

Mumbai kaali-peeli taxi for 2040

Submitted in partial fulfillment of the requirements
of the degree of

Masters of Design

by

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DECLARATION

I declare that this written report represents my own idea in my own words, and where others' ideas or words have been included, I have mentioned the original source. I also declare that I have adhered to all principles of academic honesty and integrity and have not falsified, misinterpreted or fabricated any idea, data, facts or 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 source from which proper permission has not been taken, or improperly cited.

A handwritten signature in black ink, reading "Sai Krishna Koyyana". The signature is written in a cursive, flowing style.

Sai Krishna Koyyana

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I am grateful to my family and friends who provided me with moral support and encouragement that kept me motivated throughout the duration of this project.

APPROVAL SHEET

This Mobility and Vehicle Design project entitled " Mumbai Kaali Peeli (Black and yellow) taxi for the year 2040" by Sai Krishna K. is approved in partial fulfilment of the requirement for Master of Design degree in Mobility and Vehicle Design.

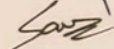
Project Guide

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ABSTRACT

This paper is a consolidated documentation of my design journey of ‘Mumbai Kaali Peeli (Black and yellow) taxi for the year 2040’ which was also the proposed theme at the beginning of the project. The process undertaken is iterative and objective was to ‘speculate a design’ as the context of the design is setup in the year 2040 i.e. ‘future’. Stepping aside from conventional design research which consists of detailed user interviews to understand users, process focuses on a unique methodology that has been developed to empathize with users through conducting an observational research exercise, i.e. a photo documentary on Kaali-Peeli taxis. Insights were drafted from the photo documentary to outline user’s current day aspirations. Insights were further utilized in speculating possible aspirations that users would have in the year 2040. Multiple relevant taxi services across the globe were bench marked to understand different directions of design that are redefining taxi services for the future. As part of studying trends, a self synthesized methodology was developed which provided key insights on core values of different directions that current day trends are inferring about the future. The insights from studying trends helped in developing variety of possible futures with different key themes. These futures were analysed through ‘Futures cone model’ to arrive at preferred futures. Identifying

preferred futures provided base to develop a scenario in 2040 in which Kaali Peeli is set to be in action. To arrive at the design of Kaali-Peeli, conventional vehicle design process has been followed. Mood boards and theme boards were used for ideation and final concept was synthesized through constant revisiting of all the research that was conducted and final design was developed through 3D modelling. Further, the designed Kaali-Peeli is visualized in the already developed future scenario which marked the end of the project.

The aim of this report is to address few important questions through speculating a key and culture bound service, i.e. Kaali Peeli taxis for the future. The questions addressed are (but not limited to) related to the identity of Kaali-peeli taxi, essence of Mumbai and aspirations that are paving way for the future.

Final design through its visualization is ventured to invoke a curiosity among the viewers to have self reflection on the way our commute is shaping up especially in the taxi service.

TABLE OF CONETENTS

1. Introduction	1	17. Renders	79
2. Observational research	2	18. Bibliography	89
3. Glimpse of chapter 1 of photo-documentary	3		
4. Glimpse of chapter 2 of photo-documentary	4		
5. Glimpse of chapter 3 of photo-documentary	5		
6. Key user interview	11		
7. Purpose	17		
8. Design brief	17		
9. Bench-marking	18		
10. Trend analysis	34		
11. Future cone model	42		
12. Mood boards	54		
13. Vehicle packaging	56		
14. Theme board	60		
15. Ideation	61		
16. Design fiction	67		

1. INTRODUCTION

Experiencing Mumbai for a year as an aspiring vehicle designer the Mumbai Kaali Peeli taxi has always intrigued me. An icon of the city, still stuck in the 90's. And thus my proposal for designing it which can bring out the true essence of the Kaali-Peeli taxi. And my interest in future of mobility has influenced the proposal to be in the context of the year 2040. And thus the proposed theme emerged as **‘Mumbai Kaali Peeli (Black and yellow) taxi for the year 2040’**. Mumbai Kaali-Peeli taxi refers to the black and yellow taxis that are in the mobility service for over more than a century. The service doesn't limit itself to one single type of vehicle, rather many models of different car companies are painted black and yellow and registered as taxis. In the late 90's the numbers have seen a boost of about 60,000 odd trying to cater to the growing city's demands back then. These numbers have been consistently taken a dip since the early 2000's because of the newer services emerging in the market and overall shift towards alternating fuels. As of 2023 about 30,000 Kaali-Peelis are operating on road.[1] 29th October 2023 though marks the end of an iconic Kaali-Peeli taxi i.e. Premier Padmini. An upgraded Fiat 1100 model which was introduced in 1975 by Priemer as Padmini (named after the 14th century Mewar princess) which gained popularity in the streets of Mumbai. It remains perhaps the only mass-produced car in India to have carried



Fig. 1. Mumbai Kaali Peeli

(Source- <https://www.behance.net/gallery/89922339/Kaali-Peeli>)

such a distinctly Indian name.[2] The reason many state when asked about its popularity is that these taxis and their drivers have taken officials, politicians, celebrities, tourists (doubling up as city guides) and the city's residents to their destinations for over a century now. Yet today the service is dying. Many are moving to alternating services such as Ola and Uber because of the accessibility. These insights from early stage of research indicated that there is a problem in the service and designing a vehicle around it would be an

interesting intervention. To understand the problem better, a unique methodology was undertaken. To photograph, document, observe and interpret was the set process of the methodology. The final documentation was made into a coffee table book for better interpretation. (Fig.2)

2. OBSERVATIONAL RESEARCH

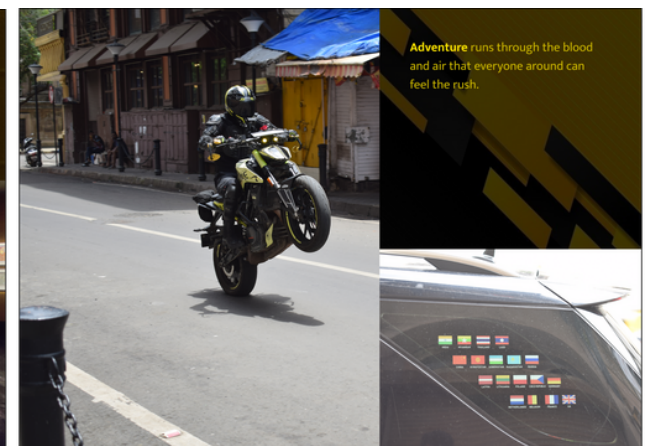
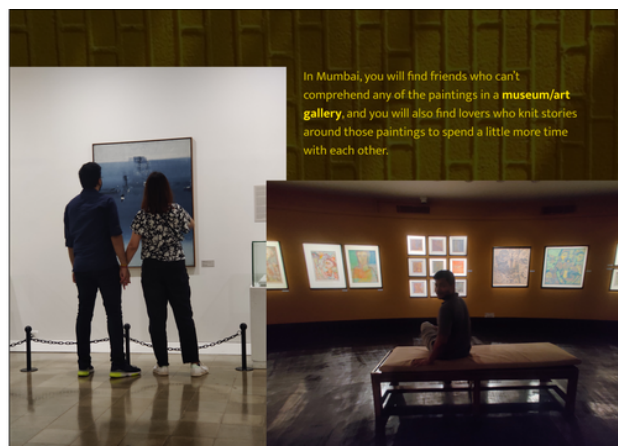
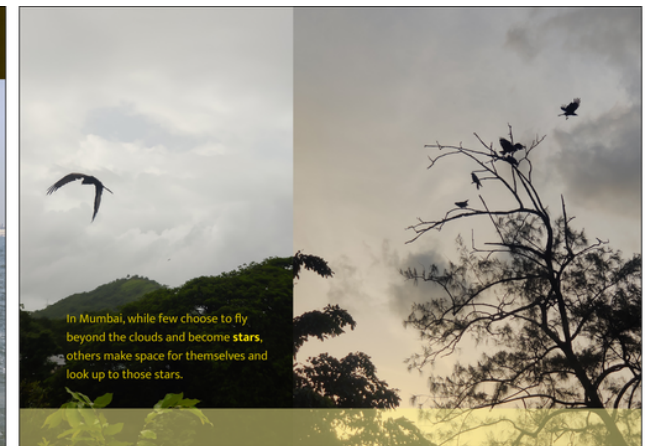
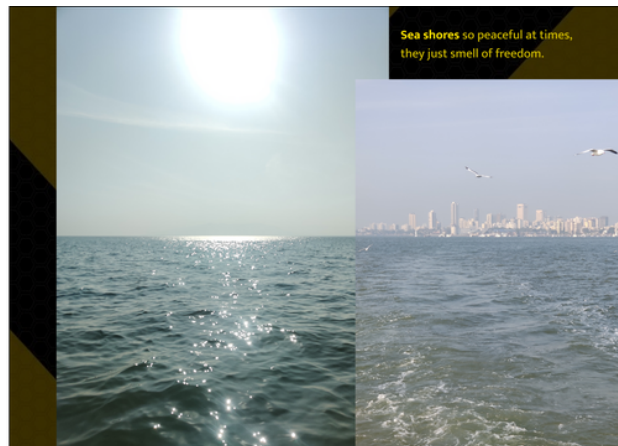
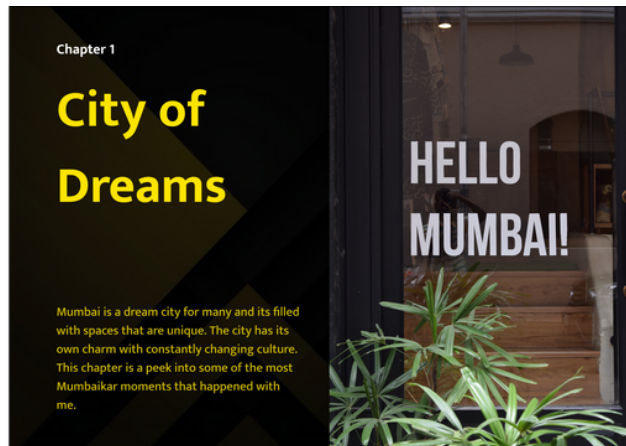
A vehicle designer's key objective is to bring some essence into the vehicle. And if the essence of the Kaali Peeli vehicles captured behind the lens, then the essence can be replicated into the final design in a better way. Also, a good **photograph** contains a lot of information and if observed carefully one can understand the nuances in it. And thus photo walks were undertaken. The aim of the photo walks was to capture a day in life of Kaali-Peelis and to understand the life around it in the city of Mumbai. Post the photo walks, for the **documentation** process three chapters were formulated. Chapter 1's objective was to capture the essence of Mumbai through a compilation of images that were captured in my experience of Mumbai (ref. Section 4). Chapter 2's objective was to capture Kaali-Peeli's spirit and drivers aspirations (ref. section 5). Chapter 3's objective was to give a glimpse of life (humans) that prevails around these vehicles (ref. section 6). **Observations** are printed along as commentary through the book. Book can be accessed through link at the end of the report or click [here](#). [3]



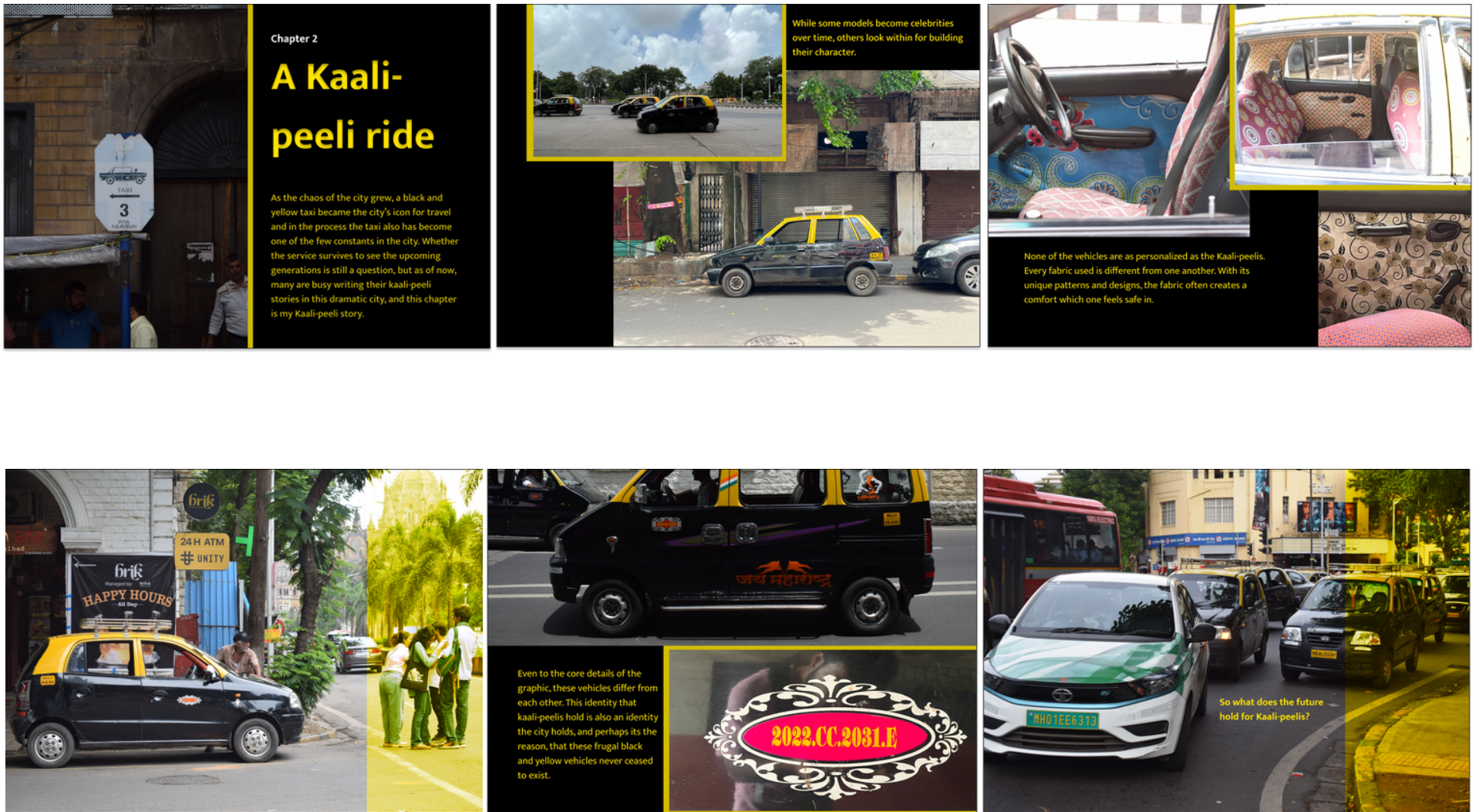
Fig. 2. Photo-documentary book

The key **insight** found from the book is that Kaali-Peeli service is facing identity crises. While every other competitor driving a taxi is a part of an organisation, the Kaali-Peelis though act extremely independent. They are only part of taxi unions, but are unprivileged of any resource to develop their service. Since their inception, Kaali-Peelis have been independent and only competition was fleet taxis. And they never faced threat as they were the only service providers. But current day technology brought concepts such

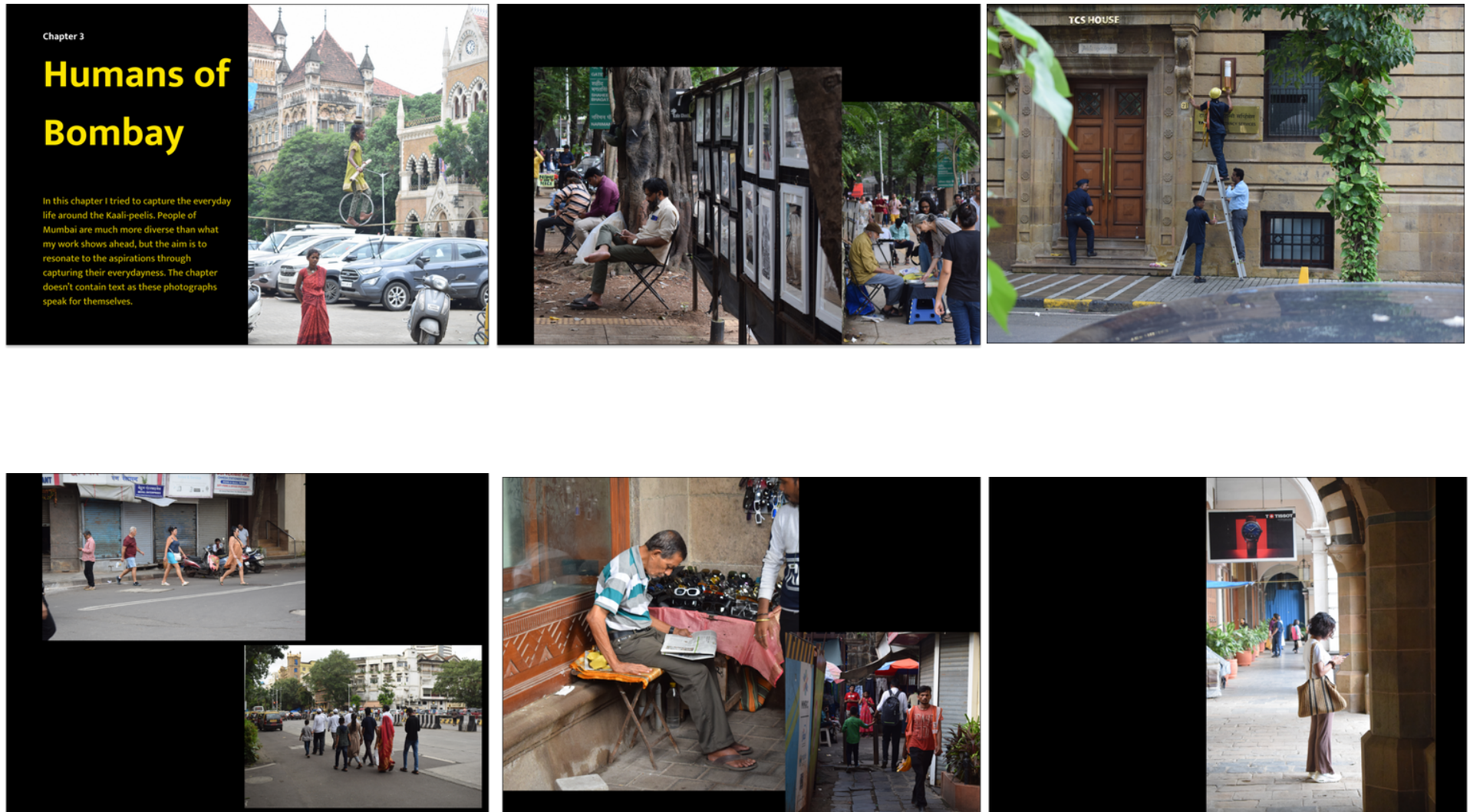
3. GLIMPSE OF CHAPTER 1 OF PHOTO-DOCUMENTARY



4. GLIMPSE OF CHAPTER 2 OF PHOTO-DOCUMENTARY



5. GLIMPSE OF CHAPTER 3 OF PHOTO-DOCUMENTARY



as Ola and Uber, that provide consistent income with independence to the drivers. Most importantly they made taxi services more accessible. But there is key factor that differentiates Ola/Uber services that has been gathered from user interviews.

8. KEY USER INTERVIEW

This is a record of an unfiltered conversation. This is a key and detailed interview that has been conducted. One can find the insight at the end of section.

User details

- Name- Akash
- Age- 26
- POB- Prayagraj, Uttar Pradesh
- Education- Senior secondary
- Marital status- Unmarried
- Profession- Uber taxi driver in Mumbai
- Years of experience- 6+

Context- After a tiresome trip back to Mumbai, I along with my two friends took an Uber to reach college. It was an hour ride in Wagon R VXI, and as we chatted along with the taxi driver, we slowly realized the potential insights he is providing. And this is the conversation I had with a very decent human being and also a responsible taxi driver.

Me- Your car looks very damaged, did it undergo any accident recently Bhaiyya(brother)?

Akash- In a city like Mumbai, for a taxi driver an accident every now and then is common. I didn't get it repaired because I have already booked a Dzire, and it is on its way in about 15 days.

Me- That's great Bhaiyya. Who owns this Wagon R then?

Akash- I only own it, I have recently cleared my EMI on this vehicle and I am investing on a new one. I am planning on building a fleet soon, so this is one step of it.

Me- So are you getting finance from somewhere or is it all your earnings?

