ShareSavaree

Public Sharing Vehicle for India

Saurabh Nimsarkar
Guided By- Prof. K.Munshi

Pointers from Urban Transportation Report

- The Use of desirable modes of transport like walk, bicycle and public transport is declining whereas use of undesirable mode like car and two wheelers is on the rise
- Share of public transport should be aimed at 60% of trip including walking and cycling and 40% of motorized trip
- Cities around world have set modal target for balanced and sustainable transport as 30% non motorized and 30% public transport

Pointers from Urban Transportation Report

- Urban Transport contribute to poverty reduction and contribute to economy growth. Cities contribute most to the gross domestic product which is about **60** % and will grow to about **70** % in 2030
- Average travel distance for metropolitan cities is over 8 km , Mumbai is over **12 Km**
- Average journey speed on major corridors in future will reduce from **26-17 Kmph to 8-6 Kmph.**
- Daily Trips are anticipated to be **doubled** in 2030

Pointers from Urban Transportation Report

Policy of Avoid, Shift and Improve for 2030

- Technology is changing our transportation needs
- Transportation is second largest household expenditure in America
- Commutation is considered stressful have a negative impact on environment
- Vehicle sharing has enabled people to adopt car-free or car light lifestyle

Pointers from Urban Transportation Report

Policy of Avoid, Shift and Improve for 2030

- Increase the use of public transport and non motorized transport
- Share of public transport should be aimed at 60% of one way trip including walking and cycling and 40% of motorized trip
- This is to reduce traffic congestion, parking problems and pacifying fuel problems

Pointers from Urban Transportation Report

Policy of Avoid, Shift and Improve for 2030

- Use of clean efficient technology for public and private transport
- Use of alternative clean fuel like electric, hybrid vehicle, LPG,CNG etc
- Development of dedicated one way bicycle lanes and footpaths
- Connectivity of bicycle lanes and footpath with public transport for seamless commutation

Pointers from Case Studies

- Each car share vehicle removes 9-13 private vehicle from road
- San Francisco City CarShare reports that members increased use of waking and cycling by 49% after joining
- University of California studied that 18 months after joining car sharing system 30 % sold one or more cars ; 67 % avoided purchase of new car and there was 47 % drop in overall automobile travel. Total reduction in miles driven is estimated at 1.1 billion miles till early 2013
- Car share members reportedly increased use of public transportation by 11%

Vehicle sharing systems worldwide

Vehicle sharing systems worldwide

DIVY

namma

תל-אופן
אופניים להשכרה
בכל רחבי העיר

vélo'v

I CPH

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dbs
dublinbikes

Cycle Chalao!
cyclechalao.com

bixi
Toronto

velib'
MAIRIE DE PARIS

Vehicle sharing systems worldwide

PhillyCarShare
Our Wheels. Your Freedom.

mobility
car sharing

autolib'

ics

cambio
CARSHARING

zipcar
wheels when you want them

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Vehicle sharing systems worldwide

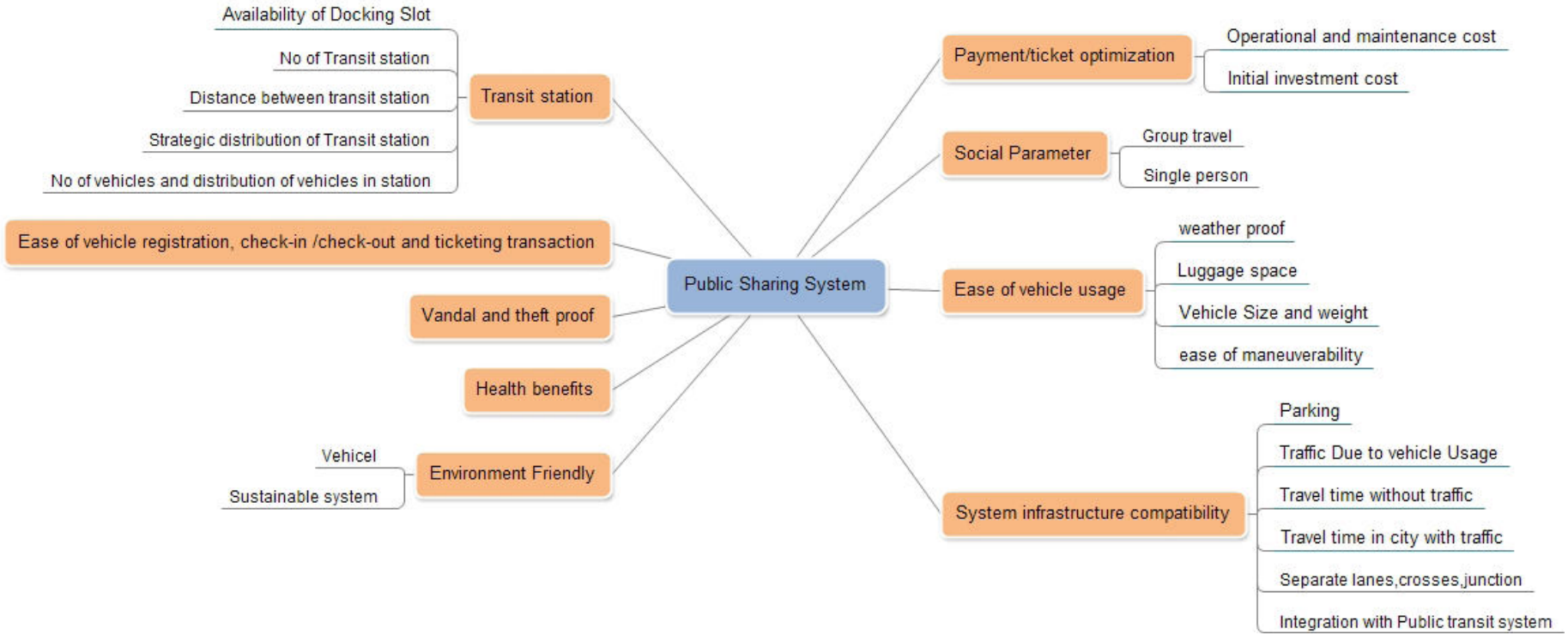
motiI

SEGWAY
Simply moving

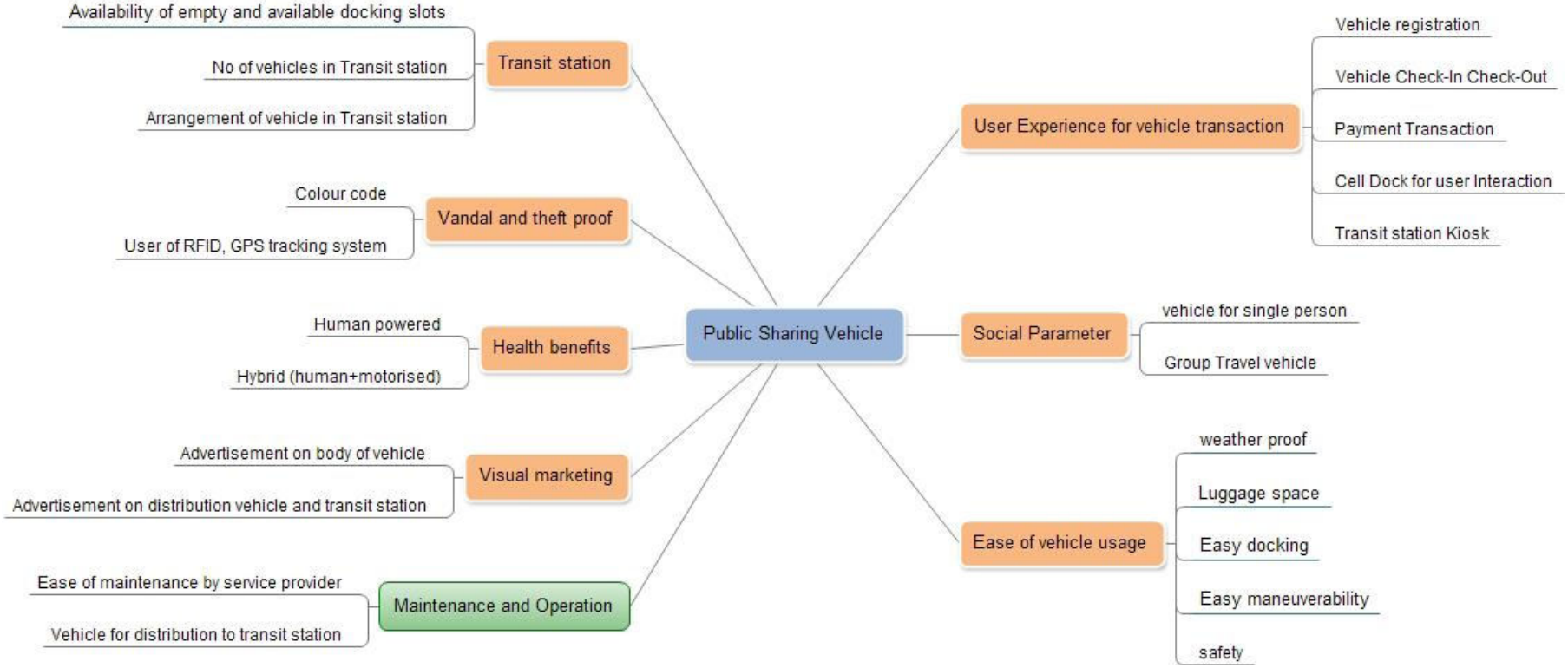
scoot

Roboscooter

List of parameters of major and sub parameters relating to public sharing system



List of parameters pertaining to vehicle used in sharing system



- Ideal sharing vehicle will be the one which has an advantage of collapsibility in size and shape thus occupying less usable space or footprint when parked, docked or even while driving on road.
- Sharing Vehicle should be easy to use (preferably motorized) and comfortable for long duration travel.
- For younger age group, most of the aspire to have car in the next 5 years and are currently riding scooter.
- Less initial investment, operational and maintenance cost reduces the hire cost thus can promote use of vehicle.

- Sharing vehicle should not aggravate existing traffic and parking woes and should complement existing transport for seamless travel. Copenhagen city bikes have separate lanes and reserved train compartment to carry bicycle.
- System should be user friendly and unregulated for seamless and hassle free transaction, this will not only benefit primary user but decrease operational and maintenance cost for secondary user.

Salient features of Sharing system

- Hire cost should be kept competitive so that cost should not exceed that of bus and auto and other existing transport.
- User should be able to locate transit station via GPS and google maps through apps.
- Transit station should be in the proximity of walking distance. Preferably 0.5 - 1 Km range in dense population zone.
- Transit station should have equal number of empty docks to check out and available docks for vehicle hire.
- Vehicles should be arranged in the transit station so that it easily integrate with roads and lanes.

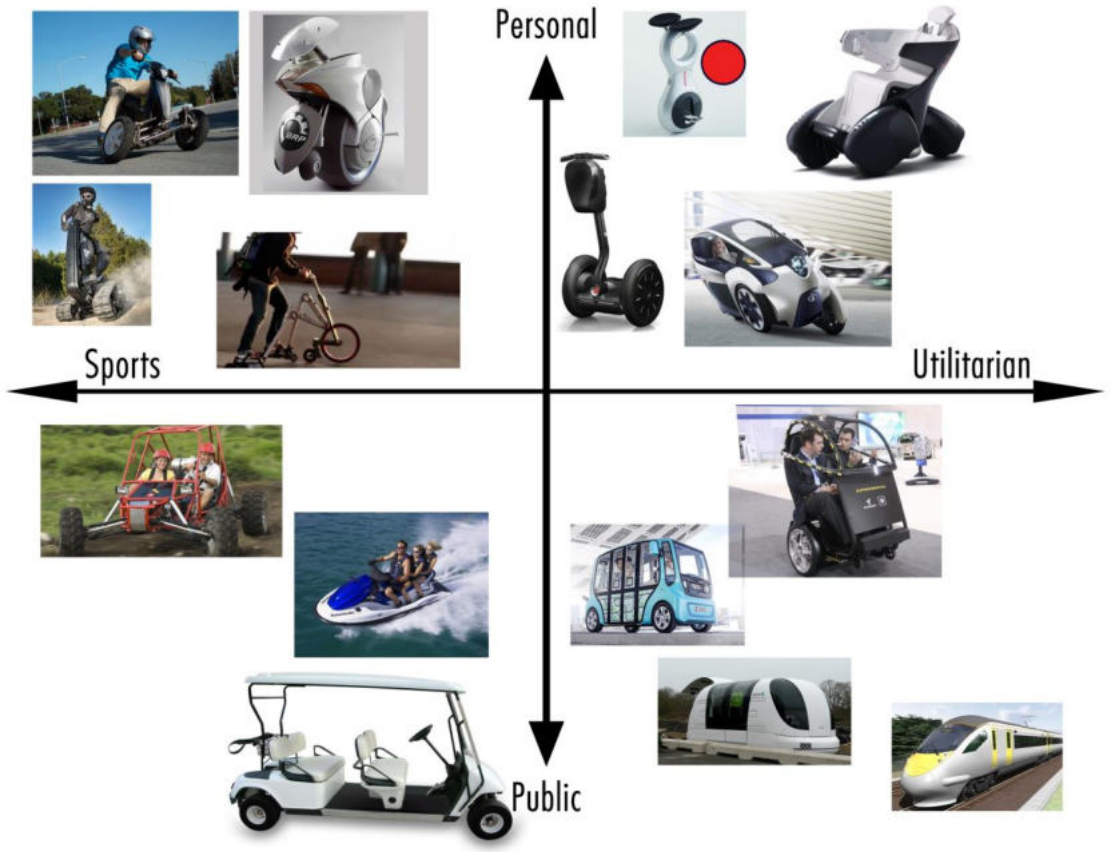
Salient features of Sharing system

- Vehicle registration, check in and check out and payment and ticketing should be preferably unregulated and unmonitored
- Information kiosk at the transit station should display all necessary information like nearest transit station, time to reach the station, status of available vehicle, user balance, vehicle charge, major routes, safety instructions etc.
- Sharing should be driven on separate lanes.
- Vehicle should have a notification which informs the service provider for schedule maintenance of the vehicle.
- Sharing system around the world have employed distribution strategy via distribution vehicle which circulates sharing vehicles from dense to scare transit station.

Salient features of Sharing system

- An ideal sharing system should address the need to mitigate the theft and vandalism. Design should be distinct and recognizable, it should have parts specifically designed which cannot be assembled into other vehicles.
- Colour coding the vehicle parts helps reducing theft Moreover use of existing technologies like RFID,GPS technology, real time mapping and ITS can track the vehicle and mitigate theft and vandalism.

Product Space



Defining the user

For public sharing vehicle system, the primary user is commuter using the vehicle and secondary is the service provider. The primary user is an urban **technology oriented** person of age 18 and above. He **values time and environment** he lives in. He is **in control of his life**, prefers to do **multi-tasking and open to try new and radical things**. User commutes daily to office/workplace/campus as a part of his daily chores, he wants his **life flexible without baggage of worries to carry around.**

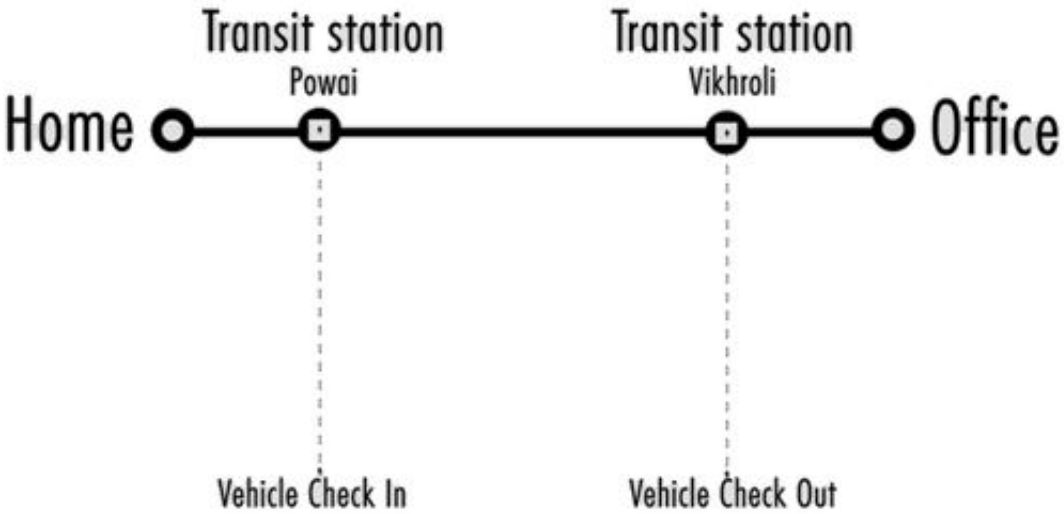
Daily commuting for work with point to point travel

Present Scenario

Paul stays near Hiranandani hospital. Daily he commutes around 14 km round trip to work and home. He uses his bike to go to office and it takes him half hour in dense traffic. Paul has to pay and park his vehicle in parking space which is 5 min distance by walk from his office. In the night, tired Paul has to drive through the traffic to reach home further adding exertion.

Daily commuting for work with point to point travel

Proposed Scenario

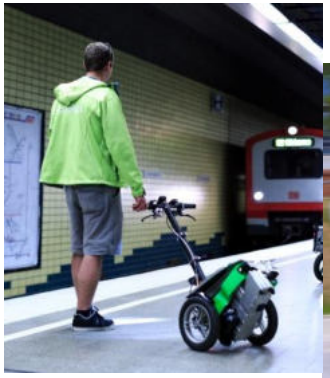


The Segway PT

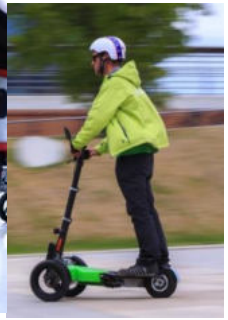
The Honda U3-X

Yike Bike

Bombardier Embrio



Scuddy..



Urban-E

GM PUMA

Toyota Winglet

Vehicle	Range	Top Speed	Charging time	Posture	Suspension	Wheel dimension(Road worthiness)	Weight	Total
Ideal Value	14 kms	~20 Km/hr	2-3 hrs	Sitting	preferred	Wheel dimension > 16"	20-25 kgs	
Points	9	9	9	9	10	7	7	
Yike Bike	9	9	9	9	1	5	9	**414**
Segway i2	9	5	1	1	5	9	1	254
Urb-E	9	5	5	9	1	1	9	312
GM Puma	1	1	5	9	9	9	1	292
Scuddy	9	5	9	1	1	5	1	258

Yike Bike Dimensions

Total vehicle length - 1011 mm
Wheel base 740 mm
Height of the vehicle 888 mm
Width - 700 mm

Yike Bike Front wheel dimension 20”

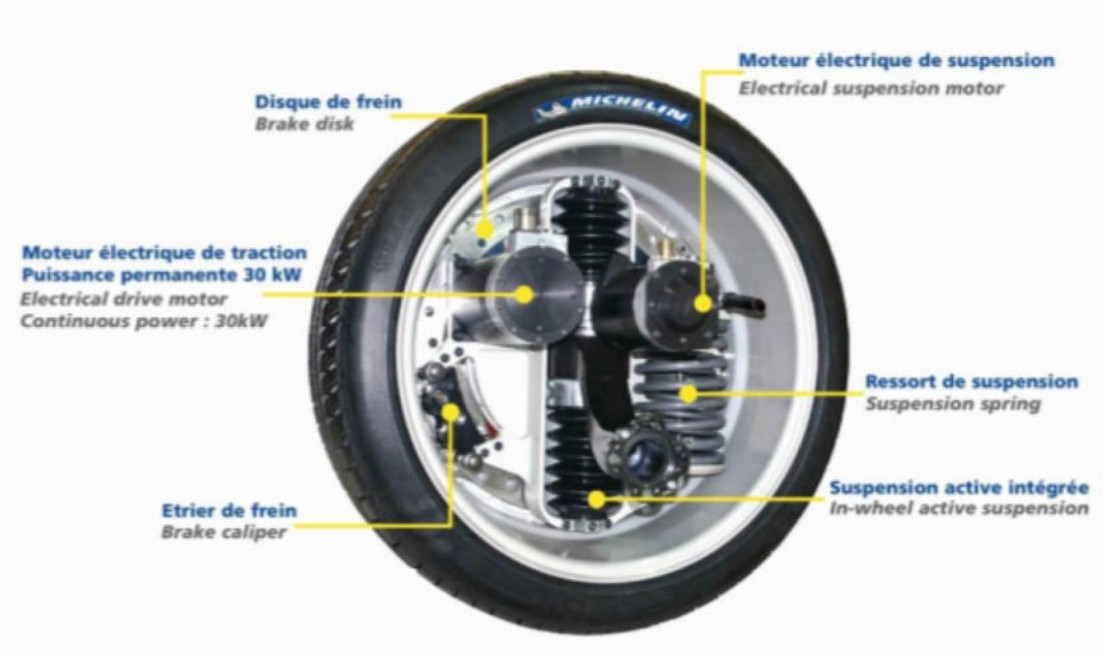
Yike Bike FRP fusion version weighs 65% more than that of Carbon fiber version

Cost - 3,595 $ / 2,12,716 Rs.

Hubless wheel

Lithium ion battery pack used in Yike bike.
Dimension 180X150X100 mm.

Motor + Brakes + Suspension + Steering



The Active Wheel design provides direct power delivery of approximately 55 kW (40 hp)

Inductive Charging

Magnetorheological Dampeners

Magnetorheological shock absorber is a damper filled with magnetorheological fluid which is controlled by a magnetic field to absorb shocks. Used in F1, Prosthetic limbs and aerospace applications.

MR Suspension dampeners are light weight. A 0.2 m extension length,0.15 m compression length dampener weighs 0.8 Kgs and has capacity of 4448 N i.e. 500 Kgs.

Loop Wheel

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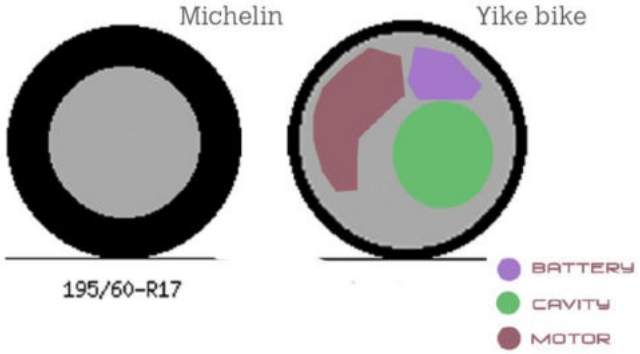
1. Loop wheel are currently available for 20" wheels.
2. Unlike suspension forks, loop wheels provide tangential suspension: that is, the suspension works in every direction.
3. With manufacturer claiming to launch loop wheel for bigger and smaller size as well



Yike bike
Tire width : 0.1 m
Wheel width at axel : 0.2 m
Tire Diameter : 0.48 m

Michelin Active wheel
Tire width : 0.195 m
Wheel diameter : 0.665m
Wheel rim diameter : 0.43m
Weight : 24 kg
Weight without motor and suspension : 6.5 Kgs

- User research was conducted for 37 user who travel daily to office and do not use modal split.
- Out of the total 37 user, 24 were male and 13 were female. They either use bike or scooter to commute.

