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APPROVAL SHEET

The Mobility and Vehicle design project report entitled "Design of the Delivery Vehicle for Online Grocery Portals" by Parthkumar Chaudhari is approved in partial fulfillment of the requirement for Master of Design degree in Mobility and Vehicle Design.

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I am grateful to Big Basket and Grofers team for letting me visit and study their operation; Member of IDC School of Design, IIT Bombay for their support and fellow classmates and friends who have willingly helped me with their skills and abilities. Thank you all.

Parthkumar Chaudhari

ABSTRACT

India’s E-Commerce market is growing at a fast rate due to cheap & fast internet availability and penetration of smartphones. Last mile delivery service is provided by most of the E-commerce platforms, including third-party delivery service like Delhivery and E-Kart, etc. Indian online grocery companies like Groffers and Big basket are gaining popularity due to the ease of access and fast doorstep delivery. Online grocery portals deliver a wide variety of daily used products that include perishable items like vegetables, fruits, dairy products, and frozen goods. These items need special care during delivery. At present, order items are packed in card boxes and carried in the canvas bag. Since these bags don’t provide proper cooling and adequate storage, vegetables and fruits often get damaged or seem as sufficiently not fresh. These products are returned to the companies, generating a significant amount of waste on a daily bases.

Furthermore, weight carried by the delivery person of grocery portals is way more than the person doing standard package delivery. This excess amount of load is causing various physical and mental health issues. Also, the security of the orders is a major concern in the current delivery system.

This project deals with designing a new delivery vehicle for online grocery portals. For this project, a user study was done by visiting grocery portals such as Groffers and Big Basket to understand the current delivery system, problems faced by the delivery persona, and issues with existing delivery methods. The insights from this exercise led to developing a design brief, which led to the design of new concepts. These concepts were evaluated on specific criteria, and the most suitable one was further developed. The final design is battery operated, has dedicated compartments for various items, better ergonomics, provides security to the orders, and it eliminates weight carried by the delivery person.

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INTRODUCTION

1 Introduction

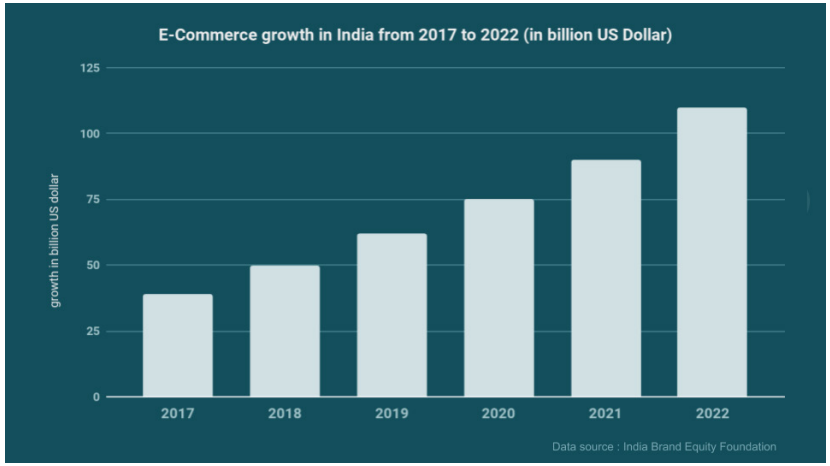
India’s E-Commerce market is growing at a fast rate due to the cheap and fast Internet availability, penetration of smart phones. The growth of E-Commerce in India has given birth to many delivery models. Last mile delivery is becoming accessible with a third-party delivery service provider like Delhivery, E Kart, etc. Due to the availability of fast doorstep delivery, the online grocery market in India is also speeding up in growth.

Online grocery portals usually deliver vegetables, fruits, dairy products, and frozen goods along with other grocery products. These perishable items need special care during delivery. A significant amount of waste is being generated daily due to the return of the products because the delivered products are either seem as sufficiently not fresh, or they are damaged. Also, the amount of weight carried by the delivery person of online grocery portals is way more than the person doing standard package delivery. The delivery person has reported a lot of health and security issues due to the current delivery system.

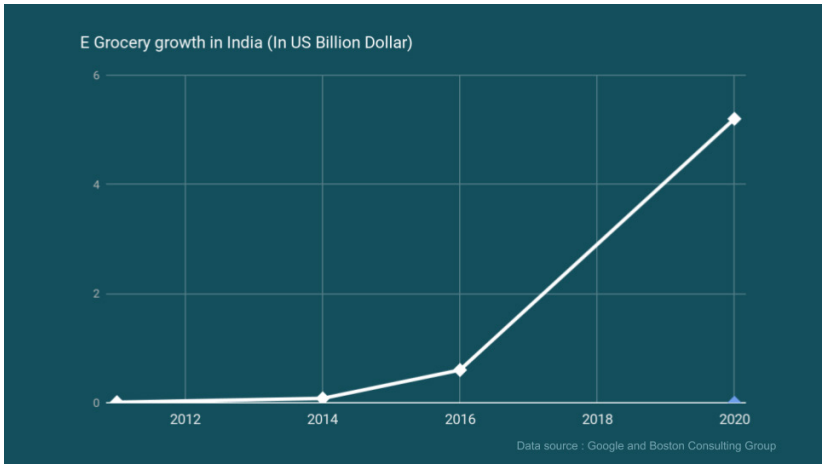
An e-grocery market in India is likely to touch 5 billion dollars by 2020; there is no significant solution has been implemented to narrow down the problems with current delivery and the issues faced by the delivery person. This project aims to design a delivery vehicle which would provide specialized care to the perishable products and narrow down the problems faced by the delivery person.

PRE RESEARCH

2.1 Growth of E-Commerce



(Image 2.1.1 : E-commerce growth in India)

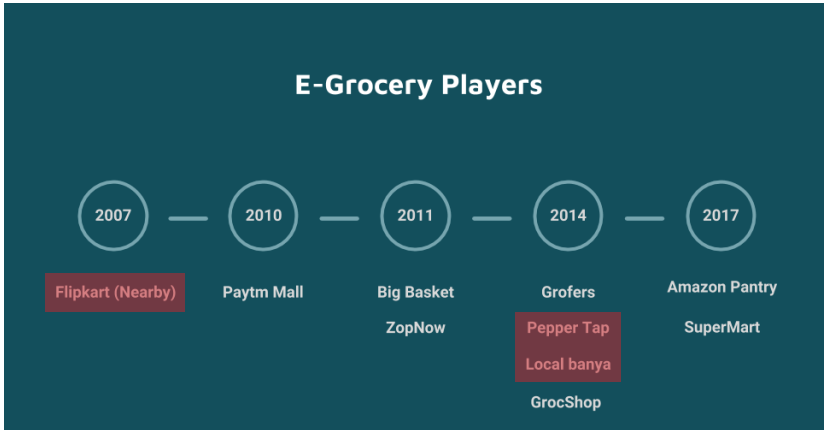


(Image 2.1.2 : Growth of E-Grocery market in India)

What started was back in 1995 by Amazon, e-commerce is growing at a fast and steady rate. Due to a more online player like eBay, Alibaba, Flipkart etc. The Online Market is likely to touch 5 trillion US dollar by 2021. With the availability of the fast and cheap Internet, penetration of affordable smart phones, govt. Initiatives like 'Digital India', 'Startup India' and more than 500 million online population, the Indian e-commerce has seen a steady growth over the years from 2014 which is expected to cross 100 billion US dollar with 25% growth rate by 2022. (Image 2.1.1)

Within the umbrella of e-commerce, online grocery market has also seen a significant amount of growth with the entry of Big Basket and Grofers which are only focusing on grocery products. Also, big events in grocery market are happening like Amazon has tied up with BigBazar and Hypercity to provide fast delivery, Alibaba has invested in BigBasket and with an investment of SoftBank into Grofers, the online grocery market in India will touch 6 billion US dollar by 2022 (Image 2.1.2). Due to significant growth in e-commerce market third-party delivery service providers like E-Kart, Delhivery, Javas, Xpressbees are coming up with unique doorstep delivery models.

2.2 Online grocery delivery in India

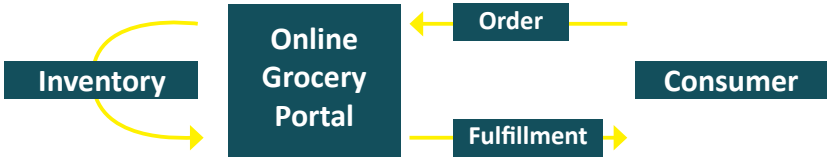


(Image 2.2.1 : E-Grocery players in India by 2017; companies highlighted in red are shutdown)

The first successful online grocery delivery started in 2007 by Flipkart through its child company Nearby, followed by Paytm Mall, Big basket, Zopnow and other big players like Grofers. Amazon and Flipkart came into the market in 2017 under brand name Amazon Pantry and SuperMart. By the starting of 2018, there are only five major players who are into the successful business of online grocery delivery, BigBasket, Grofers, ZopNow, AmazonPantry and SuperMart. There are other retail outlets like D-Mart has also started their own delivery service. BigBasket and Grofers are major two players in delivering vegetables and dairy products along with grocery. Rather than relying on a third-party delivery service provider, these players have developed their own delivery system under the same brand name.

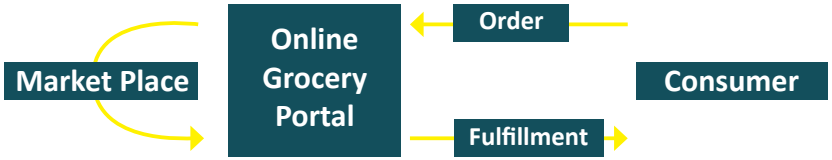
The online grocery delivery service in India mainly follows either of the following systems:

1) Ware House Delivery system or Inventory Delivery System Grocery websites where online buyers choose from among products owned by the online grocery company or shopping website take care of the whole process end-to-end, starting with product purchase, warehousing and ending with product d is patch. Bigbasket and SuperMart follow this model.



(Image 2.2.2)

2) Market Place Delivery system or Zero Inventory Delivery System. The online grocery companies become a digital platform for consumers and merchants to connect with each other without warehousing the products. Marketplaces do offer shipment, delivery and payment help to merchants by tying up with some selected logistics companies and financial institutions. Amazon Pantry (tie up with BigBazar and Hypercity), Grofers (tie up a local brick and mortar grocery shop) and Paytm Mall (tie up with BigBazar) follow this model.



(Image 2.2.3)

2.3 Delivery vehicle in India and across the globe

Observational study and Internet references were taken to understand how the delivery of grocery is happening in India and across the globe.

