

IDC School of Design
अभिकल्प विद्यालय

Design Project 2

Designing an Electric Shuttle For AIIMS Campus

Submitted By

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Declaration

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



Signature:

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Date: 17/11/2023

Approval sheet

The Mobility and Vehicle design project report entitled 'Design of an E- Shuttle for AIIMS Campus by Piyush Tanwar is approved in partial fulfilment of the requirement for Master of Design degree in Mobility and Vehicle Design.

Guide: Prof. Nishant Sharma

Internal Examiner:

External Examiner:

Chairman:

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I also thank to security people at main gate of AIIMS, Transport Officer of AIIMS and fellow classmates and friends who supported and helped me with the creative inputs during the project.

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Introduction

The unavailability of effective first mile and last mile connectivity emerges as a significant factor discouraging people from opting for public transport, leading them to rely on personal vehicles. This challenge is a nationwide concern, impacting urban mobility and contributing to the escalation of private vehicle numbers.

AIIMS, a premier medical institute in India, confronts a similar challenge with first mile and last mile connectivity. While public transport efficiently takes patients, staff, students, and visitors to the main gate, navigating within the campus becomes a considerable hurdle. Patients without personal vehicles, including students and staff, face inconveniences, often relying on sporadic modes of transport like auto rickshaws. The situation worsens during night-time and adverse weather conditions, compelling patients to undertake lengthy walks due to the scarcity of available transportation.

This connectivity gap leads to a surge in personal vehicles on campus roads, resulting in road congestion and parking space shortages. The exponential growth in private vehicles emerges as a primary contributor to air and noise pollution within the serene AIIMS campus.

After initial user study, it has become evident that an internal transportation system, runs by the AIIMS administration, can be a transformative solution. This proposed system aims to seamlessly connect various crucial landmarks within the campus, including gates, hostel complexes, and markets. After collection of all data, design brief is formulated.

Need For E shuttle in AIIMS Campus

In the first scenario, the E-Shuttle serves the crucial role of transporting passengers from external public transport hubs such as bus stands, auto stands, and metro stations to the heart of the main hospital. This addresses the common issue of the "first mile" connectivity problem, where individuals face challenges reaching their final destination within the AIIMS campus after disembarking from public transport.

The E-Shuttle ensures a seamless transition for passengers, offering a convenient and efficient mode of transportation from external transit points to the hospital premises. Scenario Two: Transporting Passengers Within the Campus, Between Departments

In the second scenario, the focus shifts to providing intra-campus transportation, specifically catering to the movement of passengers between different departments within the AIIMS campus. This addresses the "last mile" connectivity challenge encountered by patients, students, and staff who need to navigate within the campus after reaching the main gate.



Figure 1 Scenario 1

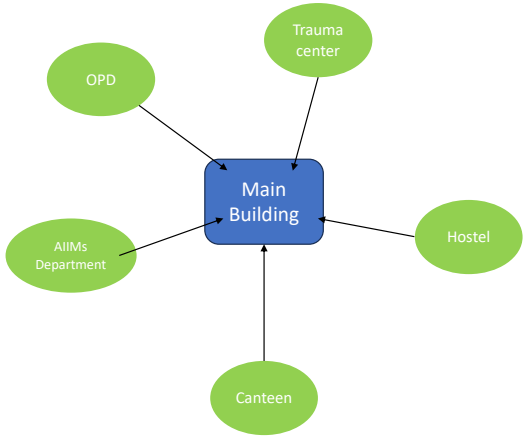


Figure 2 Scenario 2

Roles for E-Shuttle in Hospitals

- The shuttle is used for transport passengers / staff members within campus
- To transport patients from one department to another for specialized treatment or patients who use wheelchair
- To carry heavy loads such as hospital equipment between different areas within a hospital.
- In certain case shuttle may be used to carry stretchers for emergency purpose

Area of Interest



Motivation to make new style E- shuttle

1. To recognizing the shortcomings of the initial design and to create a better patient- centric solution. Some key aspect to consider for a patient- friendly E shuttle:

- comfort and accessibility
- Safety features
- Smooth ride
- Temperature control
- Infection control
- Designing a shuttle from space and parking perspective

2. Pre Research

2.1 Existing shuttle services across World

Current scenario of E shuttle across the world. This study is done to understand the current scenario of electric shuttles across the world. Manufacturing technology, experimentation, technical problems etc. The study helps to know the advance technology used in the vehicle, technical specification, seating etc.