Akash- Its finance from the bank, thing is it's quite easy to get a bank loan as there is a very good system Uber has established. Uber provides finance for a new car and monthly I guess it charges around ~21,000 INR as instalment.

Me- Does it require any collateral to buy a taxi through Uber?

Akash- Absolutely not, but yes you definitely need a credible bank account holder who regularly pays his debts. The thing is bhai, even if I fail to pay my debt on time, the car still is a good taxi, and the strength of taxi drivers is only

increasing. So they will sell the car to some other person. But it is very unlikely, as many see good business in this profession and eventually they clear the debt.

Me- I shouldn't be asking you this, but I am curious to know how much do you earn, cause if the figure of 21,000 INR exists, then your earning should be a lot more to pay and sustain in a city like Mumbai.

Akash- It's okay Bhai, it depends. This is a dynamic business. For example, if I take 120 trips, which is also my target, I will have an additional bonus of 5000 INR for the week, otherwise it is somewhere around 55-60,000INR at least. But if I own a fleet, then there is a very different kind of earning that happens. For example, my brother has a fleet of three Ertigas, and a few other vehicles. And all of them operate on uber. And every driver has targets, but it is not necessary that you take them. And my brother apart from owning a few cars he also manages a fleet of about 70 cars owned by different people and all of them operate on Uber. And he started along with me driving. There is also another friend of mine, who started as a car cleaner and now owns an apartment in the neighbourhood of Shah Rukh Khan. So that much money is there in this business but one has to be smart about it. You wouldn't believe, if I don't get a ride the whole day, or if I don't accept any, I still will be paid ~500 INR by Uber.

(Akash showed his Uber for fleet owners app under his brother's account on his phone, and every transaction of every ride under the fleet is recorded and the whole system is lubricant.)

Me- I never imagined the scale of this business for a taxi driver, but tell me one thing, how much is the commission charged by Uber and fleet owners?

Akash- I can't tell you exactly, but I can tell you figuratively. How much is the fare estimate that you have been given by Uber?

Me- About 615 bucks.

Akash- Yeah in this I am given 490 INR, so you can get an idea now.

Me- So you know the fare which you will be rewarded beforehand?

Akash- Yes Bhai, everything is available now on the app.

Me- And what about the fleet owners?

Akash- Their income is far greater in terms of the number of rides their fleets take. For every ride a car in the fleet takes, depending on the ride, it is either 3 rupees or 5 rupees they get rewarded with. Even though the numbers look small, but at the end of the month or year if you calculate,

it's a lump sum. And there are other commissions but that's their key earning.

Me- Tell me one thing Bhaiyya, do you think it's justified for Uber to charge so much?

Akash- I don't mind, cause I don't have to worry about finding a customer. I am quite content with the business that happens on any day of the week. I can adjust a destination location and my app finds me customers preferably to that location or those who have to go in the same direction. That's a key advantage, I can plan my day accordingly.

Me- But many times, drivers cancel my rides Bhaiyya. They call me for the destination address and once they know, they cancel it from their end. Why does that happen if you are only finding the rides you want?

Akash- It used to be the scenario initially, that driver isn't aware of the destination address. But eventually Ola, Uber have given the provision to drivers to access the destination address. Ola in between only showed the destination street name, which used to be very confusing. For suppose, someone wants to go to Gandhi Nagar, which Gandhi Nagar is the customer talking about, we would never know. And that's why sometimes we ask the customers themselves. But this created a stigma. Passengers nowadays if asked about their address think we will cancel the ride and hesitate to

share the information. But it's not completely true. And also now there is no problem. For example tonight I just finished my target and I was at Mira Road, and I have to go to Ghatkopar, as I live there. And I just put that region, and you guys had to go to Powai and it falls in the same direction and thus Uber found you guys a ride whose taxi driver also wants to go in the same direction. After dropping you off, I will go back to my room. Isn't it better this way?

Me- It is Bhaiyya, I never knew of the algorithmic operations of the system. It's kind of a revelation for me. So do you plan your day?

Akash- Yes Bhai, in the morning I take the airport route, because I live in Ghatkopar and it's a free way and I can drive freely and reach quickly. I take few short rides from there and depending on the situation and condition of traffic at that time, I select the destination addresses and I get better rides which makes me money and also I don't feel stressed about the next destination because 90 percent of the time, it's the same region and remaining time its neighbourhood regions. So that's how I plan my trips. But it is not necessary everyone plans their trips, there are a few I know who just blindly take on everything that comes in their way.

Me- Were you part of Uber since you started or where were

you before this?

Akash- Its almost 6-7 years now with Uber. When I first came to Mumbai, there was Taxi, and I was earning a lump sum. Rides like yours at least earnt me 1500-2000 INR. But eventually Uber and Ola came into the market and made the fares more reasonable.

Me- You said you live in Ghatkopar in your room, I am guessing you are either unmarried or have your family elsewhere? Where are you from anyway and what is your Name bhaiyya?

Akash- I am single Bhai, and my name is Akash. I am from Allahabad. My brother said once I can leave driving the vehicle and managing the fleet I'll be enough for marriage and then maybe.

Me- That's a profound thought Bhaiyya, but honestly from whatever you said i am sure you will soon own a fleet. You earn much more than what a normal engineer is earning. Didn't you find any lady yet?

Akash- Oh, not in Mumbai bhai. If i am marrying it would be a woman from my place. Thing is bhai, like you said, if I take up a normal job, with my qualification even if I get the most out of it, it will be only upto 20,000 INR per month. And in a city like Mumbai, it's impossible for me to sustain with that salary. And along with a salary would be even

bigger headache. Driving also is a little unstable profession and I guess it is expected that I will be little stable by marriage. Even if I don't shift my family to Mumbai in the future, they still want things at home just like people in Mumbai. Which woman at home wouldn't want a washing machine or vacuum cleaner. And women are smart about it. And also, the place where I come from, if I am hospitalised for one day, hospitals and doctors charge at least 10-15000 INR per day. Considering all this I believe I still need time.

Me- Why not Prayagraj bhaiyya to settle down, and how do you think Mumbai is different from where you come from?

Akash- Mumbai is active 24/7. I can work at any time. That's a flexibility I get. And what is the usage of Uber in Allahabad bhaiyya, its not sustainable there and people don't even give respect there.

Me- Do you get respect here Bhaiyya?

Akash- Well a taxi driver is a taxi driver anywhere. I don't mind it, but few customers especially women think when they book a ride, they own the cab, they own me and they give orders to carry their luggage and all. I can do it if the customer is an oldie or someone who can't help themselves, but why should I help those who are completely capable of helping themselves. Otherwise, in this vast city which runs round the clock, it doesn't really matter till I am earning and

providing for my family. See the road Bhai, it's almost an hour past midnight and see the traffic.

Me- Yes Bhaiyya, the place where I come from, the roads almost look abandoned past dinner times. How is the case of Prayagraj, I have heard it's quite unsafe especially at nights due to gun violence?

Akash- Allahabad also sleeps off Bhai, and in the case of guns and security, how can we help any egoistic fool who thinks putting a bullet in someone's head because their ego is hurt? We can't and in that matter, Mumbai is pretty safe actually.

Me- A completely off the topic question. What do you think of kaali-peelis Bhaiyya, do you think they will disappear in future?

Akash- I don't think any service would disappear as such especially in a city like Mumbai. I am not sure of how it would be but kaali-peelis have customers. They don't have air-conditioning bhai, so many don't prefer it. But metre does charge more than what an Uber would cost.

Me- How much would they earn Bhaiyya? Do you have any idea?

Akash- I can't tell much, but whomsoever I know in that business at least earns 2000-2500 per day. Thing is Bhai,

they don't often take longer routes and they operate in good roads, and have their own flexible timings and responsibilities as mostly they own it or someone from their family used to own one in the past. And eventually they will turn out to be something.

Me- You are impressive Bhaiyya, so I will tell you why I am asking you things in a very detailed manner. I am working on something related to taxis for the future and I wanted to understand what is happening.

Akash- That's great Bhai, can I also pool my cars in it or any way I can be part?

Me- Alas! it isn't something like that. I am designing a taxi for the future. I have to show how it should look like and all. And as taxi driver would be spending most time in it, I just wanted to understand your perspective.

Akash- (We were inside the IITB campus by now) Is this a big college Bhai? It certainly looks big.

Me- It is Bhaiyya, one of the elitists in India. Many people die literally to come here.

Akash- That's great and you study here? How many years? Where do you live?

Me- I live in hostels and I get a stipend, monthly salary kind

of thing. We have a nominal fee and subsidised hostel facilities good enough for one person to live.

Akash- I have never come across such a college. This is the biggest in India?

Me- It is one of the biggest, there are other IITs as well and many other institutions.

(We reached the destination)

Me- Thanks Bhaiyya, for being so open about your life. It was a pleasure talking to you. It certainly gave me so many insights for my project.

Akash- No problem, have a nice day.

Of the many interviews conducted the key insight that differentiates Ola/Uber services to that of Kaali-Peeli is that drivers enlisted with 3rd party service facilitators like Ola and Uber are consistently provided with incentives. The driver who learns the algorithm of the application or service they are registered with, they learn to establish their schedule and destinations to their convenience. And thus drivers see more benefit through incentives whenever they achieve feats established by the service facilitators. There is independence, but the whole system is built around one key idea, i.e. drivers as well as platforms are in agreement to

earn as much as possible. And that exactly is the difference. For Kaali-Peeli drivers money isn't the criterion to hold onto the service, rather its a lifestyle they adopt contributing their lives to the taxi service with a pride of driving Mumbai's iconic service. Following are the fundamental aspects in which Kaali-Peeli service is different from others-

- **Affordability-** Kaali-Peeli service is designed around a meter which dictates the cost of the ride. The algorithm governing the rate is designed keeping in mind the necessities of drivers and their well being as well as affordability of general public. The prices are fixated and don't spike on rush hours which indicates reliability and affordability of the service.
- **Iconic-** Kaali-Peelis have an innate character and charm that resonates with Mumbai. The iconic nature of the service makes it more enjoyable in terms of experiencing an ingenious service.
- **Path control-** Generations of drivers under the Kaali Peeli service have managed to navigate through the busy roads of Mumbai without any help of GPS systems. Technology evolved but passengers sitting in a Kaali-Peeli are quite comfortable even today if the driver isn't using a navigation device because the drivers are known to remember different routes. Slowly the belief in taxi drivers for already knowing the route is getting lost as everyone is dependent on GPS systems.

- **Human touch-** If one looks closely at a passenger's journey in Kaali Peelis and compare it with other service providers, they can find that in a Kaali-Peeli ride the passenger has no idea who the driver is or how they drive unlike in services like Ola/Uber where the passenger has every possible detail about the driver and their ratings are supposed to infer their behavior on road. In the age when safety is the key USP of services like Ola/Uber, Kaali-Peelis don't face an issue with it. Passengers trust the driver only because of the service and their contribution to the city. And most importantly Kaali-Peelis have kept up their chin throughout the century of their service which embarks reliability. A passenger comfortably sitting along with a stranger(driver) in a car not knowing the directions but trusting blindly that the driver would take care of the journey could have been only possible with service like Kaali-Peeli. And the trust comes along with the conception that people in the city are safe, especially while travelling in a Kaali Peeli. And this trust is something other service providers couldn't tap into.

This trust is the reason for keeping such service alive as it shows the goodwill people have for each other in the vast city of Mumbai. And thus purpose for the project was found.

8. PURPOSE

Designing a Kaali-Peeli for 2040, knowing the service might soon be extinct underlies the purpose of the project. The unique mobility service intertwined itself with culture that helped Mumbai become the city it is today. The culture of being able to trust others and create a positive and safe atmosphere for everyone to grow in, is unique to the city of Mumbai. Spaces like Kaali-Peelis played a vital role in cultivating such culture. Today if the city is losing these spaces it means it also is losing the culture, which soon impacts the synthesized trust that took years to get established. Hence, it is everyone's responsibility to save these spaces where mutual respect and trust exists simply because we are humans. And to design for the year 2040 is to believe that neither the service, nor the trust is going to disappear. And that is the purpose of the project.

9. DESIGN BRIEF

Finding purpose paved path to establish a design brief to strike boundaries and dictate the final deliverables. Following is the established design brief- **'To design a Mumbai Kaali-Peeli taxi for the year 2040 and speculate a scenario in the said year to shed light on the potential Kaali-Peeli service holds in the present.'**

Project is thus **scoped** to design a vehicle that holds the essence of Mumbai Kaali-Peeli service and has functional aspects to address the variety of necessities that users (drivers and passengers) have in the set year of 2040. **Boundaries** are drawn through setting up a scenario that speculates different aspects of a Mumbai Kaali-Peeli ride in the year 2040, there by providing base to intervene a design solution in every aspect.

10. BENCH-MARKING

Design brief requires two entities to be designed simultaneously, a vehicle and a scenario both set in 2040. For designing the vehicle, technology and experience of a taxi service needs to be speculated and bench marking of multiple current day taxi services around the globe that are pushing the whole service towards the future were analysed. The different designs that have been bench-marked were New York city taxi (2014) , LEVC TX-London taxi (2017), Zoox-Amazon's robotaxi(2020), Waymo one- Google's robotaxi (2022), Cruise- GM's robotaxi(2022) and REDS-by Chris Bangle(2017). Different aspects of design have been categorized through photo documentation. The categorization includes location, CMF, packaging and ergonomics, technology, fuel type, driver interaction products, interactive mediums, service products, roof, doors and essence of the vehicle.

New York city taxi [4]

Nissan NV200 Taxis have hit the roads of New York in 2013 and still are sustaining. With a vision to modernize, NV200 NYT has improved technological accessibility and facilities that make it an inclusive design. If there is any city comparable with the multi-cultural geology of Mumbai, it is New York, and the design even though a decade old, resonates its charm to the current day Mumbai city.



New York taxi

Insight

Design of New York taxis considers inclusiveness to be the identity of its design. It's a benchmark to understand how diversity can be accommodated in a space. Resonating with Maruti Echo in space, NV200 approaches taxi service to add value to the lives of its users.

LEVC TX- London Taxi [5]

Anyone anywhere in the world, automobile enthusiast or not surely has an opinion about London Taxi, because everyone has come across at least an image of it. The stories of the London taxi drivers resemble with that of the city of Mumbai. Just like in London, even the Mumbai's kaali-peeli drivers know the city from tip to toe. The elegance of the London taxi is unmatched though, its suicide doors and considerations for comforting a driver as much as passenger is what stands out from the design. Mumbai deserves an innate kaali-peeli resembling the elegance of London taxi.



London/2017

LEVC TX- London Taxi

Insight

When given resources, a design can embrace art without compromising on functionality and that is exactly what London taxi is all about. Even though its far away from the design of Kaali-peeli, the idea to empower people emotionally through a taxi ride exists in both the vehicles.

Zoox- Amazon's robotaxi [6]

A post modern society expects a post modern thought, even in mobility. Zoox defined a direction to the future of mobility, completely self aware with an added degree of freedom with its rear steering ability Zoox has only become the first of many autonomous vehicles produced. Reports state the trust on these vehicles is only growing, and thus it would be no wonder if in a decade we witness these vehicles everywhere in the world. But the real question is, can such technology be imagined in Mumbai, a chaotic, rich yet partly damaged terrain? Zoox is an aspiration, so far to that of current day kaali-peeli in design, yet both carry few of the most ultra modern people to their destination across the city.



Zoox- Amazon's robotaxi

Insight

Zoox is what future holds. It doesn't mean that we will have autonomous vehicles taking over. It needs sincere and seamless efforts to achieve it. Zoox is a technological revelation that opens up new real within the experience of a taxi ride.

Waymo one- Google's robotaxi [7]

Google's influence has been evident in all the areas of technology. Current day, Google has made its mark even in the remotest of places around the world. Waymo one is a product of Google's idea of mobility, a Jaguar having a crown

eye, making it conscious, spreads the idea of making any car autonomous, be it big or small, all it needs is a few technological additions.



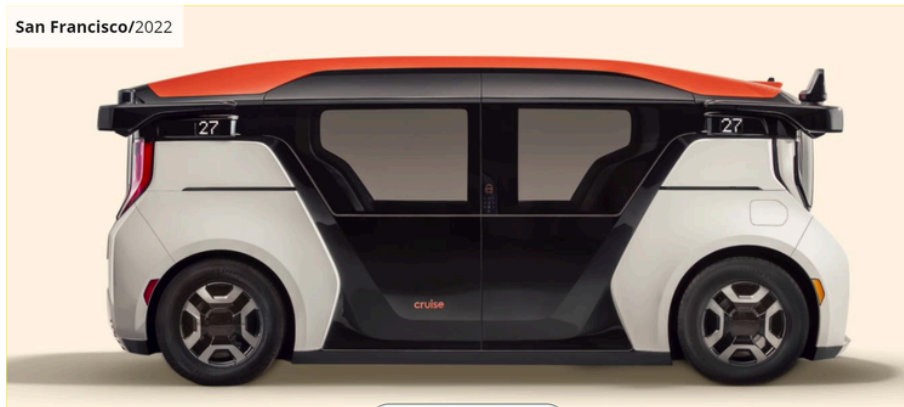
Waymo one- Google's robotaxi

Insight

Google's personalized autonomous taxi paints a picture of having a pet like taxi. With the amount of data Google owns about a user, its quite possible that our public transportation too gets personalized with each ride giving a new experience. The idea to peronalize a community service probably chips in from the Google's other products. But it still holds great value, as the possibilities with data are endless.

Cruise- GM's robotaxi [8]

Very similar to Zoox, GM's cruise concept is yet to hit roads. The idea of mobility becoming autonomous is still at its infant stage, and everyone wants to chip in, thus the idea of cruise. Currently the service of GM's Cruise has a drive-able car with an added self aware technology.



Cruise- GM's robotaxi

Insight

Taxis can be autonomous, but is there a need for the service to become autonomous? There are already many ethical questions the world is trying to find answers for, like the trolley problem. To extend the idea to community service is poses a bigger threat. But since these vehicles are proving to be performing with much lesser accident rates, the questions are become less lethal. GM's cruise is only different from Zoox in its form and figure. Essential question is, without a taxi driver, would the kaali-peeli ever be the same?

REDS by Chris Bangle [9]

Chris Bangle's REDS (Revolutionary, electric, dream, space) is a design that triggers the conventional mind to think radically of the space and form in mobility design. A micro-car made for Chinese urban cities, REDS takes the concept of multi-utilitarian experience of a vehicle to future and it does it in a very limited space. A variety of use cases and users can be accommodated in this unique design. Mumbai and space doesn't really go well together, be it vehicles, roads, building, or just a footpath. Hence REDS can be an inspiration to look at space not just as given but to explore as an opportunity to create unique experiences in the same space.



REDS by Chris Bangle

Insight

Space utilized at its finest, REDS offers a creative solution to an ever growing problem. Its a vehicle built on scenarios and rethought in other scenarios, and this iteration resulted in the compact yet blingy design. But when put this vehicle into a public service use like taxi, will the modularity in space become a hindrance to the everyday-ness of the user?