(Image 2.3.1 : Delivery by BigBasket)

(Image 2.3.2 : Delivery by Amazon)

(Image 2.3.3 : Delivery by Grofers)

(Image 2.3.4 : Delivery by Flipkart)

(Image 2.3.5 : Delivery by BigBasket)

(Image 2.3.6 : Delivery by Grofers)

(Image 2.3.7 : Delivery by AmazonFresh

(Image 2.3.8 : Delivery by Honestbee)

(Image 2.3.9 : Delivery by Farmdrop)

(Image 2.3.10 : Delivery by Coles)

(Image 2.3.11 : Delivery by Save on foods)

(Image 2.3.12 : Delivery by ASDA)

(Image 2.3.13 : Delivery by HonestBee)

(Image 2.3.14 : Delivery by Yihaodian)

Online grocery service is offered by various players across the globe they also usually either inventory model or marketplace model but the delivery service is different than delivery service provided by Indian online grocery players.

Most of the online grocery portals in abroad like Honestbee which operates in Japan, Hong Kong, Malaysia and other Asiatic countries use the van as well as moped to deliver their products. While other players like AmazonFresh, SaveOnFoods, ASDA, Coles, Farmdrop etc uses refrigerated vans to deliver their product. While China's second largest online grocery delivery uses trike or moped for the delivery. Here most of the company provides their own vehicle to the delivery person and in case of delivery through bike weight carrying capacity is limited to 10 to 15 kg.

While in India most of the delivery is handled by mini pick up truck like Tata Ace or the bike. The pickup truck used are generally not refrigerated. Also, normal weight carried by a delivery person in India is about 40 kg. Here, a vehicle is not provided by the company so deliver person have to use their own private vehicle.

2.4 Future delivery scenario

The future transportation methods and technology was studied to understand its potential effect on current delivery models and to find out will those advancements change the current delivery method of groceries? Which methods will be most effective in the area of delivery of groceries. By the studies, the futuristic delivery vehicle was classified in mainly five categories which are as follow,

1) Autonomous Delivery Droids
2) Autonomous Delivery Van
3) Delivery Drones
4) Special Delivery Bikes
5) Special Delivery Vans/Cars

Autonomous Delivery Droids

(Image 2.4.1 : Droid by Segway)

(Image 2.4.2 : Droid Dominos)

(Image 2.4.3 : Droid Starship)

Companies like Dominos, Starship and Segway is working towards making of autonomous droids which can deliver goods within a limited range around the shop. But it has limited storage space and needs flat terrain.

Autonomous Delivery Van

(Image 2.4.4 : Autonomous van by Nuro)

(Image 2.4.5 : Autonomous van by Robomart)

(Image 2.4.6 : Autonomous van by Renault)

Nuro, Robomart, Renault and other companies are working towards the development of autonomous delivery van. Which has a considerably larger volume than droids and lack of human interaction. Even though it has a larger delivery range it is expensive.

Delivery Drones

(Image 2.4.7 : Drone by Airbus)

(Image 2.4.8 : Drone by Amazon PrimeAir)

(Image 2.4.9 : Drone by Raketun)

Amazon prime air, Airbus parcel service, Raketun Japan are experimenting with delivery of the goods using drones. Though it has a long range and short delivery time the storage space and load carrying capacity is very limited.

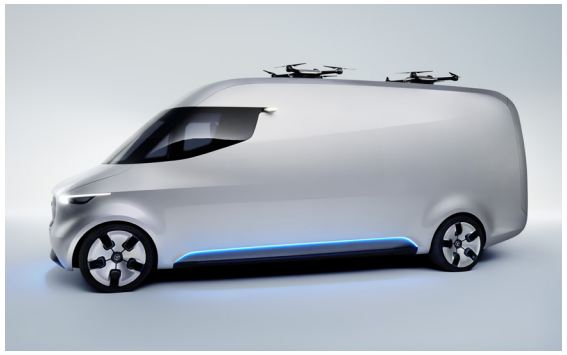
Special Delivery Bikes

(Image 2.4.10 : Delivery bike by Kubo)

(Image 2.4.11 : Autonomous bike by Dominos)

Companies like Kubo and Dominos are developing a special kind of delivery bike. With enough amount of storage space of 20 ltr. It can deliver easily in urban areas up to 50km. With better manoeuvrability and less footprint, it can easily deliver through narrow streets.

Special Delivery Van/Car

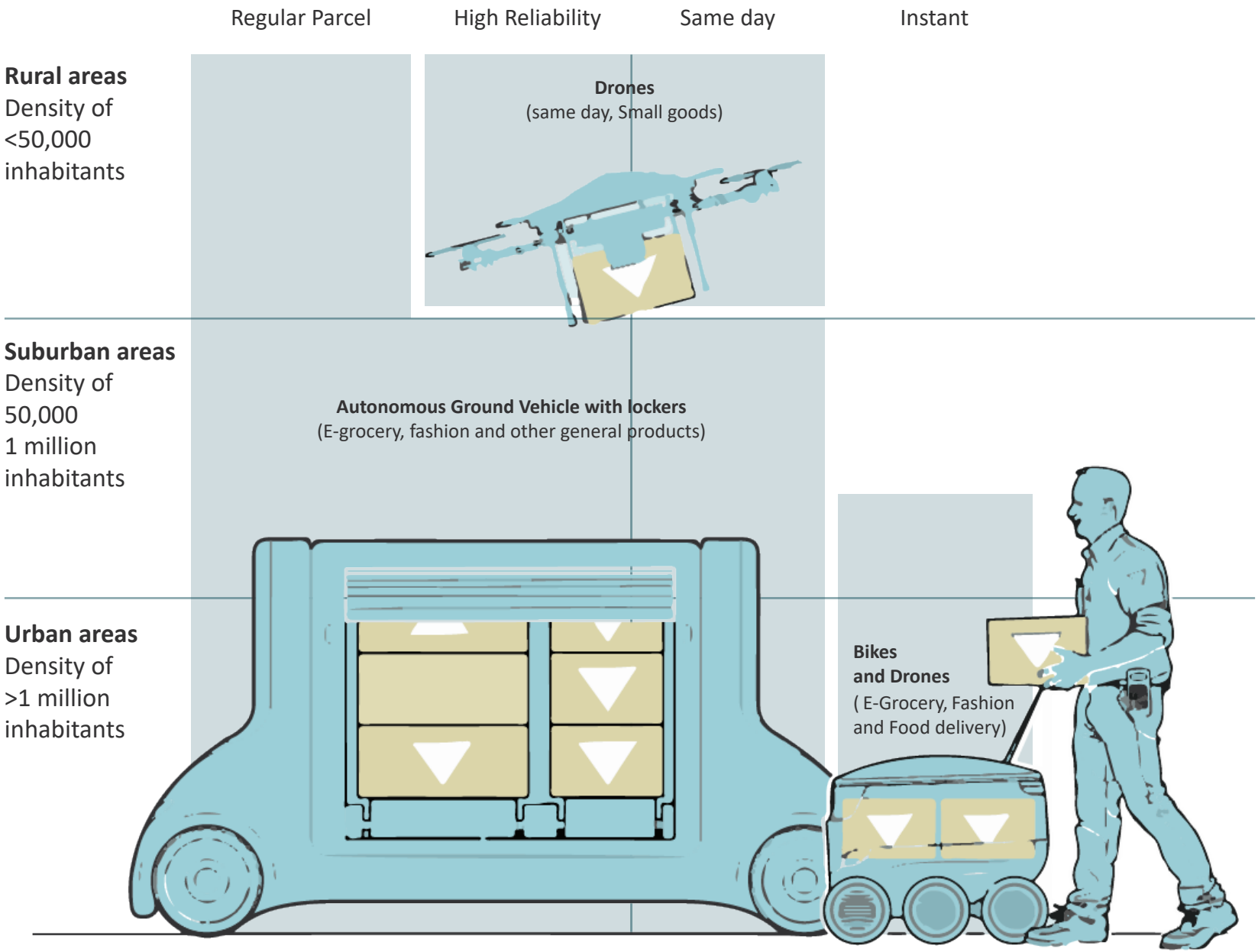


(Image 2.4.12 : Delivery van by Mercedes)

(Image 2.4.13 : Delivery van by Modec

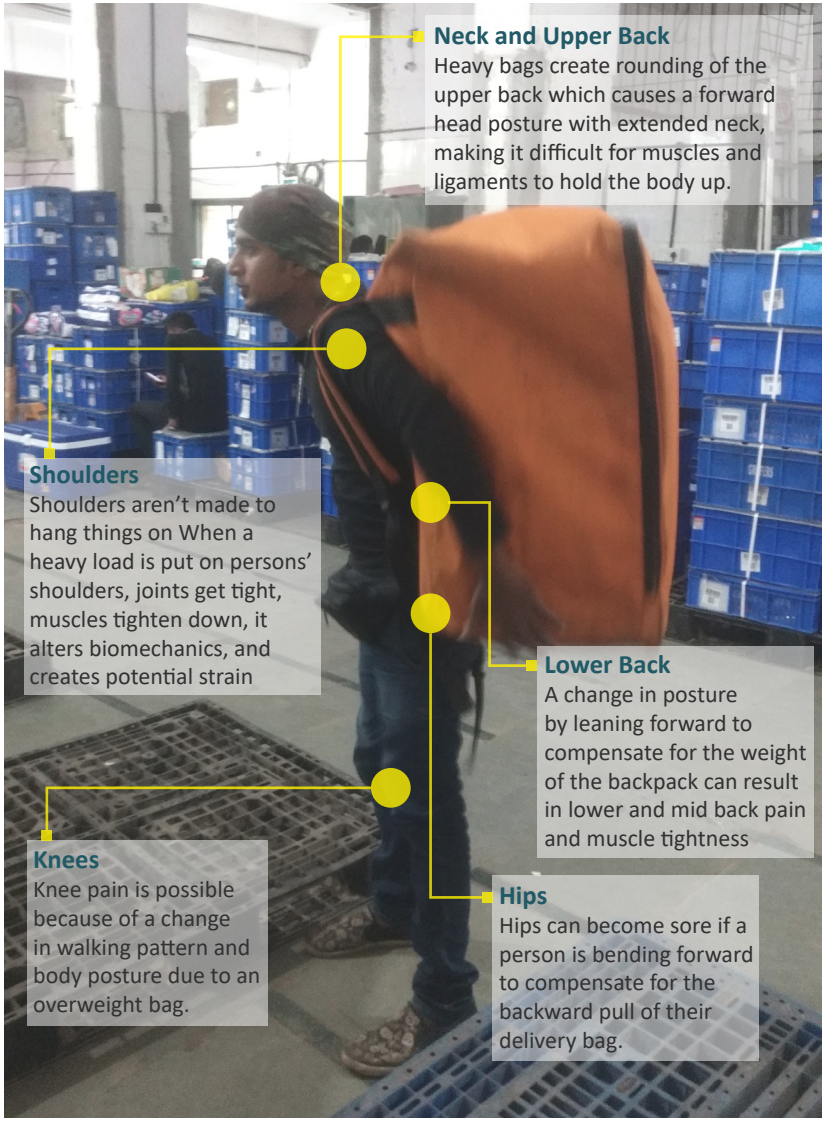
Mercedes, Modec delivery and other company has made special delivery van which support the drone landing and modular storage based on nature of goods. It has big storage space and can do cross city delivery. But when the order amount is small and has remote delivery location it is not economical. It also faces the parking problem.