- Following were the questions asked-
  - Which vehicle you use?
  - What vehicle you aspire to buy 5 years from now?
  - How much distance you travel? How much time you travel?
  - Do you travel alone or have pillion rider?
  - What do you carry to office?
    - Cell phone/Tab
    - Cell phone for navigation
    - Laptop bag
    - Tiffin
    - Helmet
  - Do you prefer close luggage or open luggage space?
  - Do you use cell phone for navigation?

- Do you need separate luggage space for laptop?
- Do you want cell phone charging/ laptop charging port?
- Where you keep your helmet? Would you be comfortable in sharing helmets?
- If no would you be comfortable in wearing personal head sock and share helmet?
- Would you prefer to pedal when no fuel?
- Would you prefer a rooftop?
- Given a choice between car, scooter and bicycle what you will choose in public sharing system and why?
- Which of the given vehicle you would choose for office commuting? And why?
- What's your preference of vehicle looks from the following?

  Speedy & Sporty
  Sober & Elegant
  Robust & Safe
  Agile & Aggressive

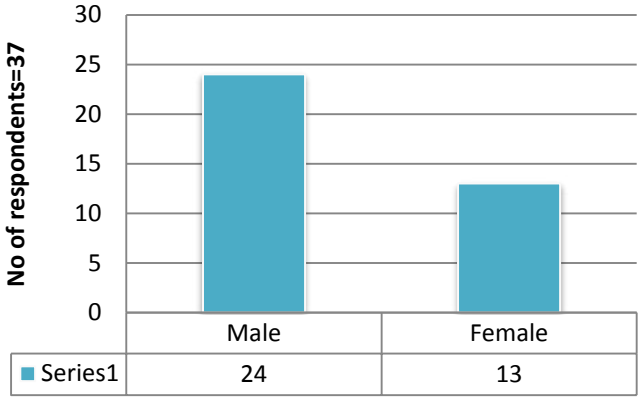
- Which of the given vehicle you would choose for office commuting? And why?

Option 1

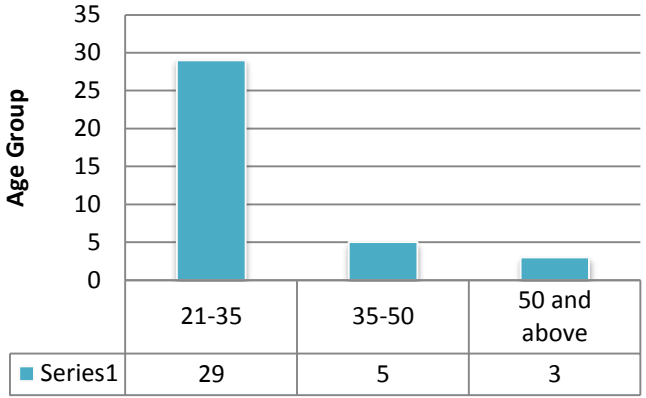
Option 2

Option 3

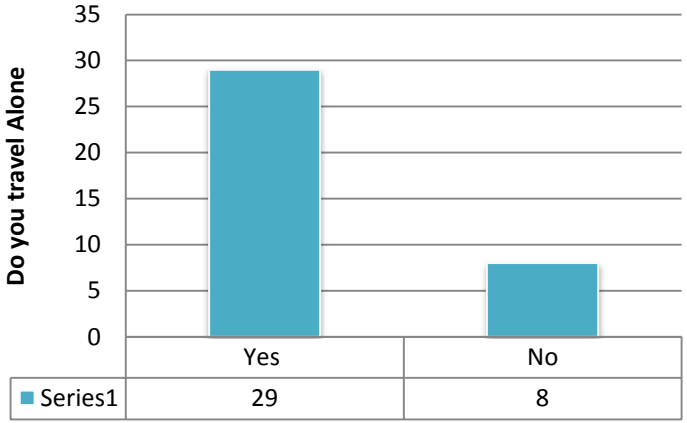
Option 4



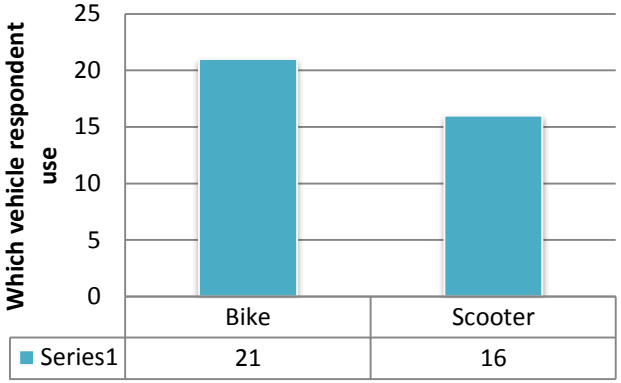
No of respondents=37



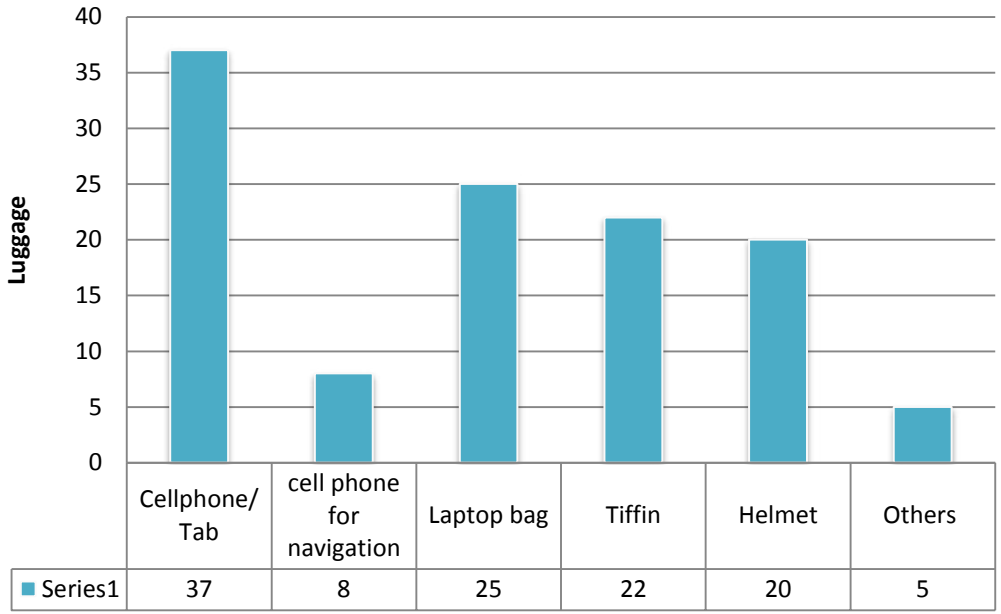
Age Group



Do you travel Alone

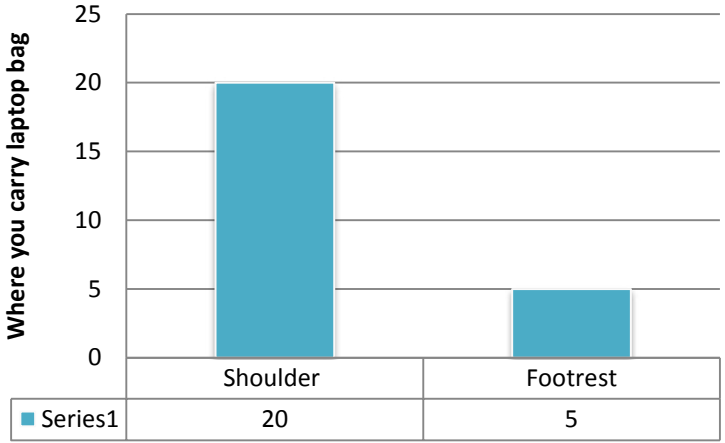


Which vehicle respondent

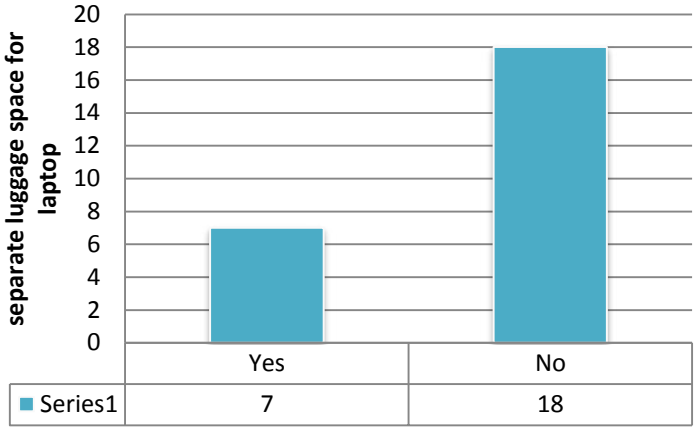


Luggage

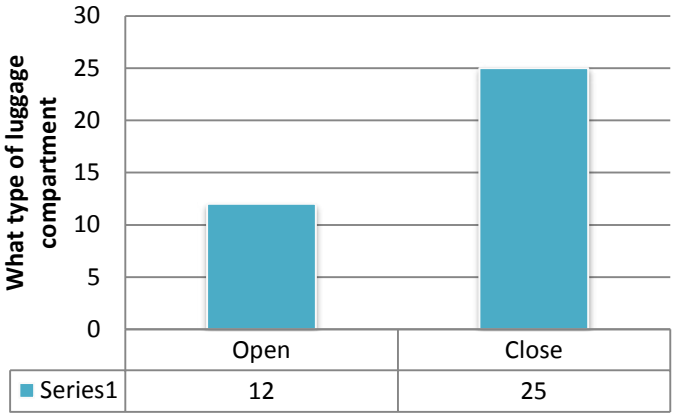
Dimensions in mm
Laptop/backpack – 500x350x150; 11 of them prefer keeping the bag over the shoulder
Tiffin bag – 250x200x150 : Handle, footrest, under seat
Helmet – 300x250x250



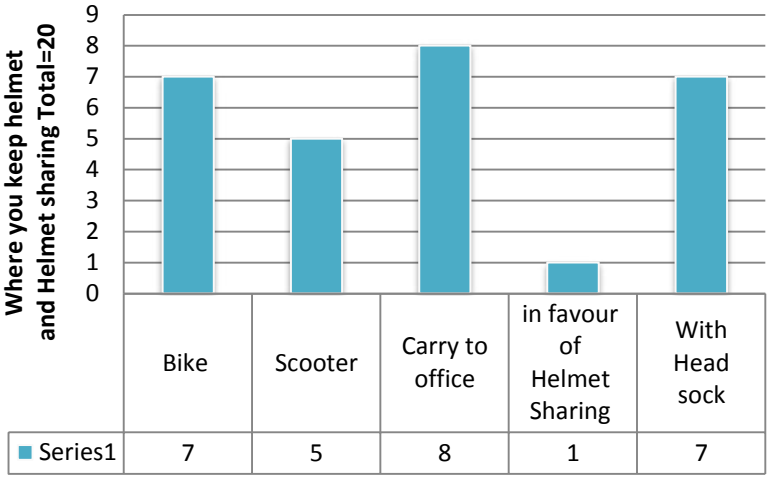
Where you carry laptop bag



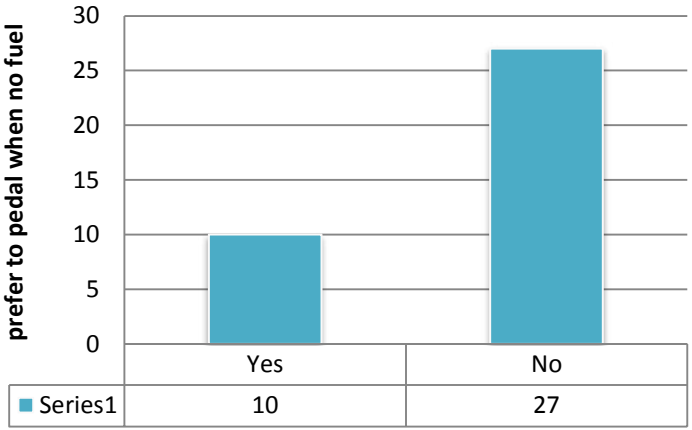
Do you need separate luggage space for laptop



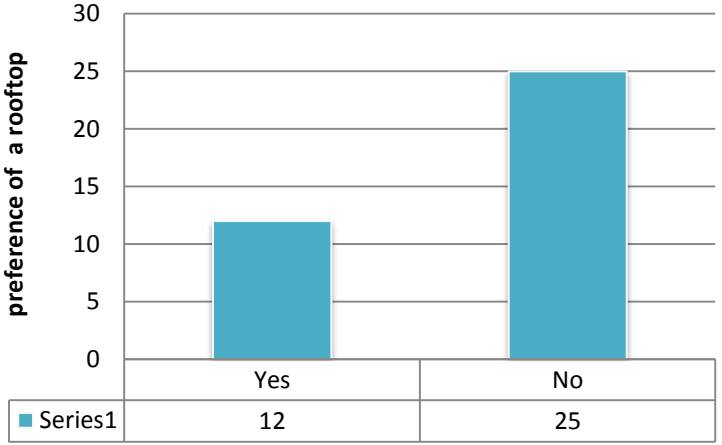
What type of luggage compartment



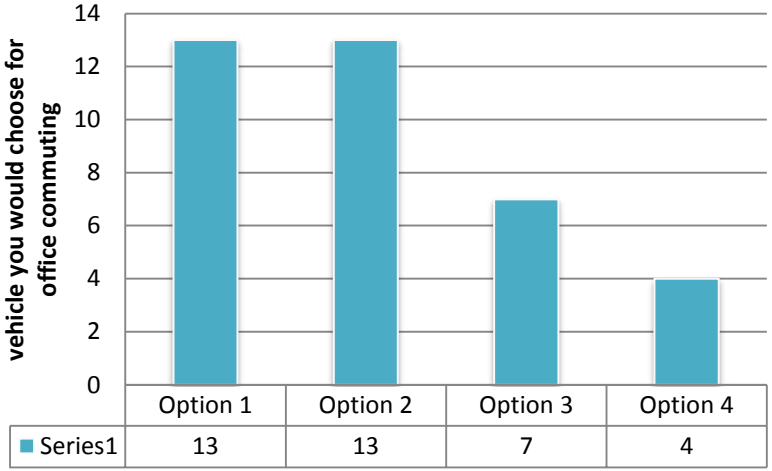
Where you keep helmet
and are you in favour of Helmet sharing



Do you prefer to pedal when no fuel



preference of a rooftop



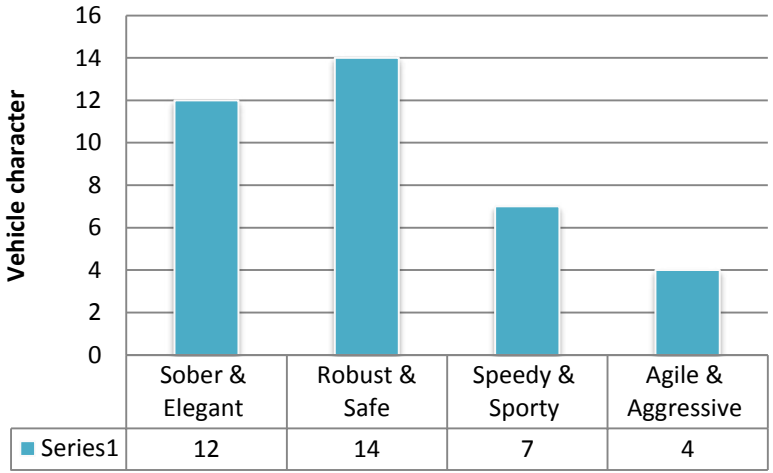
Which vehicle you would choose for office commuting

Option 1

Option 2

Option 3

Option 4



What Vehicle Character you would like for your daily office commuting vehicle

Objective:
To design a compact sharing vehicle for urban office commuters

Target User:
User above age of 18 years who lives in a city and commutes to his office daily.

Market:
Currently public sharing of vehicle does not exists. Vehicle and system will be designed for the future scenario

The vehicle intended will be compact, light weight and electric. As vehicle will be used every day, form should convey vehicle being robust and safe and futuristic.

i. The vehicle designed will be compact and light in weight for easy transportation within the city via distribution vehicle.
ii. A compact vehicle will occupy less space in transit station and on distribution vehicle enabling more vehicles to be docked.
iii. Footprint of the vehicle will be in benchmarked from Yike bike and e-scooter.
iv. Yike bike and e-scooter are having length of 1 m and 1.35 m respectively. Thus effort will be made to achieve the footprint between 1 m to 1.35 m.

Vehicle should be easy to maintain for service provider.

i. Vehicle intended should be easy to use not only for primary user for age group 18 but the vehicle should also be convenient to maintain for secondary user i.e. service provider as well.
ii. A mechanism that will sync usability and serviceability will be explored.

Design solution to mitigate theft and vandalism.

i. Theft and vandalism are the serious problems of vehicle sharing system which makes sharing system inoperative.
ii. Vehicle intended will have solution to minimize or mitigate theft and vandalism.

Vehicle will be intended for one person and will have closed storage space for Tiffin required for daily commuting to office

i. Vehicle designed will be used by a single person
ii. As per user research storage space will be closed
iii. Since vehicle will be checked out, in order to mitigate risk of forgetting luggage behind, solution will be explored.
iv. Dimension of tiffin : 250x200x150 mm.

Vehicle will be driven on separate lanes for safety and convenience.

i. Considering the recommendation of urban transportation for India 2030 (Separate lanes for bicycle to be developed by 2030), these vehicles will be recommended to be driven on separate lanes for Safety and hassle free commuting.
ii. However package selected with take care of today's road conditions and need as well.

Registration, vehicle check in, check out, docking mechanism and payments will be user friendly and unregulated for enhanced user experience.

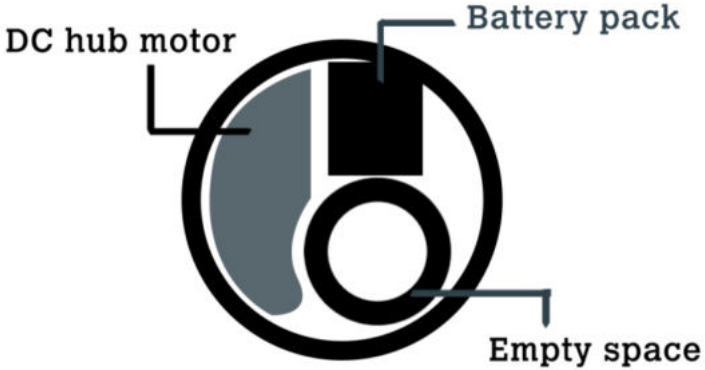
Design solution for effective space optimization of transit station.

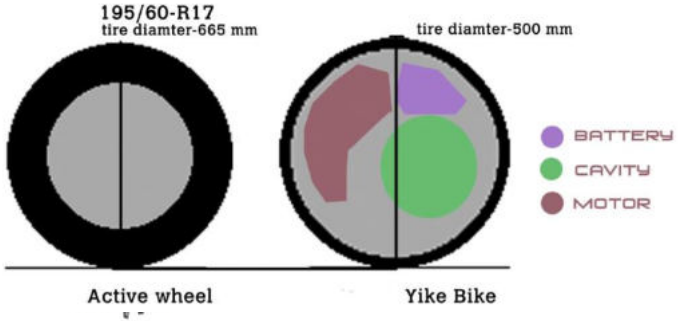
i. Docking station will be designed for considering the final design of the vehicle considering the factors like easy and hassle free check in and check out.

Vehicle will use Li-ion 37V 6.6 Ah battery pack bench marked from YikeBike , vehicle will thus have maximum speed of 23 Km/hr powered by 450 W motor and will have a range of 14 Kms per charge for 75 Kg person on a flat road.

i. For the defined scenario for point to point travel a 14 Km range per charge is considered to be adequate.
ii. With transit stations located within area of 1.5 to 2 Kms.
iii. Since vehicle will be used in dedicated lanes for safety, maximum speed will be recommended to be 23 km/hr.
iv. Weight of the specified battery will be 1.4 Kgs with dimensions of 180x150x100 mm.

Comparing Michelin Active wheel and Yike bike wheel





Michelin Active wheel
Tire width : 0.195 m
Wheel diameter : 0.665m
Wheel rim diameter : 0.43m
Weight : 24 kg
Weight without motor and suspension : 6.5 Kgs
Power : 55kW
Max Speed : 150 kmph

Yike bike
Tire width : 0.1 m
Wheel width at axel : 0.2 m
Tire Diameter : 0.48 m
Power : 450W
Max Speed : 23kmph

Michelin Active wheel and Yike bike wheel

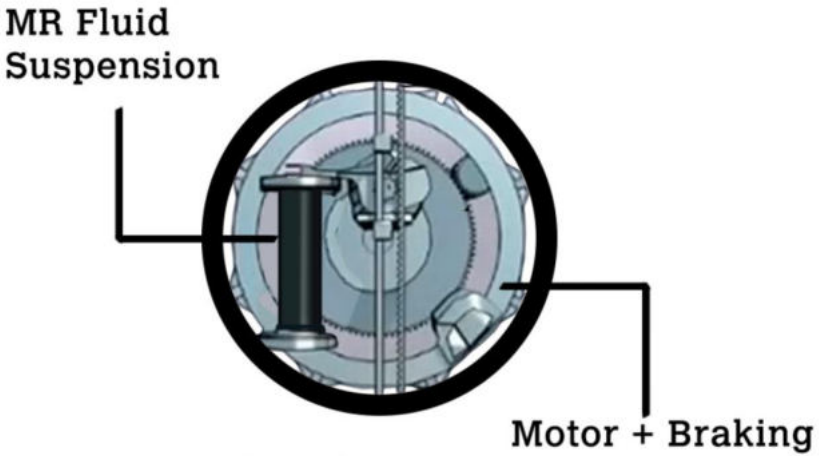
i. Use Active use wheel technology to implement suspension, steering and braking in Yike wheel package
ii. For active wheel weight of the tire is 6.5 Kgs. Weight of the hub motor 7 Kgs, remaining weight of braking system, suspension and steering amounts total of 24 kg.
iii. Yike bike weighs only 9.5 Kgs only with battery and motor weighing only about 5 Kgs which is sufficient for 75 kg person to travel 14 Kms.