Various elements of these designs were categorized and compared. Different designs are color coded as follows to indicate reference of image in the further analysis-

New York city taxi (2014) -



LEVC TX-London taxi (2017)-



Zoox-Amazon's robotaxi(2020)-



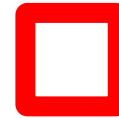
Waymo one- Google's robotaxi (2022)-



Cruise- GM's robotaxi(2022)-

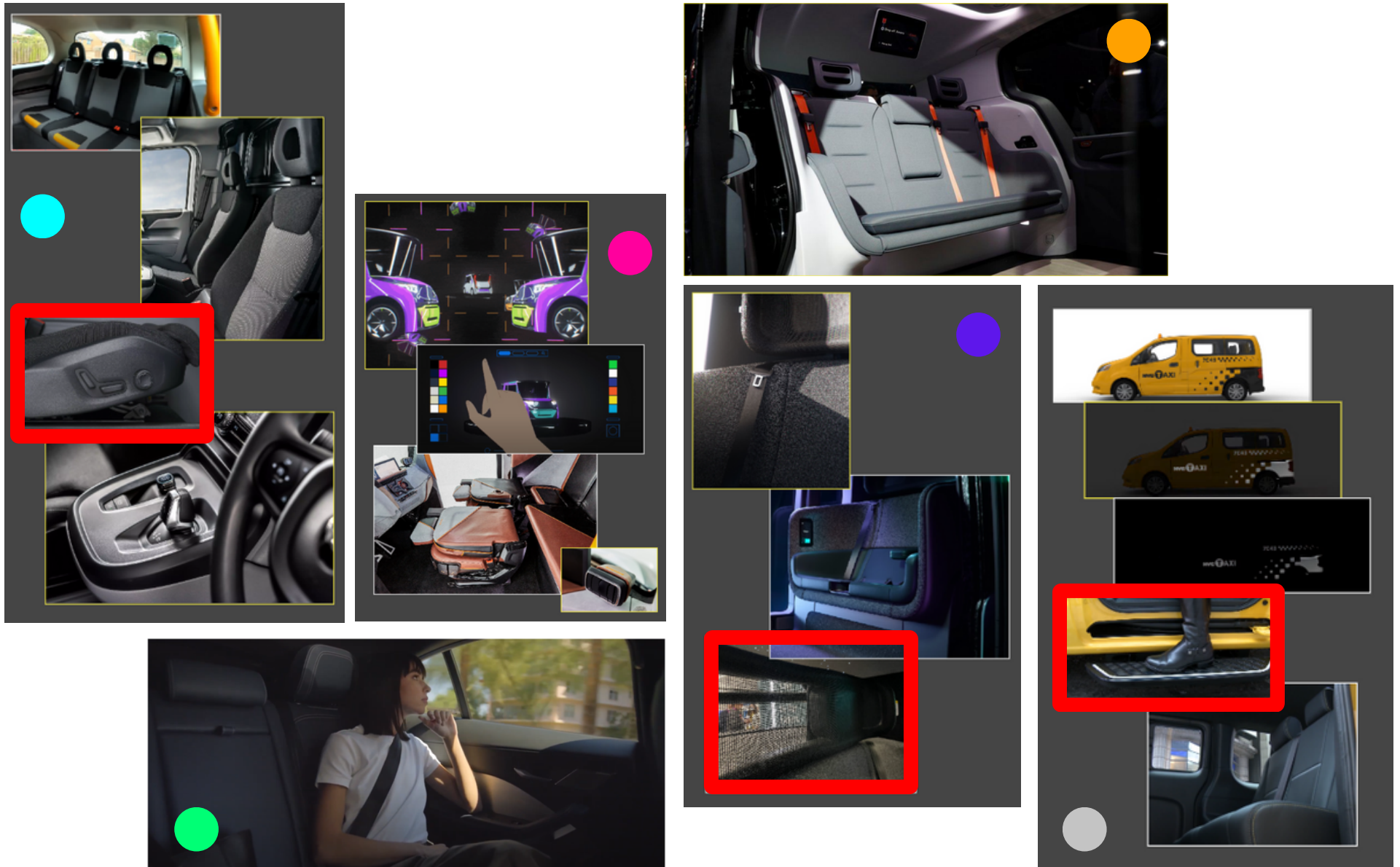


REDS-by Chris Bangle(2017)-

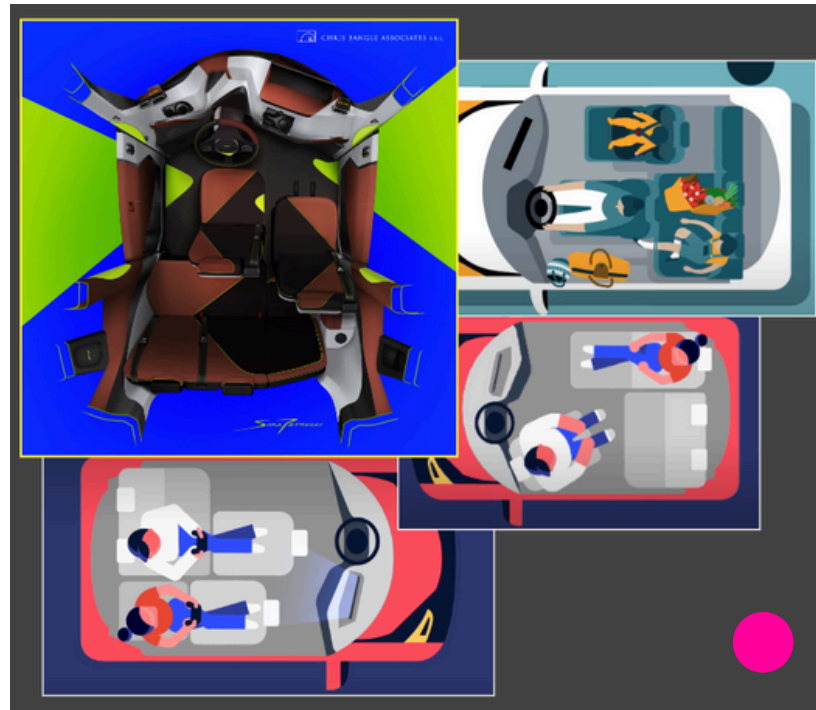


Information from bench marking was assessed and revisited multiple times during different stages of design process. Highlighted zones were elements of design that have been carried forward and were intended to be part of final decision.

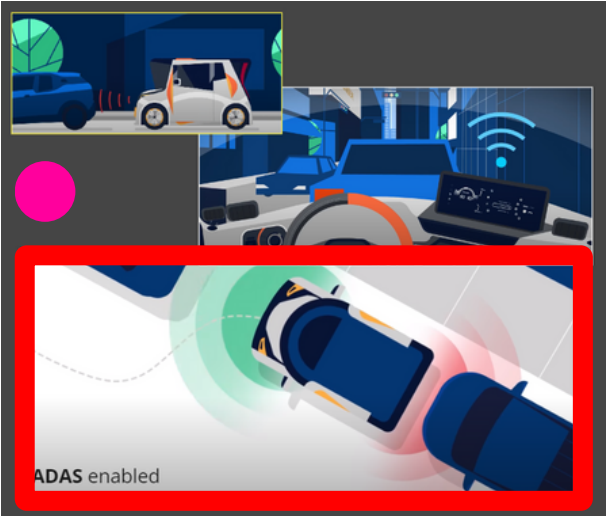
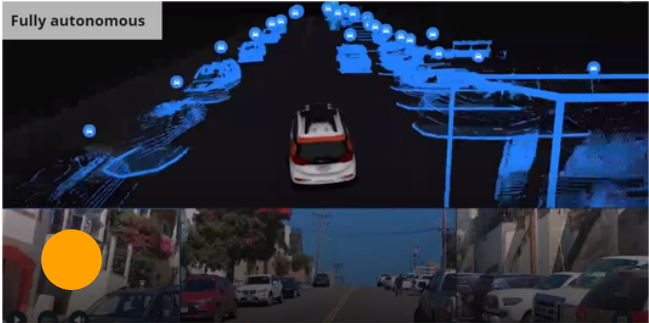
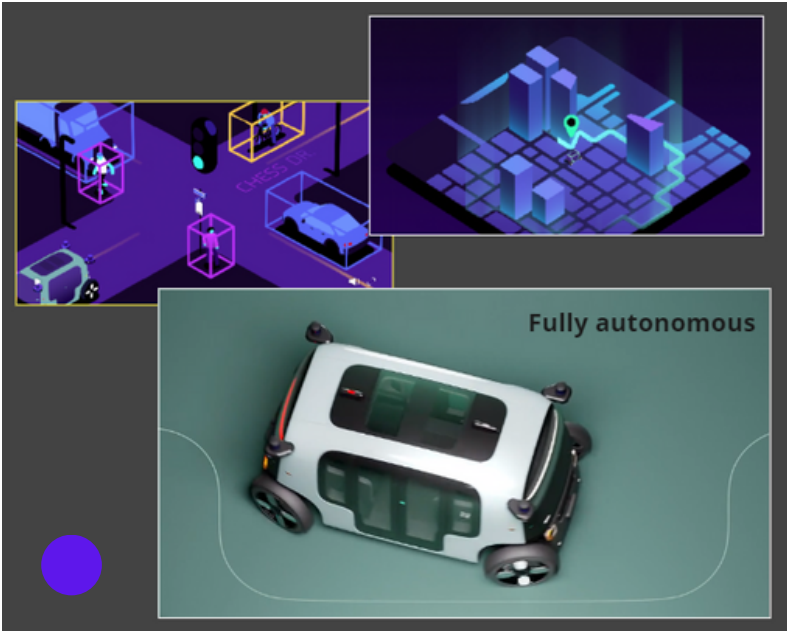
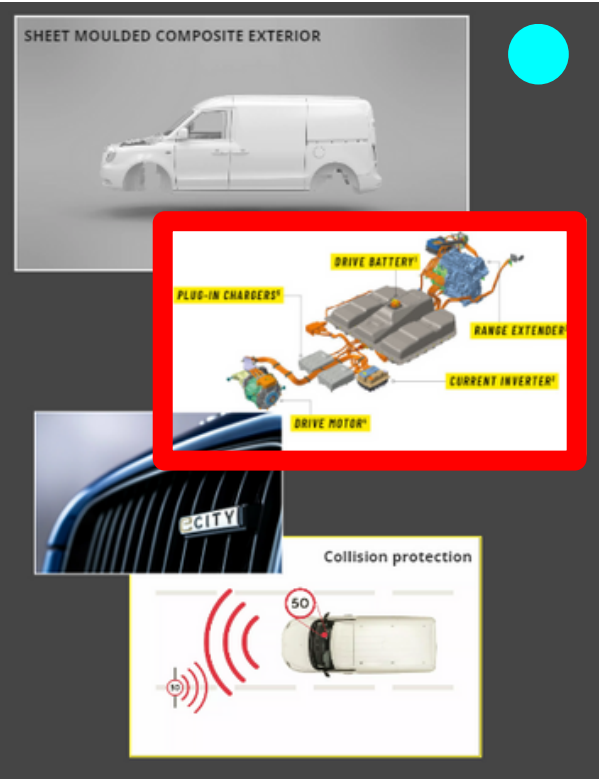
10.1. Colour, material and finish



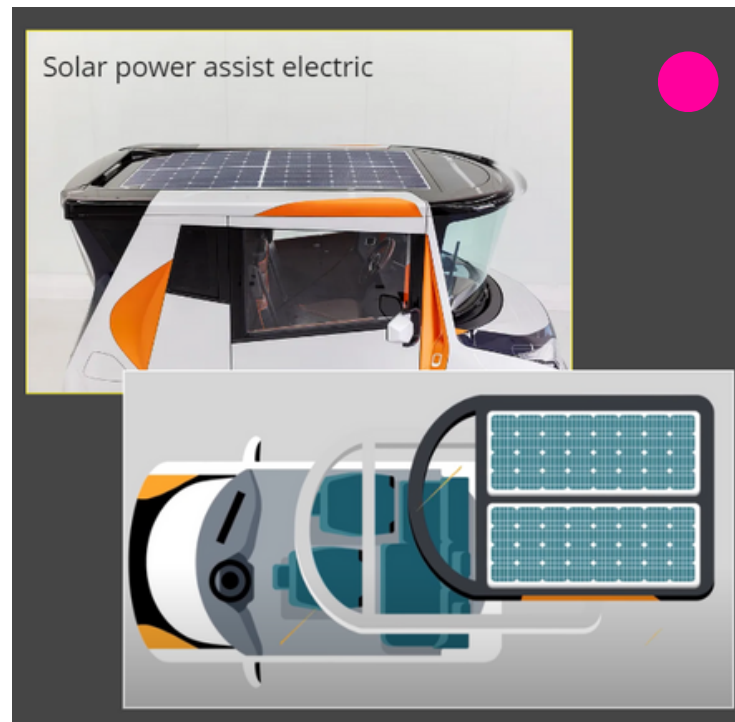
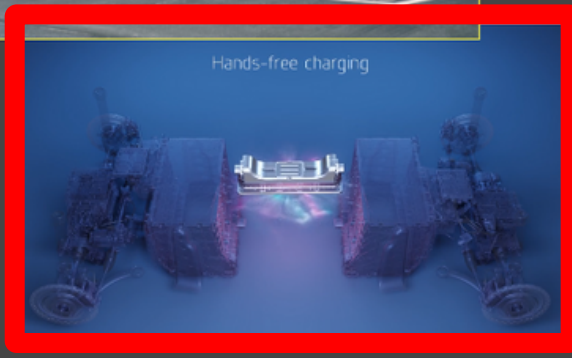
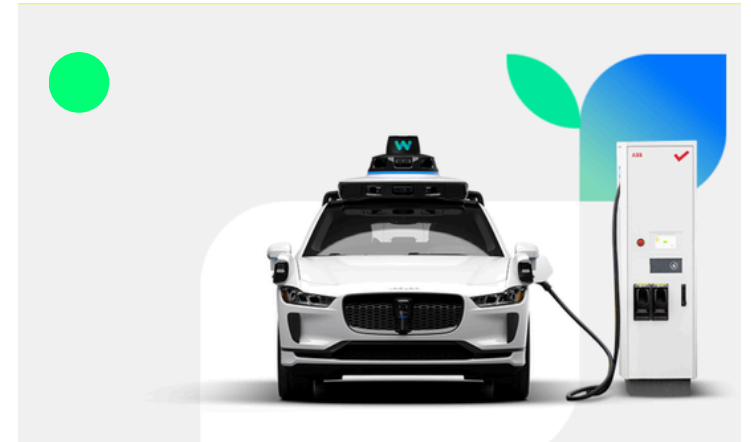
10.2. Packaging and ergonomics



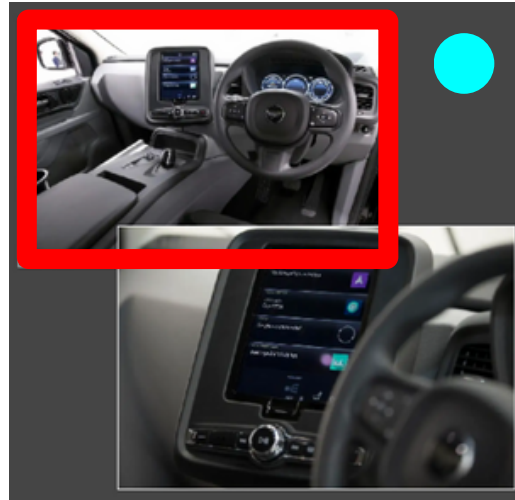
10.3. Technology



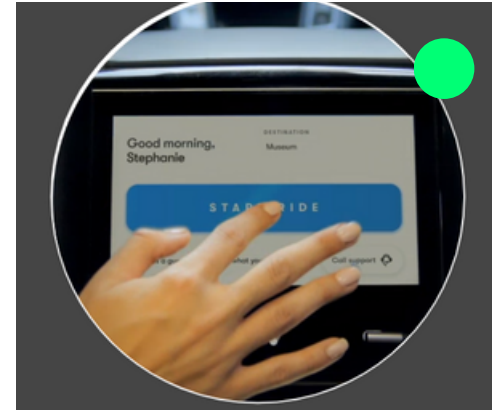
10.4. Fuel type



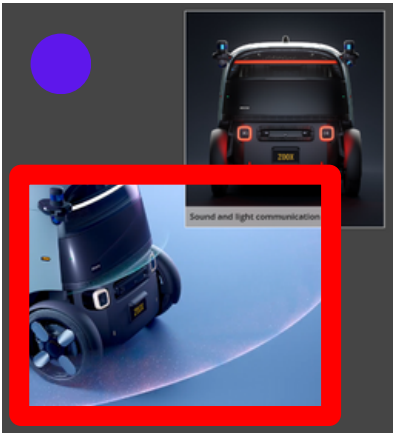
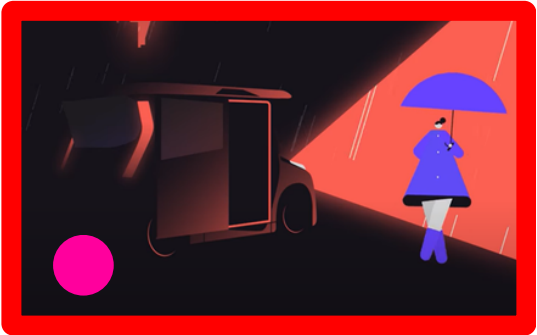
10.5. Driver dashboard



10.6. Interactive products



10.7. Service products



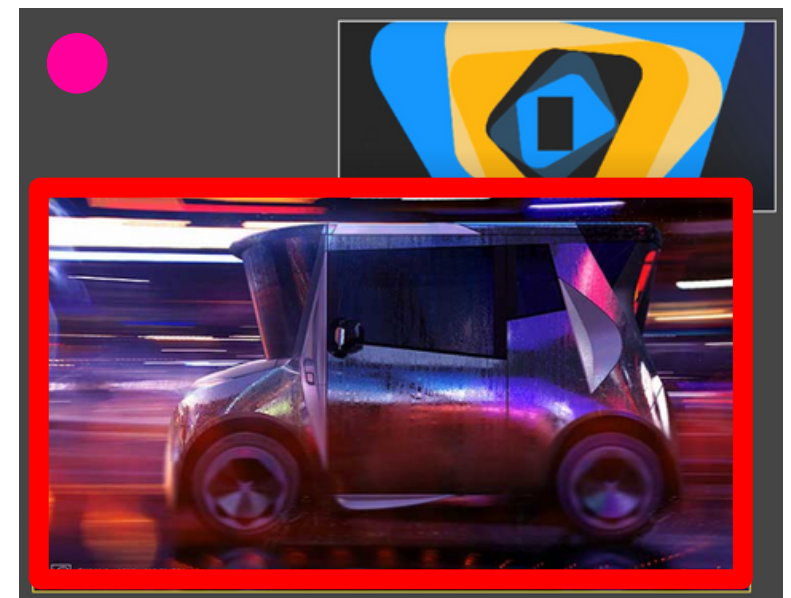
10.8. Roof



10.9. Doors



10.10. Essence



Insights from categorization of different aspects of design

CMF

The character of the vehicle is ultimately judged by its color, material and finish. The kaali-peelis with their personalized touch in graphic and fabric are already ahead in the race. But to bring out finish and to create the elegance these designs created is a challenge.

Packaging and ergonomics

Most of these designs consider one key aspect in designing a service, to improve social interaction through space.

Technology

Technology is growing and consciousness in vehicles is improving day by day. But to design technology to the necessities of the users is still under process. Once vehicles past the stage of level 4, there would be immense research on the need based AI in the vehicles.

Fuel type

Green technology is not a myth anymore, and especially in vehicles, the society in all ways is pushing people to adopt electric infrastructure in vehicles. Accessibility of recharge stations on current day is still a burden, but speculating charging infrastructure, there are abundant possibilities to

solve the issue.

Driver dashboard

Interactive interfaces for driving assistance are still at its infancy in India. There are no certain regulations over the ergonomics of dashboard unlike the west. Said that, a taxi is a good place to hold values, and design better considering why the regulations exist.

Interactive products

Interactive mediums in taxis will be rethought. Interactions have always been there, be it news papers in the past or screens for navigation in the present. With integration of technology, the possibilities are widened up.

Service products

New challenges come up as everyday needs of people get upgraded. But to have universal design within ever changing necessities is what makes these designs different from others.

Roof

A ride almost is like a film showcased from the car door windows, often abstract but overly dramatic. The pleasure in having a window seat while riding a taxi should not be taken for granted, and roof should accommodate some space for the user to get a peek of the outside world.

Doors

There are three things about doors, one the way it provides safety to the people sitting inside, and two the ability of doors to make the hopping in and out process easier. The third is how much space it takes.

Essence

Every design above contains a unique essence that is consistent throughout the design language, from the inside out. To capture the essence, designs need to hold on to the spirit of the vehicle in its truest sense.

Designing taxi has transformed from makeshift solutions to creative approaches to cater to the needs of users. Different parts of the world have different approaches as to the needs of the users specific to geography. As the pioneers of futuristic taxi services the core values these designs hold are, sustainability, service through user centric approach, inclusiveness and personalization through value adding technology.