Based on the study conducted by McKinsey&Company on 'How customer demands are reshaping last-mile delivery' how different vehicle will play a different role in e-commerce and other B2C delivery services were derived. The following info-graphics shows the prediction of available delivery options by a density of local, delivery nature and e-commerce segment.



(Image 2.4.14 : Image by McKinsey&Company

2.5 Effect of heavy load on body



(Image 2.5.1 : Effect of heavy weight on human body)

Prof. At Tel Aviv University has determined that the pressure of heavy loads carried on the back have the potential to damage the soft tissues of the shoulder, causing micro structural damage to the nerves.

The result could be anything from simple irritation to diminished nerve capacity, ultimately limiting the muscles' ability to respond to the brain's signals, inhibiting movement of the hand and the dexterity of the fingers. In practice, this could impact functionality, reducing a worker's ability to operate machinery, compromise a soldiers' shooting response time, or limiting a child's writing or drawing capacity.

Also, The American Academy of Orthopedic Surgeons recommends that the weight of a backpack should be less than 15-20 per cent of a person's body weight, but that isn't always the case. Too often, a delivery person carries around 40kg of a load which beyond safe load carrying capacity, increasing risk of injury. The image shows the effect on different body part if a heavy load is being carried.

2.6 Inferences from pre research

In the current delivery model, a person is hired on a contract basis who already owns a vehicle. This vehicle is not made to serve as a delivery vehicle so they generally carry the crates in a bag on their shoulder.

The amount of weight being carried by them is around 40 Kg which is more than a person should carry.

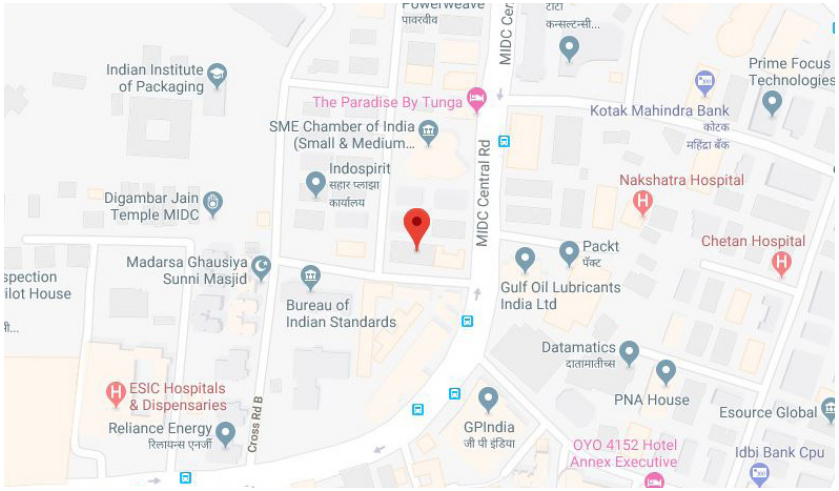
The online delivery portals deal with volumes intensive and perishable products like vegetables and fruits, dairy products which need special temperature control and multiple variants in packaging.

In future autonomous vehicle will come in action but India is far behind to implement that level five autonomy. Since customer demands instant delivery and instant return the human interaction will be the key factor in e-grocery delivery, e-grocery sectors will still prefer delivery by a human.

While India is far behind for level five autonomy and increases demand for instant delivery it is not economical to deliver single customer using a van. Bike or Moped will be still relevant in near future.

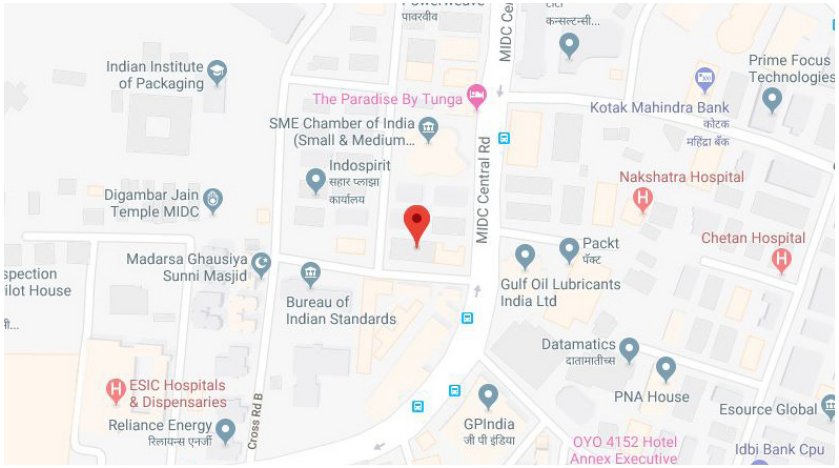
RESEARCH

3.1 Understanding Grofers' and Big Basket Delivery



GROFERS

Location: MIDC, Andheri East, Mumbai
19.1204, 72.86934



bigbasket

Location: Mulund, Mumbai
19.1673, 72.9428

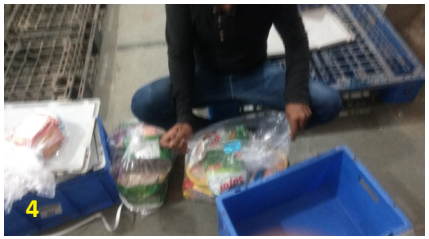
To understand the better understanding of how delivery system work at Grofers I visited their dark store situated at MIDC-Andheri, Mumbai. During the time of visit, Grofers was not handling its vegetable delivery wing so I got insights on grocery and dairy product delivery excluding vegetables. A delivery boy named Mohmmad, who had just finished his morning shift helped me to understand the overall process and guided me through their facility. The visit includes taking photographs, measuring a dimension of products they use to carry the products, interaction with delivery boys and other observational studies. While visiting the BigBasket dark store at Mulund gave me insights on how vegetables are being packed and delivered.

3.1.1 Operation at dark center Grofers

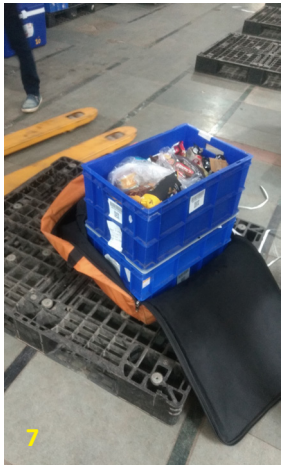
All orders come from either inventory or marketplace in tempo truck. Items are placed in one or more crates based on quantity. Minimum one crate assigns for one order even if its one item

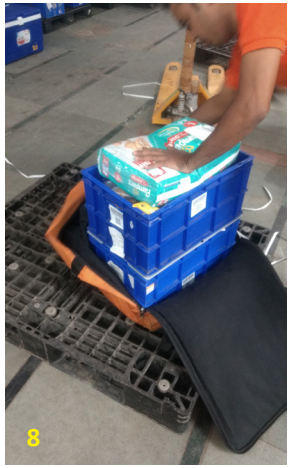
At the dark store, all the order crates which arrive are not yet segregated based on different delivery zone. They are stored in Input zone.

These order crates are then segregated based on different delivery zone and order density.



A delivery person scans the bar-code on crates, open it, check the order again and reconfigure it. Edible and Non Edible items are packed differently in a crate.





At last, an order is either delivered by the bike section or the small pick up a van like TATA ace.

Table 3.1.1 shows different conditions in which particular delivery option is chosen

3.1.2 Operation at dark center BigBasket

Storage of different vegetables

Vegetables are bought from nearby APMC market, a Quality check is done and kept in a storage room. Damaged products are discarded.

Vegetables which does not requires cooling kept in dry storage space.

Leafy vegetables are kept moisturized using wet greenhouse net and under a fan.

Vegetables which people don't buy frequently and other fruits are kept in cold storage

Since BigBasket also provide cut vegetables they are packed in a plastic box and kept in cold storage

Vegetables are packed in advance in a pack of 500 g, 1 kg and 2 kg and kept in a rack

Fruits like grape and other vegetables which are likely to damage are kept in plastic boxes

Vegetables which are frequently bought are not kept in cold storage, they are kept in rack only but provided refrigeration

Separate space is provided for packaging and storage of the organic vegetables and fruits

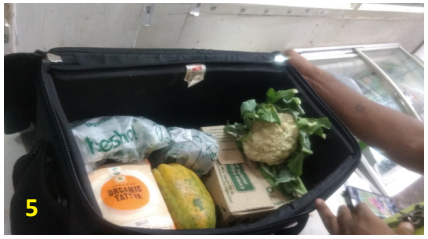
Operation

Order is assigned to delivery boy, based on number products he choses the crates.

He choses the products from the racks and put it in a crate.

Quantity is checked in pre packed products to reduce the return rate of products.

Products which does not require special packaging are kept above the box.



Delivery happens based on number of order and quantity of order.

Packed bags with order

All this products are either placed in one single bag or multiple crate is are packed in one big bag.

3.2 Selection of Delivery Vehicle and Package study

Order Numbers	Order Quantity	Delivery Location	Delivery Option
> 3	Less	Within 10 Km	By Bike with multiple trip
> 3	More	Within 10 Km	By Small pickup truck
< 3	More	> 10 Km	By Small pickup truck
< 3	Less	> 10 Km	By Bike

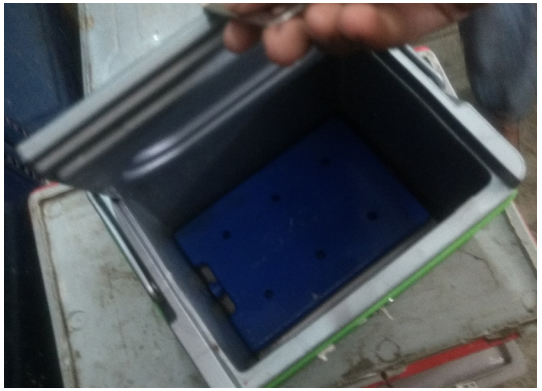
Table 3.2.1 : Selection of Delivery Vehicle

Volume study of different bags and crates

Delivery Bag
Dimension (LBH)
55cm x 33cm x 70cm
Volume: 127 Ltr

Big Crate
Dimension (LBH)
44cm x 25cm x 28cm
Volume: 30 Ltr

Small Crate
Dimension (LBH)
44cm x 25cm x 18cm
Volume: 20 Ltr



Cool Tubs
Dimension (LBH)
28cm x 28cm x 28 cm
Effective Volume: 8-10 Ltr

Side-bag
Dimension (LBH)
55cm x 30cm x 30cm
Volume: 50 Ltr

Side Bag
Dimension (LBH)
28cm x 28cm x 28cm
Volume: 21 Ltr

Packaging used for different products

Plastic boxes : For cut vegetables, Soft fruits like Grape, Strawberry etc. (Weight: 250g to 5kg)

Carton boxes : For hard fruits like Apple, Guava, Avocado, Banana etc. (Weight: 250g to 5kg)

Plastic Bag : Leafy and Hard vegetables, spices like ginger, Fruits which are big in size etc

Foam, Bubble wrap: For glass items, Eggs and other breakable items. (Weight: 250g to 5kg)

Plastic Net Bag : Onion, Lemons, Potato and other hard vegetables. (Weight: 250g to 5kg)

Cool Tubs : Dairy Products, Frozen and Chilled vegetables and meat (Weight: 250g to 2kg)

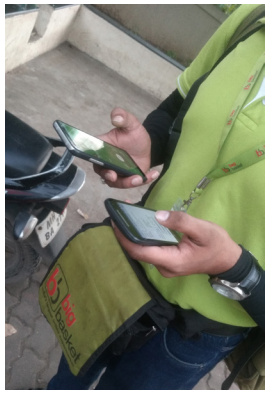
3.3 Observational Study

An observational study was done to understand how these bags are being transported, what happens if packages exceed, which bikes are commonly used, how they access crates at a delivery place, how they access other devices and maintain documents etc.