Michelin Active wheel and Yike bike wheel

i. DC motor weight of Yike is 2.5 Kgs instead of 7 Kgs of active wheel DC motor.
ii. MR fluid suspension - 0.2 m of suspension weights 0.8 Kgs and has capacity of 500 Kgs. Therefore for considered rim diameters of 0.4 m, suspension will not weigh more than 2 Kgs. This weight has reduced from 4 Kgs of active wheel suspension to 2 Kgs.
iii. Tyre weight of yike bike 1.5 Kgs
iv. Therefore total weight of front wheel module –
Tyre(1.5 Kgs) + Suspension(2 Kgs) + Motor(2.5 Kgs) + Braking system (4 Kgs)
1.5 + 2 + 2.5 + 4 = 10 Kgs

Calculating the new weight with active wheel configuration

i. For rear wheel, pneumatic tire of scooty was considered-
   i. Section width - 80 mm
   ii. Tire diameter - 413mm
   iii. Weight - 4 Kgs
ii. Thus total weight of front and rear tire adds up to 14 Kgs.
iii. A similar personal mobility vehicle 'Urban e' with weight 13 Kgs uses same battery specification i.e. 37 V 2 hp motor with 12 Ah battery amounting 30 km of range and 24km/hr of top speed. However it is important to note that charging time will increase from 1.5 hours to 3 hours.
iv. Dimension of new battery pack – 180X150X125

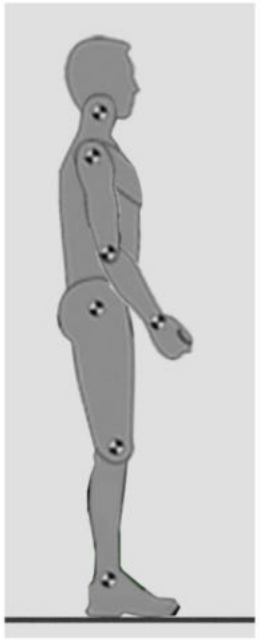


Front Wheel Configuration in Yike bike wheel

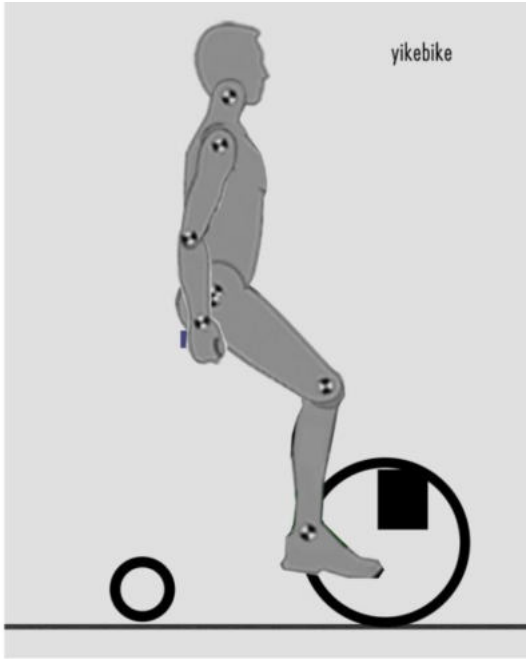
Package exploration

Package exploration

Yike Bike



95 % male 1.77 m



Yike Bike Posture

Package exploration

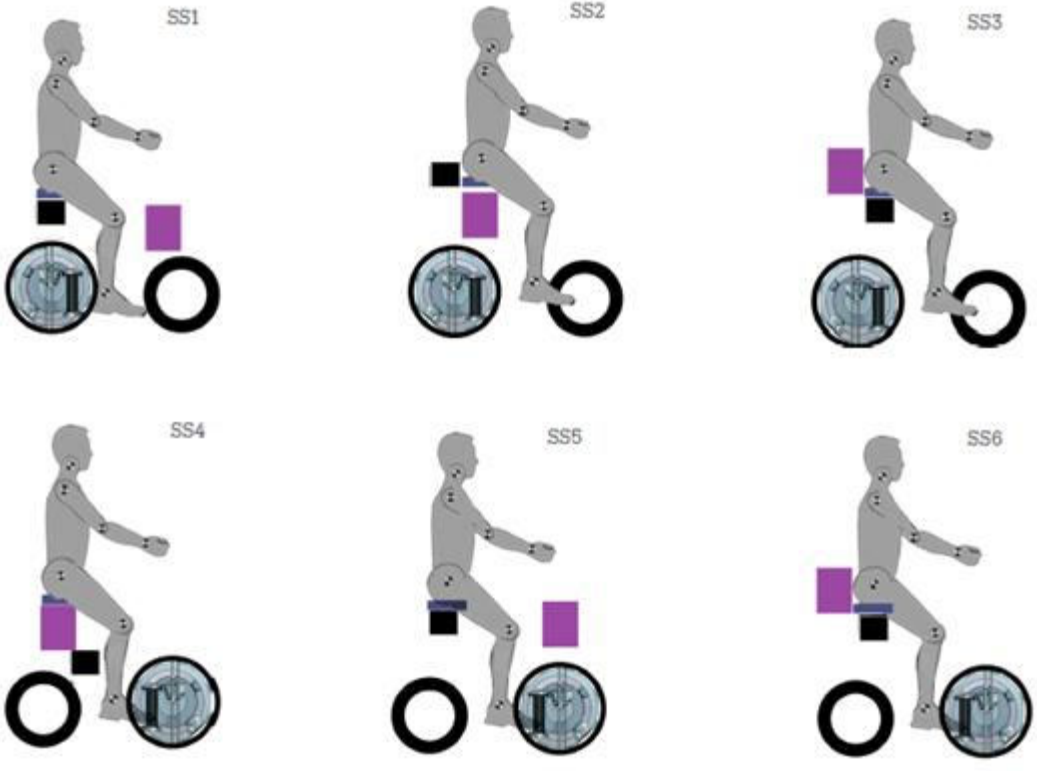
95th % male- 1.77 m

2013 Honda Activa

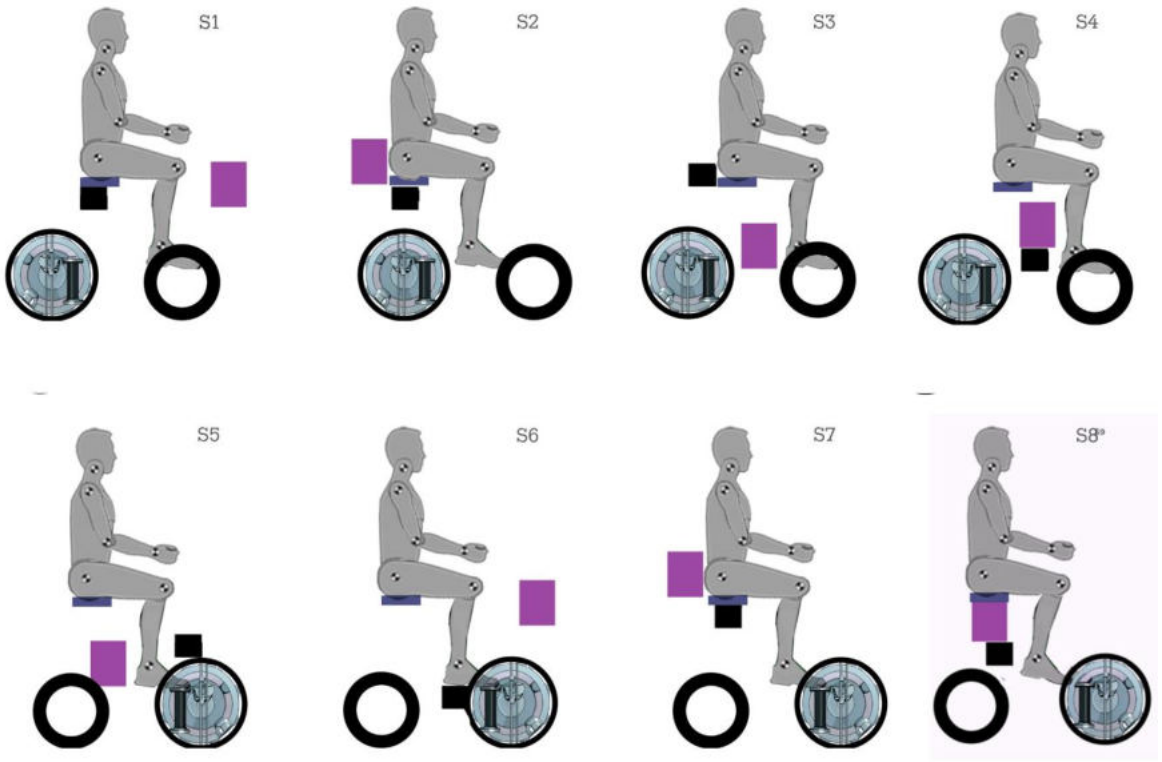
Calculated seat height: 30.4"
Forward lean: 0°
Knee angle: 89°
Hip angle: 82°

Honda Activa sitting posture

Semi standing Posture

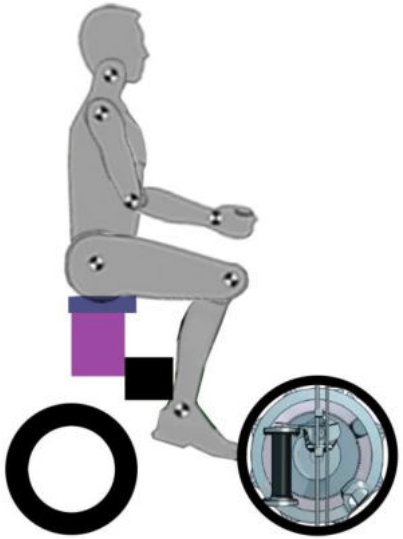


Sitting Posture



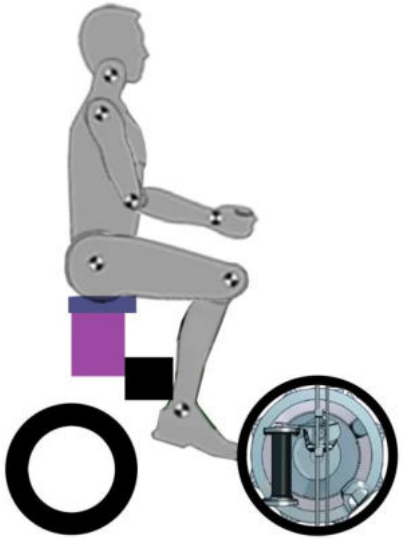
- Sitting posture is more comfortable than semi-standing posture for longer rides of 30 minutes.
- Semi-standing posture has an disadvantage of reduced ground clearance since feet are more closer to ground.
- Semi-standing posture does not alter or make the package more compact in any way.
- Considering the sitting posture package S4 and S8 are more compact with elements close to each other occupying less volume.
- small rear wheel allows more space below the seat.
- Battery and Luggage can easily be accommodated with the extra space below seat.

S8

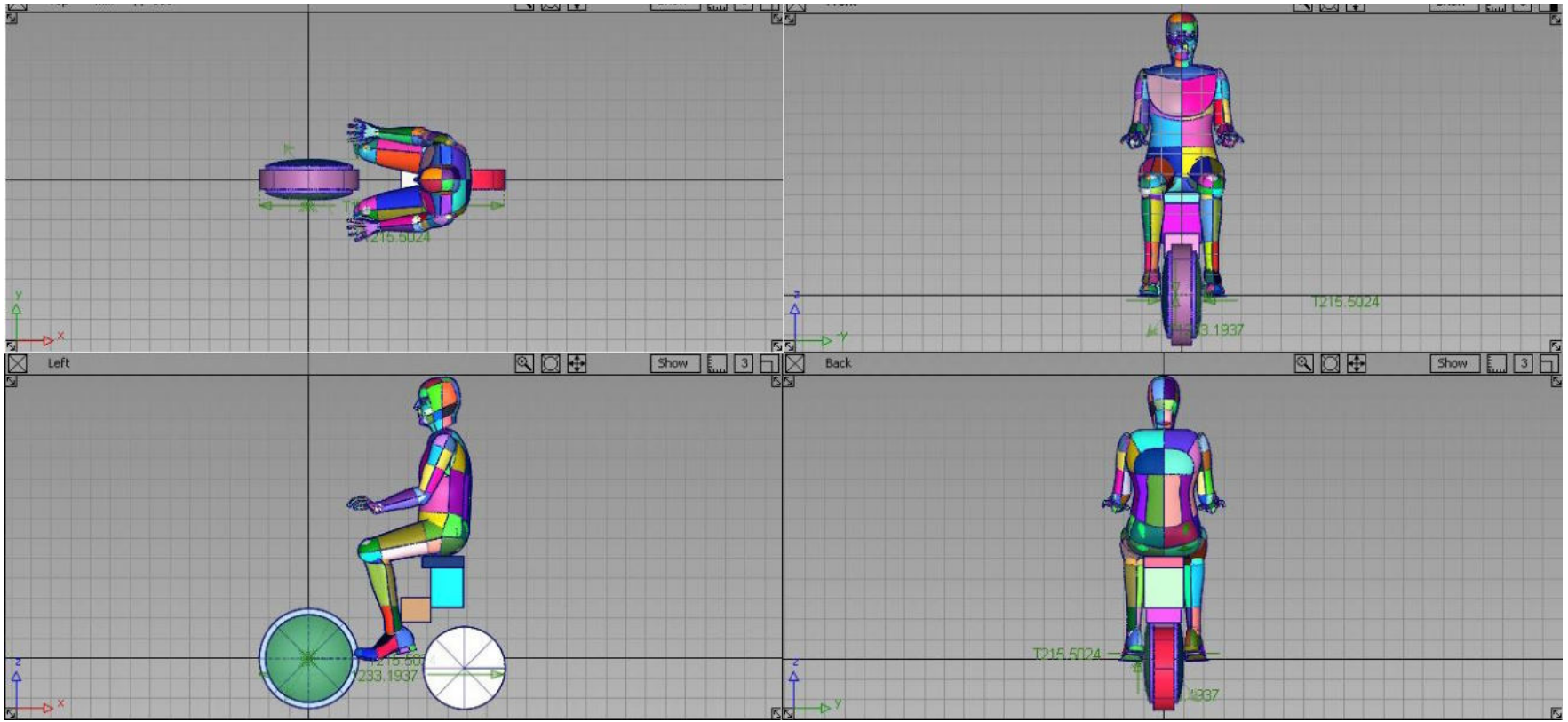


- Front wheel drive vehicles are more stable on uneven terrain and dumpy roads compared to rear wheel drive.
- For uphill and downhill rides, front wheel drive are considered more safer. Toppling is seen more in rear wheel drive vehicles..
- Turning radius is front wheel drive vehicle is less than that of rear wheel drive.