11. TREND ANALYSIS

Bench-marking indicated that the evolution of taxi service is happening within the context of its geography, its socio-economic construct and technology resources the services were invested with. For understanding the context of 2040 as per the requirements from design brief, trend analysis has been conducted. The methodology adopted was synthesized through categorizing different trends that one can see in the

present w.r.t India. Mumbai Kaali-Peeli can be summarized as 'Mobility service vehicle for Mumbai' and hence four trends were identified as essential for speculating the context of Kaali-Peeli in 2040. The trends are mobility trends, technological trends, design trends and general trends. Card sorting was used for categorization. (ref 11.1) These categories provided inter-relatable spaces that were later mapped into a uniquely synthesized tool. The tool is named as CDPT (Core values, directions and products for trend analysis). (fig. 3)

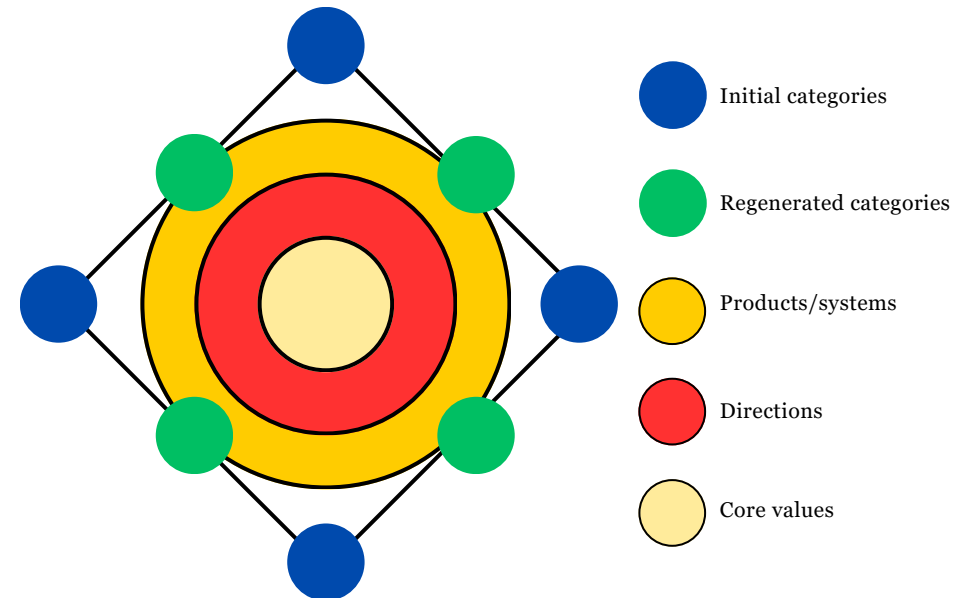


Fig. 3. CDPT (Core values, directions and products for trend analysis)

The concept emerges from the idea the current day products indicate different future directions and these directions indicate our core values of the future one wants to imagine.

11.1. Card sorting technique for categorization

Initial categorization

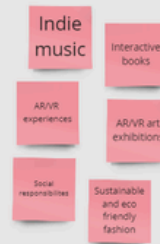
Design trends



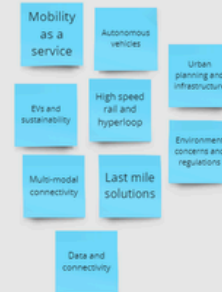
Technological trends



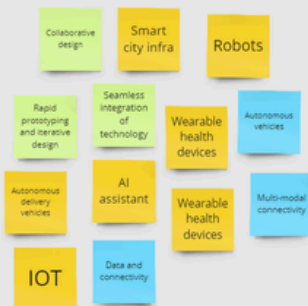
General trends



Mobility trends



Design and technology



Sustainability



Design and service



Design and emotions



Regenerated categories

The map uses categories generated from card sorting to map the boundaries of CDPT. Note that there are 8 categories in total which have overlapping cards within them. Hence the diamond shape of CDPT. But the concept can be extended to any even number of categories. Different categories are mapped into CPDT for understanding their inter relations. (Fig.4.)

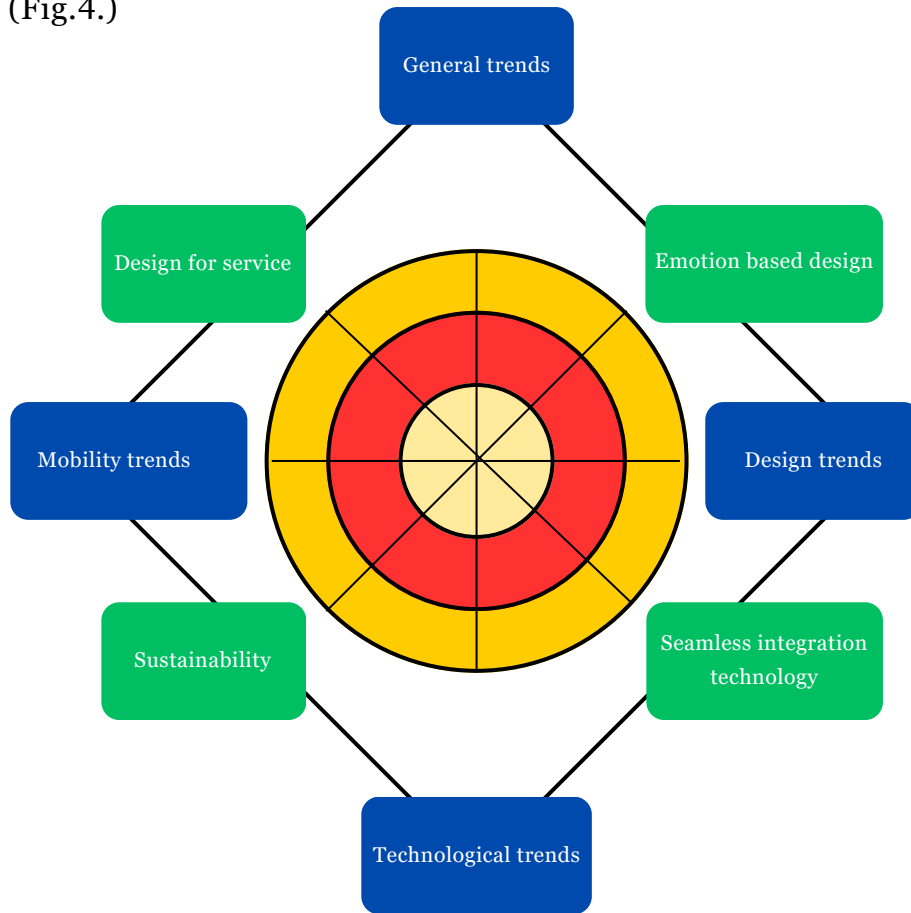


Fig.4. Trends mapping on CPDT

The sections divided in the central disc space indicate boundaries of the trends which have overlapping elements with their adjacent trends. The technique limits itself to indicate relations between trends that are adjacent to each other. Despite that if the discs are rotated each of the element in the disc can be related to other trends to fetch any useful insight. For the project though, elements are carefully placed to bring out efficient insights. Different products/systems that have been considered for the analysis are as follows-

Images are sourced from Google for this section.



Products/systems



Minus zero's
autonomous vehicle,
Bangalore



Formula-e,2023,
Hyderabad



Digital magazine for
air, Panasonic



Digital mobility
services



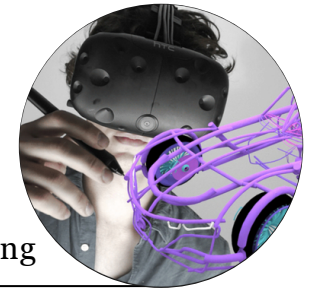
MG Comet, micro car



Covid vaccine



Diamond trading
centre, Surat



VR modelling



Lifestyle products



Amazon campus,
Hyderabad



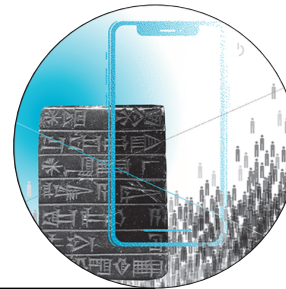
boAt ring for health



Mixed reality



Sustainable fashion



Data Encryption



EMO- LivingAi,
Table top pet



Khaby Lime, Meme artist



Andhra Bhojanam



Unified payment interface



Travel and more



Oppenheimer, 2023



Atmospheric water generators, Meghdoot



Open network for digital commerce



Zero emission building by Shunya, IITB



Cleansing ocean technology



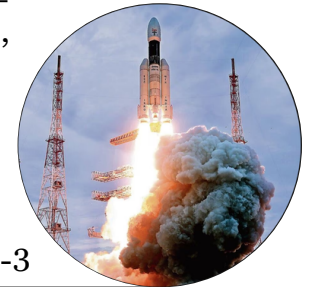
Dabbawalas of Mumbai



Vehicle tracking



Boron rich nano-sheets, IIT gandhinagar



Chandrayaan-3



Human factors



Bio-philic design

Analysis of the product space ● after mapping different elements into CPDT generated different directions of future trends. Different directions of future trends that are generated were-



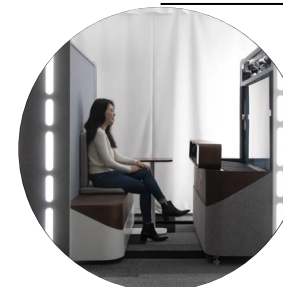
Directions



epump- Bangalore



Delhi-Mumbai highway



Google's 3D video calling booths



Van Gogh 360- Mumbai



Pride parade- Mumbai



Under-standing self



Teach to inspire-
TeachforIndia,
Mumbai



TATA house- Mumbai



Free bus service for
women



Gati Shakti- Multi-
modal connectivity

Its important to note that the products studied and the derivative directions assessed have a bias of preference. The selection and analysis of any future trend strictly comes with the bias of vastness of research conducted by the designer and also the intent to see unique possibilities. For this particular project the elements in the trend analysis are

selected basis on their value addition to society. CPDT helps to process different elements to understand the key values that society as a whole is aspiring. Aspirations about futures defined today would provide a base to build a context and scenario for the future and also would help to understand and gauge the advancements to decide what fits in the final design, and in this case its Kaali-Peeli for 2040. The core values thus identified are as follows-



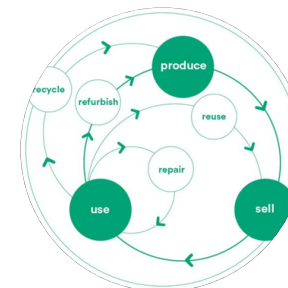
Core values



Service economy



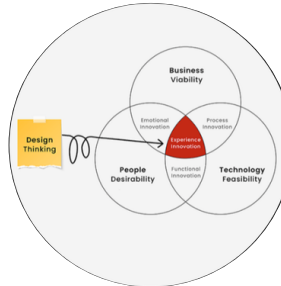
Green energy



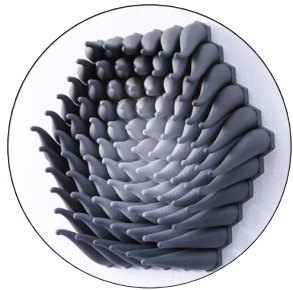
Circular economy



Data driven society



Think design



Organic forms



Realizing emotions



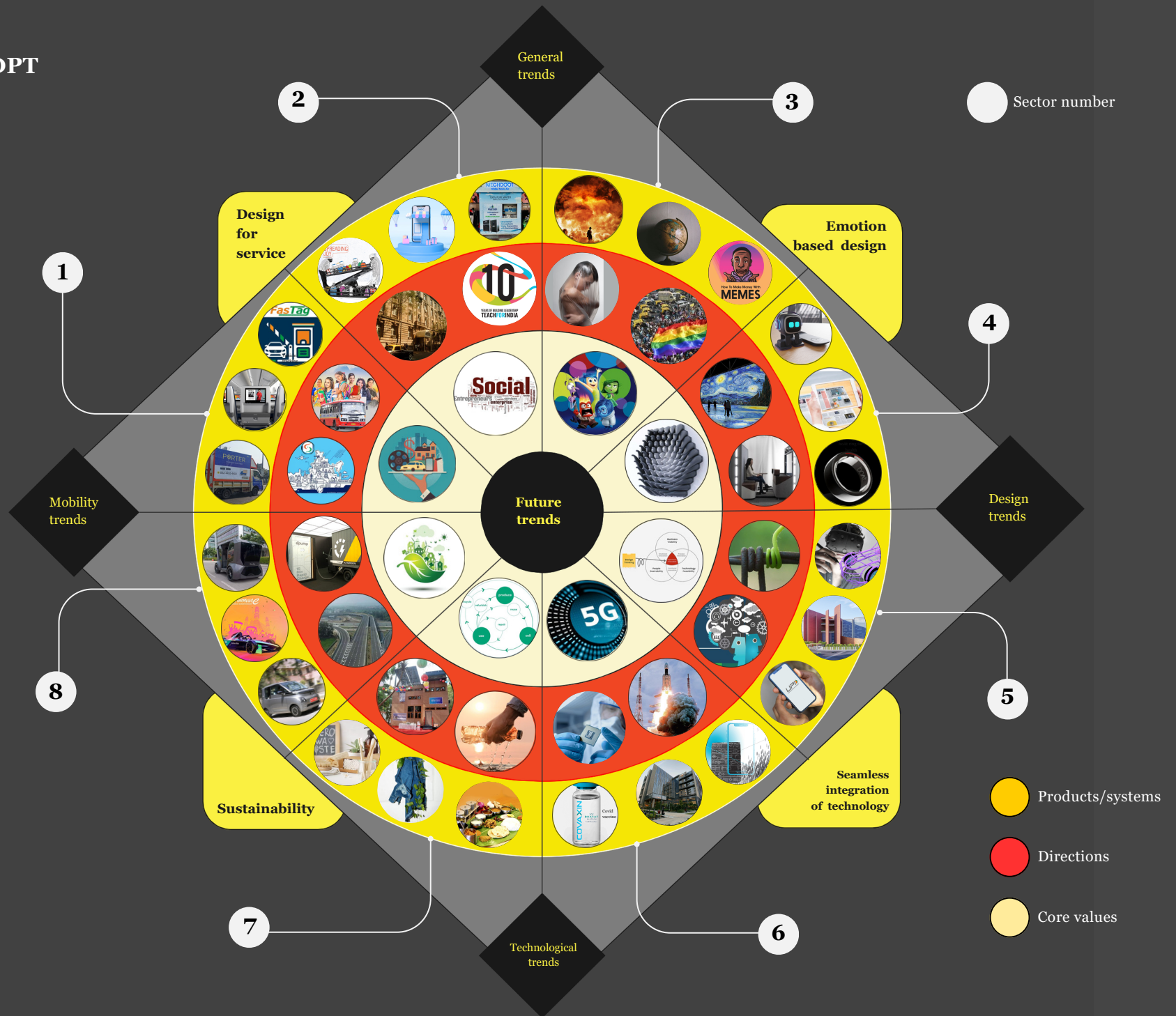
Growing together

Progress of society depends on achieving these current day

aspirations. To design a vehicle in 2040 and to build a scenario means to gauge whether these aspirations can be achieved. Final design was then objected to provide a qualitative metric (renders and story boarding) that would showcase our estimated success in achieving these aspirations. Section 11.2. showcases how different elements are arranged in the map. Relationships between trends are analysed and insights are fetched from each sector. Following are the insights from each sector-

- 1.Value addition in a service is thoroughly being under scrutiny. And the potential of making a mobility service economy is realized and is being tapped into.
- 2.Service uplifting the standards in the society ensures collective growth and reduces the disparity in the economy. Necessities at least are met with a social cause.
- 3.There is a consistent need for identifying the self and being relevant with the things around us.
- 4.Design is opening up to explore alternate realities and the rise of AI is intervening in all products possible.
- 5.Design is constantly changing with newer tools and technologies for prototyping.
- 6.Data driven society is prospering and humanity's future and survival is greatly influenced by it.
- 7.A consciousness to save the planet has begun, and every consumer choice has a pigment that's growing towards sustainable choices.

11.2. CDPT



8. The ideologies of electrification and eco friendly fuels are leading mobility. But infrastructure needs to be established to achieve the vision.

Insights were fetched from different discs as well to understand future on a whole.

- Society is moving towards establishing a green and eco friendly lifestyle with different services emerging and changing constantly ,which add not just functional value but also emotional value to the user. And these possibilities are continuously assessed under a design lens to bring together the right technology in the right way.
- Directions show that the boundaries are blurring and the capacity to endeavor as a society on a whole is remarkable. But to be in the path of prosperity one has to widen their perspective and look beyond their field of work and collaborate with others. Essentially a common aspiration to jump into a sustainable and affordable future that takes care of the well being of every individual is growing.
- The products and lifestyles only preview that we are already on the path, but to sustain and cultivate these lifestyles and systems requires attention. Many of the trends are unregulated and there is little thought to the consequences. But if the consequences are extreme

poverty and joblessness among individual, these very aspiring trends can become bane to the society.

With an understanding of future trends two different different design directions were simultaneously pursued to achieve the design brief that states building a vehicle as well as a scenario. For designing a vehicle (Kaali-Peeli) conventional design process is adopted i.e. mood boards have been imagined and concepts are built through sketches and modelling. W.r.t. building a scenario, a fictional world is created by assessing multiple imagined futures through 'Futures cone model.'

12. FUTURES CONE MODEL

One of the main goals of speculation is the inclusion of the public in the re-thinking and dialogue on new technological realities and new social relations.[10] One of the related practice in speculation is to speculate on possible futures (other being designing alternate present). Futures cone model was used to assess few possible futures to speculate a scenario. The 'futures cone' model was used to portray alternative futures by Hancock and Bezold (1994). [11] The model categorizes futures into four kinds- **Probable futures, plausible futures, possible futures** and **preferred futures**. (Fig.5)

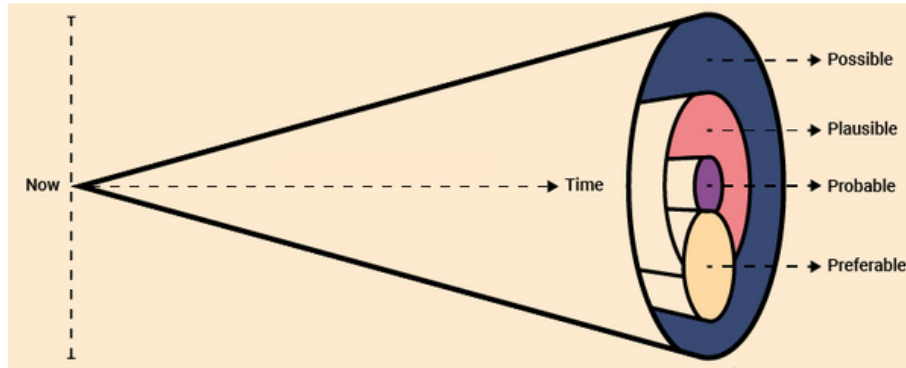


Fig.5. Futures cone model

Source : <https://mindmappingsoftwareblog.com/anticipatory-thinking/>

Probable futures are those we think are 'likely to' happen, usually based on (in many cases, quantitative) current trends. Plausible futures are alternative futures, linked with the today's world. Possible futures includes all extreme scientifically possible scenarios. Preferred are those futures that designers (or anyone using the tool) choose to synthesize and visualize the future scenario their design is set up in. Many futures were ideated using AI tools to have a wide scope of futures. A total of 17 futures were visualized. Following are the different futures-

12.1. Sustainable Mobility Hub

Mumbai leads the way in sustainability, with an emphasis on eco-friendly transportation. Electric taxis, integrated into sustainable mobility hubs, define the city's commitment to environmental consciousness.



Transportation Landscape:

- Majority of taxis are electric or hybrid.
- Mobility hubs offer multi-modal transportation options.
- Emphasis on reducing emissions and promoting green alternatives.

12.2. Autonomous Urban Transport

In this scenario, Mumbai embraces the era of autonomous vehicles. Taxis operate autonomously, ensuring efficient and safe transportation in a city optimized for self-driving technology.



Transportation Landscape:

- Autonomous taxis dominate the streets.
- Streets and infrastructure are optimized for autonomous navigation.
- Focus on safety, efficiency, and reduced traffic congestion.

12.3. Hyper-Connected Megacity

Mumbai thrives in a hyper-connected digital world. Taxis are seamlessly integrated into the city's digital ecosystem, providing a smart and efficient urban mobility solution.



Transportation Landscape:

- Extensive use of digital platforms for transportation.
- In-car entertainment, connectivity, and on-demand services.
- Real-time data and connectivity define the mobility experience.

12.4. Oceanic Metropolis

Rising sea levels have transformed Mumbai into an oceanic metropolis, with taxis transitioning seamlessly between land and waterways.



Transportation Landscape:

- Water-based transportation is predominant.
- Taxis are amphibious, navigating both land and water.
- Efficient travel across the city's aquatic environment.

12.5. Vertical Urbanization

Mumbai's vertical growth has led to the creation of rooftop taxi ports on skyscrapers, facilitating rapid vertical mobility.



Transportation Landscape:

- Skyscrapers dominate the cityscape.
- Taxis operate from rooftop ports.
- Vertical mobility solutions for efficient transport.