Polaris GEM e6.



Toyota E Palette



Navya Arma



E Z Go shuttle Bus



EZ GO club Cart



E - Rikshaw



Figure 3 Existing Shuttle services across world

2.1.1 Existing shuttle used by hospitals across world



Figure 4 Navya Arma Exterior



Figure 5 Navya Arma Interior

Navya Autonomous

- Navya, a French start-up automotive company has introduced an autonomous e shuttle in the Detroit medical center heart hospital. It's a self-driving shuttle featuring an ADA Compliant wheelchair Ramp

- Detroit first, self-driving, accessible, para transit shuttle is being deployed to transport senior citizen and disability peoples to local hospitals. The shuttle connects the village of Brush Park Manor Paradise Valley and Brewster homes to Detroit Medical center heart hospital

- The shuttle runs Monday to Friday, serving the residents of Brush Park Senior Center and Brewster Homes during the hour of 9:00 am to 5:00pm

Navya Arma used as Private and public road transit for Scheemda Hospital (Netherlands))



Figure 6 Navya Arma Used at scheemda hospital

- Supplement the local transport offer between Scheemda hospital and the bus stop with a roundabout to negotiate.
- SHUTTLE since August 2018

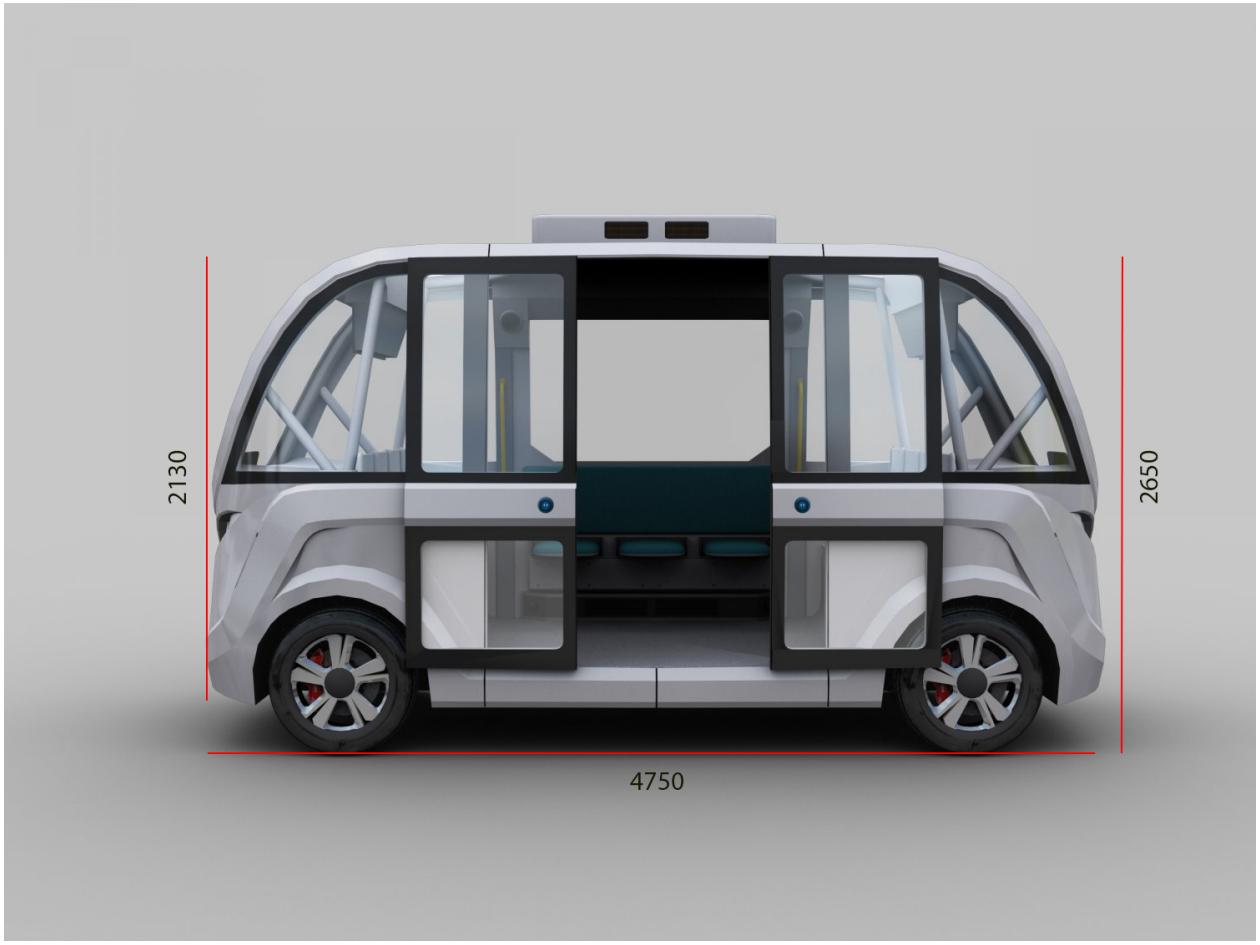


Figure 7 Navya Arma Dimensions

2.1.2Specifications of NavyaArma

Dimensions

Length	: 4.75 m
Width	: 2.11 m
Height	: 2.65 m
Clearance	: 0.20 m
Tyers	: 215/60R17

Energy

Battery	: LiFe Battery Pack
Capacity	: 33 KWH
Charging	: Induction/Plug

Drive

Drive Wheel	: 2
Engine	: Electric
Motor	: 15 KW
Max speed	: 45

Capacity

Total Passengers	: 15
Sitting	: 11
Standing	: 4



Figure 8 Yamaha Golf Cart

2.1.3 Yamaha Golf Cart

Yamaha Motor Manufacturing of America in Newnan recently donated a new golf cart to Piedmont Newnan Hospital. The golf carts are driven by hospital volunteers and provide a free shuttle to those coming into and leaving the hospital.