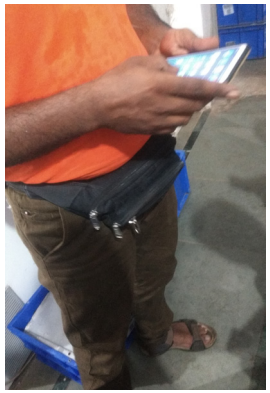
The study was helpful to understand how delivery boys interact with their vehicle and what problems they face while accessing the crates.

(Image 3.3.1)

(Image 3.3.2)



(Image 3.3.3)



(Image 3.3.4)

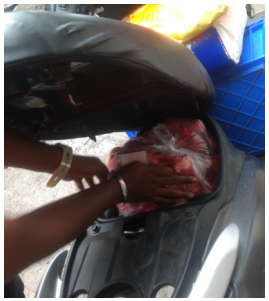
Accessing crates

Since the bag is not attached to the bike and when put on the bike it becomes difficult to access crates and the product within it. So usually bag is kept down, unlike other delivery services which use a bike as a platform to keep the bag. A delivery boy has to band down several times a day to lift the heavy crates which may cause the back problems in a longer run.

Multitasking and Document storage

Many times the address provided is not familiar to a delivery person and they highly rely on Google Maps to find the location. Most of the delivery person uses two phones one for the navigation and other communication purposes, other is to update order and delivery status.

Also, other documents like a bill, advertisement templates and other important documents are carried in waist pouch which sometimes company provides or sometimes they have to buy.



(Image 3.3.5)

(Image 3.3.6)

(Image 3.3.7)

(Image 3.3.8)

(Image 3.3.9)

(Image 3.3.10)

Carrying Extra Orders

Sometimes when it is not possible to pack all the crates in bags, when there is a single item in order then those products are carried either in dickey or on front luggage space in a moped. If the delivery person has not the moped then he has to do multiple trips to complete the assigned orders.

Lifting Bags

Usually, the crates bag are kept on a high level so that a delivery person can easily lift it. It becomes a major problem at delivery location when a high platform is not available and delivery person has to lift it from the bottom. Also, the person who deliver using vans they have to carry the crates on their shoulder.

Carrying Bags

Even though the bag is kept on the back seat of the vehicle it is hard to handle bike during turns and maneuverer in traffic. Though it is punishable to use a mobile phone while driving most of the delivery person uses the phone for navigation which put them on risk.

Other Important Observation

(Image 3.3.11)

(Image 3.3.12)

(Image 3.3.13)

(Image 3.3.14)

Sometimes products get damaged during transit, or the vegetables are not fresh, in that case, customer returns it. This returned products companies cannot sell which are discarded. Even when companies are trying to provide different packaging for different products ample amount of waste is generated on daily basis.

Though this is an important observation, it was not counted for a design brief since the project is addressing on delivery person's need and focusing on solving it.

3.4 Inferences from Research

The amount of volume being carried in one trip is maximum 100 ltr. out of which 20 to 30 ltr is of dairy or chilled/frozen product.

Different materials like a carton box, plastic box, plastic bags etc. are used to pack different products.

Mainly four type of orders are delivered which are 1) Vegetables which are prone to damage 2) Eatable grocery 3) Non Eatable personal care items and 4) Dairy goods and frozen items.

Ample amount of waste is generated due to damage to the product during transit.

A delivery person faces different problems while handling the bag/crates, carrying extra orders, accessing the product from the crate and while storing documents like bills, advertising pamphlet etc.

USER STUDY

4.1 User Study (Delivery Person)

A user study was conducted with a delivery person of Grofers and Bigbasket to understand different problems the faces while during the process of delivery, to know their expectation from online portals and to understand their experience on an on-site job.

A questionnaire set was made which was then used to interview users. It included all questions related to the bag, their bike, their lifestyle, gadgets they use during the delivery process.

1) How many crates do you deliver daily?
2) How much do they get paid?
3) What is the waist pouch for?
4) Which bike you use?
5) How much weight they carry?
6) How do you find address and what difficulties you face?
7) What are the problem you face during delivery?
8) Do you do overtime here, why?
9) Do the company provide money for bike maintenance?
10) Do you like your job? If yes why? If not why?
11) What is your future plan?

Abdul, 38

Insights

- Carries 3 to 4 crates weighing 15 kg to 40 kg
- Monthly salary of 11k plus incentives based on overtime and
- On time delivery.
- Uses second hand Activa.
- Rely on Google Maps to find the location.
- Faces back and knee pain when does overtime.

Shahnawaz, 28

Insights

- Previously worked at Amazon. Left it because of parcel missing issue
- Uses Honda CBZ.
- Saving money so that he can afford Wagon R and work for Uber/Ola
- Feels it is less respecting job but.
- Better if company provides the vehicle.
- Can’t carry more than 3 crates since bike has no extra storage space like moped.
- Also do over time for more money.

Mustak, 36

Insights

- Previously worked at Myntra left it because number of delivery was more than 45 a day, while here maximum delivery goes up to 15 in one shift though has to carry more load than Myntra.
- During festivals it is hectic, but works during festivals too because we get tip in festival season.
- Working in delivery area since last 6 years still have to rely on Google Maps; Facing shoulder and neck pain.
- Uses Activa. Wants moped with more storage.

Ilias, 32

Insights

- Works in event management; when its off season works in Grofers.
- Though amount of weight is more prefer to work in Grofers due to less number of order compare to others.
- Owns Activa
- Wrap crates with plastic if its heavy rain.
- In summer when it becomes difficult to carry bags.
- Faces back pain frequently.

Vikas, 30

Insights

- Faces difficulty to find address since new in Mumbai, rely on Google Maps.
- Faces dificulty in handling vehicle during monsoon.
- Security of the product is issue, can't leave bag with vehicle while delivering single order in apartments.
- Uses second hand Activa.

Sameer, 28

Insights

- Newly joined. Do it as part time while doing bachelor in arts at Thane.
- Owns Passion Pro.
- Rely on Maps
- Becomes difficult while delivering in apartments, because customer doesn't come down.
- Will prefer companies' bike if provided in range of Moped.

Mustafa, 30

Insights

- Do it as part time.
- Trouble handling his splendor with heavy bag.
- Facing back pain.
- Would like to buy Activa.

4.1.1 Inferences from User Study

Delivery persons prefer mopeds since it has extra storage space.

Security of the bags and navigation is a major problem faced by most of the delivery person.

Handling a bike with a heavy load is difficult especially in Monsoon.

They expect a special delivery vehicle provided by companies (for example Dominos provides a delivery bike for their delivery boy).

During summer to carry a bag on shoulder leads to heavy sweating which is not hygienic for the delivery person.

Back pain and knee pain is commonly reported problem among most of the delivery persons.

Youngsters in this field doesn't find this job more respecting they do it out compulsion because the get decent amount of money for their daily needs.

4.2 User Study (Customer)

1) How they buy grocery?
2) Have you ever ordered tried online grocery portals? If no, why?
3) What you have ordered?
4) How frequently you buy vegetables and grocery?
5) Why you prefer online grocery portals?

Anavadya, Architect

Insights

- Haven’t tried any online grocery portal yet.
- Prefers home delivery which in Trivandrum has started by present govt there.
- Vegetables once in a week, other grocery items once in a month.

Pragati, Clerk

Insights

- Prefers going to vegetable market.
- Tried Grofers once, but got damaged tetra pack of real juice.
- If portals promise to delivery fresh and products I would like to buy from it because online buying is usually cheap and home delivery is provided.
- Twice a week vegetables, other grocery once in a month.

Amrapali, Lab Assistant

Insights

- Not aware about online grocery portals.
- If choosing online portal, she expects same day delivery.
- Buy vegetables twice a week and other groceries twice a month.

Prapti, Microbiologist

Insights

- Have ordered groceries and vegetables both from big basket.
- Generally order vegetables thrice a week and groceries twice a month.
- Prefers cut vegetables.
- Easy, convenient, cheap and door step delivery.
- Saves lot of my time.

Shilpa, House Wife

Insights

- Never used online portals, not aware of it
- Expect the experience where she gets to chose her own vegetables.
- Would not try, trust issue on freshness of vegetables. Other groceries would like to order online.
- Buy vegetables twice a week, other groceries once a month

Surabhi, HR

Insights

- Uses Grofers for fruits and groceries.
- Orders fruits online because usually cheap and comes in better packaging which is easy to store later on.
- Fruits twice a week and groceries based on requirement.
- Prefers online service since it is cheap, save time and usually get good quality fruits.

Manisha, House Wife

Insights

- Uses Grofers for fruits and groceries.
- Orders fruits online because usually cheap and comes in better packaging which is easy to store later on.
- Fruits twice a week and groceries based on requirement.
- Prefers online service since it is cheap, save time and usually get good quality fruits.

4.2.1 Inferences from User Study

Mostly working class woman prefers online grocer portals.

Expect cheaper than the local market, same day delivery, fresh products and better packaging.

Vegetables are frequently bought than other groceries.

They are choosing online delivery portals because they expect a doorstep delivery, so if they are living in an apartment they won't come down to collect the order.

Commonly damaged products they receive are tetra packs.

Leafy vegetables are hard in terms of maintaining their freshness, specially when they are packed in plastic bags. Wet jute base and paper bags can be used for packaging to solve this problem

4.3 Shadowing

Shadowing was done to find out how people usually carry the vegetables and how local vegetable vendors stors the perishable items.
Inferences from the shadowing are bellow,

- Jute is used to keep leaf vegetables fresh.
- Paper is used to pack leaf vegetables.
- Bamboo, Plastic bucket is used to store potato and onion.
- Card board is placed in bucket for vegetables which is likely to damage (Ladies finger, Tomato etc..)
- Cotton, Bamboo and Jute bag is used to carry the vegetables.

These materials can be used inside storage space to keep different. Vegetable fresh and reduce damage.






DESIGN BRIEF

5 Design Brief

Design of the two wheeler for online grocery portal which will facilitate the following requirements,

- A vehicle should have inbuilt navigation system.
- Should have better accessibility of the products.
- Should have better ergonomic and maneuverability.
- Should have special storage unit of 120 Ltr of volume.