12.6. Bioluminescent Nightlife

Mumbai dazzles at night with bioluminescent technology, transforming taxis into vibrant symbols of the city's nightlife.



Transportation Landscape:

- Bioluminescent technology enhances urban aesthetics.
- Taxis become part of the vibrant nightlife scene.
- Synchronized with music and events.

12.7. Megagarden Oasis

To combat pollution, Mumbai becomes a megagarden oasis, integrating greenery into urban design and transportation.



Transportation Landscape:

- Greenery and gardens integrated into urban spaces.
- Taxis contribute to clean air initiatives.
- Focus on sustainability and environmental well-being.

12.8. Floating Archipelago

Innovative technology allows Mumbai to create floating cities, and taxis seamlessly navigate between them.



Transportation Landscape:

- Floating islands and archipelagos as part of urban planning.
- Taxis equipped with hover technology for floating city travel.
- Taxis become an integral part of the floating cityscape.

12.9. Underground Megacity

To address space constraints and environmental concerns, Mumbai has expanded its urban infrastructure underground.

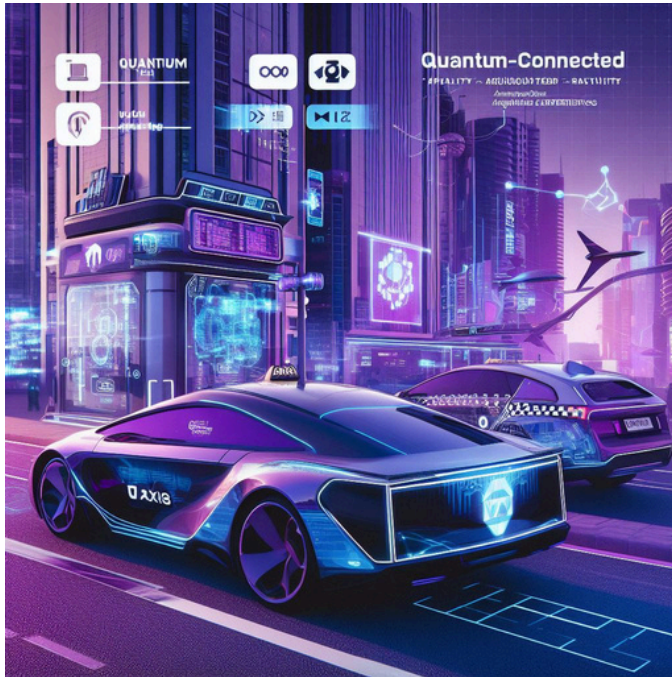


Transportation Landscape:

- Taxis operate as subterranean transport pods.
- Network of tunnels beneath the city facilitates quick transport.
- Efficient subterranean travel for urban residents.

12.10. Quantum-Connected Reality

Mumbai enters a new era of quantum-connected reality, where the physical and digital worlds are seamlessly intertwined.

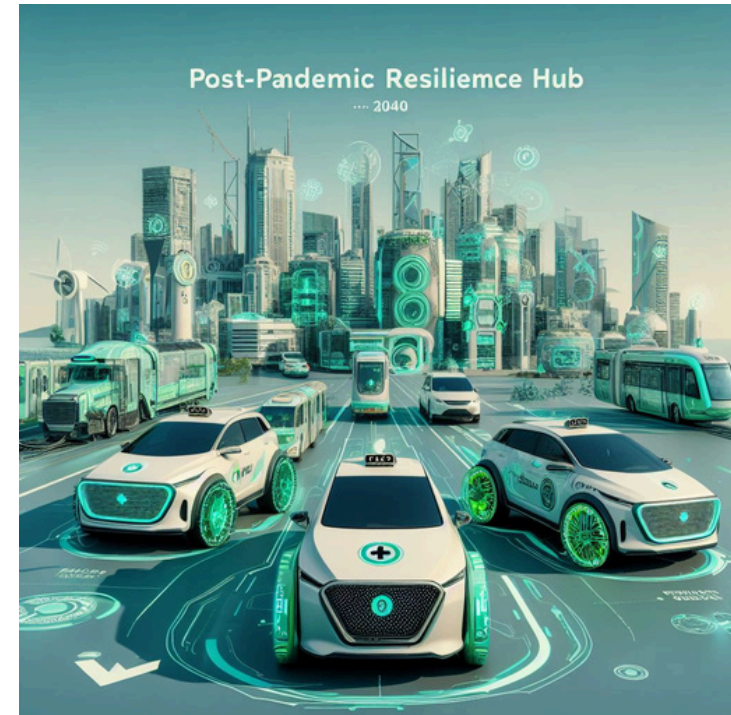


Transportation Landscape:

- Taxis operate in both the physical and digital realms.
- Passengers enjoy unique virtual experiences during their rides.
- Augmented reality interfaces inside the taxi for customization.

12.11. Post-Pandemic Resilience Hub

After a series of pandemics, Mumbai transforms into a global hub for health and resilience.



Transportation Landscape:

- Taxis are designed with advanced health-monitoring systems.
- Mobile health stations offering medical check-ups and vaccinations.
- Taxis serve as part of the city's resilience infrastructure.

12.12. Retro-Steampunk Fantasy

In a whimsical twist, Mumbai embraces retro-steampunk aesthetics, blending Victorian-era aesthetics with futuristic technology.



Transportation Landscape:

- Taxis are steampunk masterpieces with intricate gears and steam-powered elements.
- Passengers experience the sensation of traveling through time.

12.13. Dystopian Gridlock

Mumbai's rapid population growth and inadequate infrastructure have led to a nightmarish scenario of perpetual traffic congestion.



Transportation Landscape:

- Traffic jams are so severe that traditional taxis can barely move.
- Commuters are stuck in gridlock for hours.
- The taxi industry faces challenges in providing efficient transportation.

12.14. Climate Crisis Fallout

Mumbai is grappling with the severe consequences of climate change, including frequent flooding and extreme weather events.

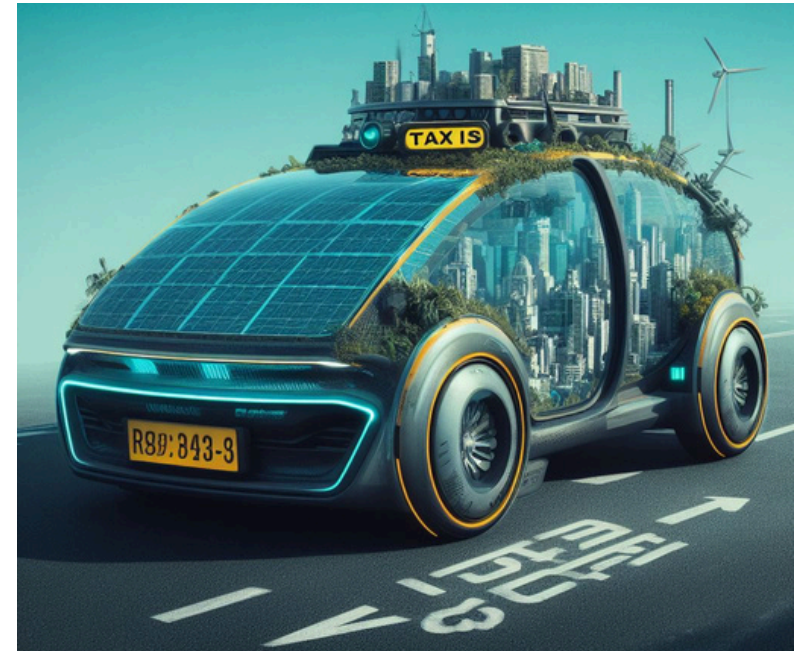


Transportation Landscape:

- The city's taxi infrastructure has been severely affected, with many taxis damaged or submerged due to flooding.
- Taxis need to navigate through flooded streets and extreme weather conditions.

12.15. Resource Scarcity Survival

Mumbai faces resource scarcity issues, including water shortages, energy crises, and food insecurity, leading to social unrest.



Transportation Landscape:

- The taxi industry struggles to operate due to fuel shortages and high prices.
- Riots and protests disrupt transportation services.
- Taxis need to consider sustainability and self-sufficiency.

12.16. Isolation in the Metropolis

A public health crisis has left Mumbai's population isolated in their homes, reluctant to use public transportation due to fear of contagion.



Transportation Landscape:

- The taxi industry experiences a significant decline in ridership, with many taxis sitting idle.
- Taxis need to address passenger concerns related to safety and hygiene.
- In-car systems to ensure passenger safety and comfort.

12.17. Urban Decay

Economic decline, crime, and neglect have led to urban decay in parts of Mumbai, making them unsafe and inhospitable.



Transportation Landscape:

- Taxis in these areas have fallen into disrepair or have been abandoned due to the unsafe environment.
- Taxis need to address safety concerns.
- Potential need for security features and resilience measures.

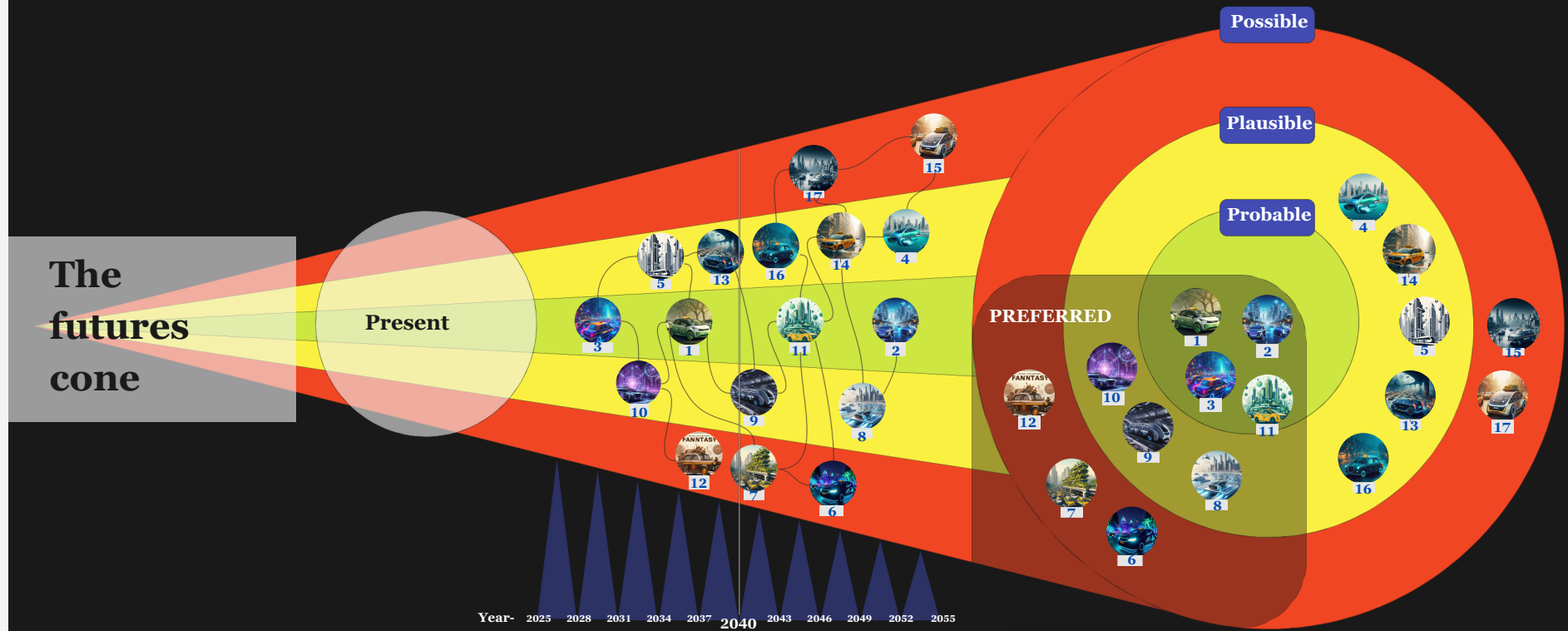
All the 17 scenarios were placed in the Futures cone with a speculated timeline. (Ref Sec 12.18) Again, the decisions of arrangement of these futures in the timeline and the decision to place them in different categories is derived from the trend analysis. These decisions can be challenged, as the fundamental objective of speculative design is to debate and discuss what is the preferable future. [10] Each of the future is connected with others to speculate the occurrence in terms of cause and effect. This technique is described as structured backcasting method for strategic planning. [12] Finding these relations would help one to segregate their preferred futures and create a mental map to achieve them. For imagine a scenario in 2040, all the futures in the preferred section before 2040 were assumed to be achieved and all that is after 2040 is yet to come. And also this assessment provided base for deciding on the functionalities of the final design w.r.t available technology in 2040.

Simultaneously as mentioned before conventional design process was applied to derive a vehicle design with the essence of Mumbai Kaali-Peeli.

13. MOOD BOARDS

To capture the essence of the vehicle, previous research was revisited and two mood boards were established. First one focuses on extracting the spirit of the vehicle to inspire the design language and second mood board captures the essence of the experience one has when they travel in a Mumbai Kaali-Peeli.

12.18. The Future cone analysis of Mumbai taxi for the future





DANCE LIKE A BUMBLEBEE

A unique dance performed by bees to communicate with each other to find food and inform about the surroundings. A bee can tell exact location of the food by informing distance and direction through their dance moves.

13.1. Dance of a Bumblebee

This mood board concept was inspired from a unique dance performed by Bumblebees (all bees perform this action) to communicate with other bees of their colonies about the location of food. The location communicated by the dance is quite remarkably accurate. And thus, this dance becomes key in finding food for the bees and thereby flourishing our surroundings with vegetation. What sets apart the bumblebee from other bees is that bumblebees are more independent. They do have colonies but they are mostly on the ground and they collect less honey, but their contribution to nature is equally important. Similarly even Kaali Peelis are partly independent beings that are performing a key task for flourishing the city, an important mobility service. And thus Dance of a Bumblebee was conceptualized as a mood board to inspire the design language.

13.2. Impart humility

To get inspiration to imagine the experience of a Kaali-Peeli ride, ice formations were referred. Depending on the conditions, the ice formations dynamically change their shape. The formations are unique but when these sculptures are looked cohesively, intricate patterns can be observed. These intricate patterns indicate the passing time and experiencing such mammoth naturally formed structures can humble one down. Being humble doesn't necessarily mean to look down upon ourselves, rather its a process where one self reflects and tries to find their place in the world. Mumbai in its essence resonates with the dynamic ice formations as the city itself consistently changes. And Kaali Peelis in its experience provide the windows to look out and ponder upon the intricate patterns the city creates. And such an experience can be humbling as well. Hence the mood of the experience was set to impart humility among the users.



Impart humility

Being humble doesn't necessarily mean to look down upon ourselves, rather its a process where one self reflects and tries to find their place in the world. Ice formations are ancient and yet, they constantly change. Experiencing such a space can be once in a life time experience for many.

With the mood set, before ideation, vehicle packaging and spacing were defined.

14. VEHICLE PACKAGING

There are three major constraints placed while understanding and deciding packaging of the vehicle-

1. Skateboard chassis - As the vehicle is intended to be in 2040, different futuristic chassis were explored and a skateboard chassis was selected. This type of chassis submerges all the necessary materials (including batteries) in one single rectangular bed with each individual wheel connected to a motor at the offset of each corner. (ref fig.6)

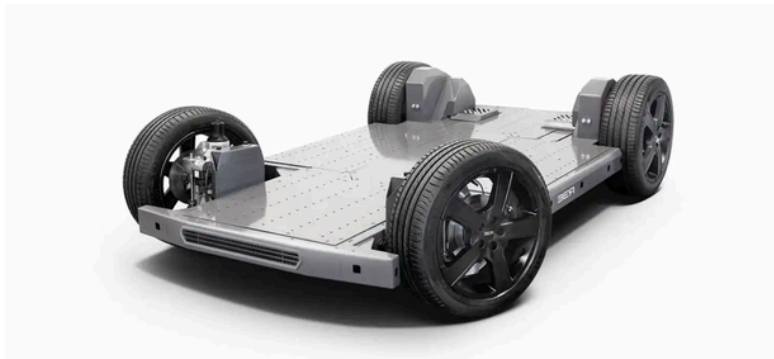


Fig.6. Skateboard chassis

Flatbed provides maximum efficiency in terms of space, as is required. More space in a mobility service vehicle opens opportunity to enhance the service. And thus, a skateboard chassis is opted for final design.

2. Boxy design - One of the key observations made during observational research was that the box type design has proven its utility in the service, providing space for all kinds of requirements from pooling more people to carrying variety of goods. And hence, this element is chosen to have maximum efficiency w.r.t space.



Chapter 2, Pg 5 of Photo documentary

3. 5+1 seating - Current vehicles that provide the service of a Kaali-Peeli taxis are models that accommodate 4 passengers and a driver. The final design was set to accommodate extra passenger without intrusion of space to add value in terms of accommodation.

These constraints provided base to decide on the proportions of the vehicle. While exploring different options in terms of models used for Kaali-Peelis till now to decide on dimensions, the presence of one vehicle on the road struck chord quite uniquely. The iconic Premier Padmini. The vehicle became a memory in everyone's mind such that anyone imagining a Kaali-Peeli thinks of a Premier Padmini painted in black and yellow. And hence the proportions were studied and adapted to replicate the essence of the icon.



Mumbai Kaali-Peeli
Source- Google Images

The length and breadth were thus decided as 3690 mm and 1460 mm respectively with a wheel base of 1460 mm. (ref fig.)

To define the internal space, different ideas were explored to create interesting forms with basic shapes. Entry exit points (doors), seating, and dashboard area were thus decided from the ideation. Some key ideas that were explored are in section 14.1. To lock an orientation, bench marking was revisited and different elements w.r.t seating, driver dashboard area and doors were finalized. (fig.7)



(a)



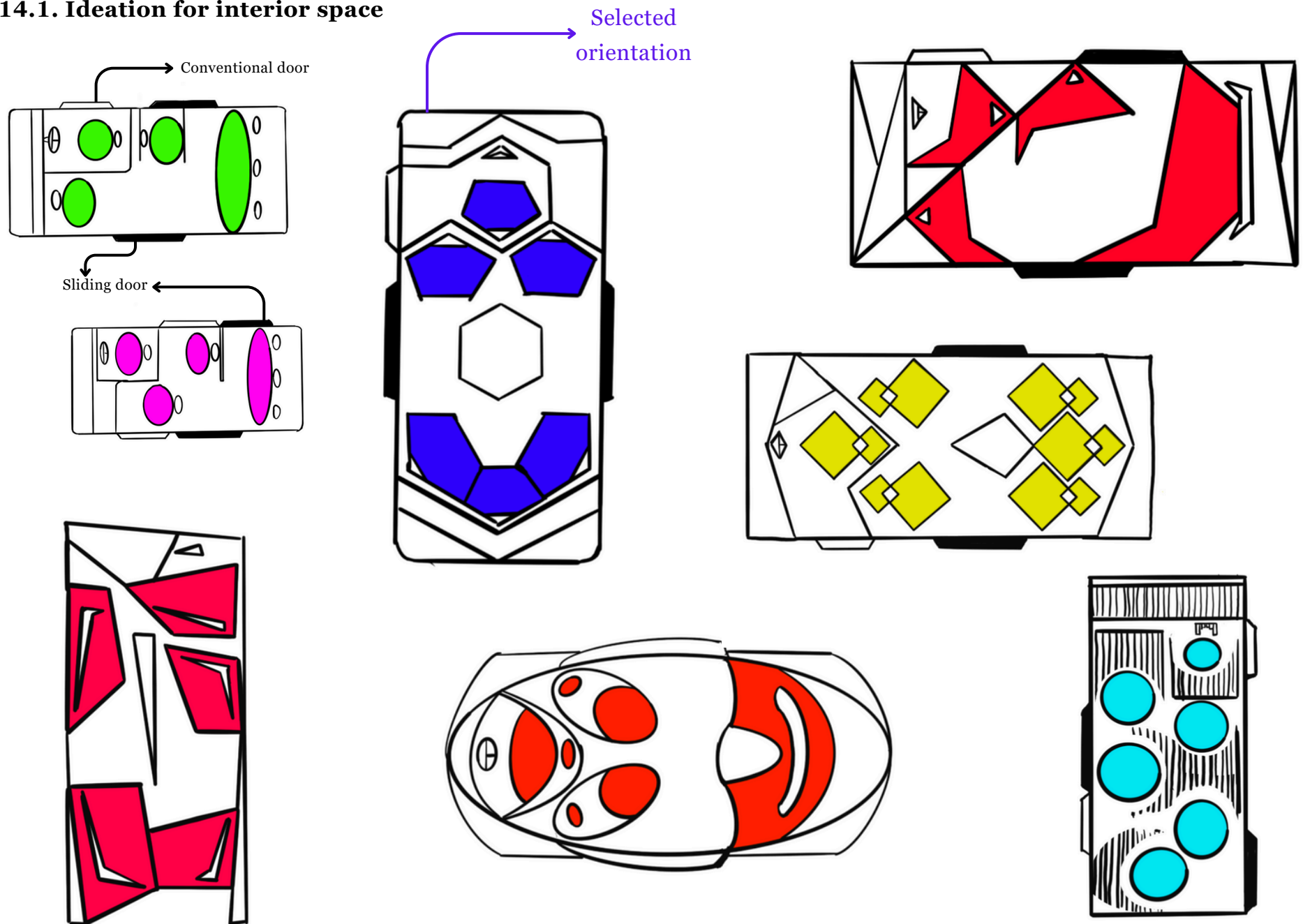
(b)



(c)

Fig.7. (a)Amazon Zoox's seating, (b)New York taxi's doors and
(c) London taxi's driver dashboard area

14.1. Ideation for interior space



Seating orientation was selected to improve social interaction among passengers. The division between driver area and passenger area in London taxi provides safe and customization space for driver which enhances their sense of privacy and ownership. And keeping driver in the middle provides wider and better view making it easier to navigate. Entry and exit points were selected to consume minimum space especially while parking and in tight spaces. Only one door was designated for driver to add extra storage space to their right.