The hospital now has three golf carts in operation. With the recent opening of the new Piedmont Medical Plaza II and the increase in patient volumes, the additional golf cart allows the cart service to provide rides to more people on the hospital campus without long wait times. Whether a patient or visitor has impaired mobility, health risks that prevent them from walking long distances, are accompanied by small children, or are just along for the ride,



Figure 9 Yamaha Golf cart dimensions

2.1.4 Specifications of Yamaha cart

Dimensions

Length : 4.1 m
Width : 1.2 m
Height. : 1.9. m
Clearance : 0.11 m
Tyers : 205/65-10 4PR

Energy

Battery : Standard: Six 8-Volt Trojan® T875
Capacity : 33 KWH
Charging : Delta-Q Charger

Drive

Drive Wheel : 2
Engine : Electric
Motor : 48 volt Ac Motor
Max speed : 45

Capacity

Total. : 6
Passengers
Sitting : 6
Standing : 0

3 Research

3.1 Physical location of AIIMS



Figure 10 AIIMS Campus

The whole campus is spread over an area of 213.12 acres

AIIMS, New Delhi's main campus is located in Ansari Nagar in Delhi. It is adjacent to the South Extension-II market and lies on both sides of the Sir Aurobindo Marg, southwards to the AIIMS Roundabout flyover crossing.
The Campus is divided into five smaller campus

East Campus – Containing OPD Block, Main Hospital Block, Ward Block, Medical College, Research Section, Convergence Block, BB Dixit Library, Administrative Wing, Undergraduates Hostels, Central Lawn, Jawaharlal Auditorium and staff quarters. The 4 Specialty Centres for Cardiothoracic + Neurosciences, Cancer Centre, Centre for Ophthalmic Sciences and Centre for Dental Education and Research are also within this East Campus.

West Campus – It comprises mainly staff quarters and residences.