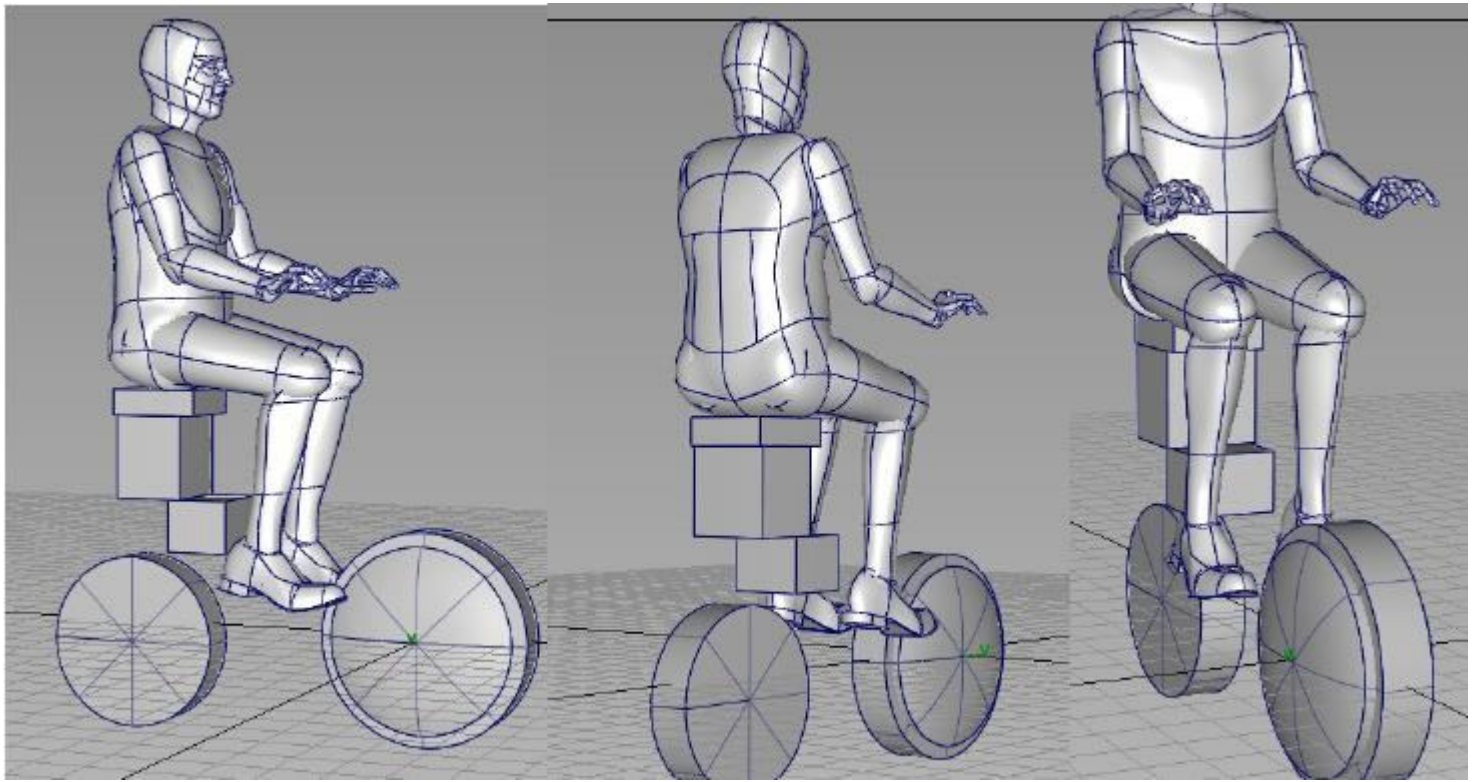
S8



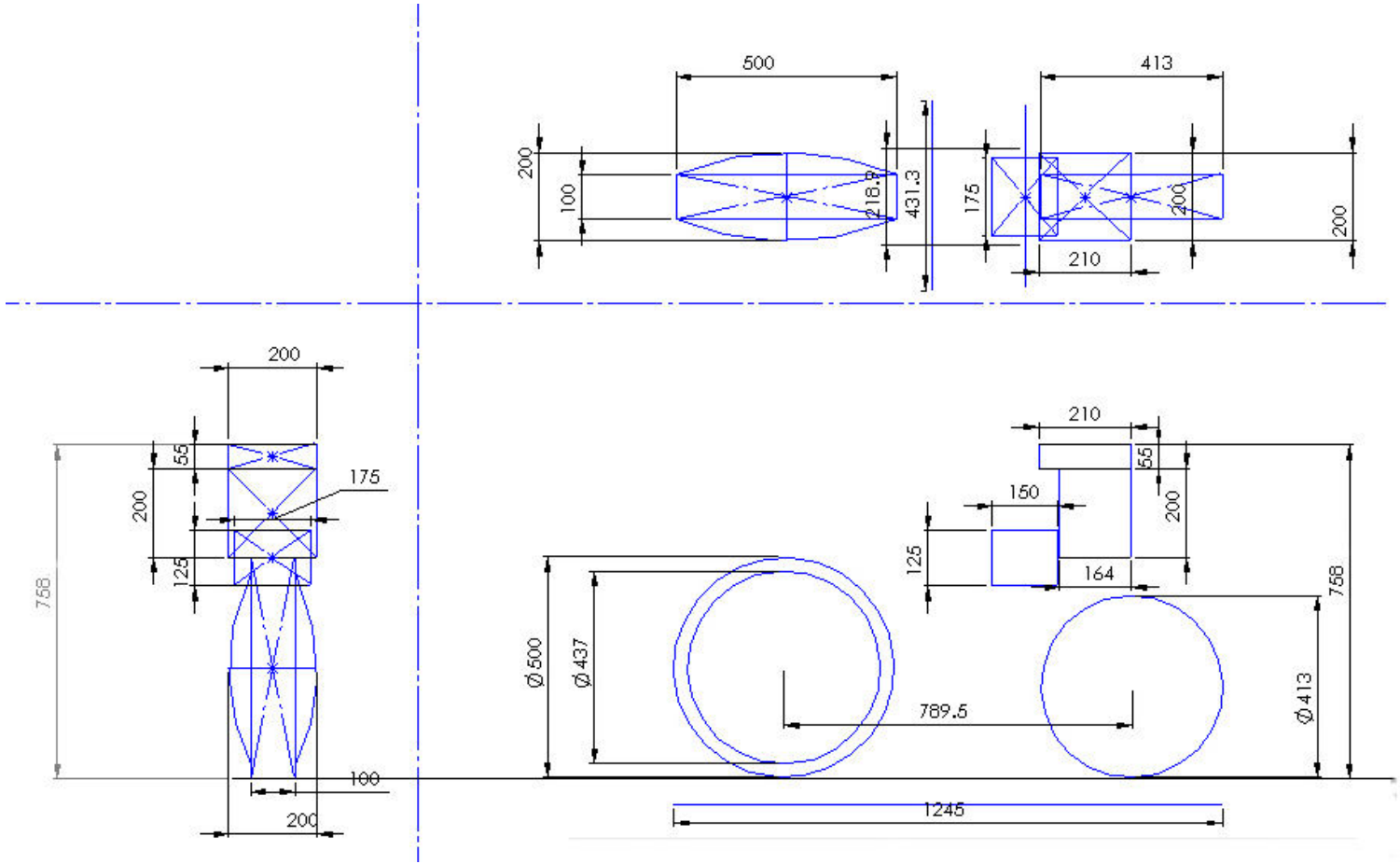
Package exploration



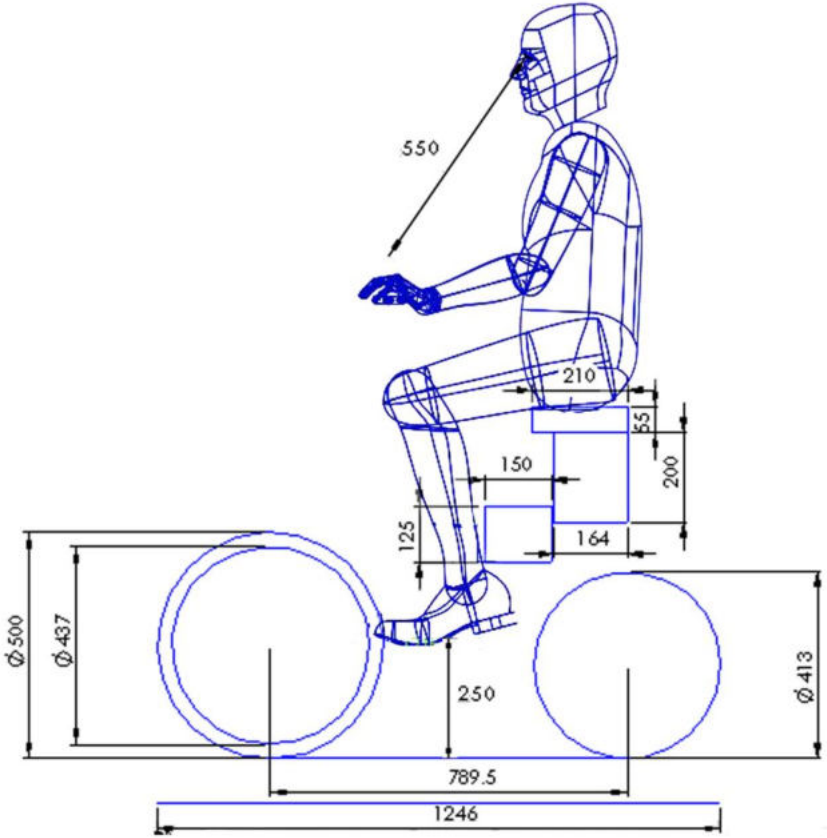
Package exploration

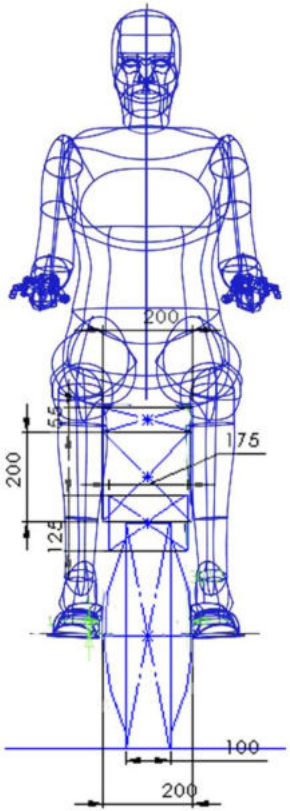


Package exploration

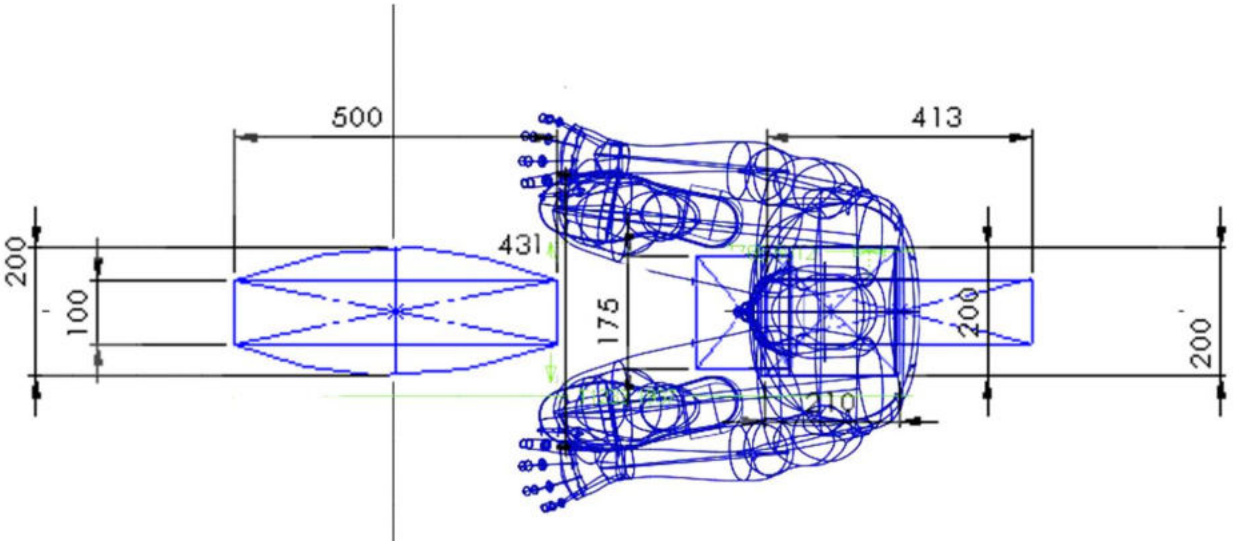


Package exploration



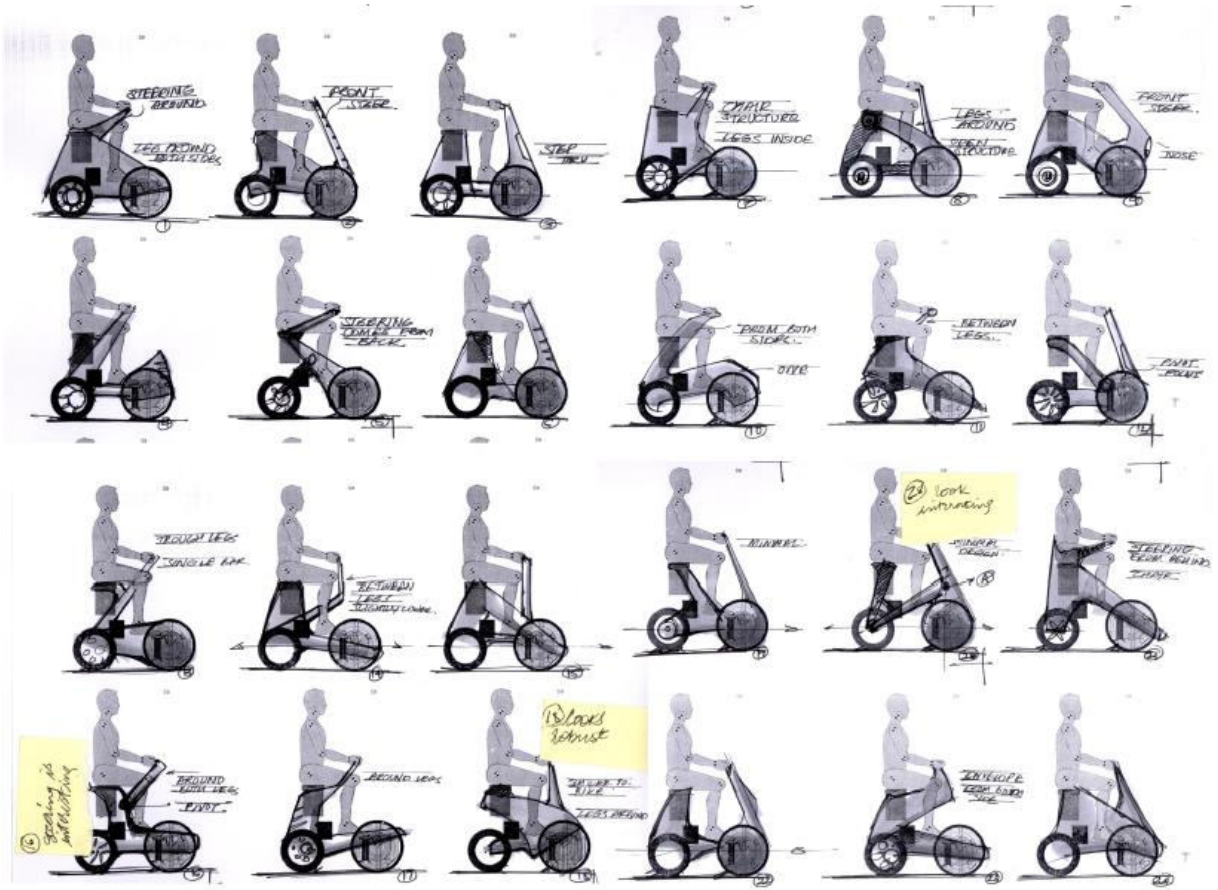


- Cell Docking 550 m away from eye
- Ground Clearance 250 mm
- Seat Height - 758 mm benchmarked from Honda Activa
- Wheel base - 789 mm
- Vehicle Footprint - 1246 mm
- Seat Dimension - 210X200X55 mm.
- Seat will be of bicycle saddle configuration.



Knee to knee distance relaxed- 431 mm
Knee to knee distance (relaxed) for 5th,50th and 95th percentile male is 284,388 and 535 mm respectively-
Indian Anthropometric dimension - D.Chakrabarti

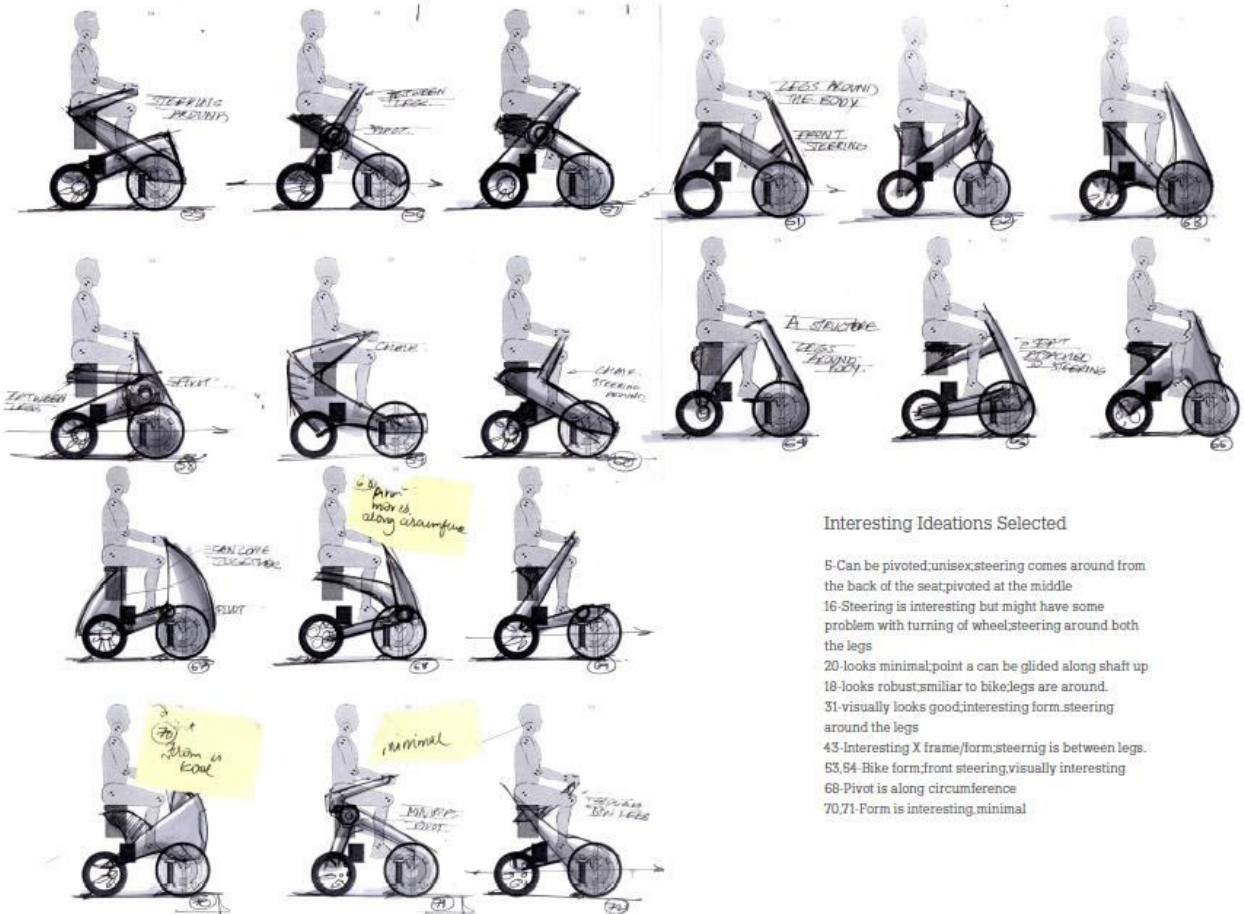
Sketches


STEERING BEHIND
FRONT STEER
LEG AROUND
LEGS INSIDE
STEERING COMES FROM BACK
BETWEEN LEGS
FRONT STEER
STEERING BEHIND
FRONT STEER
LEGS AROUND
LEGS INSIDE
FRONT STEER
STEERING BEHIND
FRONT STEER

Sketches


Good
(not) visually
STEERING
LEGS
VISOR
SEAT
LEGS
STEERING
LEGS
STEERING
LEGS
STEERING
(83) Light

Sketches

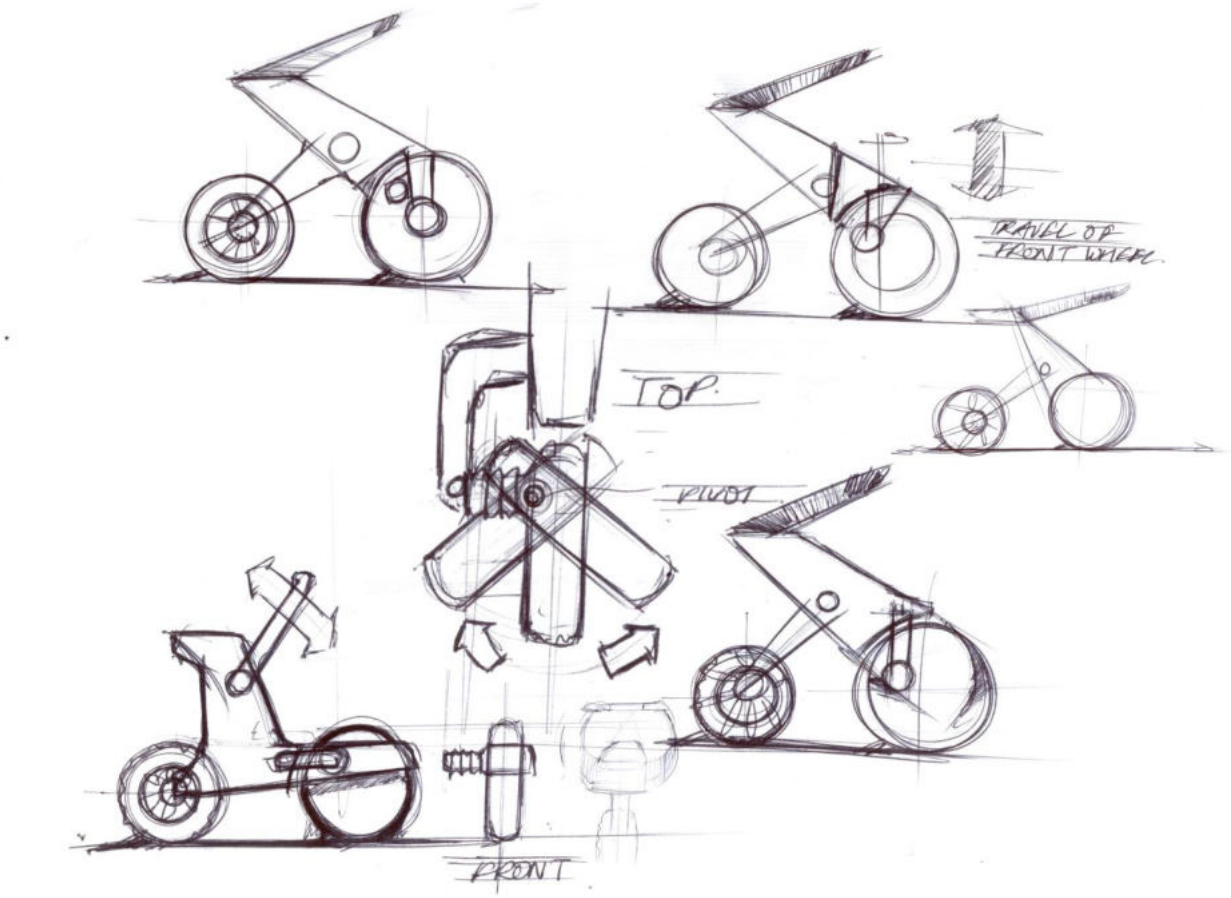


Interesting Ideations Selected

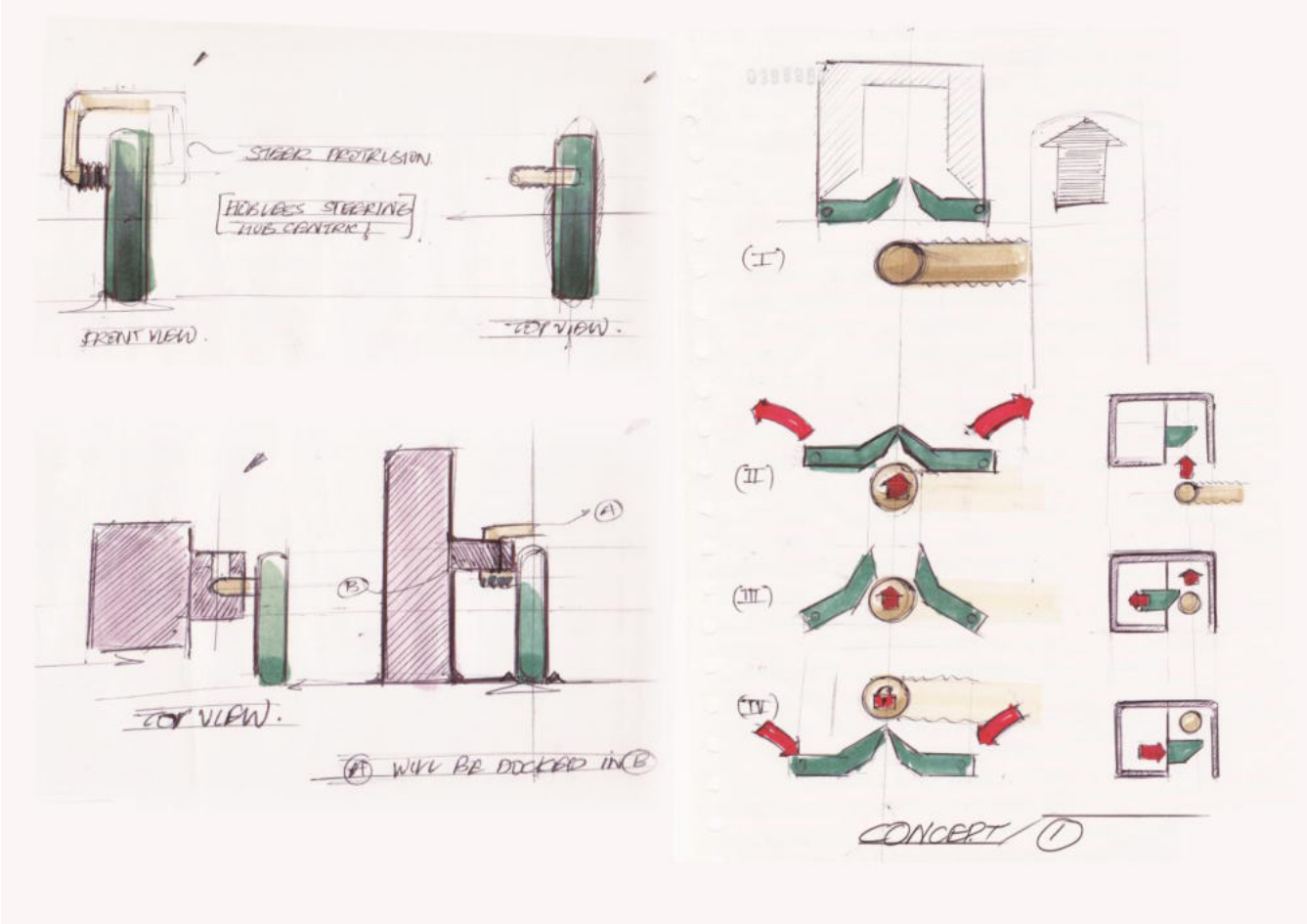
5-Can be pivoted;unisex;steering comes around from the back of the seat;pivoted at the middle
16-Steering is interesting but might have some problem with turning of wheel;steering around both the legs
20-looks minimal;point a can be glided along shaft up
18-looks robust;smiliar to bike;legs are around.
31-visually looks good;interesting form.steering around the legs
43-Interesting X frame/form;steernig is between legs.
53,54-Bike form;front steering;visually interesting
68-Pivot is along circumference
70,71-Form is interesting.minimal