With such basic mental map of the space to have better understanding of interior elements, dimensions were visualized through modelling. (Fig.8)

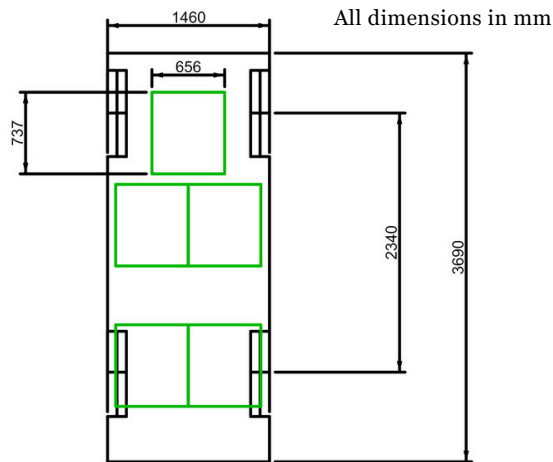


Fig.8. Dimensions of final design

To define ground clearance and wheel dimensions, the icon of Kaali Peeli service, Premier Padmini was analysed. And thereby decisions on ground clearance and wheel dimensions were made. (Fig.9.)

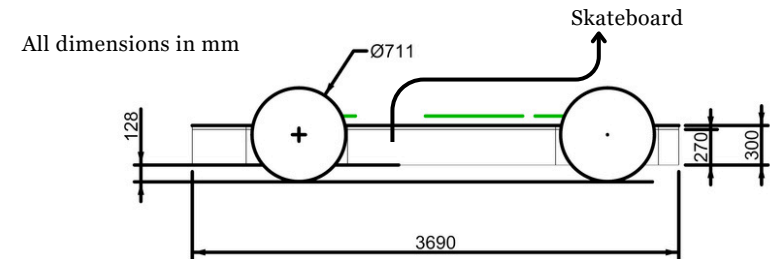
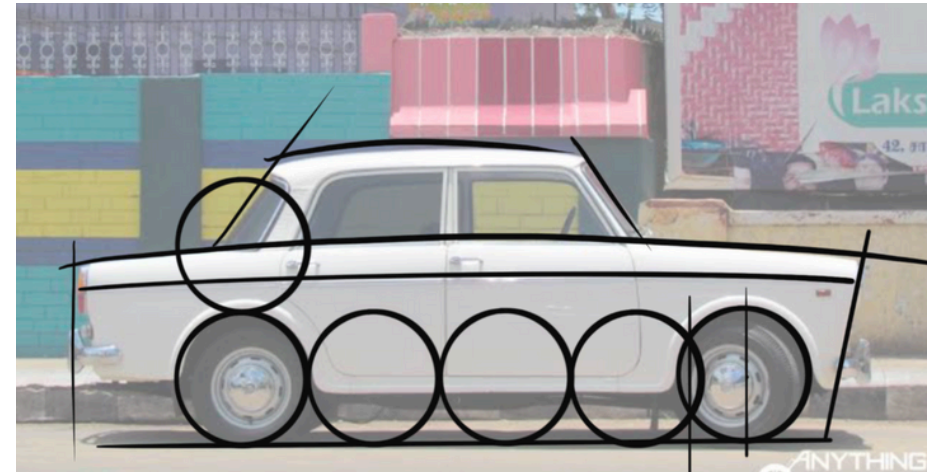
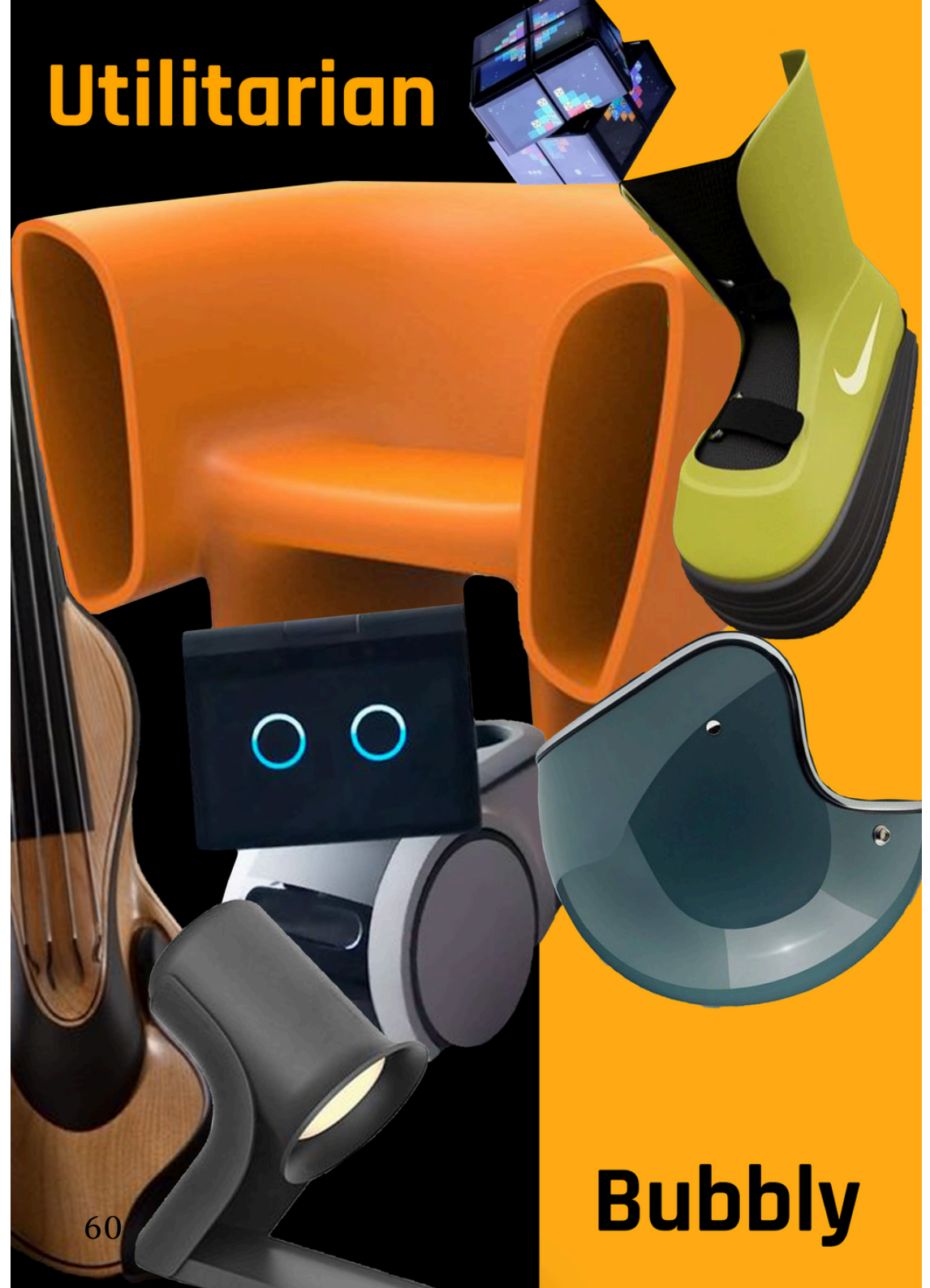


Fig.9. Cross sectional view of skateboard

Height of the vehicle was intended to address through final modelling based on further ideation.

15. IMAGE BOARD

An image was devised to inspire the final design language of the Kaali Peeli. The products in the board were chosen to bring out two elements of the design- Utilitarianism and being Bubbly. Utilitarian products usually fall short of antithetical value, but the products chosen not just have high utilitarian value but also are filled with life. Bubbly means filled with life and since Kaali Peeli is a utility vehicle that is filled with stories of life, theme board was accordingly crafted.



15. IDEATION

Based on the dimensions and configuration decided different ideas of exterior were visualized through sketching and further visualization was undertaken using AI tool. For inspiration, again Premier Padmini was revisited and sketches were developed from there.

The sketch that is finalized for further development is shown in Fig.10(a) and then a render through AI tool was developed to adopt it for modelling. Final concept was developed through modelling.

Note- *The decisions regarding form were purely instinctive.*

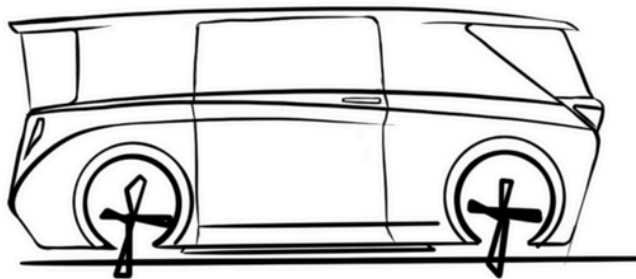


Fig. 10(a) Final sketch

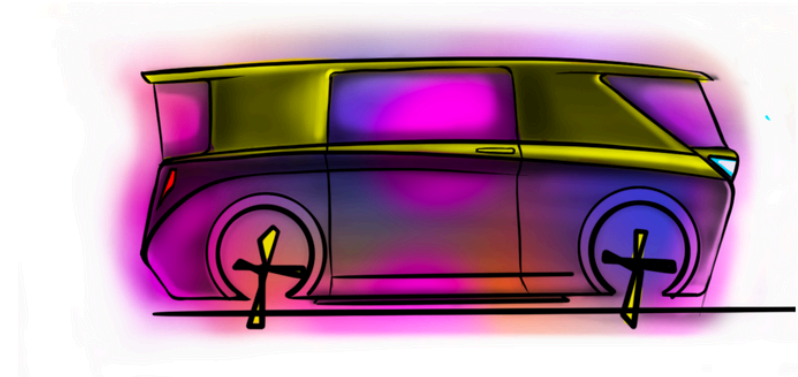


Fig.10(b) Final sketch

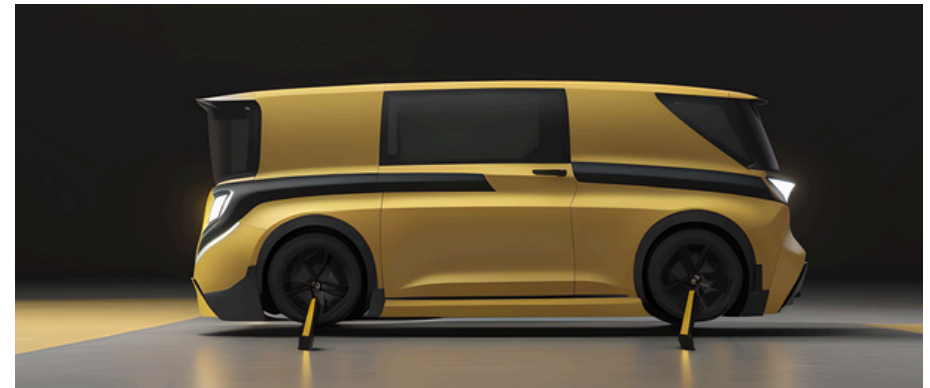


Fig.10(c) Final render through AI tool

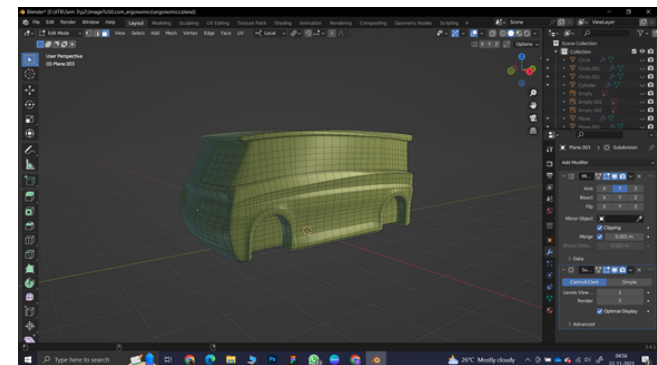
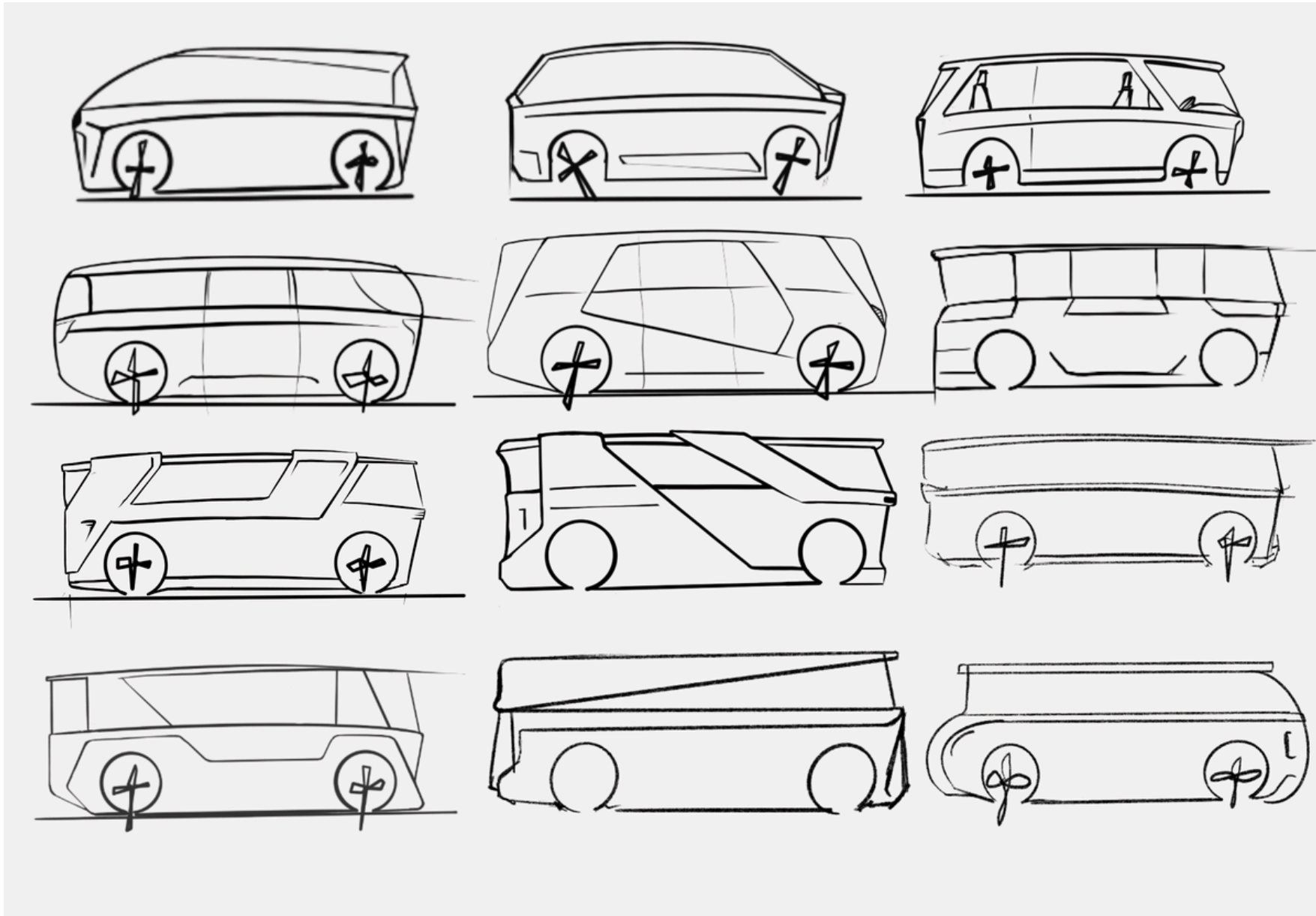
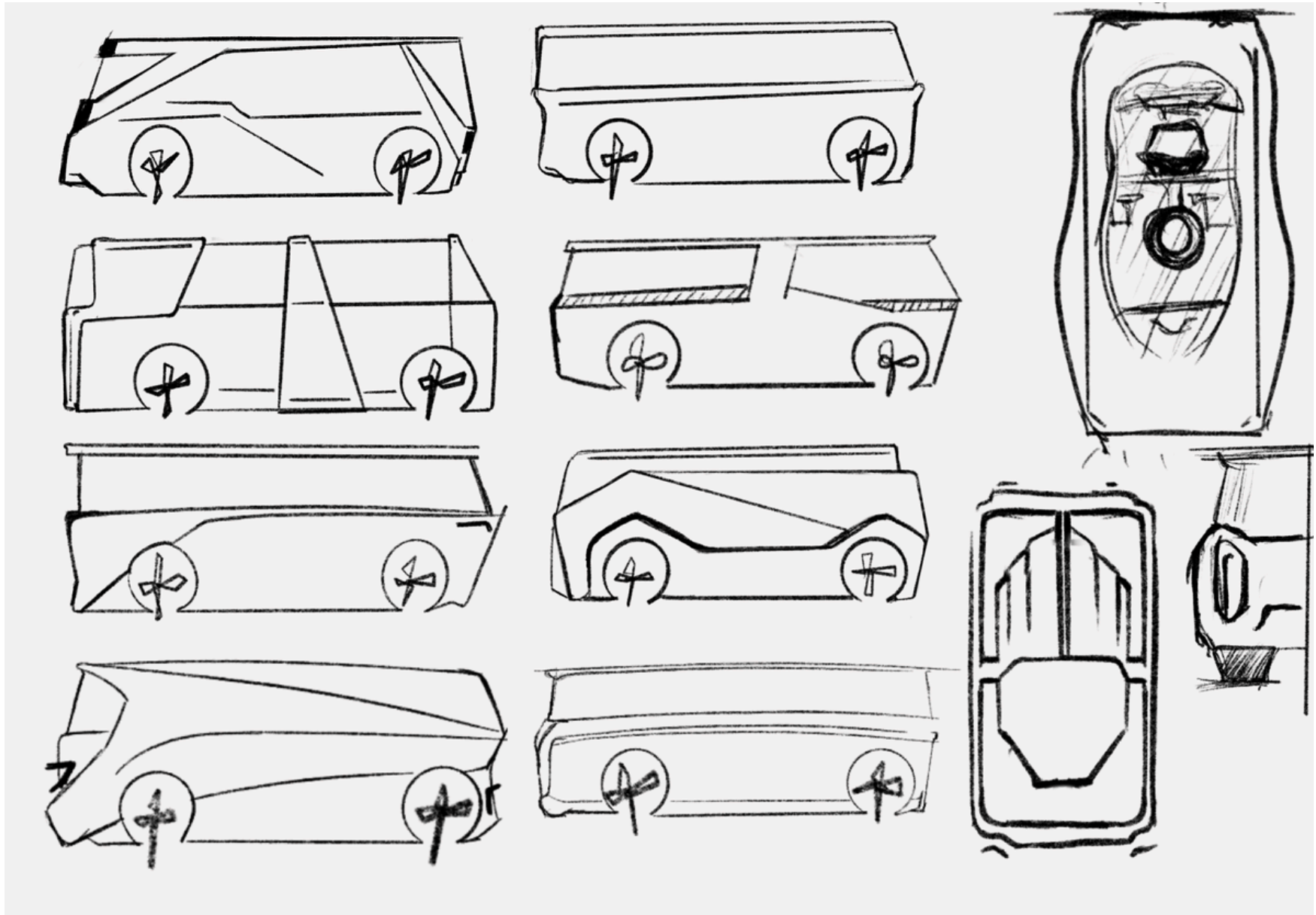
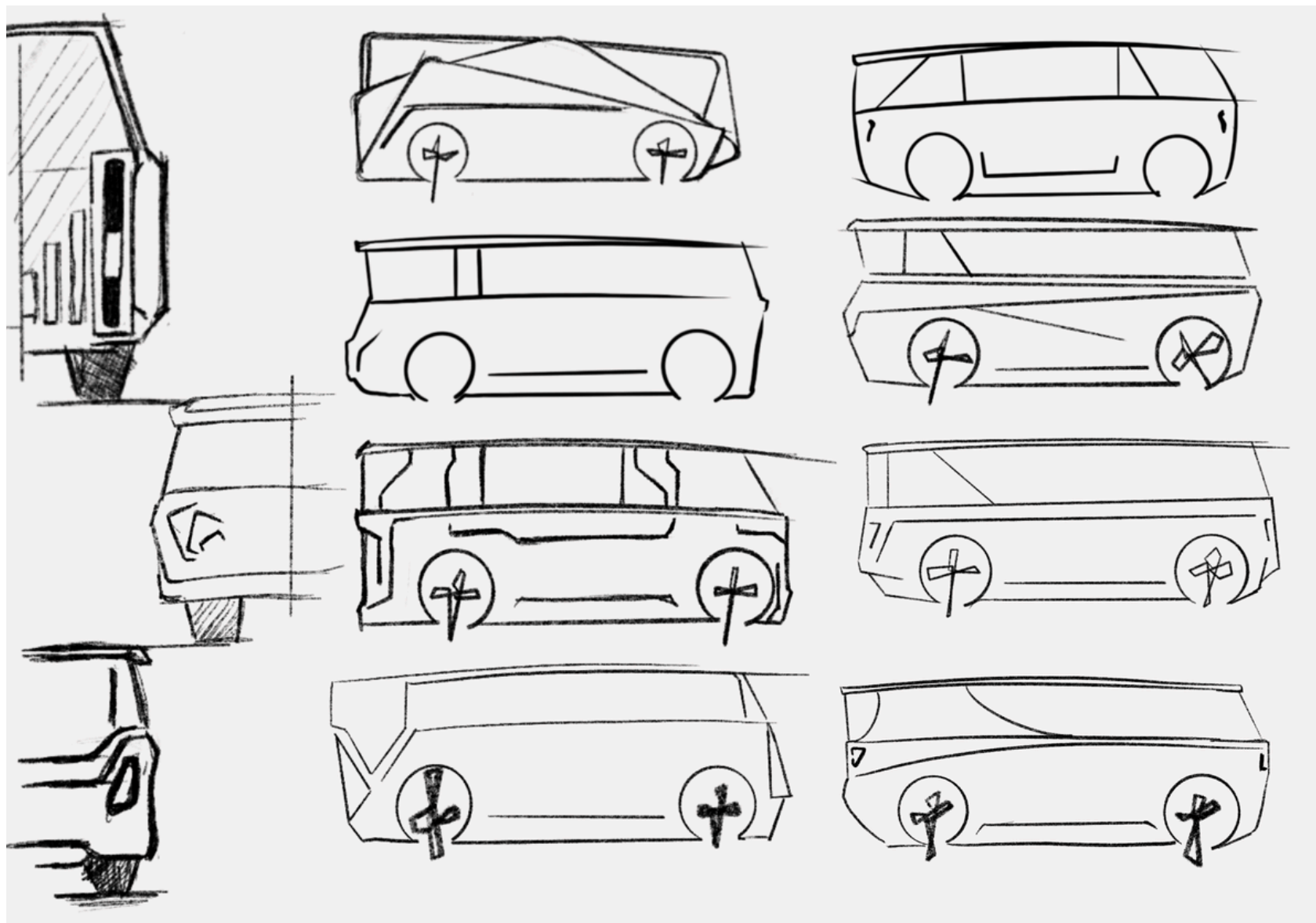