JPNA Trauma Centre – It is exclusively designated for Emergency services. In June 2018, a tunnel and ramp road link between the east campus and JPNA Trauma Centre Campus was also opened. This link route is very useful in fast transferring of critical patients across the two Campuses. Beside JPNA Trauma Centre, new 100 Bed Plastic and Burns Surgical Unit Hospital is also running, it will also comprise a Skin Bank for Burns Injuries.

Masjid Moth Campus – This site contains new Post-Graduate and Resident Doctor's apartments. Underground parking block is also situated here. Upcoming New OPD Block, Mother and Child Care Unit, Surgical Block and Geriatric Block are also under construction here. These new blocks are aimed to reduce the patient load on the present OPD block in East Campus which is currently overhauled by nearly approx. 10,000 out-patients per day.

Ayurvigyan Nagar Campus – It is too for faculty and staff's residential accommodations.

3.1.2 AIIMS Campus Map

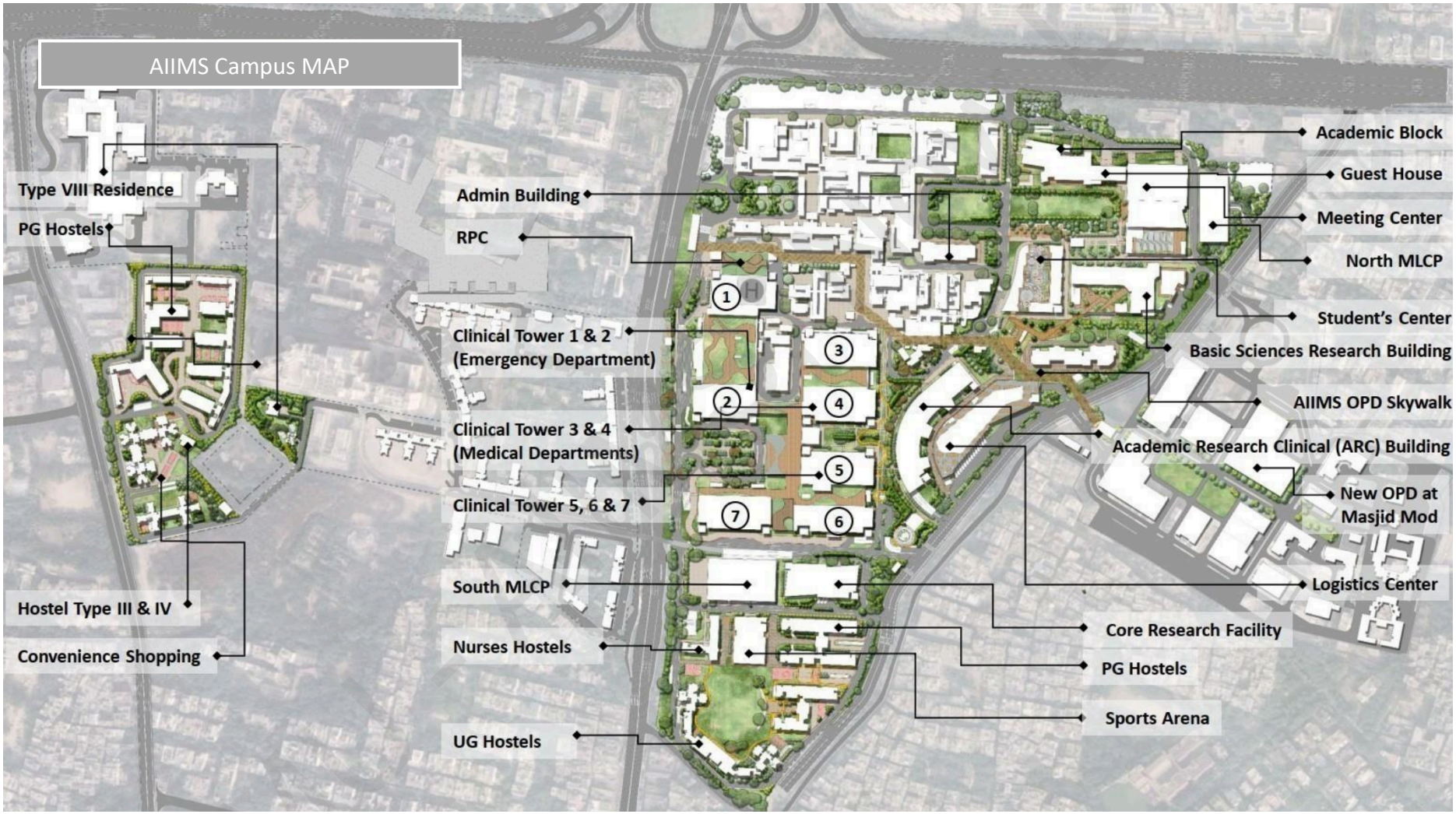


Figure 11 AIIMS Campus Map

3.1.3 AIIMS Campus Block Diagram

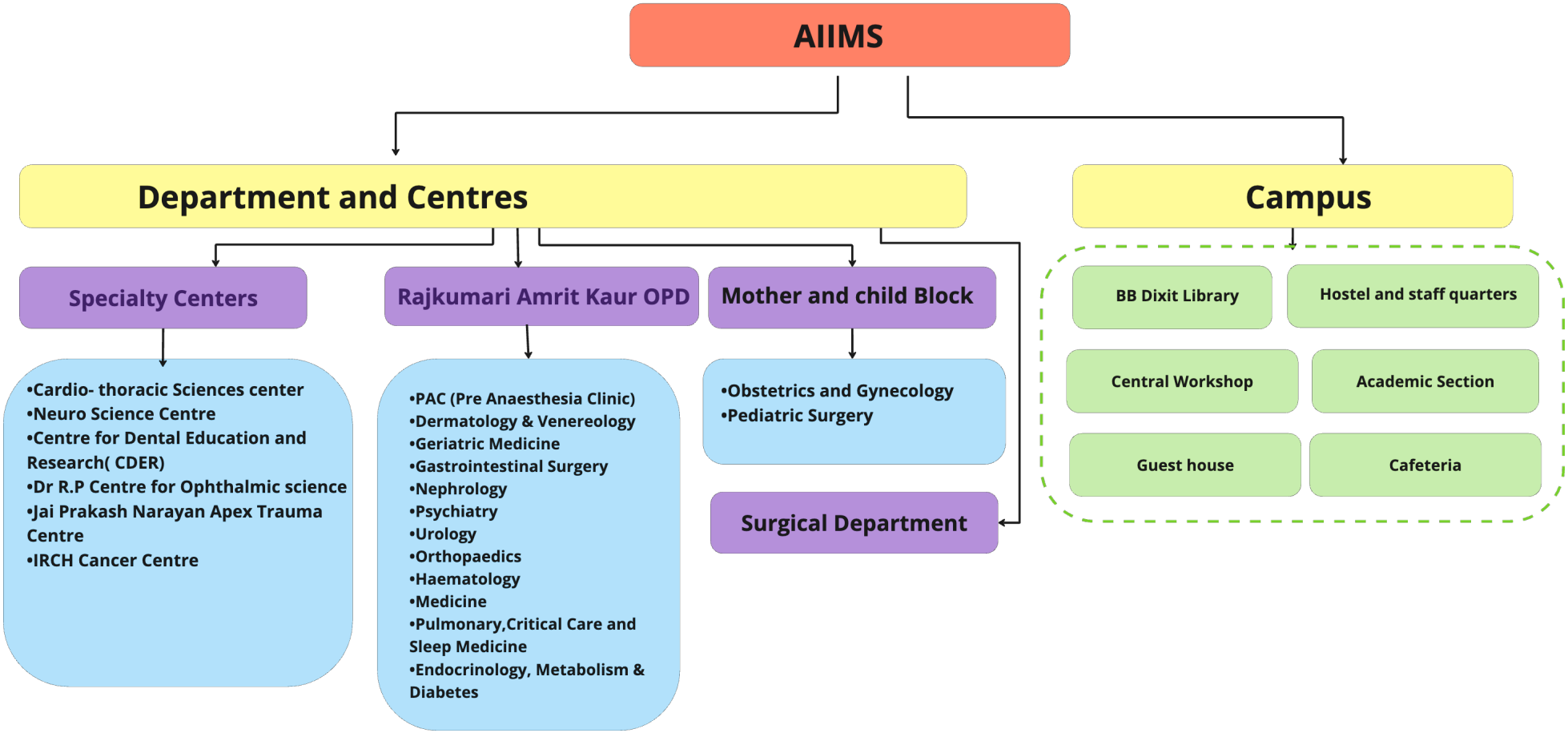


Figure 12 AIIMS Campus Block Diagram

3.1.4. Annual report for patients coming in different departments