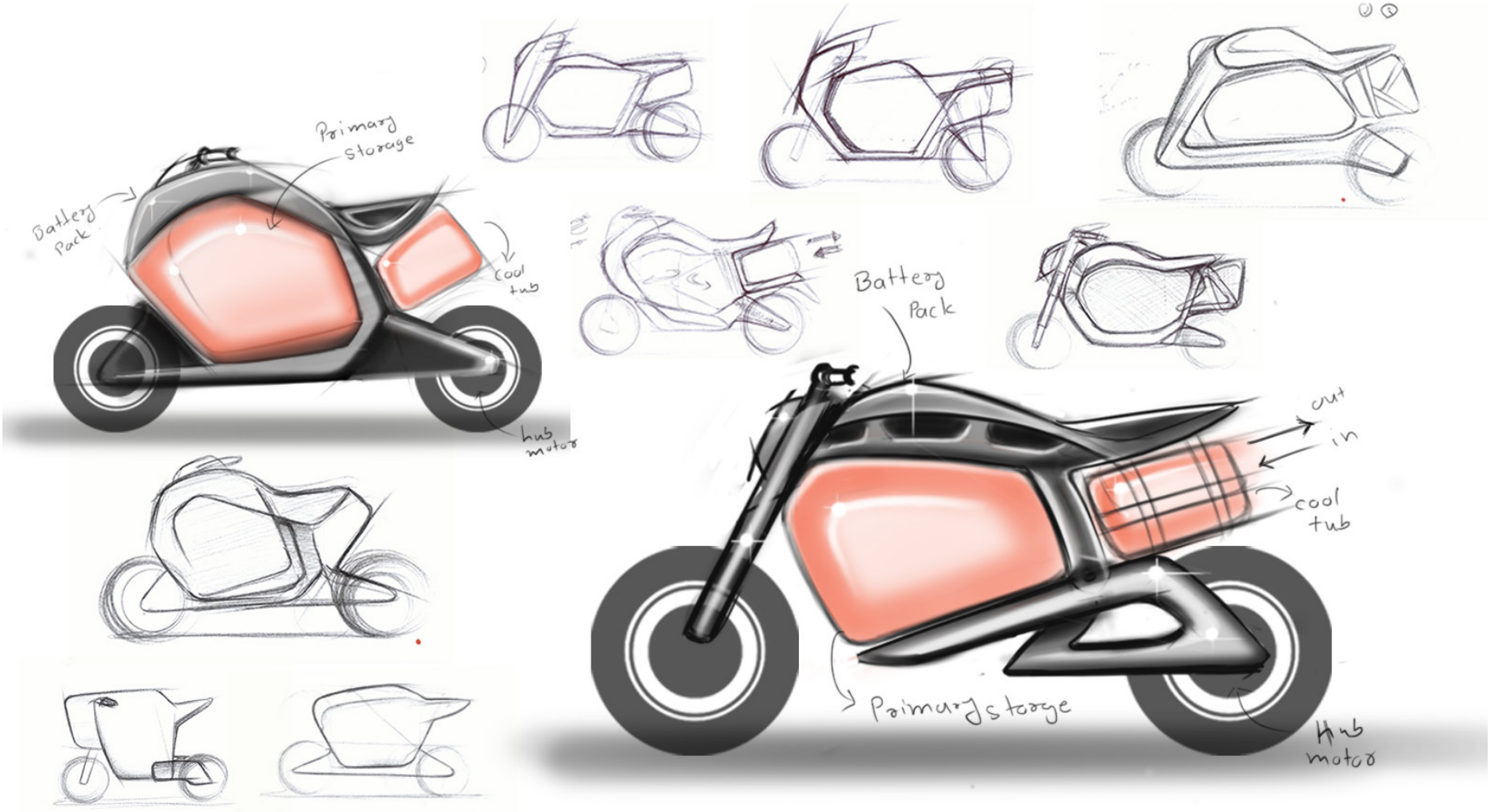
Technical Specification

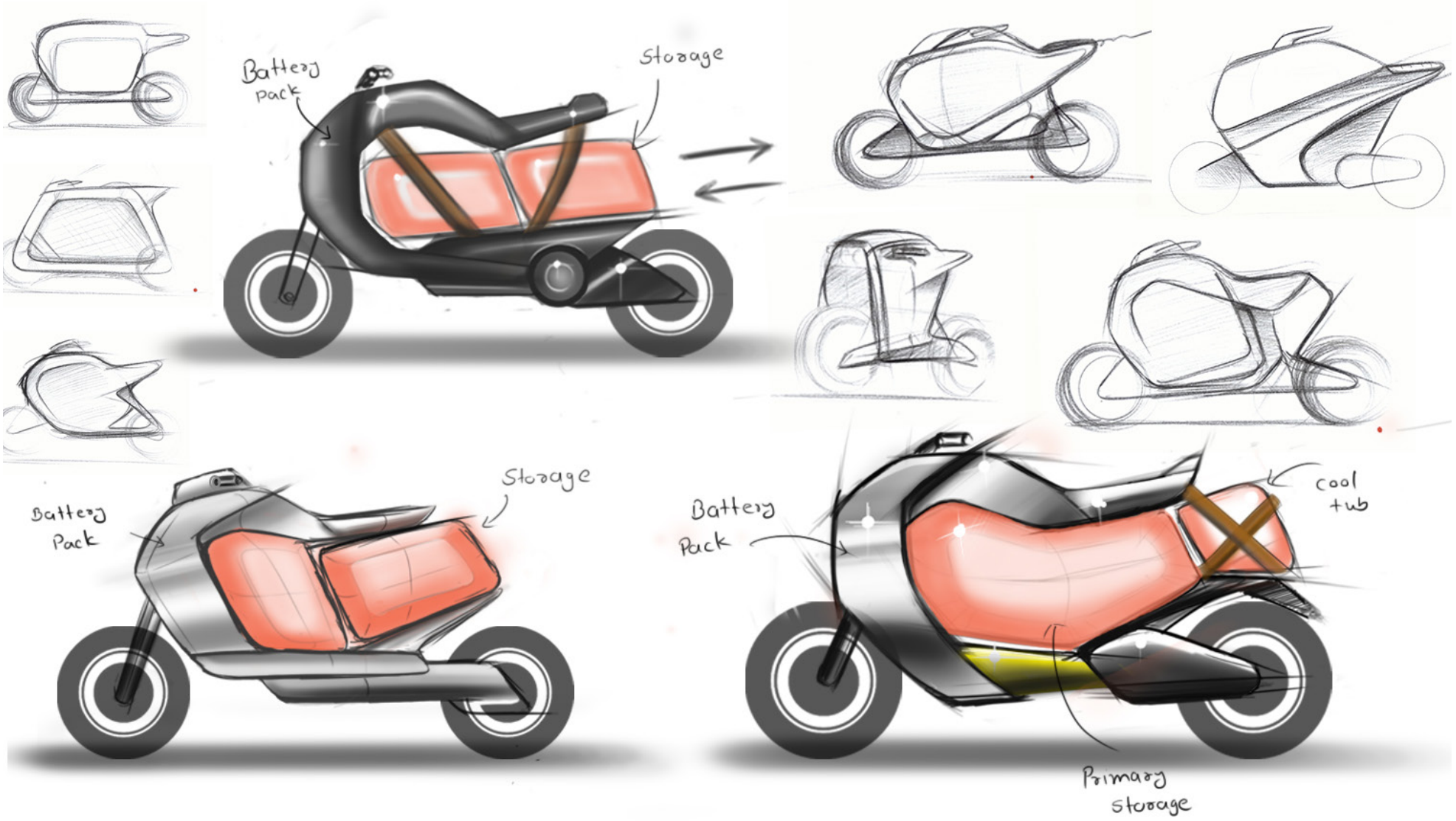
Overall Dimension (L x B x H)	: 1850 x 700 x 1130 mm
Wheelbase	: 1300 mm
Ground Clearance	: 145 mm
Seat Height	: 760 mm

IDEATION

6.1 Direction 1

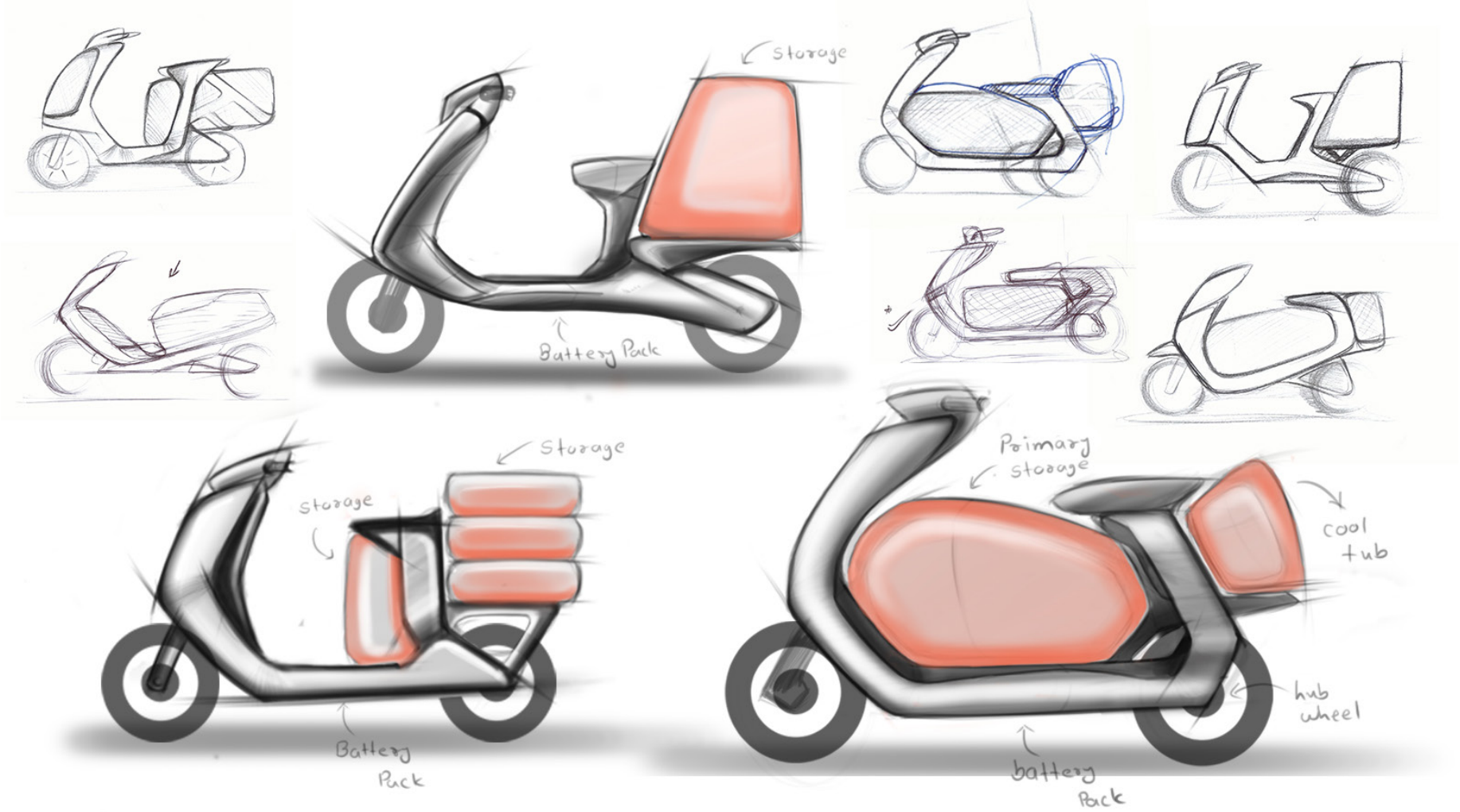
In this direction, bike posture triangle has been considered since it is more familiar to the delivery person. By reducing the diameter of the wheel and using hub motor more storage space has been created. Also, separate storage space is provided for items that require cooling. Storage space is embedded in a frame only and lockable storage allows a delivery person to leave products with bike only while they are delivering products in an apartment.