Robust and Safe

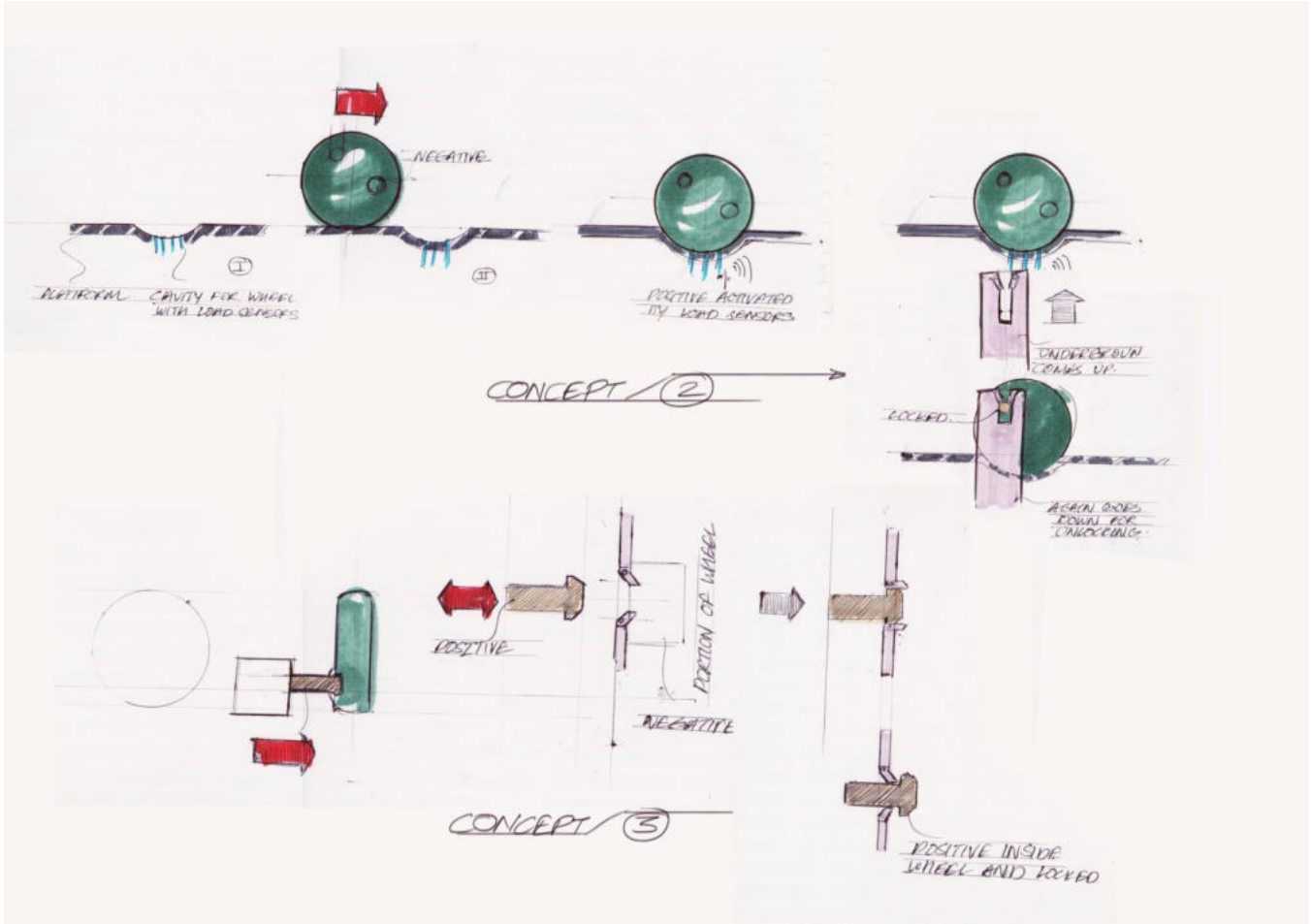
Sketches



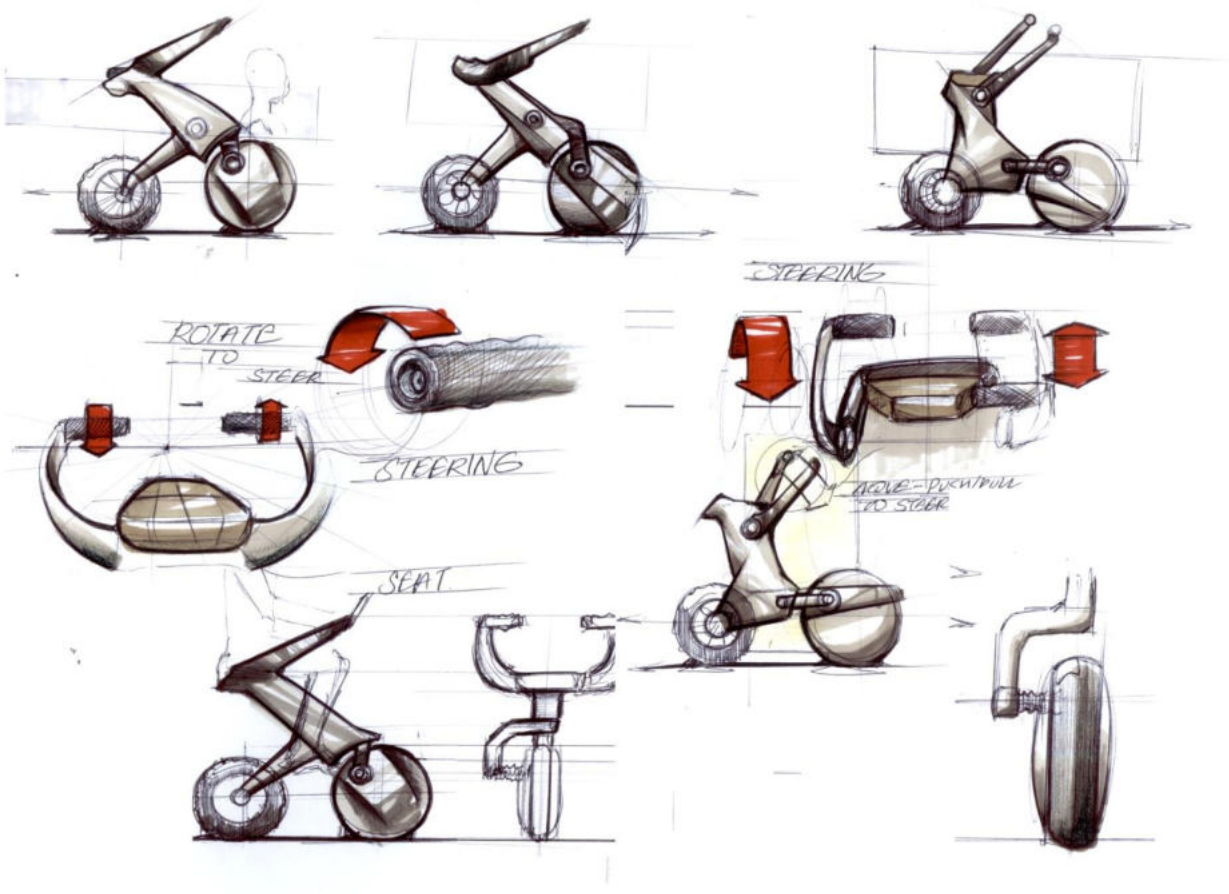
Sketches


STEER RESTRUSION
HUBLESS STEERING
HUB CENTRE
FRONT VIEW.
SIDE VIEW.
(A)
(B)
SIDE VIEW.
(A) WILL BE DOCKED IN (B)
(I)
(II)
(III)
(IV)
CONCEPT (I)

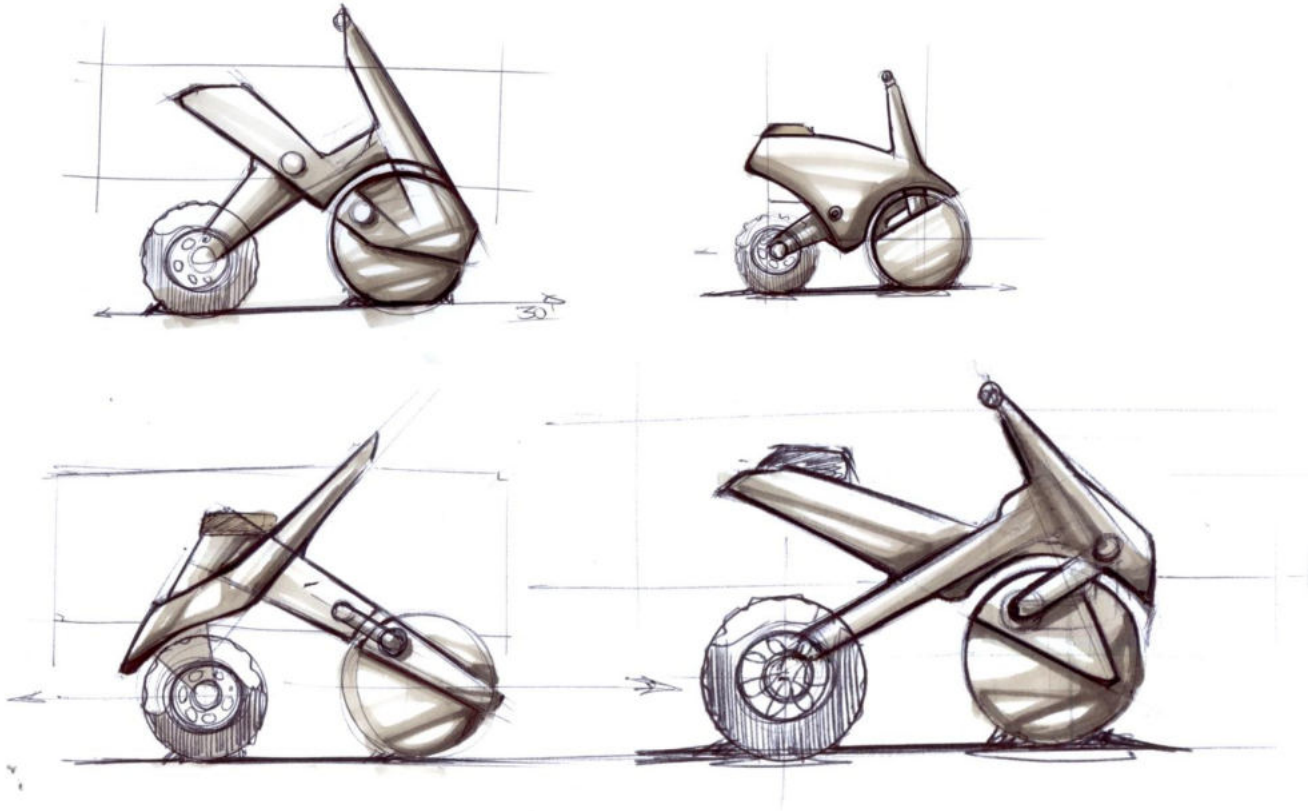
Sketches


NEGATIVE
I
II
PLATFORM
CAVITY FOR WHEEL WITH LOAD SENSORS
POSITIVE ACTIVATED BY LOAD SENSORS
CONCEPT 2
UNDERBEAM COMES UP.
LOCKED.
AGAIN GOES DOWN FOR UNLOCKING.
POSITIVE
POSITION OF WHEEL
NEGATIVE
CONCEPT 3
POSITIVE INSIDE WHEEL AND LOCKED

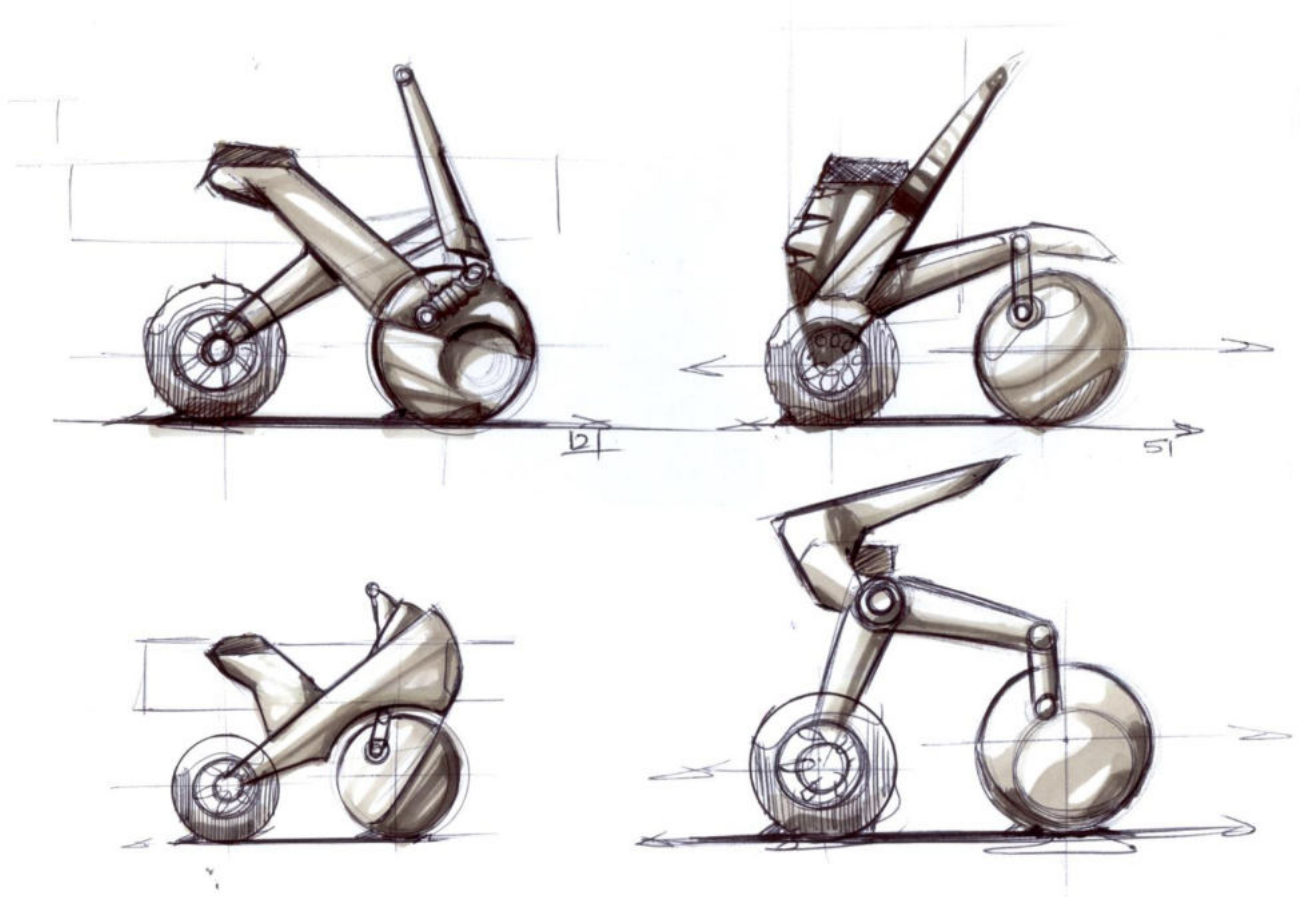
Sketches

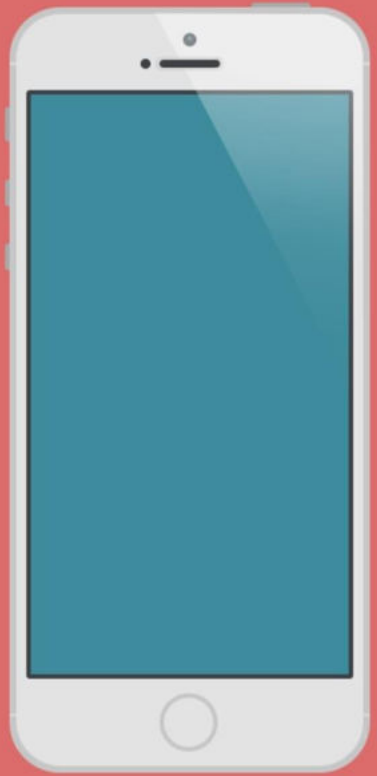


Sketches



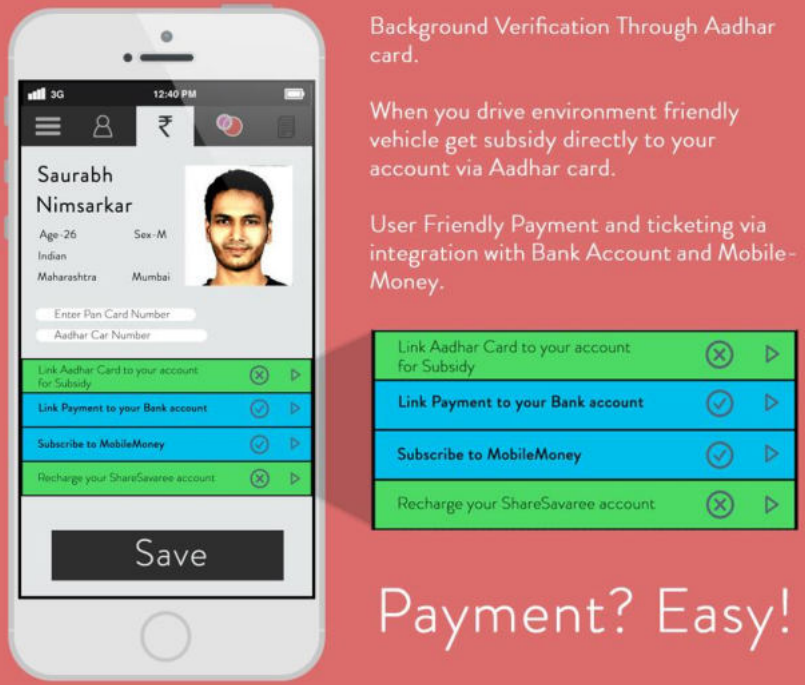
Sketches





Your cell phone is
your key !


3G
12:40 PM
Welcome
to
ShareSavaree
Username
Password
Remember ID and Password
Sign In
Sign up
Forgot password ?
Help?
Call-1800 001 00

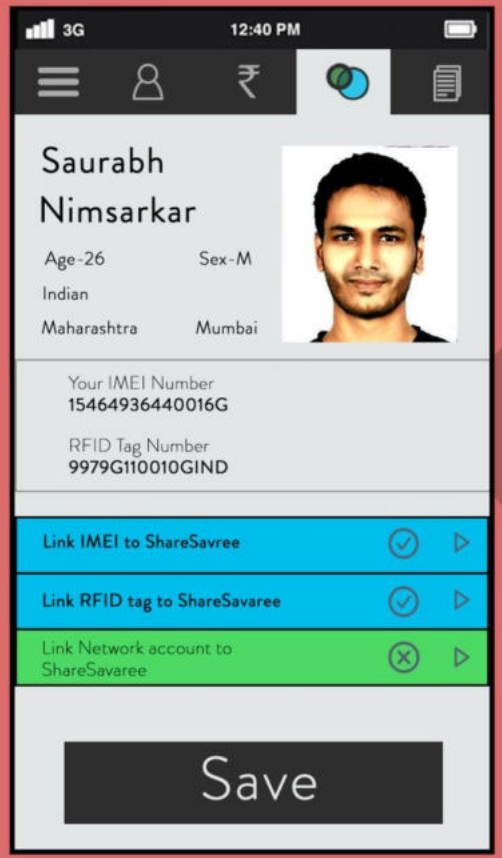


Background Verification Through Aadhar card.

When you drive environment friendly vehicle get subsidy directly to your account via Aadhar card.

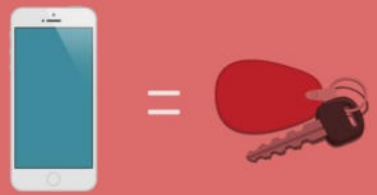
User Friendly Payment and ticketing via integration with Bank Account and Mobile-Money.

Payment? Easy!



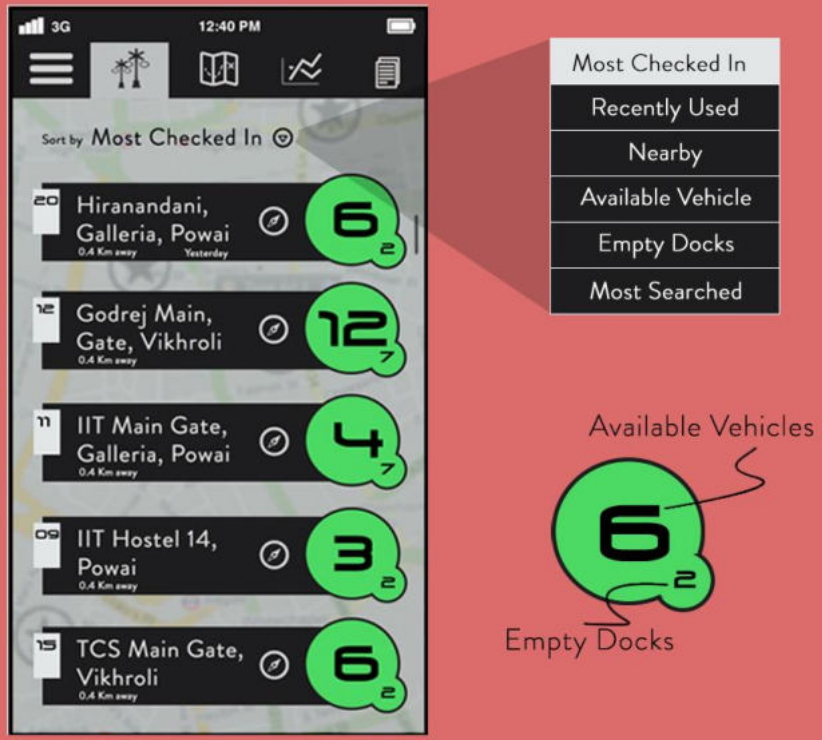
Registration of IMEI Number with Service Provider.

App registers your IMEI and RFID number with vehicle sharing provider. Each cell phone thus becomes a unique 'key' which can be docked by the user to drive a vehicle.



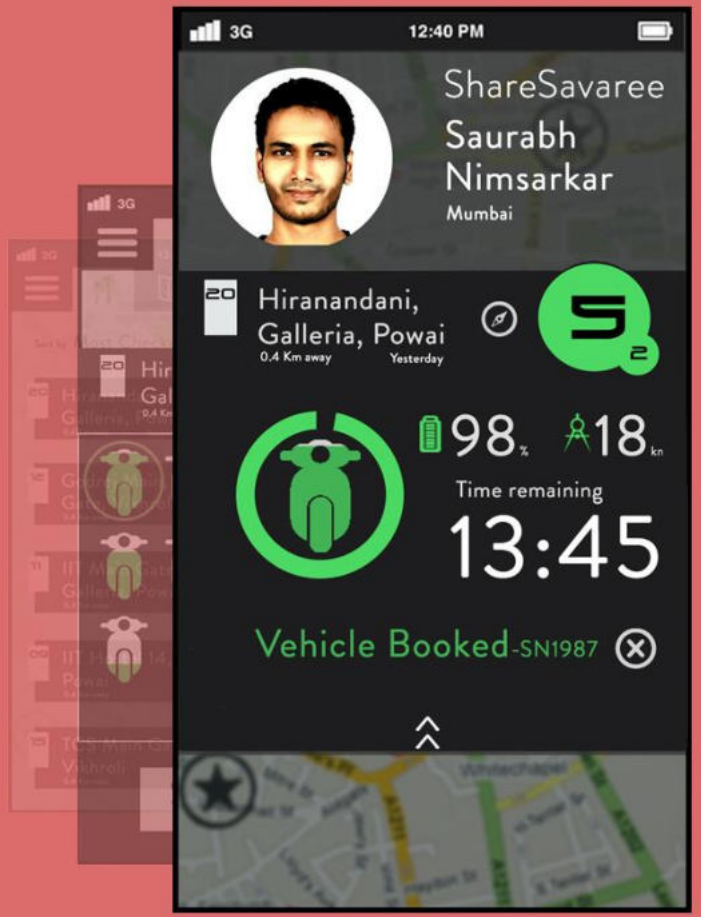
Prevention of theft and vandalism

GPS will be switched on by default when you use the vehicle.This is to prevent theft and vandalism .GPS data wont be used for commercial or private use,privacu of the user is a libility of theservice provider.