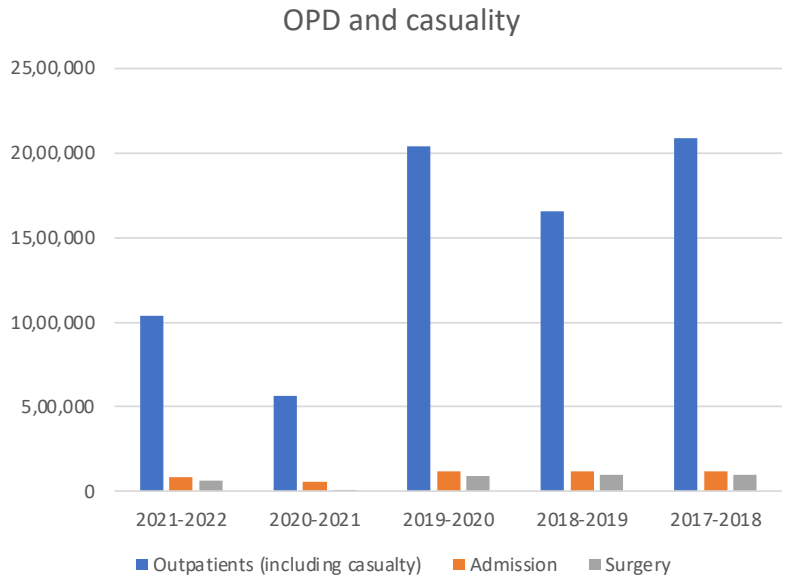
OPD and Casualty Centre

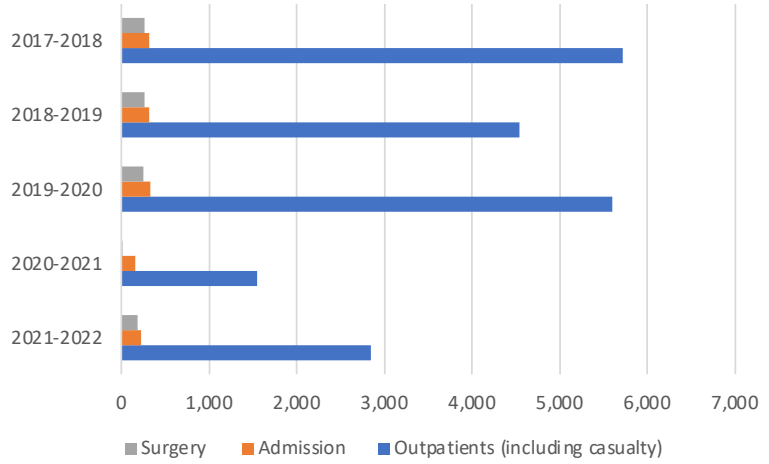
Annual Data

Year	Outpatients (including casualty)	Admission	Surgery
2021-2022	10,39,523	83,801	66,355
2020-2021	5,64,962	55,282	2,021
2019-2020	20,43,602	1,20,110	93,661
2018-2019	16,56,329	1,17,169	97,900
2017-2018	20,88,171	1,15,276	96,439

Daily Data

Year	Outpatients (including casualty)	Admission	Surgery
2021-2022	2,848	229	181
2020-2021	1,547	151	6
2019-2020	5,598	329	256
2018-2019	4,537	321	268
2017-2018	5,721	315	265





- people coming to OPD daily : 1500 to 6000 approx.
- People admitted : 150 to 350 approx.