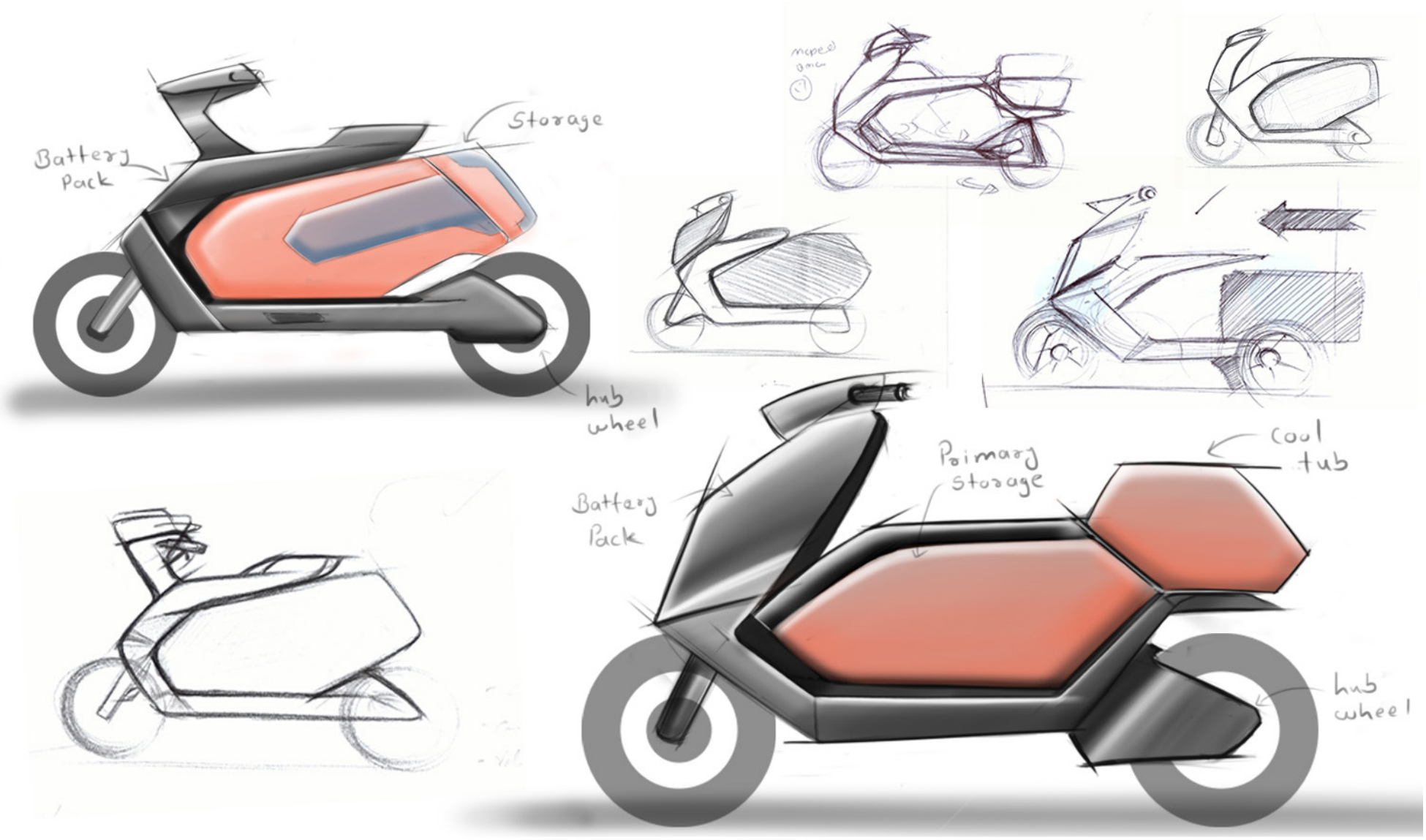



Battery pack
Storage
Battery Pack
Storage
Battery Pack
cool tub
Primary storage

6.2 Direction 2

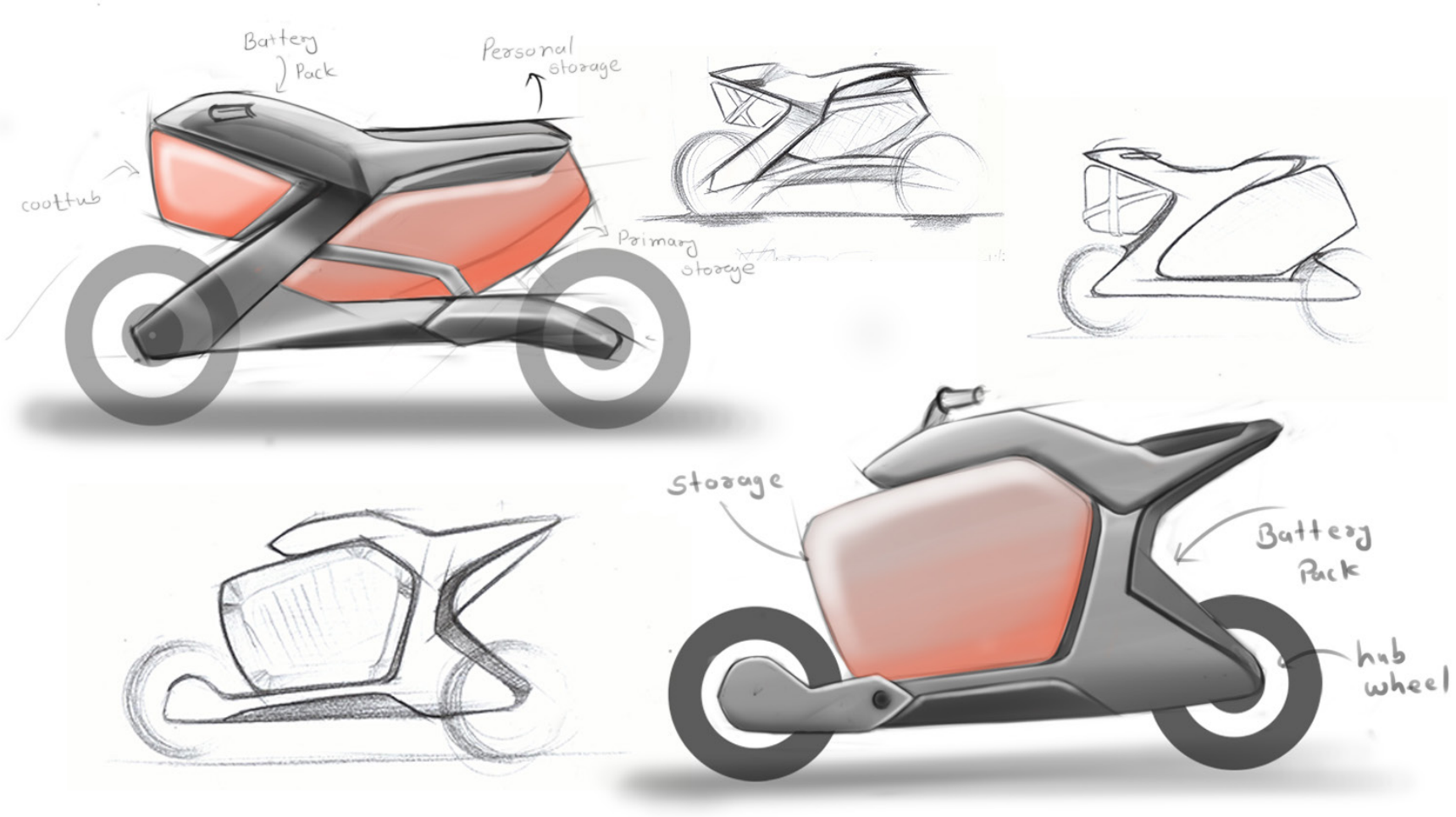
Here, expectations of the delivery person have been addressed, which is to use moped as a delivery vehicle. Different concepts like stackable storage space, modular storage space has been explored. In this direction also storage space is embedded in a frame itself. Space under the seat and footboard is converted into storage space. Here also separate storage space is provided by replacing pillion seat.




Battery Pack
Storage
hub wheel
moped
Battery Pack
Primary Storage
Cool tub
hub wheel

6.3 Direction 3

In this direction space over front wheel is used to pack a storage space. “Z” frame structure and hub centre steering mechanism is used. Embaded storage space in frame is also maintained here.



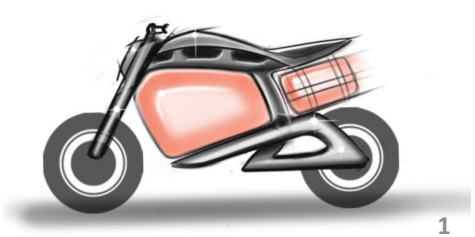
6.4 Direction 4

In this direction, the vehicle has a semi seating arrangement and has a small footprint which can be carried in a bigger delivery van. The van reach at the centre of the delivery area deploys these vehicles for the further delivery making a delivery system better. A three-wheel vehicle with storage space at back is developed.

FINALIZING CONCEPT

7.1 PROS AND CONS WITH DIFFERENT DIRECTION

Direction 1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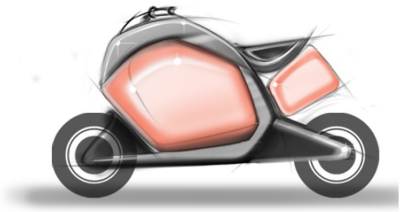
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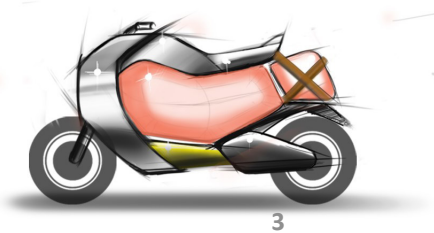
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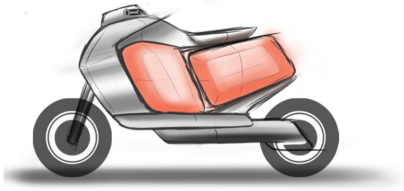
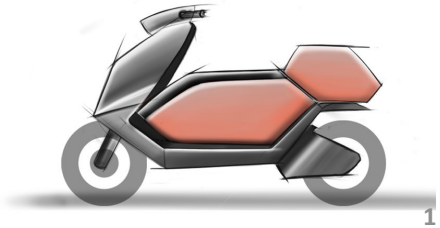

4


5

Pros: Familiar driving posture of bike
Detachable cool tub, so when there is no order of dairy product it can be removed.