3G
12:40 PM
Sort by Most Checked In
Hiranandani, Galleria, Powai
0.4 Km away Yesterday
Godrej Main, Gate, Vikhroli
0.4 Km away
IIT Main Gate, Galleria, Powai
0.4 Km away
IIT Hostel 14, Powai
0.4 Km away
TCS Main Gate, Vikhroli
0.4 Km away
Most Checked In
Recently Used
Nearby
Available Vehicle
Empty Docks
Most Searched
Available Vehicles
Empty Docks

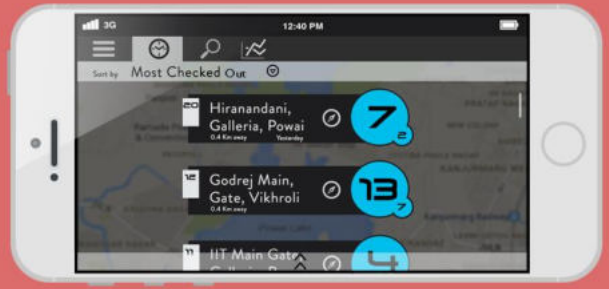

3G
12:40 PM
You are at Hiranandani Hospital
Search


3G
12:40 PM
Hiranandani,
Galleria, Powai
Vehicle Id - SN4987
98
18
Last Maintenance done 1 month ago
Save it for me

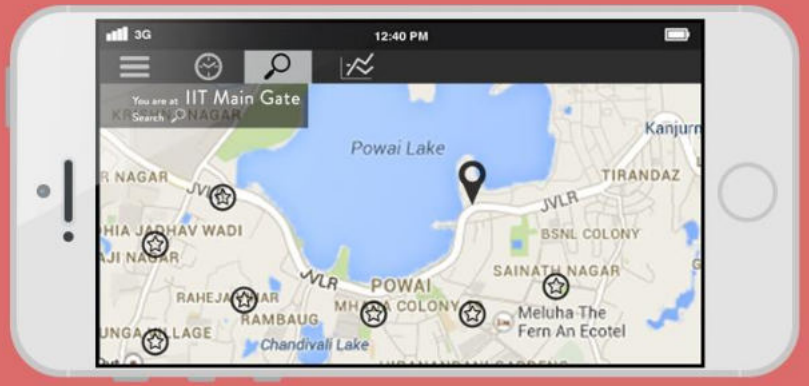

3G
12:40 PM
ShareSavaree
Saurabh
Nimsarkar
Mumbai
Hiranandani,
Galleria, Powai
0.4 Km away
Yesterday
98%
18kn
Time remaining
13:45
Vehicle Booked-SN1987

Turn Key to Start Vehicle?
Not Anymore!

Dock Your Cell Phone,
Rotate to Start Ignition!



Lets you select your Most used Transit where you Drop the vehicle

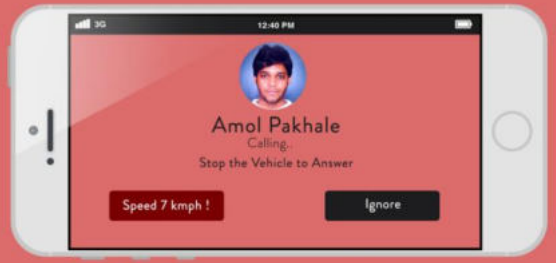


Search your desired DestinationTransit

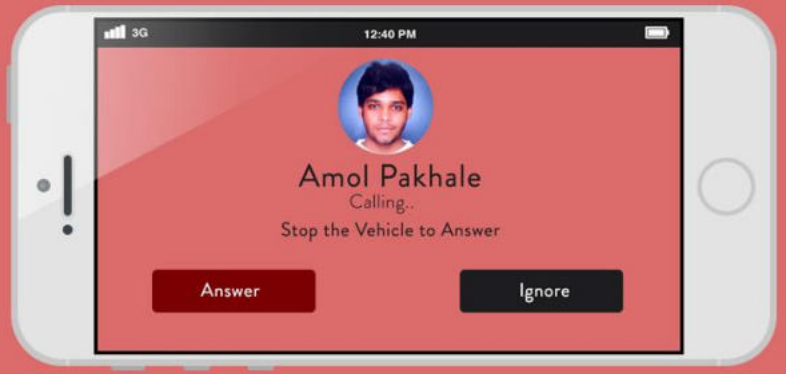
Phone becomes your
Instrument Cluster
and
WayFinder!

Phone becomes your
Instrument Cluster
and
WayFinder!

Sketches

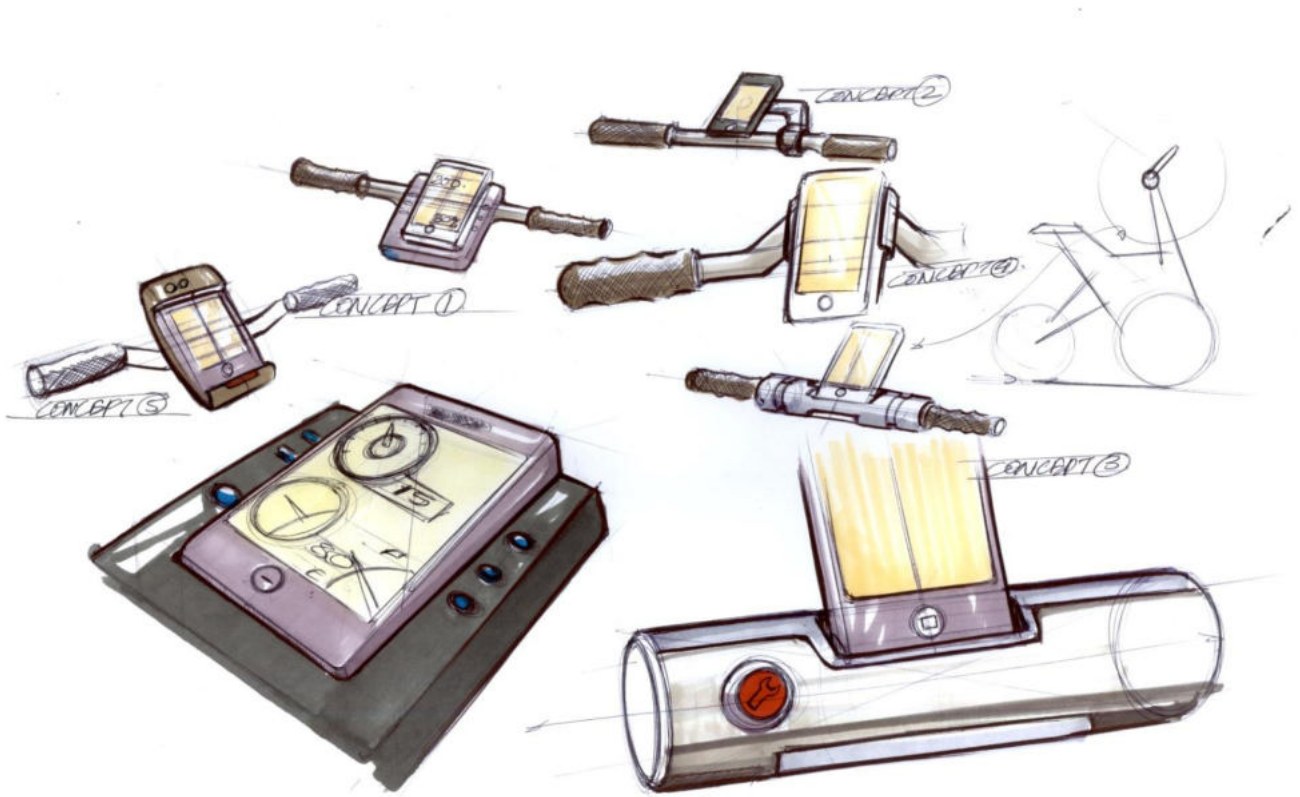


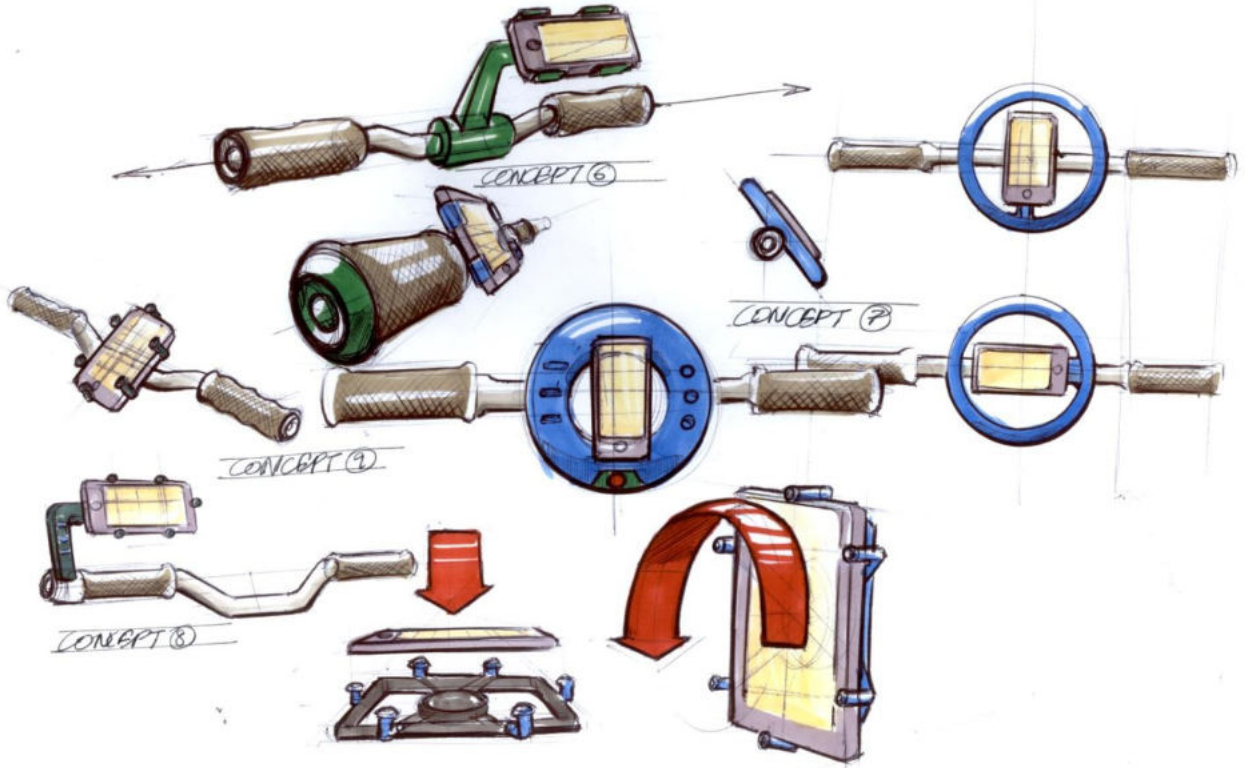
It wont let you Talk and Drive
Stop the vehicle and Answer the call



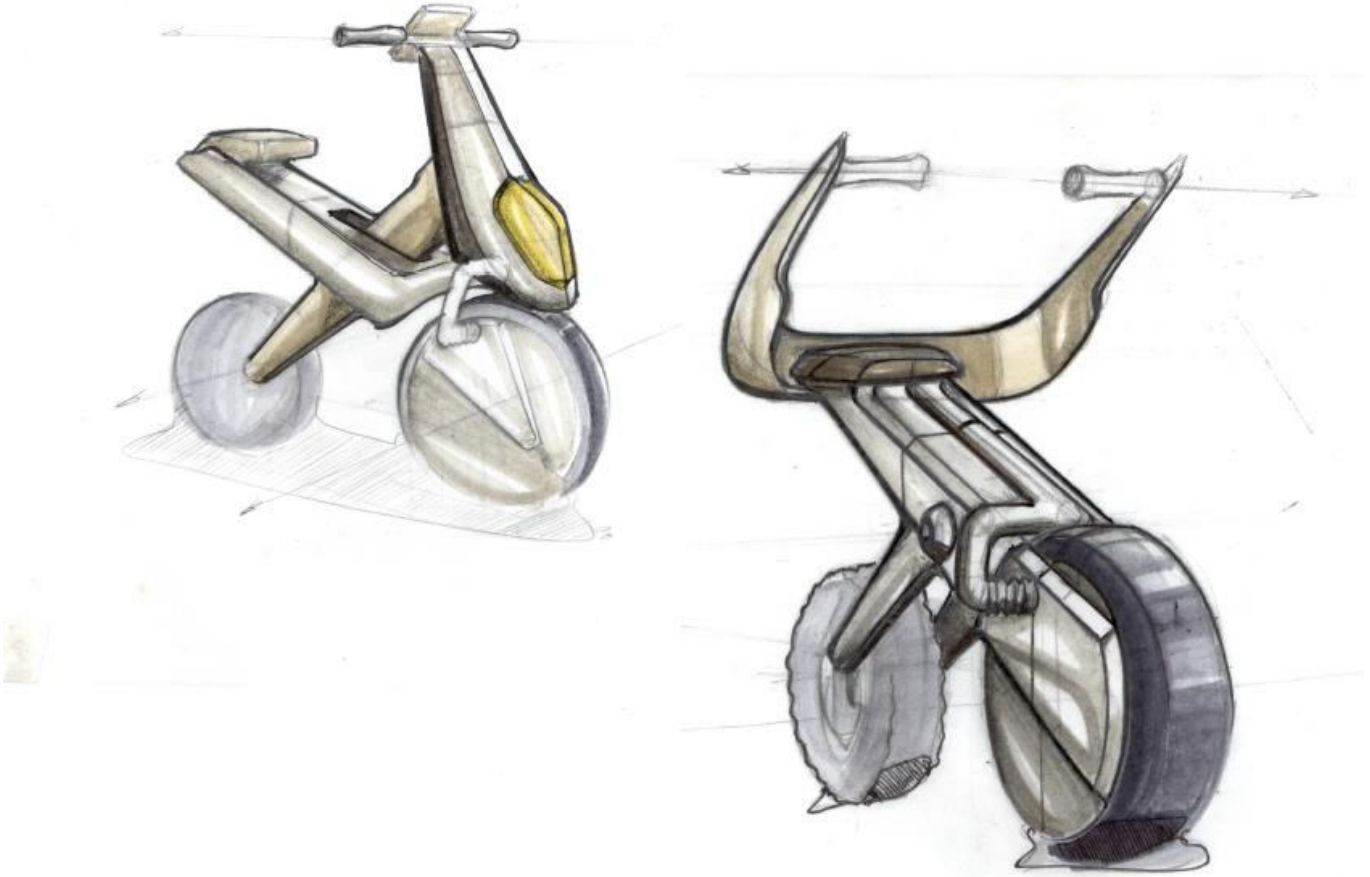
Answer Box is Activated
only if Speed is 0!