Figure 13 OPD & Casualty Centre Annual report

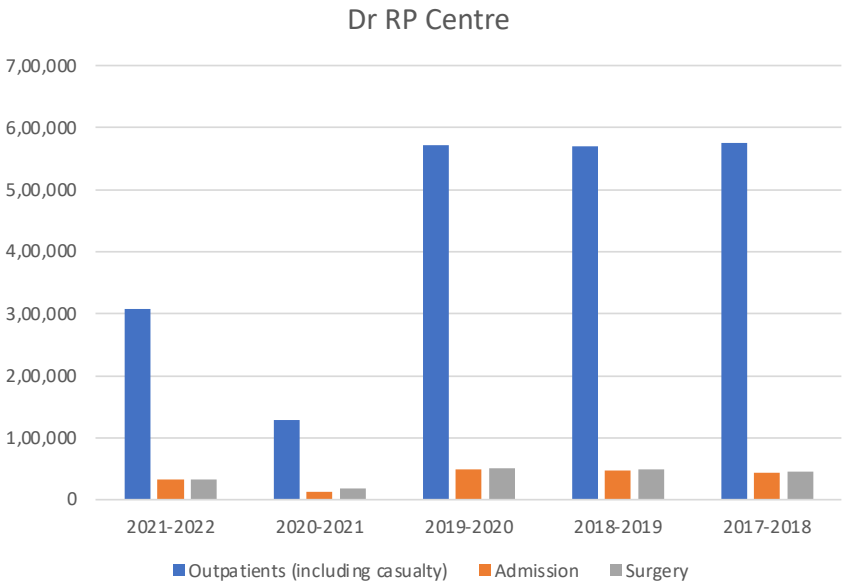
DR RP Centre

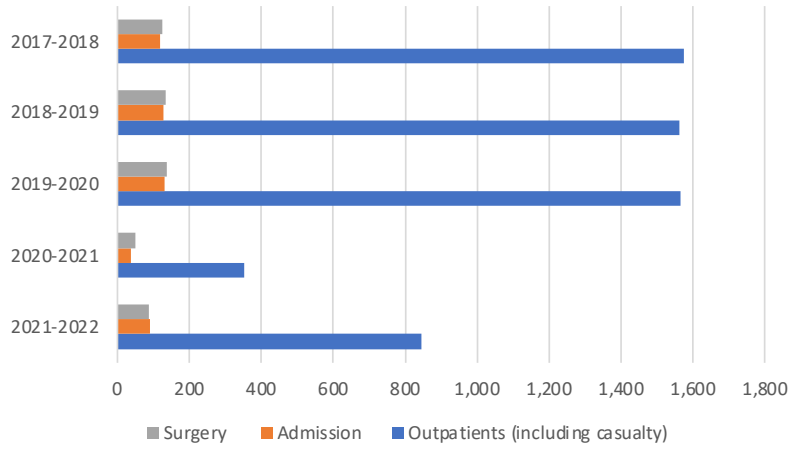
Annual Data

Year	Outpatients (including casualty)	Admission	Surgery
2021-2022	3,08,150	32,751	32070
2020-2021	1,28,979	13,786	18,899
2019-2020	5,71,170	48,283	50,510
2018-2019	5,70,061	47,356	49,576
2017-2018	5,75,174	43,684	45,411

Daily Data

Year	Outpatients (including casualty)	Admission	Surgery
2021-2022	844	89	87
2020-2021	353	37	51
2019-2020	1,564	132	138
2018-2019	1,561	129	135
2017-2018	1,575	119	124