Cons: The concept-1 has not enough space for battery pack and personal document.
Form is too common and not interesting.
Form looks like sportbike, which delivery companies may not interested in.
In concept-4 and concept-5 storage space is not secured enough.

Direction 2



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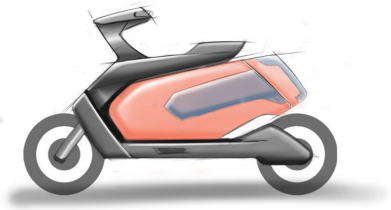

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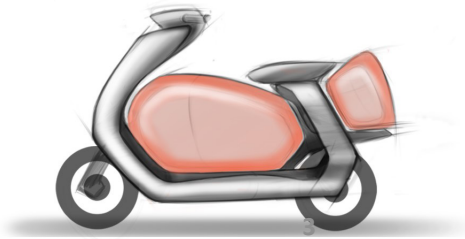

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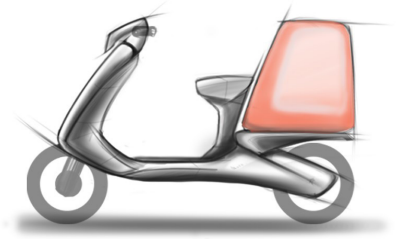
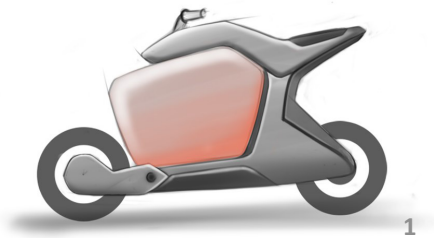


4

Pros: Familiar moped riding posture.
Enough space for batteries, controllers and personal documents.
Secured storage space within the frame itself.
Concept-2 has new and interesting form.

Cons: Concept-4 has no cool tub.
Except concept-2, all the concept are too common, which is not desirable by young delivery boys of the company.

Direction 3



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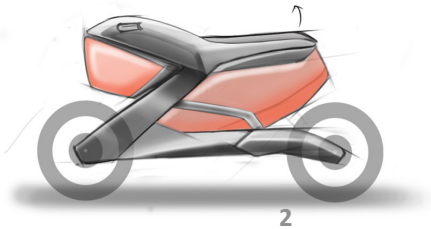
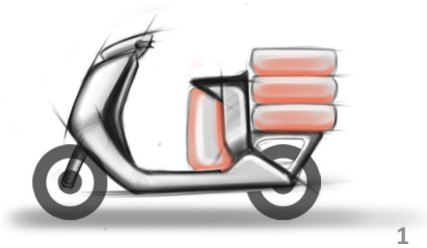


2

Pros: Enough space for packaging of batteries, controller and personal documents

Cons: Riding posture is not familiar.
To use hub centre steering wheel is difficult since it will require many linakge.
Hard to access products in concept-2.

Direction 4



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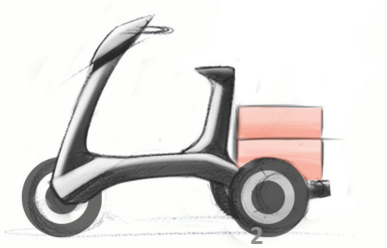


2

Pros: It provides efficient delivery system for closed systems like educational or industrial campus only.

Cons: Requires bigger vehicle to carry it along with other packages.
Since it is not foldable it will require more space to occupy by compromising space for orders.
Semi sitting riding posture is not comfortable enough.
It can be used only for short distance travlled or within controlled system delivery.

7.2 FINAL CONCEPT AND ITS PACKAGING

Most of the ideas that were developed during the ideation phase had many pros and cons. A direction 2 was taken into consideration and Concept -2 was developed further. Photoshop render, 3D model and Final scale model was prepared.

Packaging and Dimension

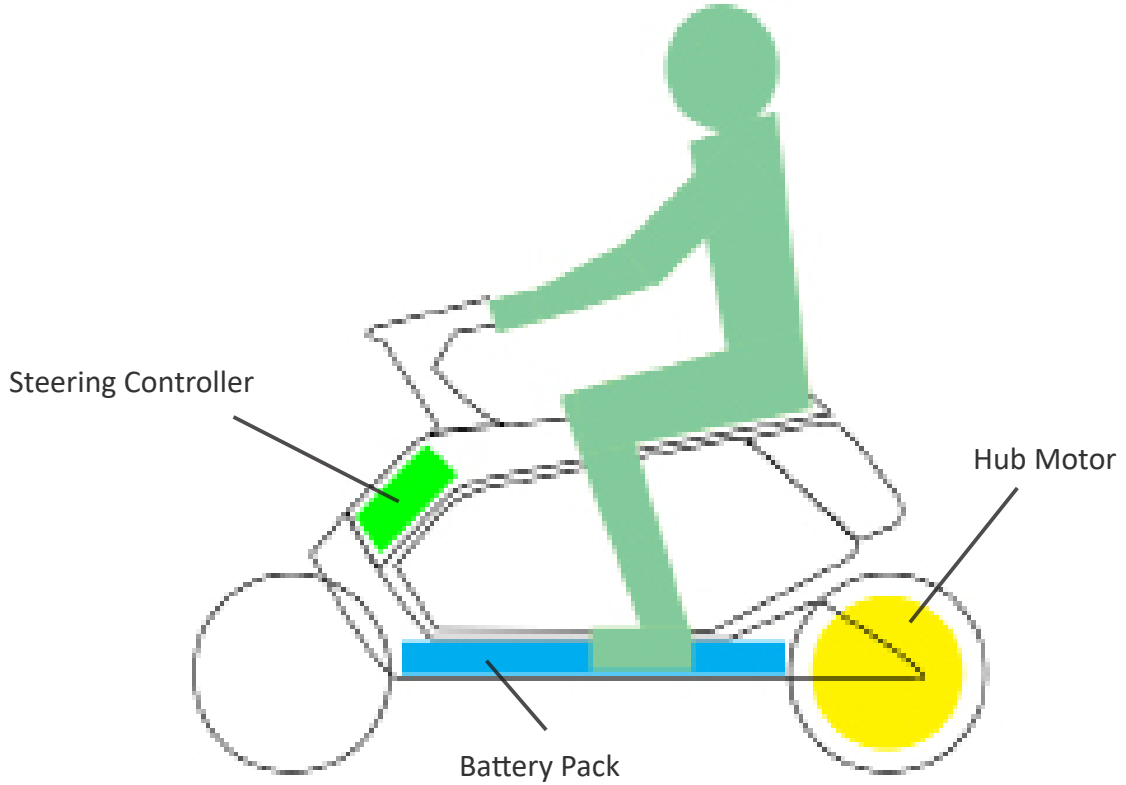
Various vehicle and technology was studied to finalized the overall dimension and drive train of the vehicle. Dimensions of the Aether was benchmarked and drive was taken from NIU NGT electric vehicles. Technologies like, Hub motor, remote steering was used to keep overall form as it is.

Dimension

Length : 1700mm
Width : 700mm
Height : 1000mm (Without Mirror)
Seat Height : 760 mm

Technical Specification

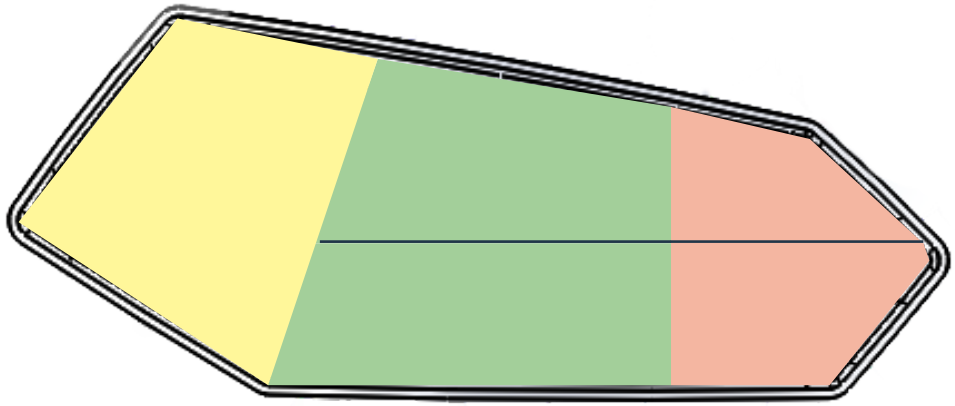
Steering : Remote Steering
Motor : Bosch Hub Motor
Battery : Lithium Ion Battey



Compartment of Storage Space

Based on the insights from user study; mainly four type of orders are delivered which are
1) Vegetables which are prone to damage
2) Eatable grocery
3) Non Eatable personal care items
4) Dairy goods and frozen items.

Separate cool tub is provided for the dairy goods and frozen items, while main storage space was distributed to keep not eatable and eatable items separately. Removable shelf are provided to manage space based on order.