Sketches

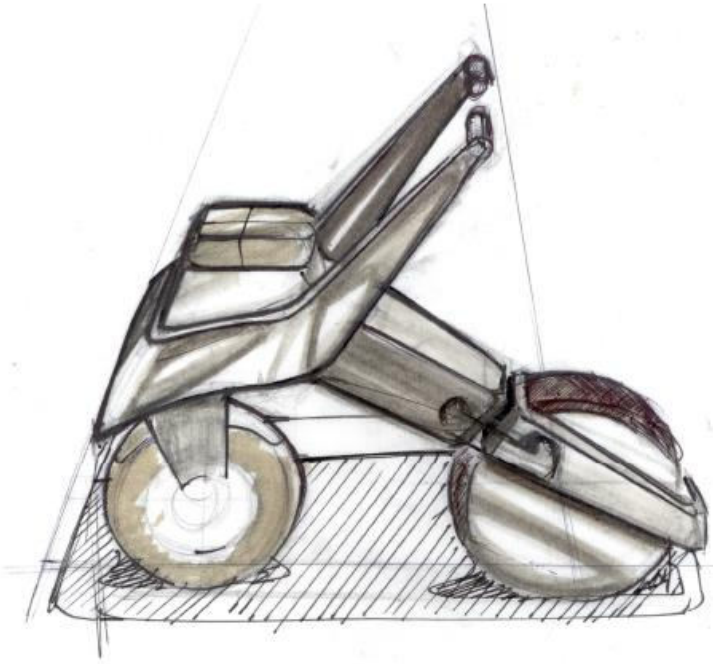



CONCEPT ⑥
CONCEPT ⑦
CONCEPT ⑧

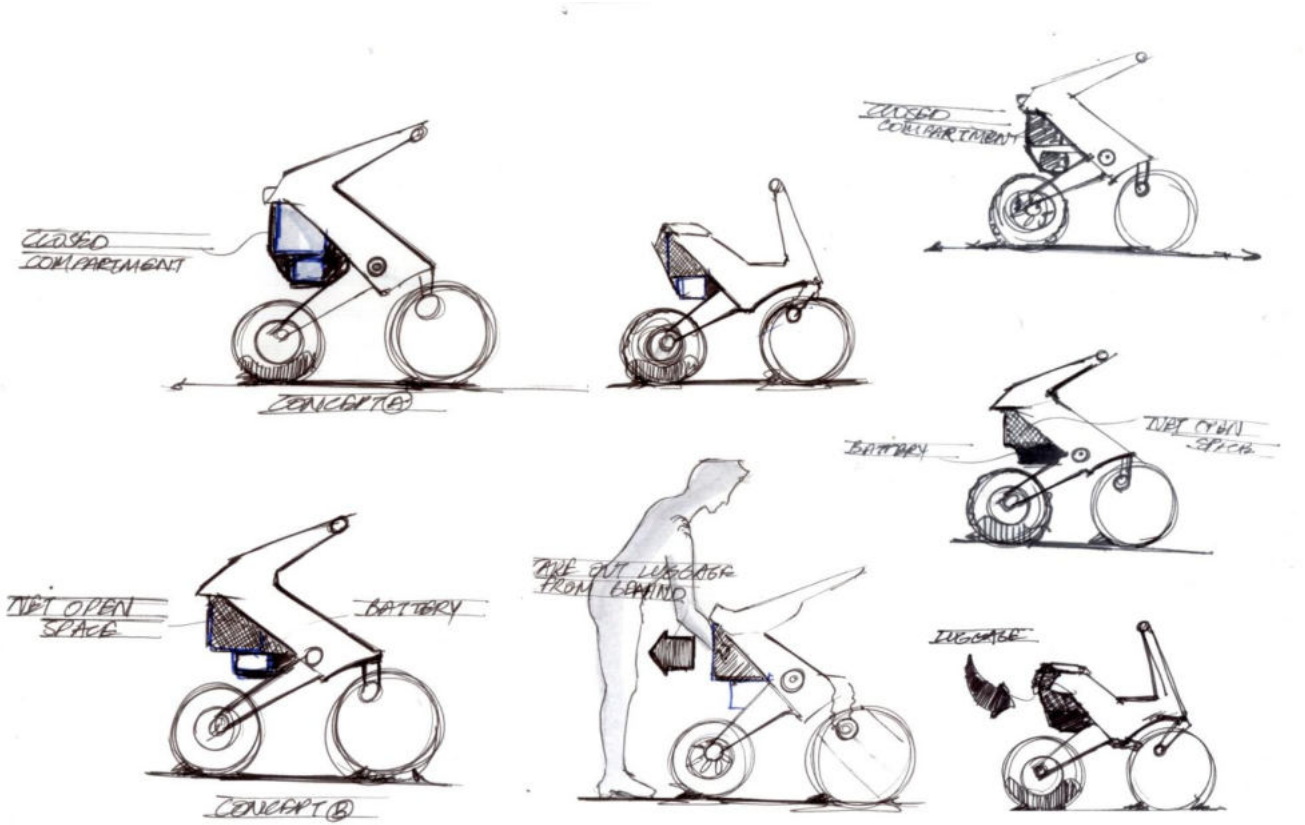
Sketches



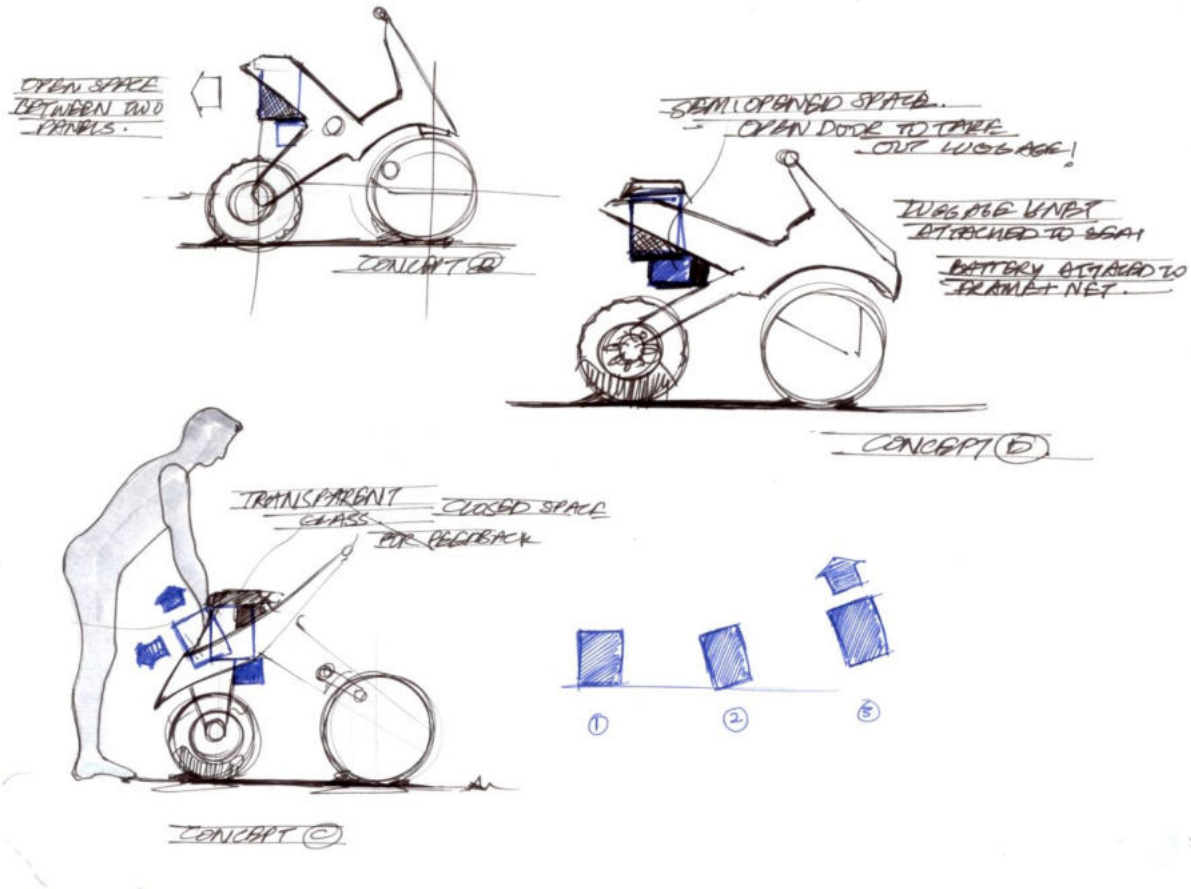
Sketches



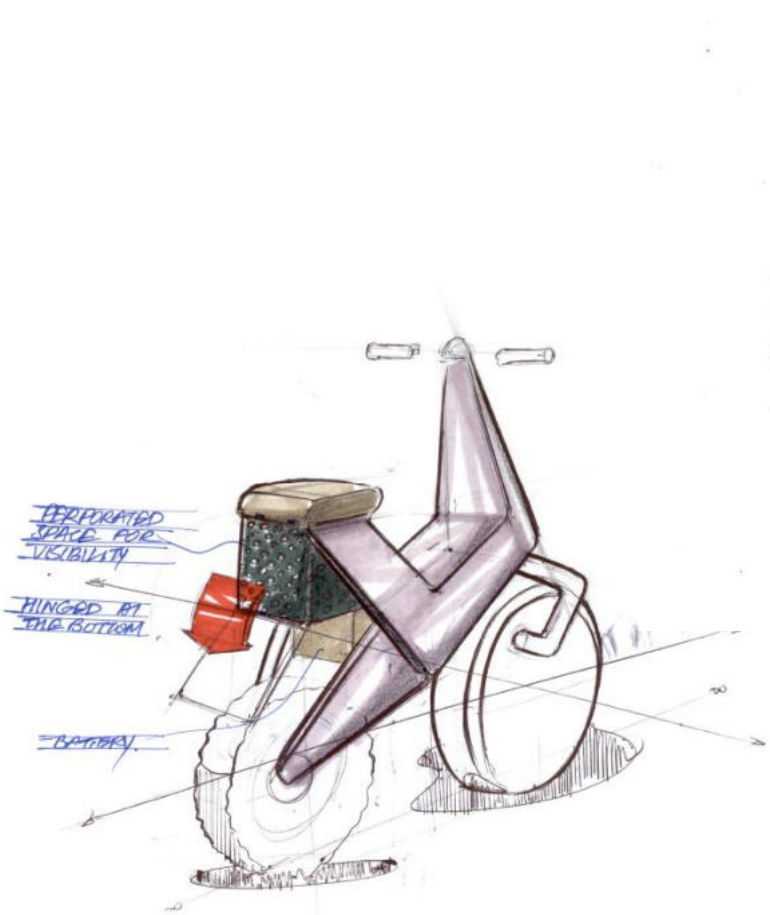
Sketches

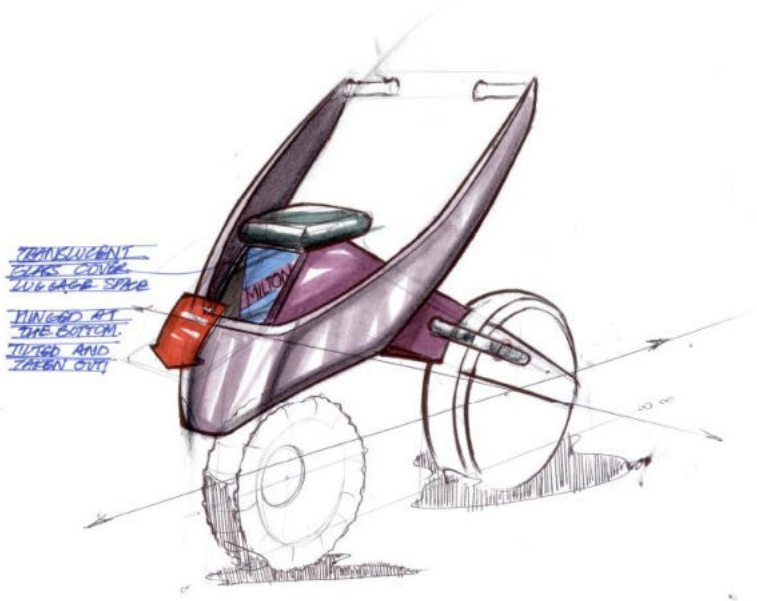

CLOSED COMPARTMENT
CONCEPT A
CLOSED COMPARTMENT
BATTERY
CONCEPT B
BATTERY
LUGGAGE

Sketches

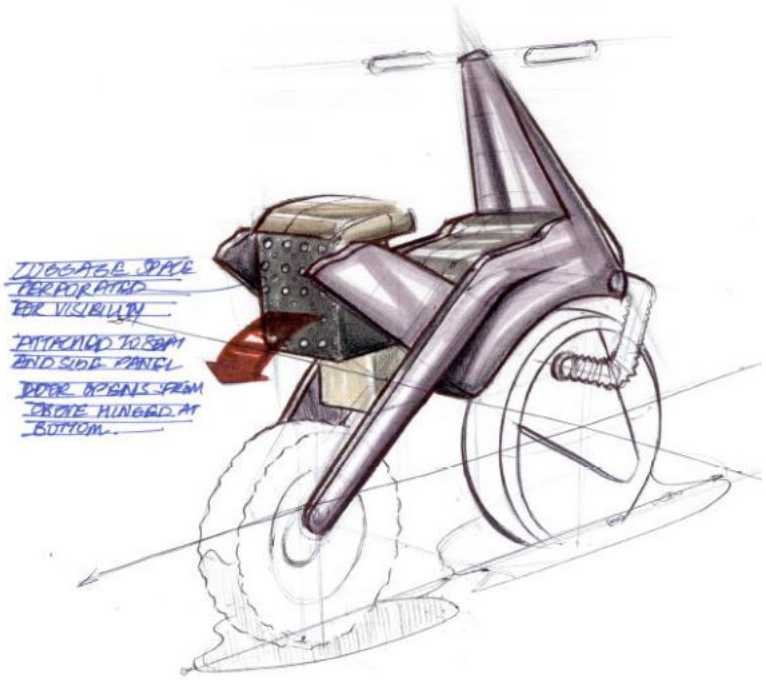

OPEN SPACE
BETWEEN TWO
PANELS.
CONCEPT (A)
SEMI OPENED SPACE.
OPEN DOOR TO TAKE
OUT LUGGAGE!
LUGGAGE NET
ATTACHED TO SEAT
BATTERY ATTACHED TO
FRAME NET.
CONCEPT (B)
TRANSPARENT
GLASS
CLOSED SPACE
FOR FEEDBACK
CONCEPT (C)
1
2
3

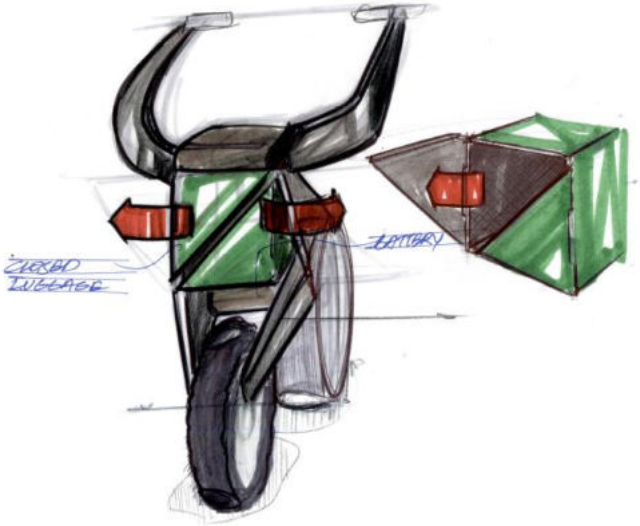
Sketches

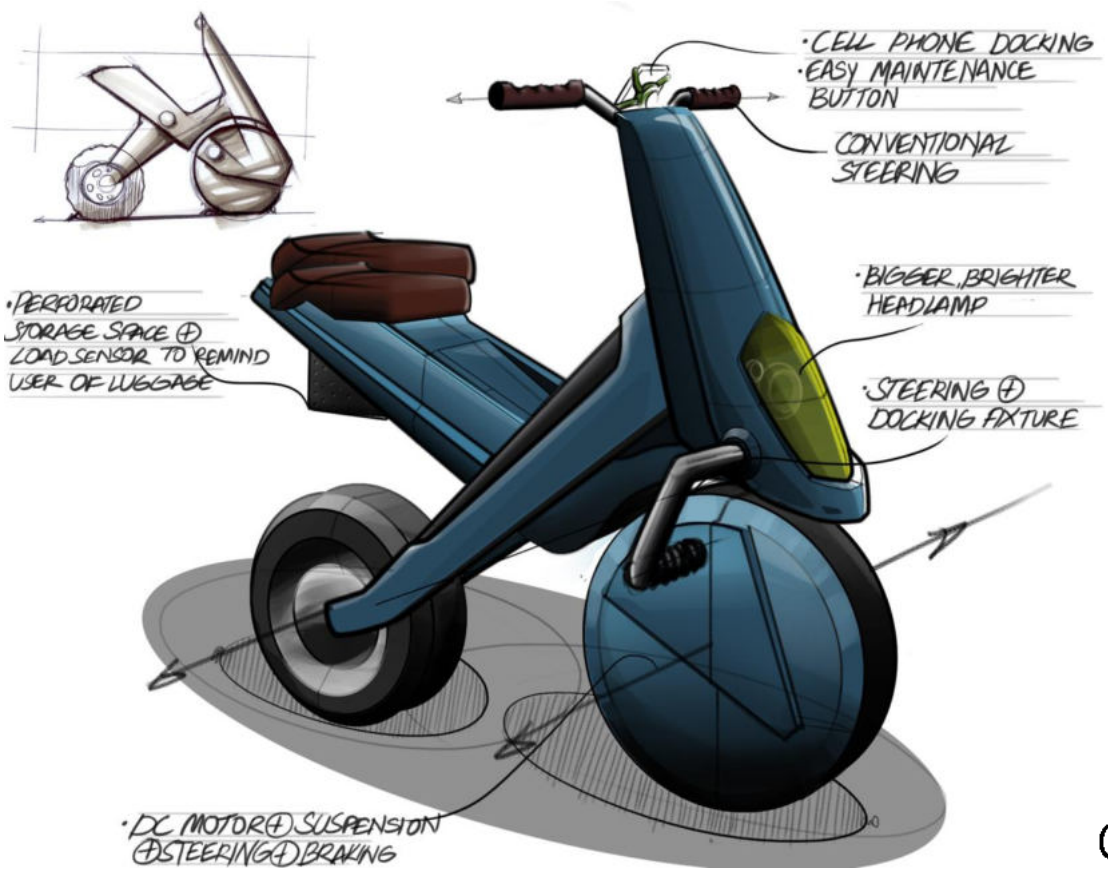

PERFORATED SPACE FOR VISIBILITY
HINGED AT THE BOTTOM
BATTERY


TRANSLUCENT GLASS COVER
LUGGAGE SPACE
HINGED AT THE BOTTOM.
TILTED AND TAKEN OUT!

Sketches


LUGGAGE SPACE
PERFORATED
FOR VISIBILITY
ATTACHED TO BOTH
SIDE PANEL
DOOR OPENS FROM
ABOVE HINGED AT
BOTTOM.

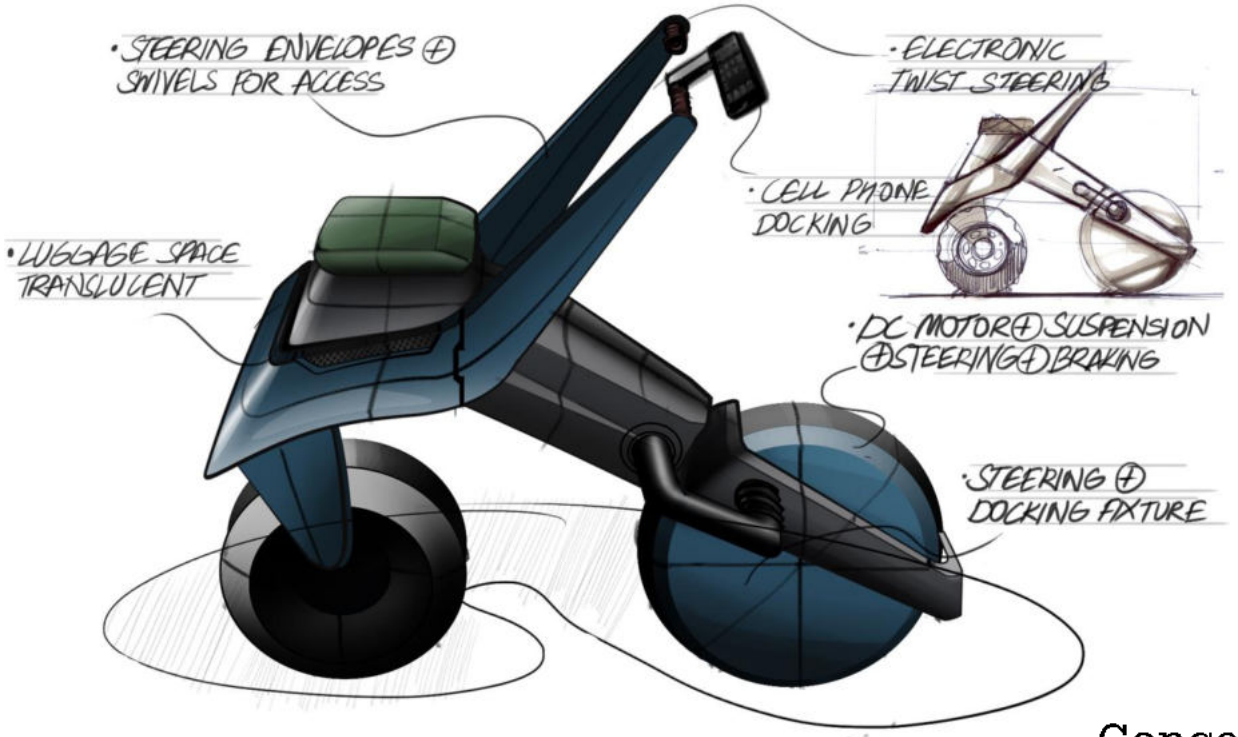

BATTERY
LUGGAGE


·CELL PHONE DOCKING
·EASY MAINTENANCE BUTTON
CONVENTIONAL STEERING
·BIGGER, BRIGHTER HEADLAMP
·STEERING ⊕ DOCKING FIXTURE
·PERFORATED STORAGE SPACE ⊕ LOAD SENSOR TO REMIND USER OF LUGGAGE
·DC MOTOR ⊕ SUSPENSION ⊕ STEERING ⊕ BRAKING

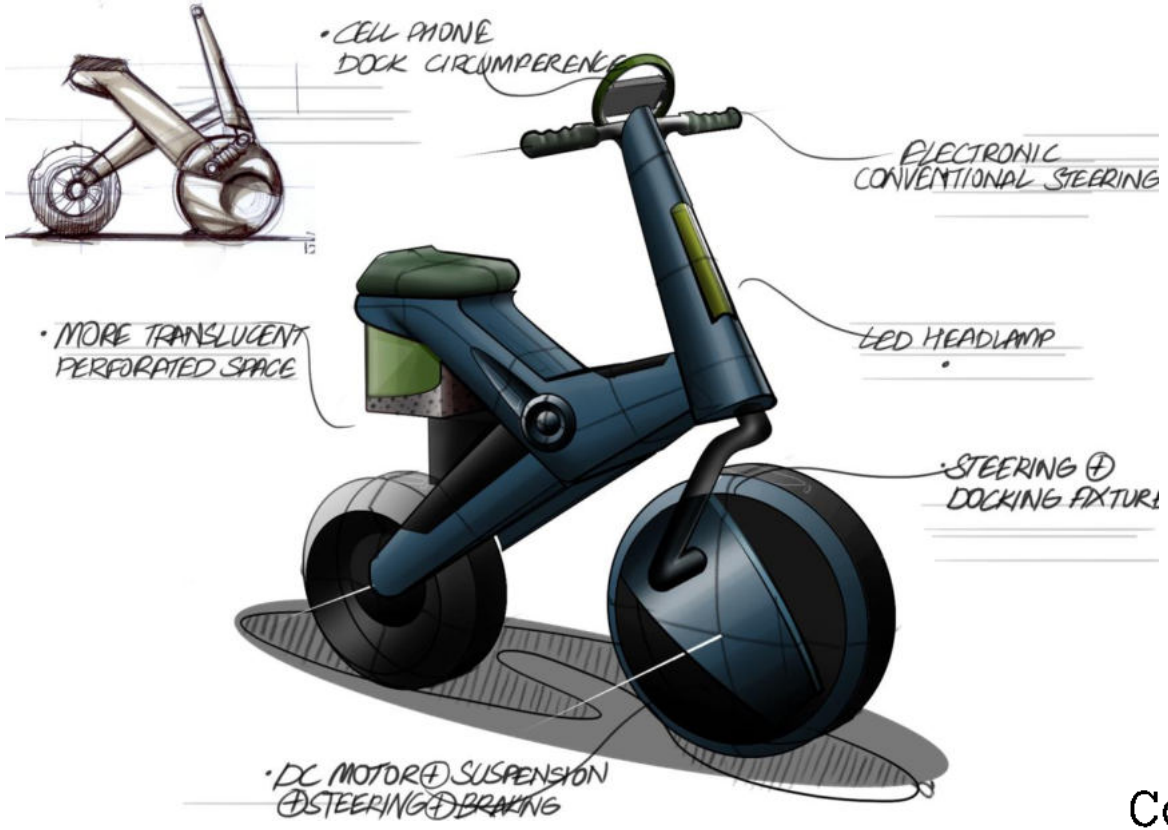
Concept A


• CELL DOCK INTEGRATED WITH HANDLE
• ELECTRONIC TOE FRO STEERING
• PERFORATED STORAGE SPACE ⊕ TRANSLUENT PANEL
• STEERING FIXTURE ENVELOPES USER
• STEERING ⊕ DOCKING FIXTURE
• DC MOTOR ⊕ SUSPENSION ⊕ STEERING ⊕ BRAKING

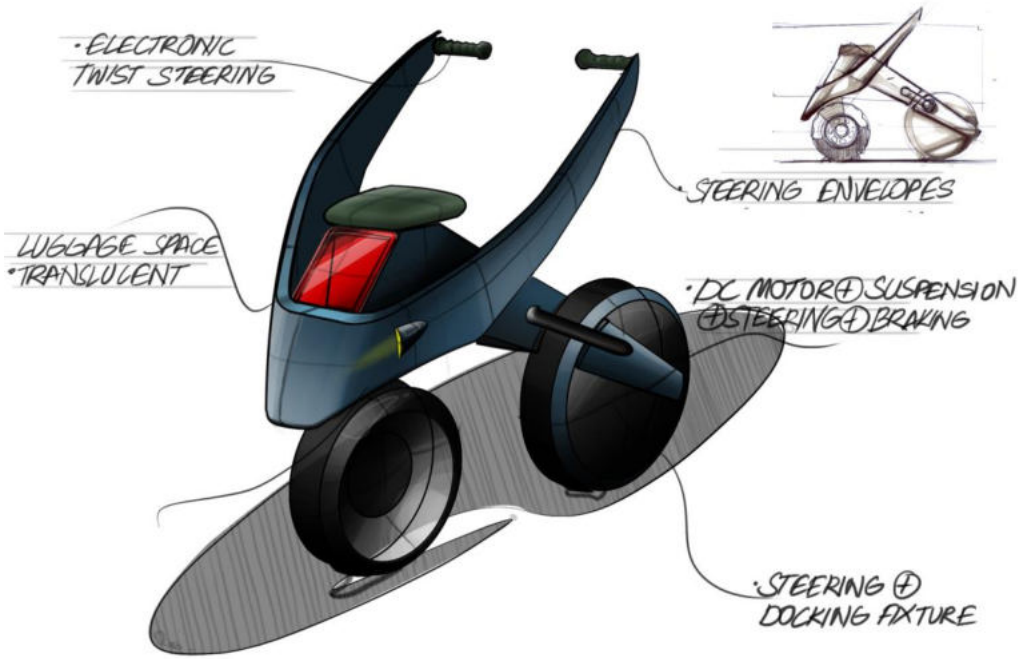
Concept B


• STEERING ENVELOPES ⊕ SWIVELS FOR ACCESS
• ELECTRONIC TWIST STEERING
• CELL PHONE DOCKING
• LUGGAGE SPACE TRANSLUCENT
• DC MOTOR ⊕ SUSPENSION ⊕ STEERING ⊕ BRAKING
• STEERING ⊕ DOCKING FIXTURE