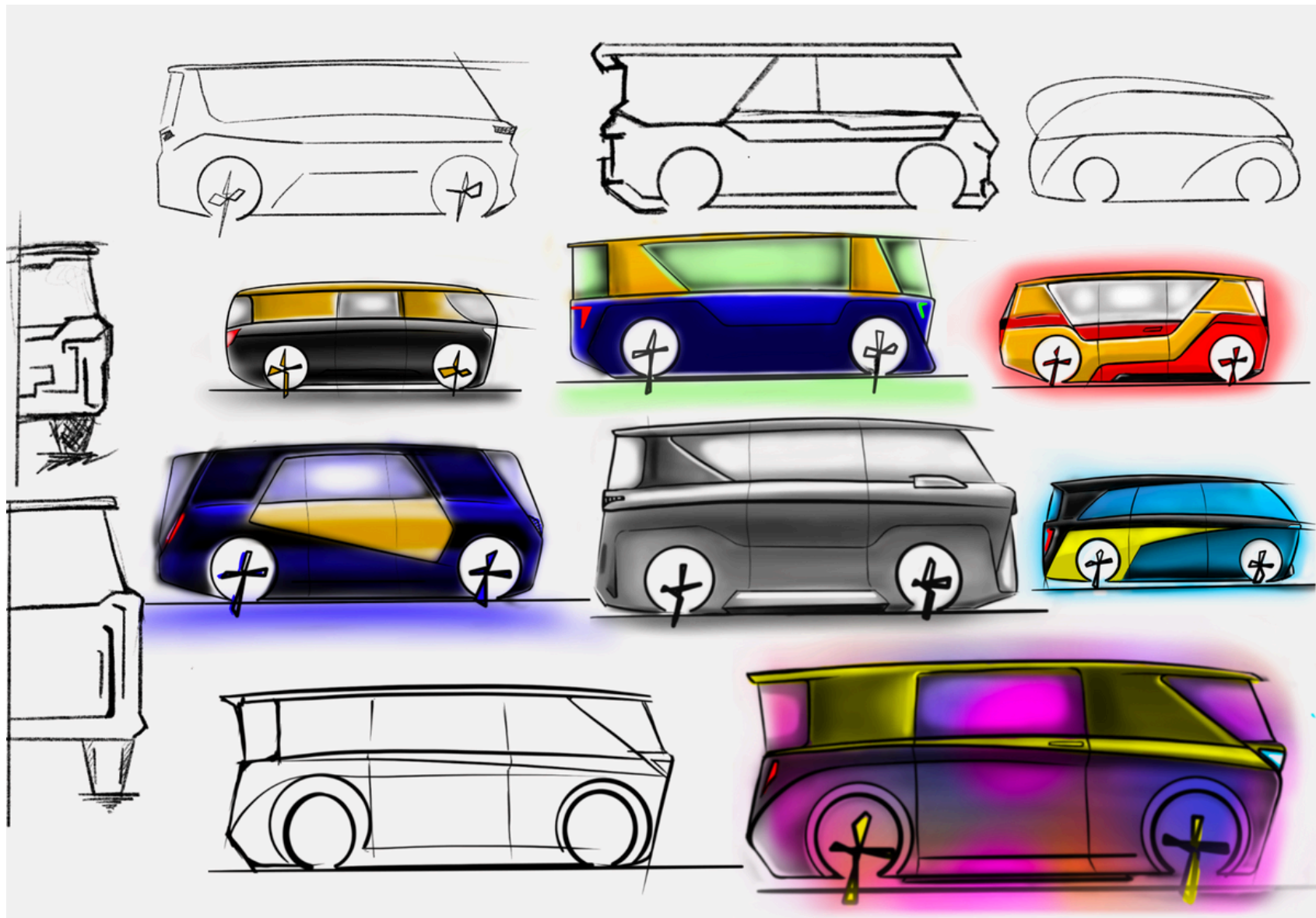
Fig.10(d) Ideation through modelling

15.1. Sketching and ideation









15.2. Visualization through AI imagery



16. DESIGN FICTION

Simultaneously, to visualize a scenario in future, a fictional world was established to provide context to the viewer. Two characters were imagined in 2040 to understand human aspirations simultaneously. The more nuanced the fictional world is setup, the more relevant the product designed in it. The two characters (users) designed can be referred from section 15.1. The basis in imagining these characters emerges from the belief that if one looks into the future, people's actions to become individuals would change but the aspirations more or less remain the same. Prithvi V. is imagined as a passenger and the character is drafted to emphasize the choices that a very well informed and aware Mumbaikar makes everyday. And with such ability to reason, if Prithvi V. finds value in the service, then the service can add value to all segments of society. Ashwad G. on the other hand, is character imagined to shed light on the approaches current day youngsters have towards life. The character symbolically informs that Kaali Peeli service is kept alive because the young generation took over (in the year 2040), what was once considered a service of the old and dying (Year 2023). With these characters a short fiction was synthesized to provide context to the scenario. The fiction was drafted as a text at the beginning and end of scenario. The prologue of the scenario was-

Year 2040, Time- 5: 45 pm, Prithvi's office

As Prithvi was leaving his office, his colleague congratulated him for locking on a deal with a government agency. It is a big achievement as investment indicates hundreds of crores. All his life Prithvi never felt this high, perhaps its because suddenly he is in the books of people sitting in the top. With a sense of achievement as he walked out of the office to go back home, it started raining and Prithvi took out his umbrella. Its the umbrella his wife gifted him when she was his girlfriend. As he walked to catch a Kaali Peeli as he always does, he started realizing that he lost the high. Of course he is well aware of the scale of his achievement and yet it all feels the same for him, as recently he thought of considering another high paying job. With these thoughts he found himself on the footpath. And he looked around for a Kaali Peeli. He doesn't mind the wait of few minutes to catch a Kaali Peeli as even if he can't find one, he can order his Kaali Peeli ride. Even though he owns a vehicle he prefers public mobility whenever he is travelling alone. As someone who has grown up in the busy streets of Mumbai, Prithvi understands the value of space. And public mobility is quite safe now a days as government invested a lot in public mobility. Take Kaali Peeli for example, in 2035 government formed a committee to produce a Kaali Peeli under Mumbai electric mobility services. And in 2038 Kaali Peelis could be seen in huge numbers on the road.

16.1. Characters of the fiction



Name- Prithvi V.

Age- 38 years

Occupation- Strategist in an MNC

Relationship status- Happily married since 2037

Mithun V. believes in approaching life with reason. He is an idealist and always aspires to contribute to the society. Grown up in a middle class family, Mithun V. learnt to handle responsibility at an early stage and it made him resilient. On the current day his 2 year old daughter with her actions makes him realize from time to time to pay attention to his surroundings with her curious questions.

Name- Ashwad G.

Age- 23 years

Occupation- Mumbai Kaali Peeli driver

Relationship status- Broke out of 3 year relationship recently

Ashwad G. is a one day at a time person. Unsatisfied with mediocrity and wanting to become a content creator, Ashwad G. invested in a Kaali Peeli taxi. He started to make vlogs and podcasts with regular commuters and today he has a following of 1 million strong on his social handles. While he looked for profoundness in the world of creativity, he found satisfaction in doing what everyone considers mediocre i.e. Kaali Peeli driver.



With such a short fiction the ground to establish the scenario was set. The scenario was visualized simultaneously with envisioned functions and renders. Section 16.2 is the visualized scenario. Key information about each frame are discussed further. (Ref 16.3) The objective of the scenario was to visualize how a Kaali Peeli ride would be in 2040. The images were sketched digitally with color bringing life to the frames. Each frame carefully curated to express 3 categories of information-

Line- Mumbai is one of the most chaotic places on the face of earth and lines in the images were expressed as such. Lines also were used to indicate the dynamic nature of moving objects.

Shade- The choice to shade with an acrylic brush is to emphasis the influence of art over this city. And frames become more artistic through the scenario to emphasis the fundamental nature of a Kaali Peeli ride that has made it iconic.

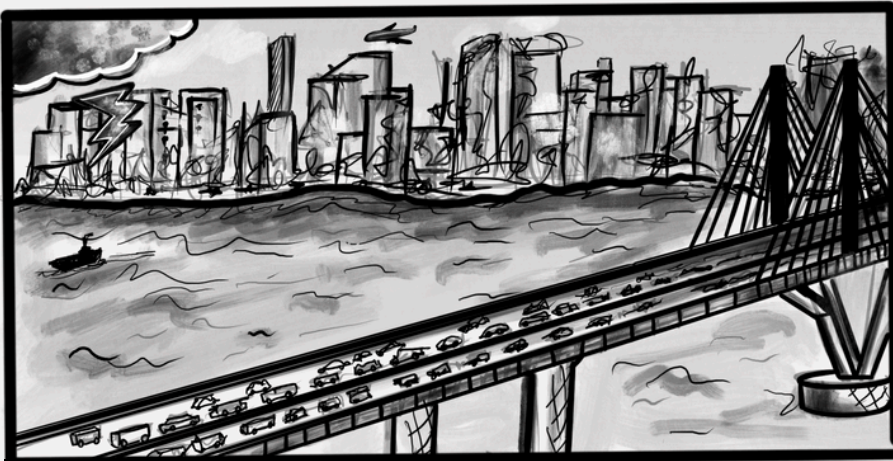
Colour- Colors were primarily used to set focus on the key information. Secondary objective was to use colour to add life into the frames. Each frame was coloured to strike a chord with the viewer to invoke the essence of the ride.

Following is the post script of the scenario.

Year 2040, Time- 6: 35 pm, Prithvi's residence zone

As he took his daughter back home, he wondered about Ashwad's life and how content he is by being a Kaali Peeli driver. He envied the passion of young Ashwad and it brought him a sense of relief as he is very clear in his head now. He decided to not go for the high paying job and work along with the government agency to impact hundreds of lives directly, which he always was passionate about.