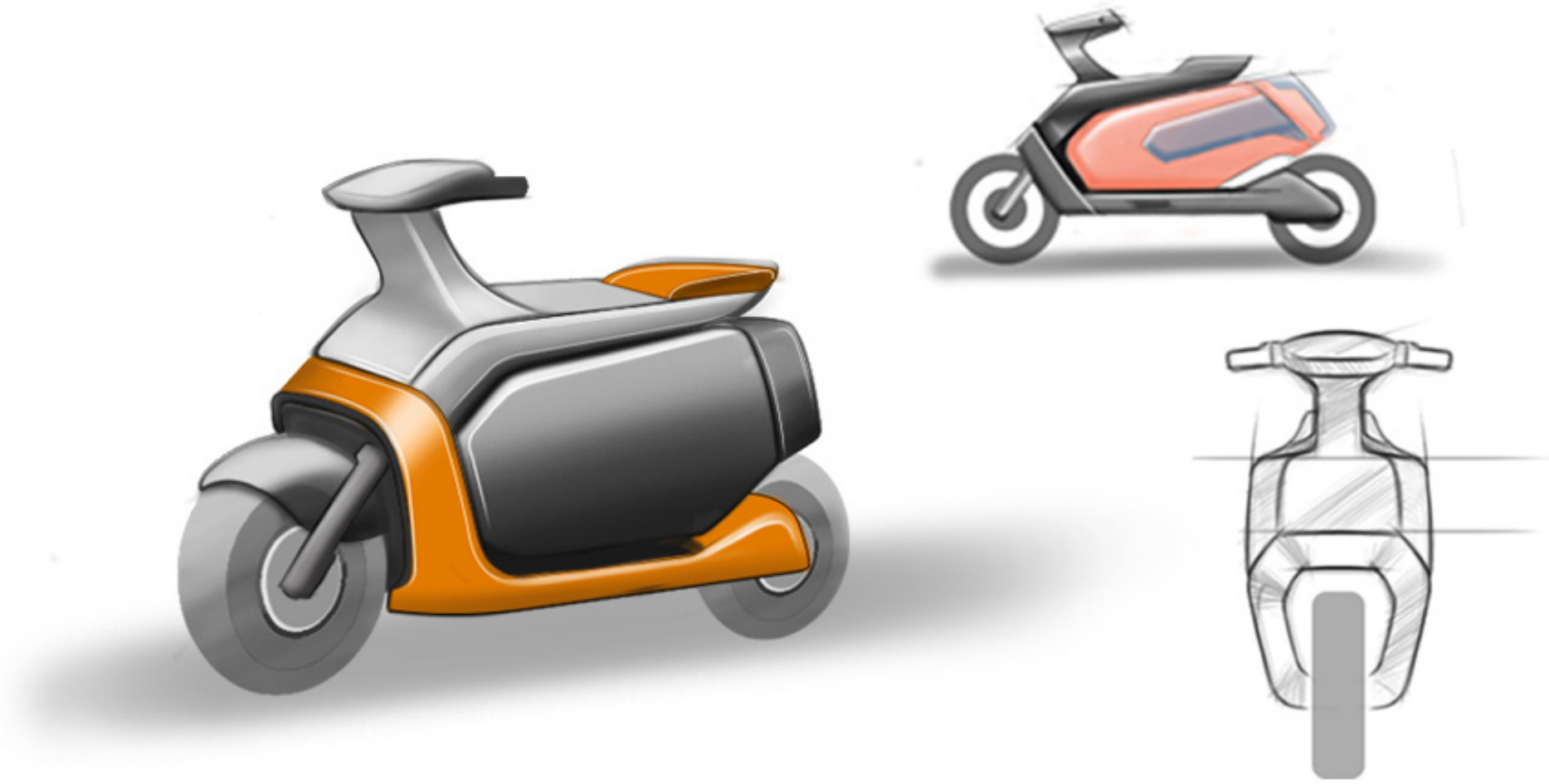


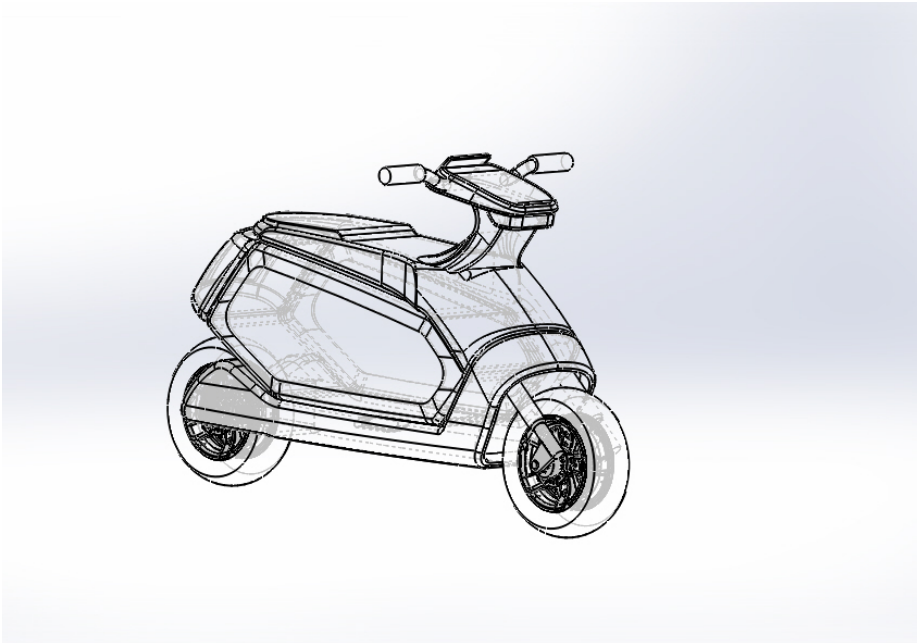
Storage space for comparatively big items like, Oil jar, Baby diper's packages and other non eatable items etc. it also can distributed further using removable shelf.

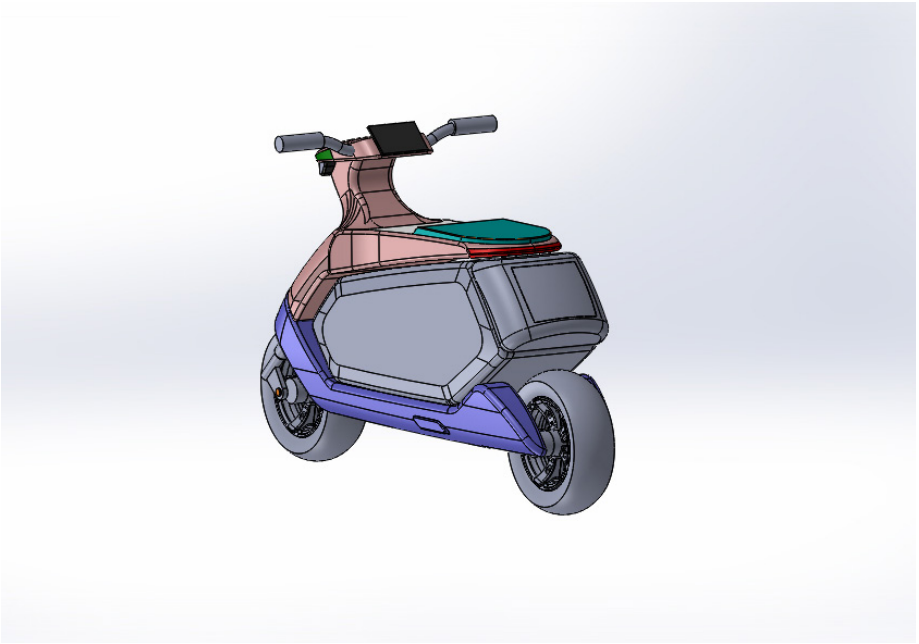
Storage space for vegetables and other grocery items

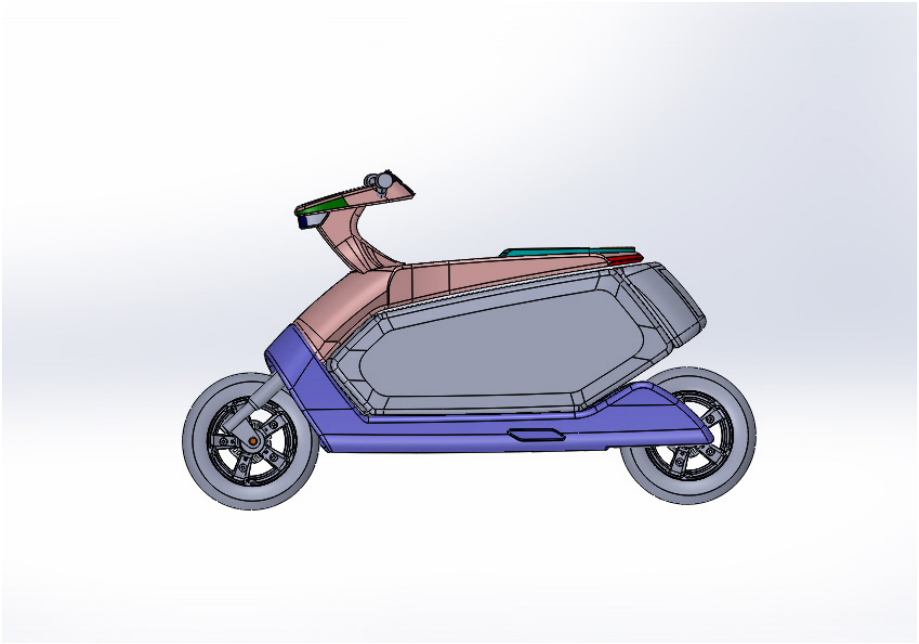
Storage space for vegetables and other grocery items

7.3 Final renders and 3D model

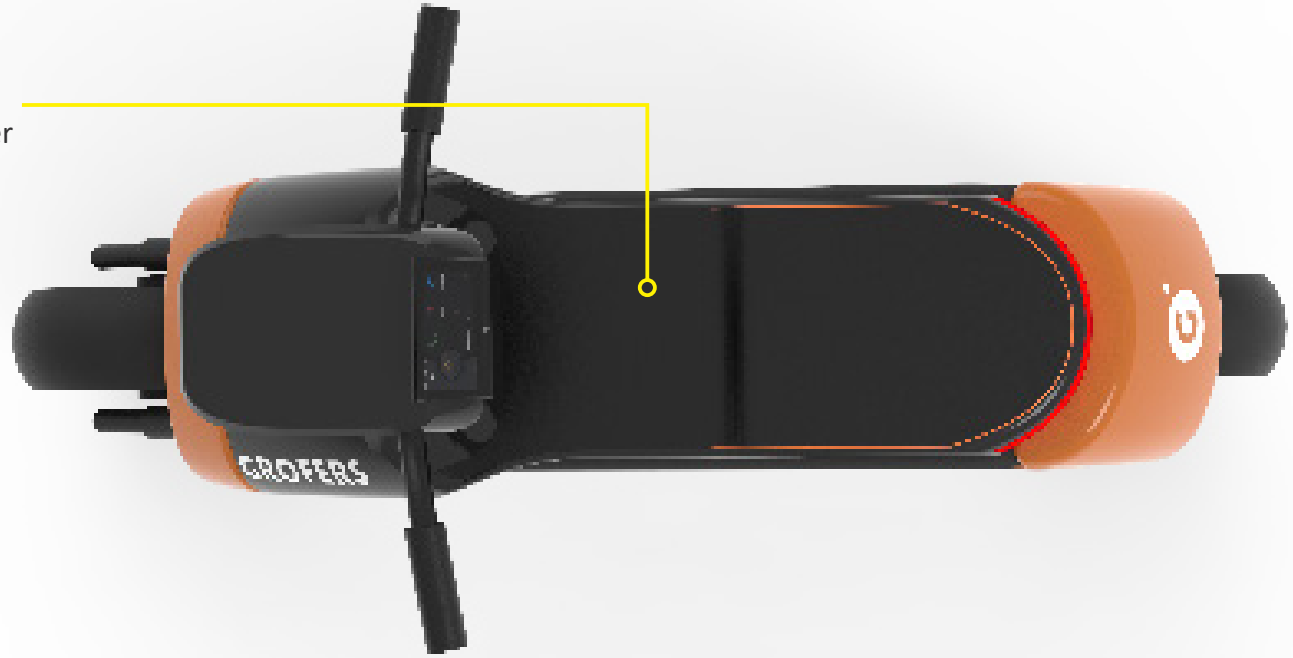








Storage space for order bills, pamphlets and other documents.



Separate cool tub space for dairy products, frozen or chilled food items etc..

Inbuilt infotainment system which serves as navigation system and can be detached to use as order management device

Separate cool tub space for dairy products, frozen or chilled food items etc..

Physical 1:5 scale model

Company Branding

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