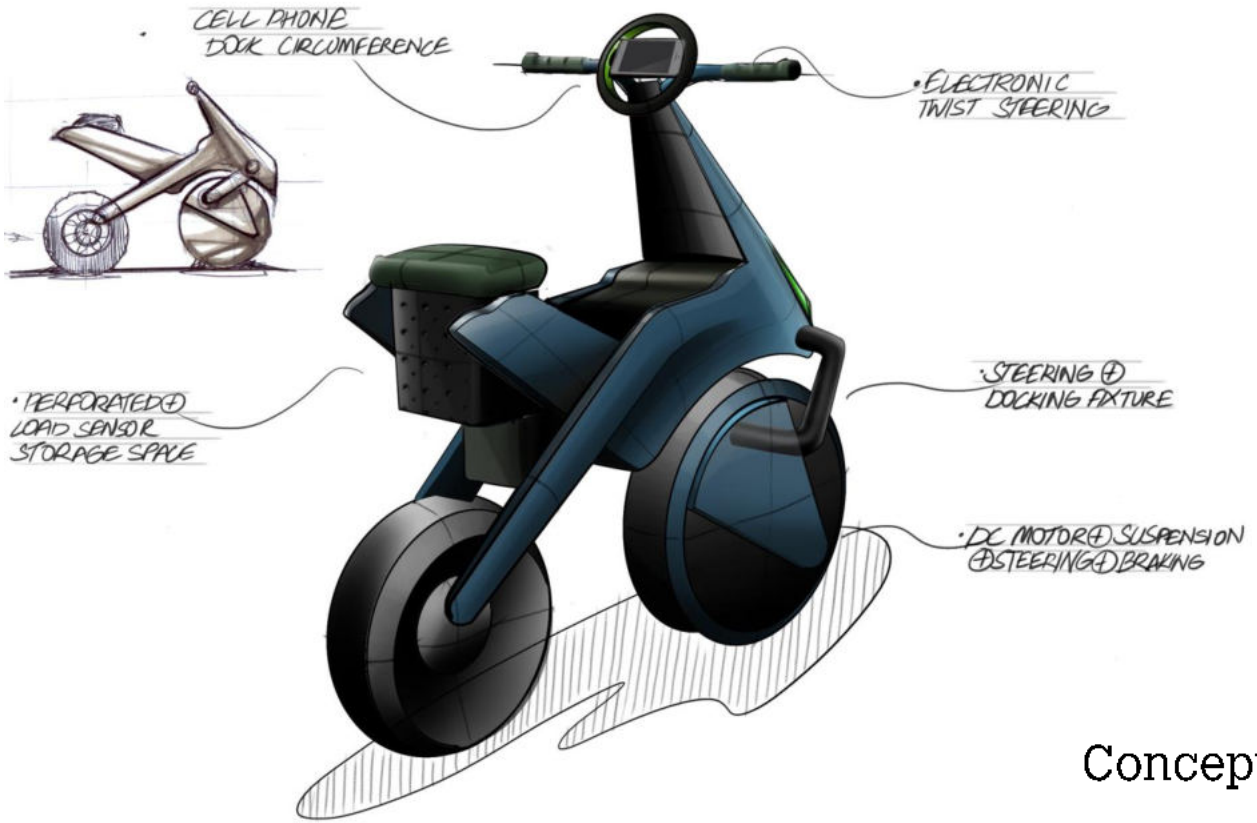
Concept C


• CELL PHONE DOCK CIRCUMPERENCE
ELECTRONIC CONVENTIONAL STEERING
• MORE TRANSLUCENT PERFORATED SPACE
LED HEADLAMP
• STEERING ⊕ DOCKING FIXTURE
• DC MOTOR ⊕ SUSPENSION ⊕ STEERING ⊕ BRAKING

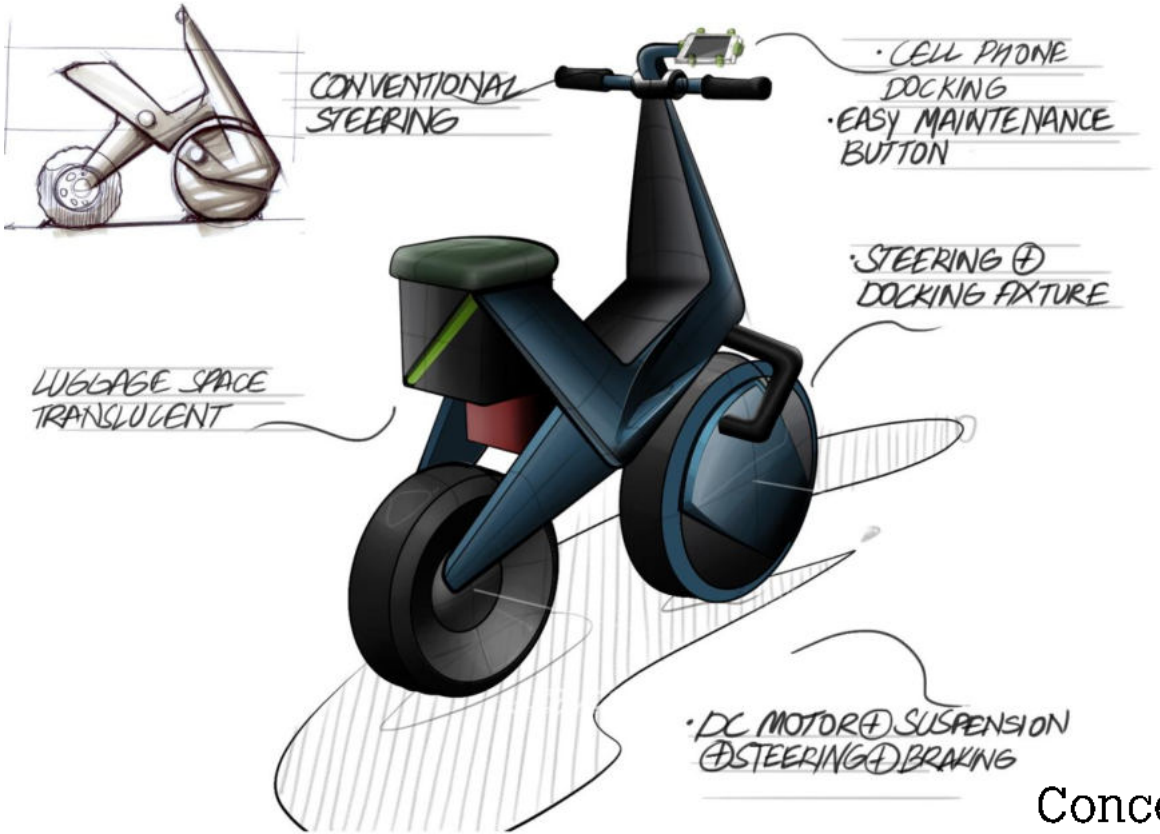
Concept D


·ELECTRONIC TWIST STEERING
·STEERING ENVELOPES
LUGGAGE SPACE ·TRANSLUCENT
·DC MOTOR+SUSPENSION +STEERING+BRAKING
·STEERING + DOCKING FIXTURE

Concept E


CELL PHONE
DOCK CIRCUMFERENCE
•ELECTRONIC
TWIST STEERING
•PERFORATED
LOAD SENSOR
STORAGE SPACE
•STEERING
DOCKING FIXTURE
•DC MOTOR SUSPENSION
STEERING BRAKING

Concept F


CONVENTIONAL STEERING
· CELL PHONE DOCKING
· EASY MAINTENANCE BUTTON
· STEERING + DOCKING FIXTURE
LUGGAGE SPACE TRANSLUCENT
· DC MOTOR + SUSPENSION + STEERING + BRAKING

Concept G

Concept Evaluation

Concept	Steering	Cell Phone Docking	Luggage
A	9	5	1
B	5	1	9
C	1	1	9
D	9	9	5
E	1	1	9
F	9	9	1
G	9	5	5
	Conventional	Round cell Docking	Translucent

Conventional Steering

Round Cell Docking

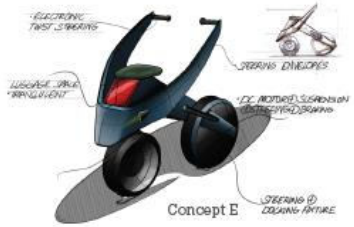
Translucent Luggage Space

Concept Evaluation

Concept	Robust and safe	Futuristic	Daily office Commuting	Light Weight and Compact	Total
Rating	8	6	8	6	
A	9	6	9	7	222
B	7	8	5	5	174
C	4	5	7	6	154
D	7	5	5	7	168
E	4	8	4	6	148
F	8	3	7	5	168
G	8	4	8	6	188


Concept A


Concept C


Concept E

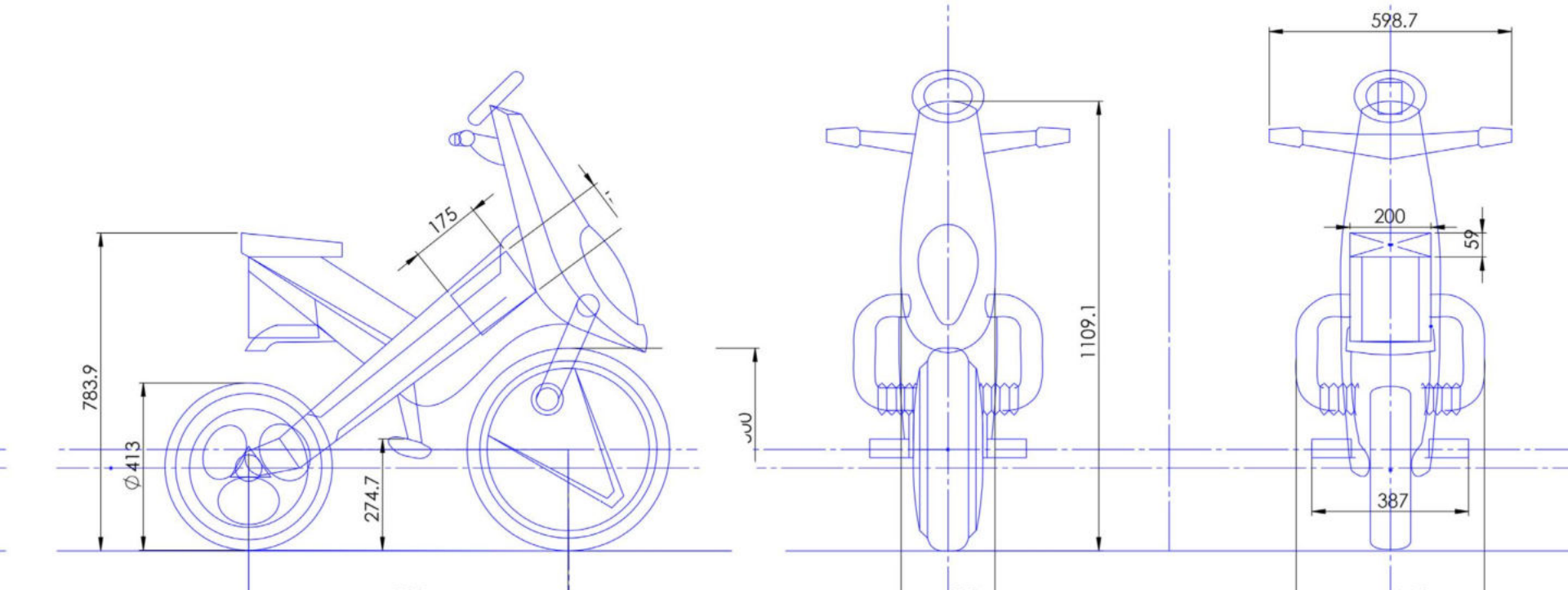

Concept B


Concept D


Concept G


Concept F

Selected Concept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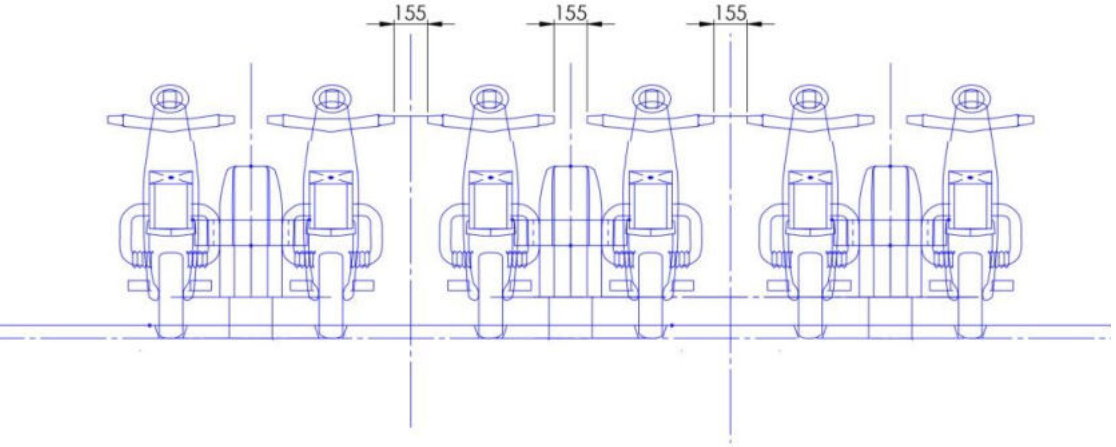
200
59
1109.1
783.9
Ø 413
274.7
175
387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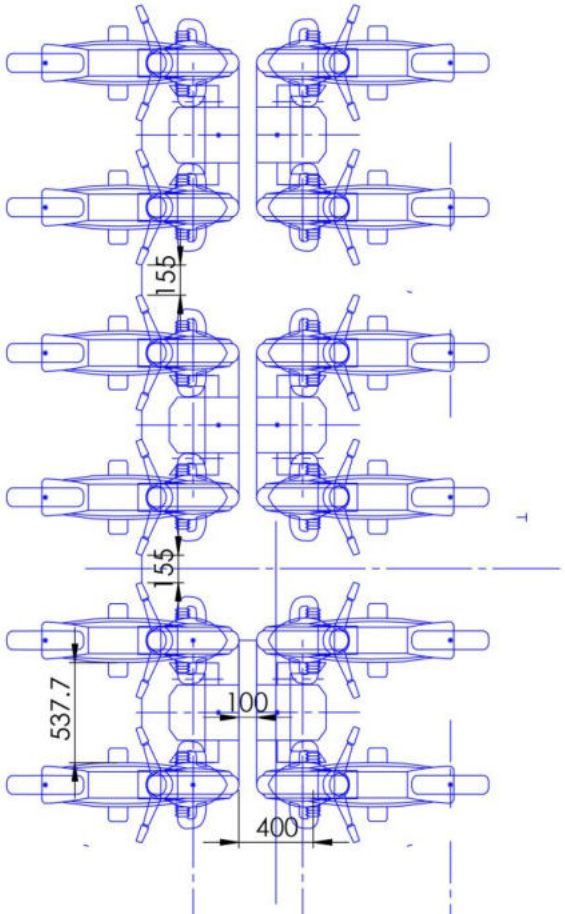
155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537.7
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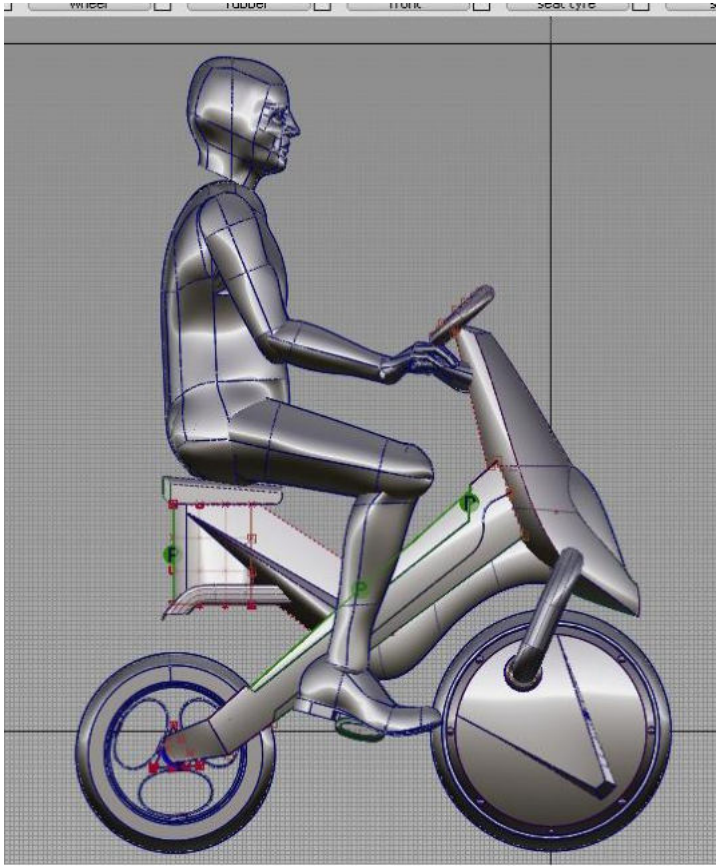

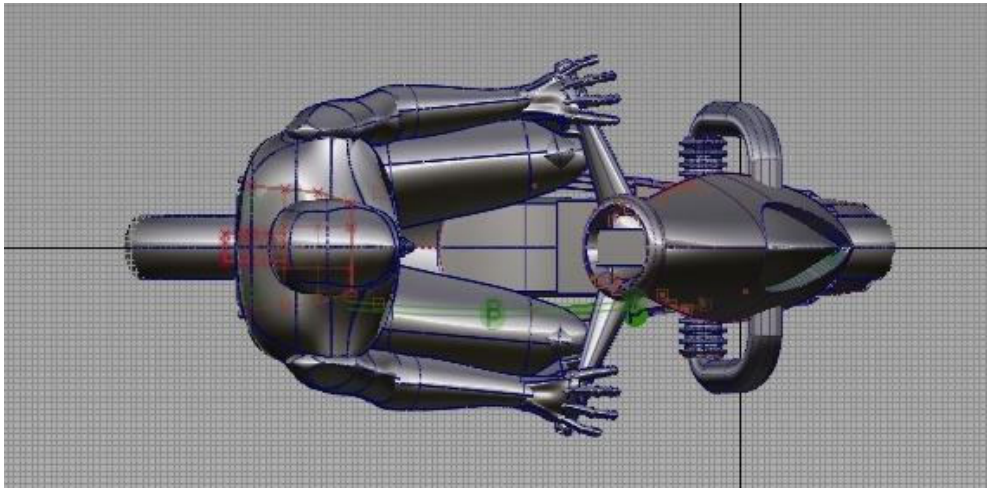

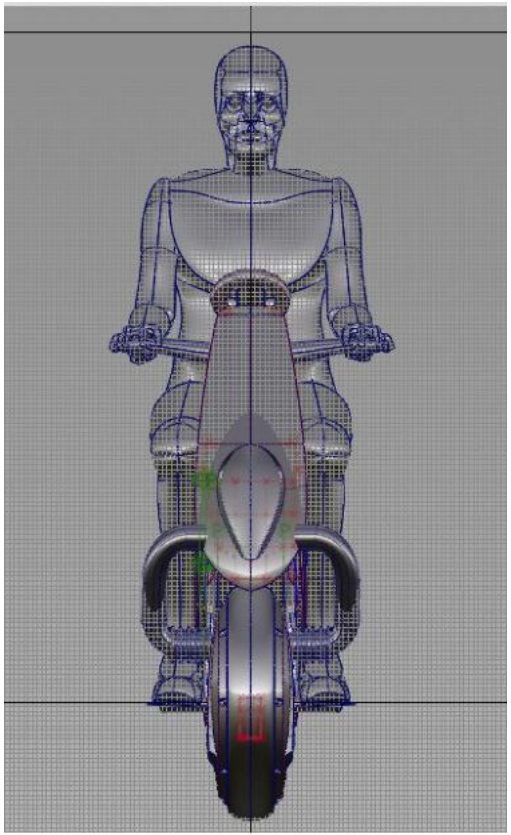

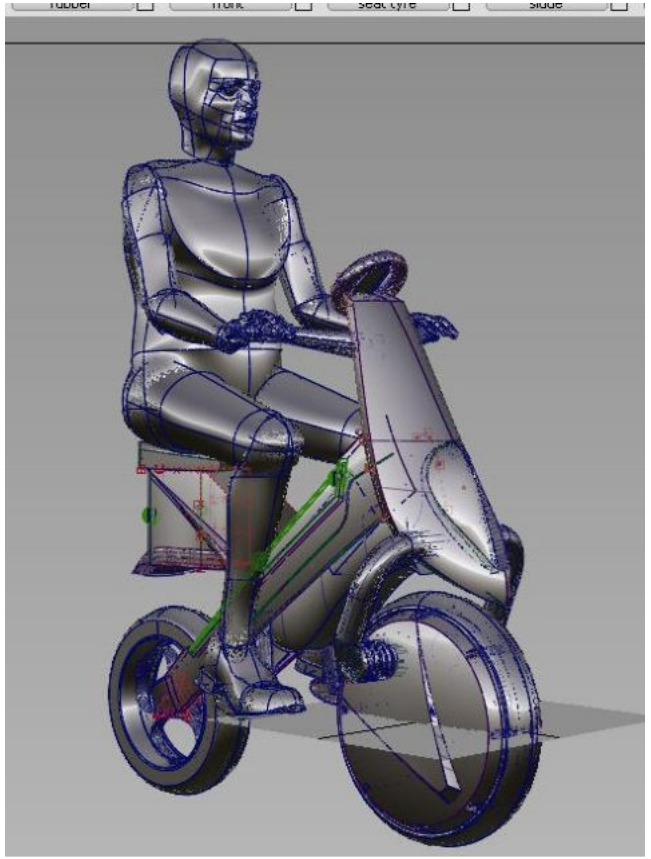


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189
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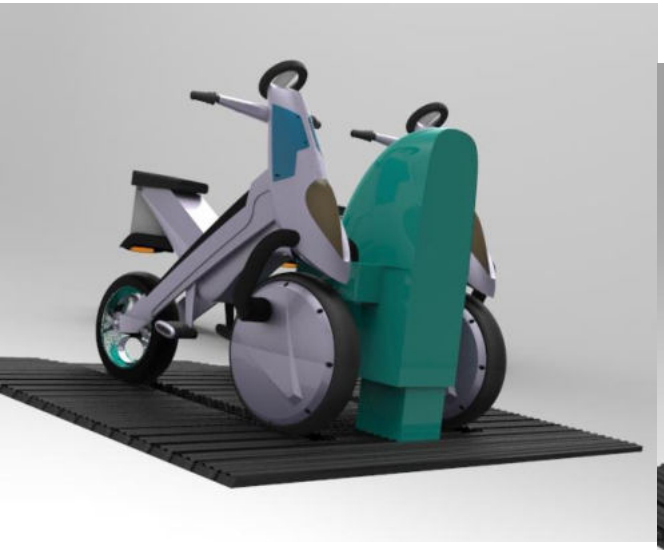
049


SS
049
SS
189

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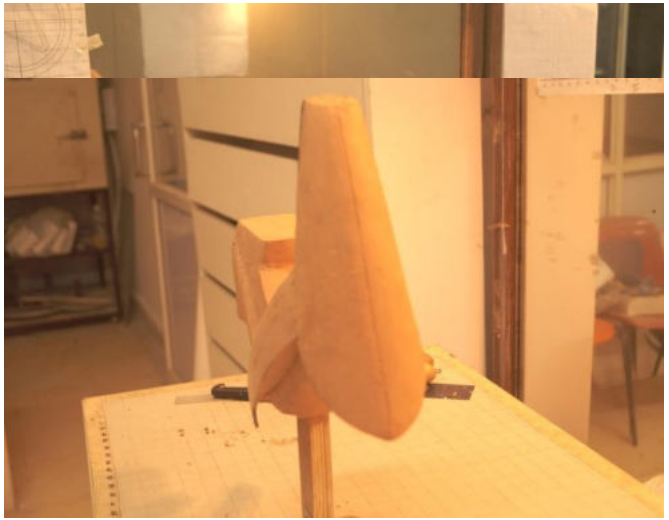
189



Thank You