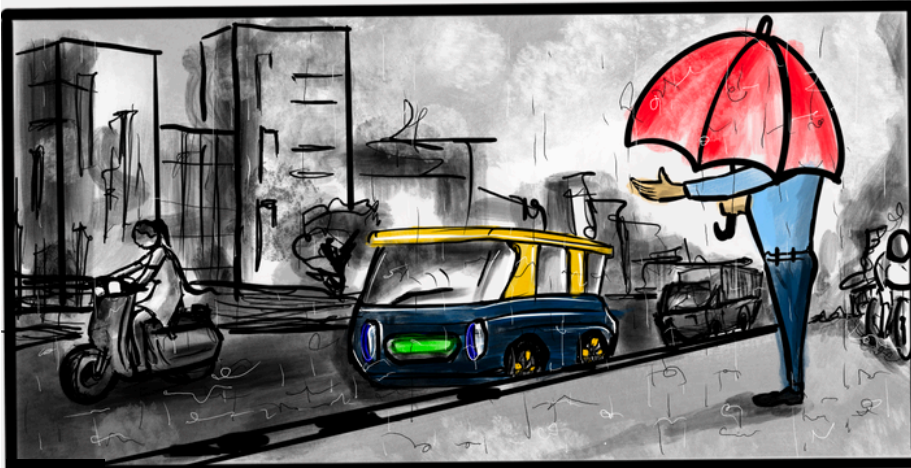
16.2. Final scenario



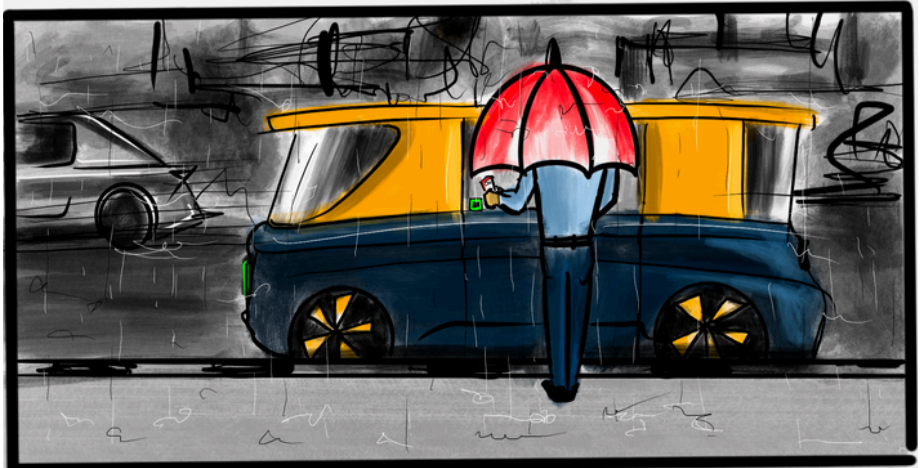
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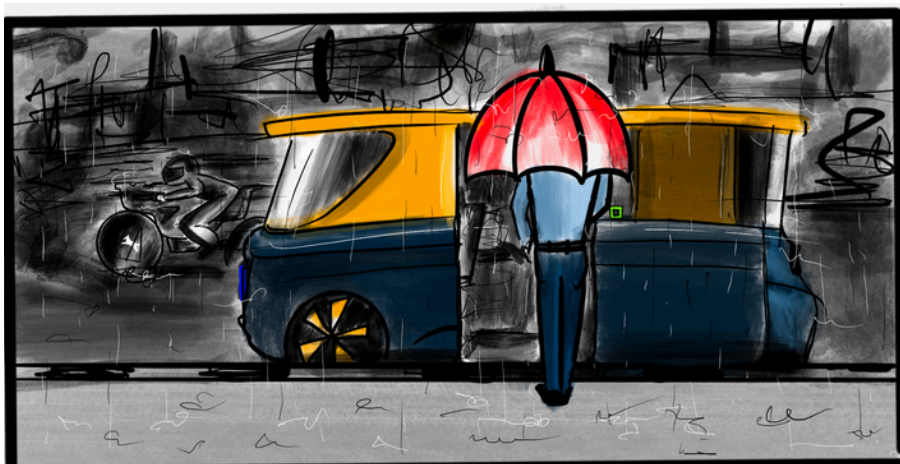
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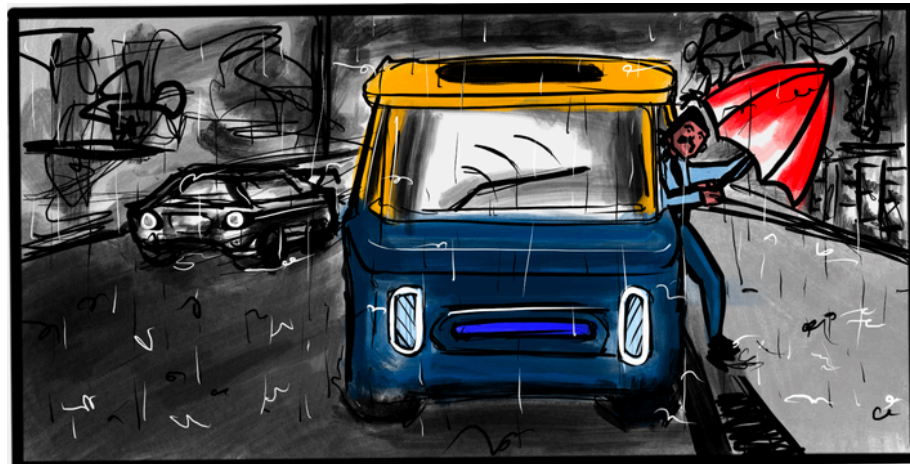
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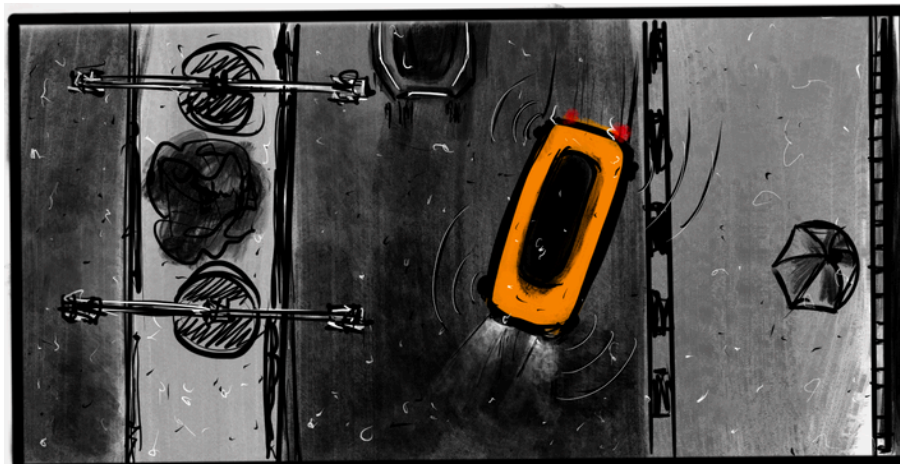
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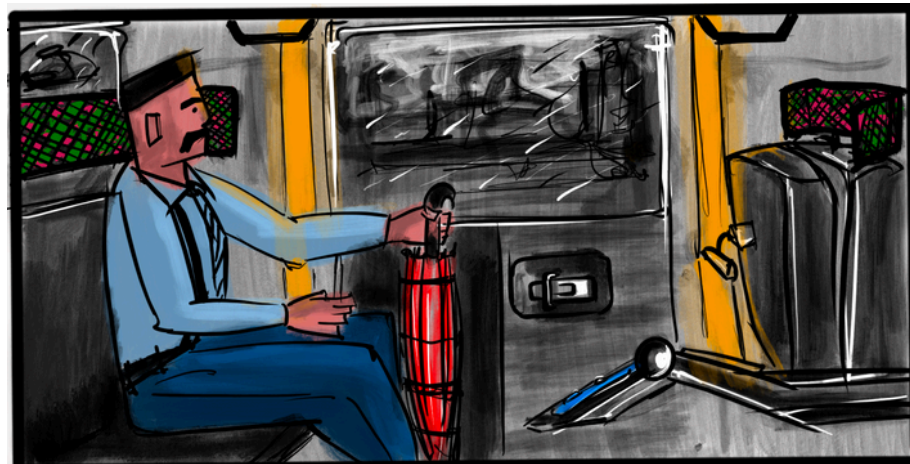
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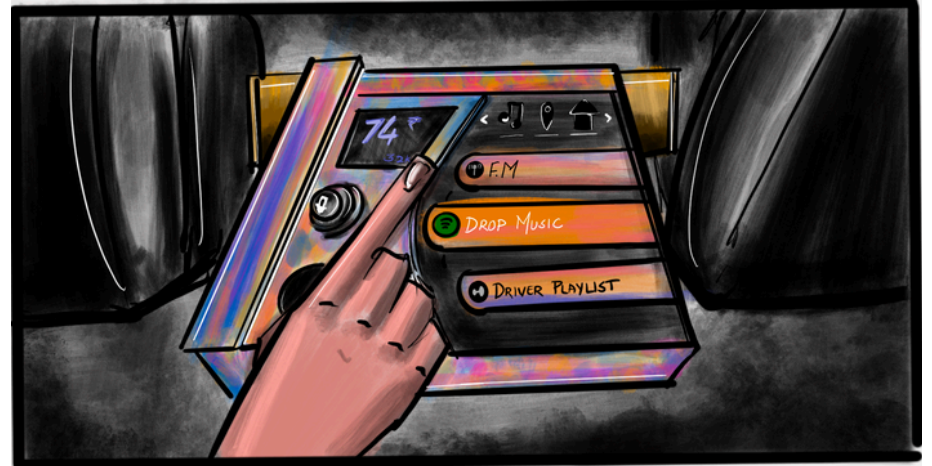
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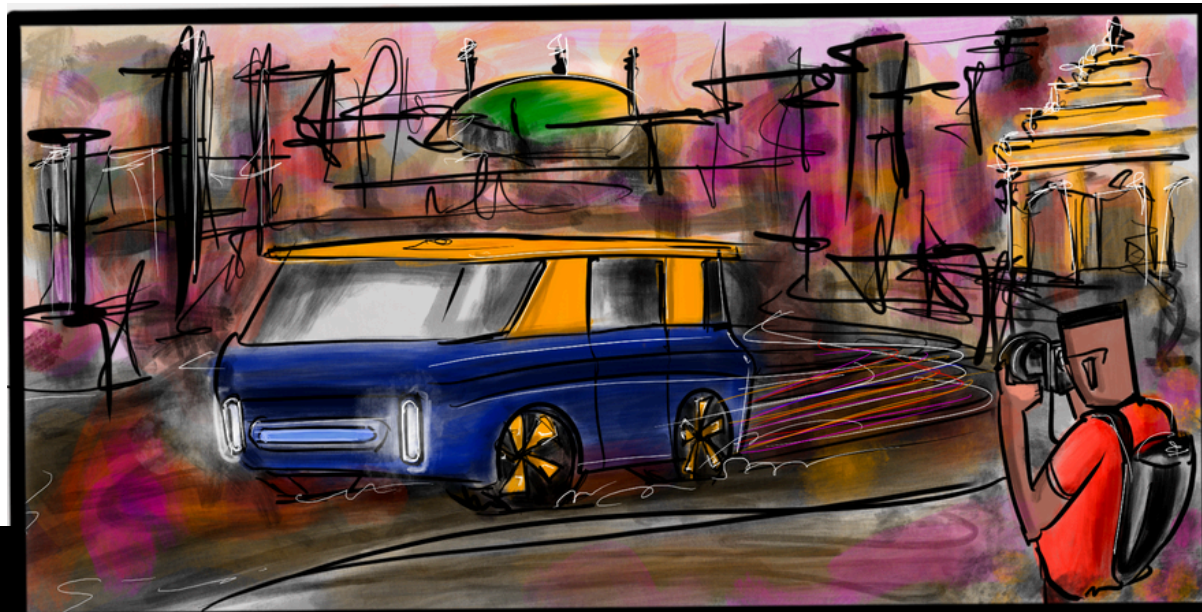
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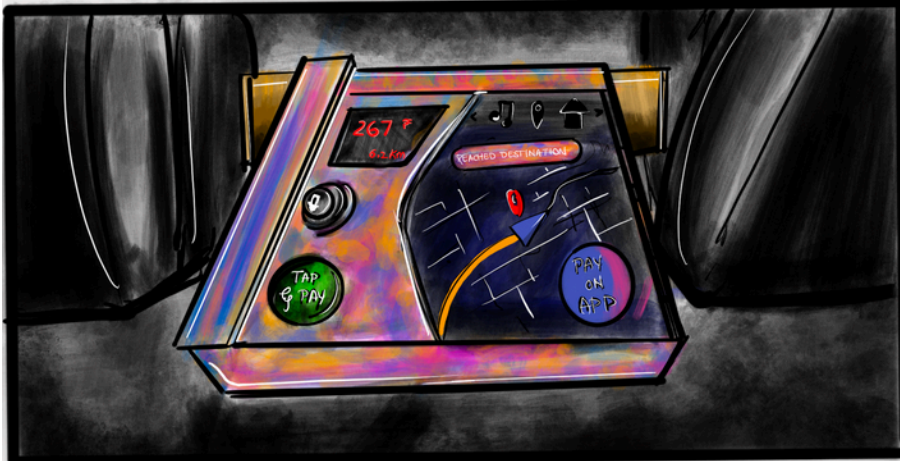
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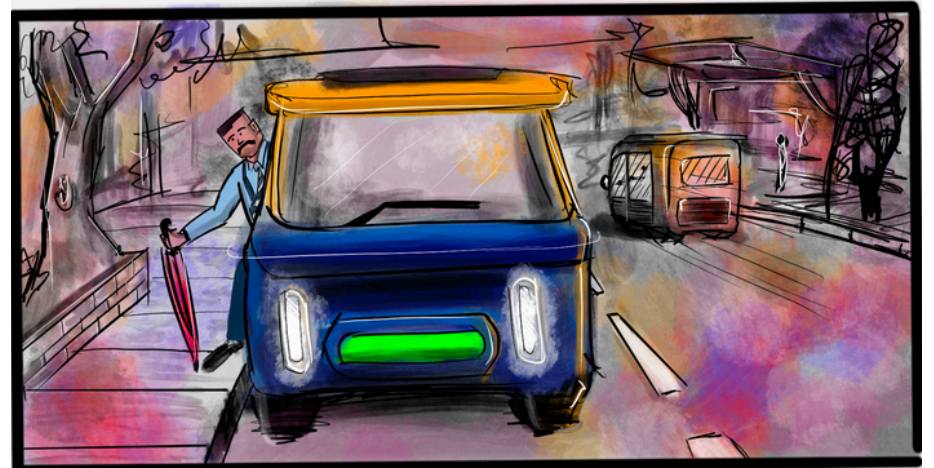
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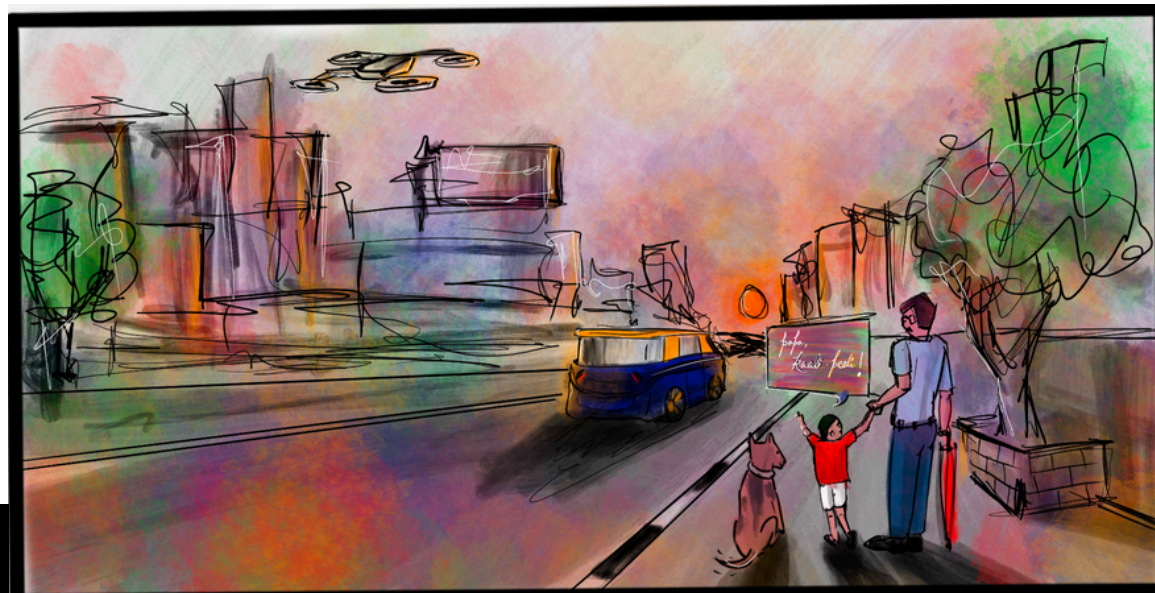
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17



18

16.3. Key functionalities of the ride

To define the key functions while simultaneously building scenarios, research was revisited. Since its a service based vehicle each aspect of the ride were thoroughly analysed. Each aspect of the ride was interpreted separately to have a design direction.

Finding a ride- A ride can be ordered through mobile devices or one can get a ride simply by waving. The green light indicates the taxi is available for booking. Once booked, the space can be made custom to interact with. The idea was adapted from bench marking. (Fig.11)

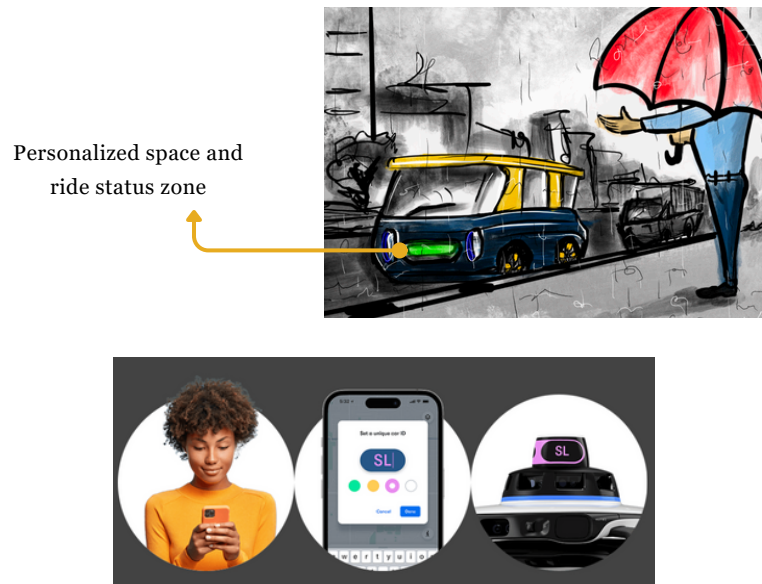
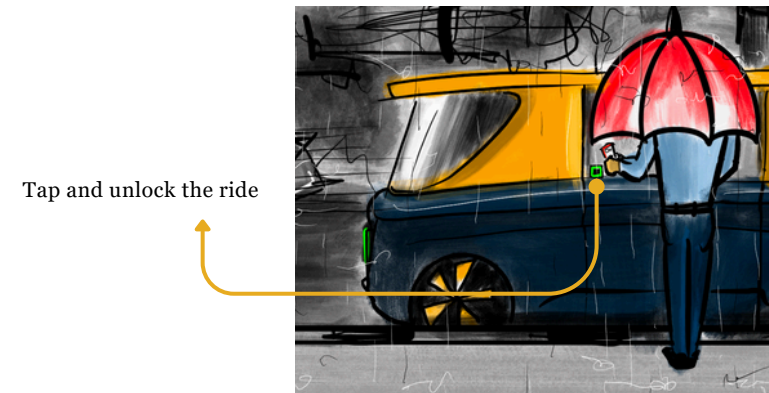
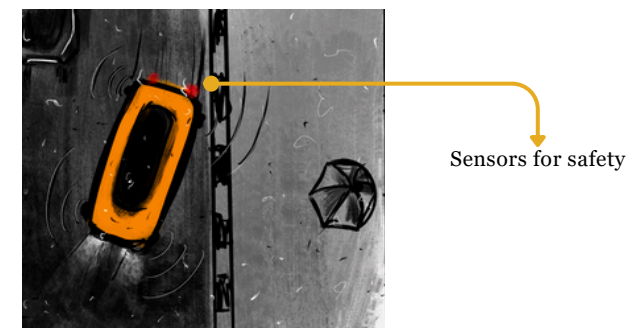


Fig.11. Waymo one exterior personalization

Securing the ride- One of the core value from analyzing trends was found to be 'data driven society'. To be able to have control over the ride is to have information of the driver for the passenger and also vice versa. Both driver and passenger would have a sense of safety as data of every ride is recorded.



Safety- The vehicle has ADAS which protects users from accidents, and the sensors around the vehicle alert the driver especially if its the case of vulnerable road users. The idea was referred from bench marking. (Fig.12)



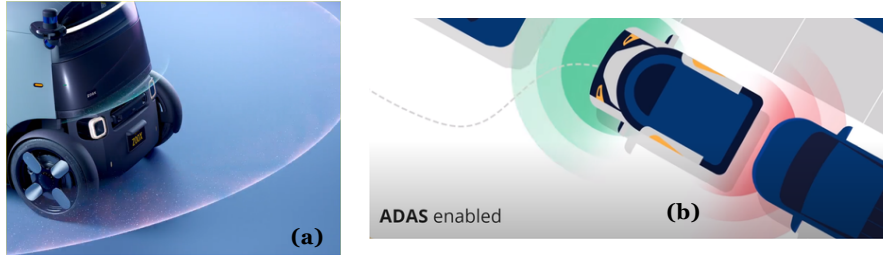


Fig.12 (a) Zoox's safety feature to protect vulnerable road users and (b) ADAS technology of REDS

Service products- Within the orientation, a separate area in the door is allotted for lifestyle products. The front two passengers seats are fold-able to accommodate more space similar to that of London taxi.(Fig.13)

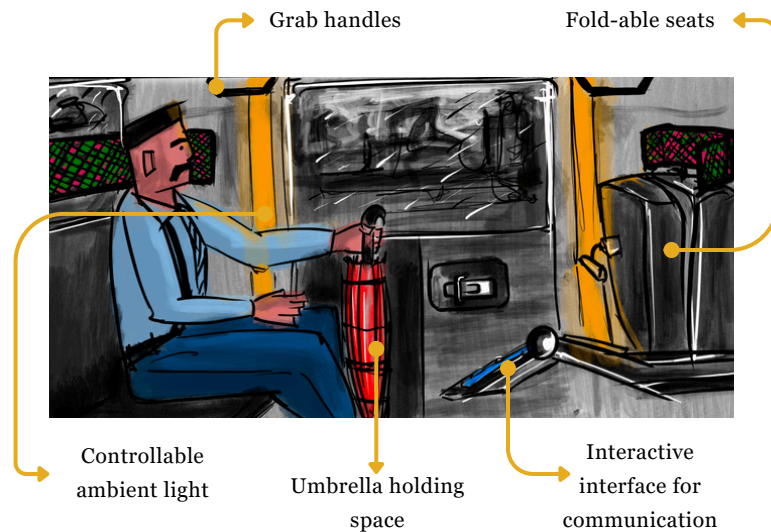


Fig.13. London taxi fold-able seats

CMF- While many elements were bench marked, headrest were chosen to be custom spaces for variety of fabric. On current day, every Kaali Peeli's interior's fabric is completely custom(Fig.). This even though adds character, the choice was made to keep it in limited to create coherence.

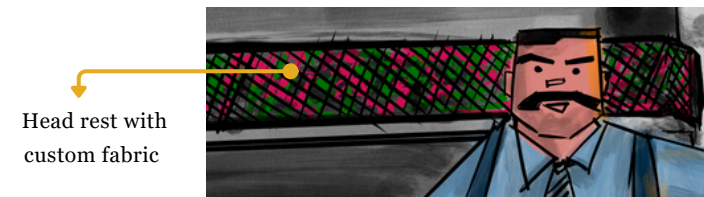


Fig. Chapter 2, pg 17, fabric of Kaali Peeli

Privacy- There is a transparent thin division between the passenger and driver area similar to that of London taxi. (Fig.14) This also protects driver specific area from contact type diseases.

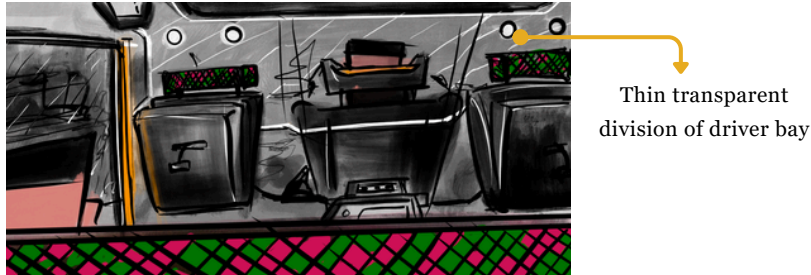
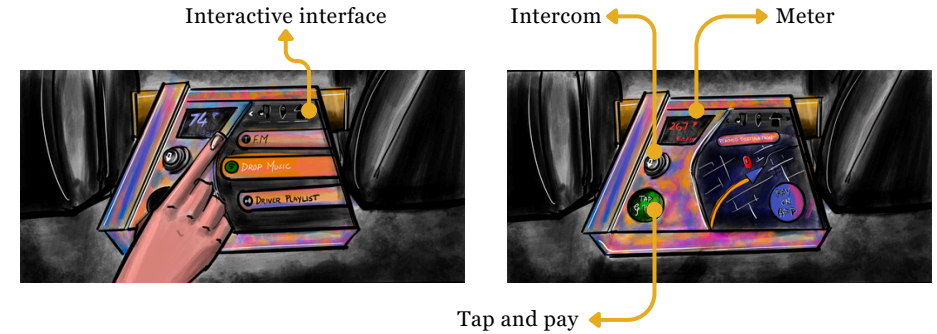


Fig.14. Driver area division in London taxi

Interactive interface- To communicate and to engage while travelling in Kaali Peeli, a rotatable console with touch interface is provided at the centre of seating orientation to make it accessible to everyone. The console has separate space for meter, usable interactive space and a button for intercom. There is also tap and go payment system available for easy transactions.



Driver dashboard- Driver can access to two separate interfaces for better access of information. The orientations of the screens is adopted from benchmarking. (Fig.15)



(a)



(b)

Fig.15(a) London Taxi driver dashboard and
(b) REDS driver dashboard

Roof- A conventional roof inspired from London taxi is adopted for better viewing experience. (Fig.16)



Fig.16. London taxi roof

With these functionalities defined and a scenario provided, the design process was concluded. For further visualization, exterior form renders of modeled form ware extracted and the whole form was 3D printed. Following are the renders extracted.

16. RENDERS





















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