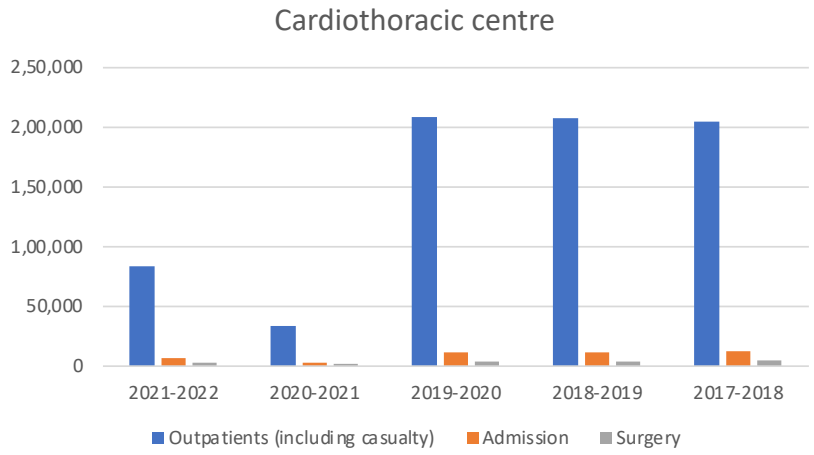
- people coming to RP Centre daily : 100 to 1500 approx.
- People admitted : 50 to 200 approx.

Figure 14 RP centre Annual report

Cardiothoracic Centre

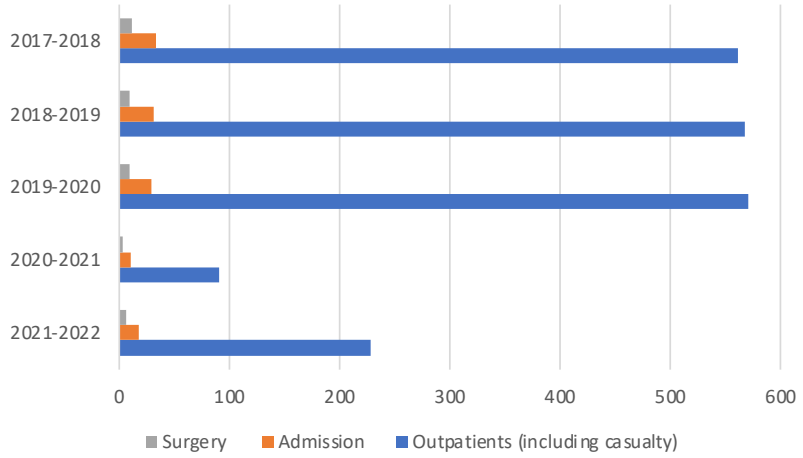
Annual Data

Year	Outpatients (including casualty)	Admission	Surgery
2021-2022	83,394	6,615	2405
2020-2021	33,015	2966	1296
2019-2020	2,08,183	10,939	3,625
2018-2019	2,07,276	11,534	3,346
2017-2018	2,04,976	12,331	4,141



Daily Data

Year	Outpatients (including casualty)	Admission	Surgery
2021-2022	228	18	6
2020-2021	90	10	3
2019-2020	570	29	9
2018-2019	567	31	9
2017-2018	561	33	11



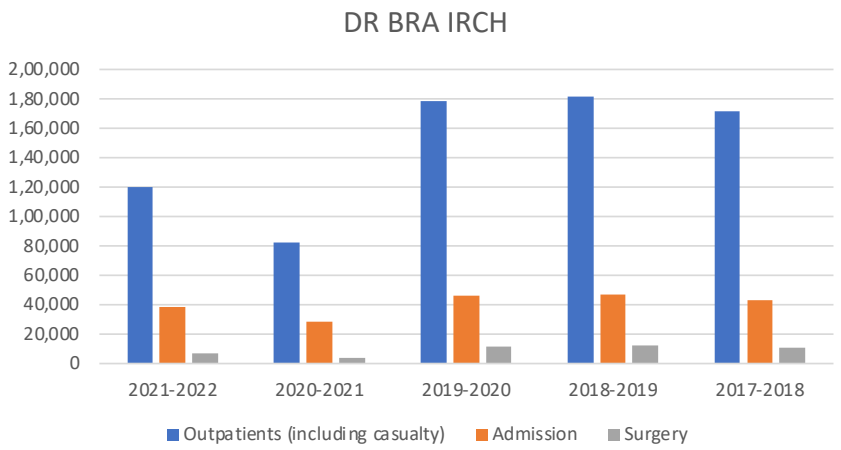
- people coming to cardio daily : 90 to 500 approx.
- People admitted : 15 to 35 approx.

Figure 15 Cardiothoracic Centre Annual Report

DR BRA IRCH Centre

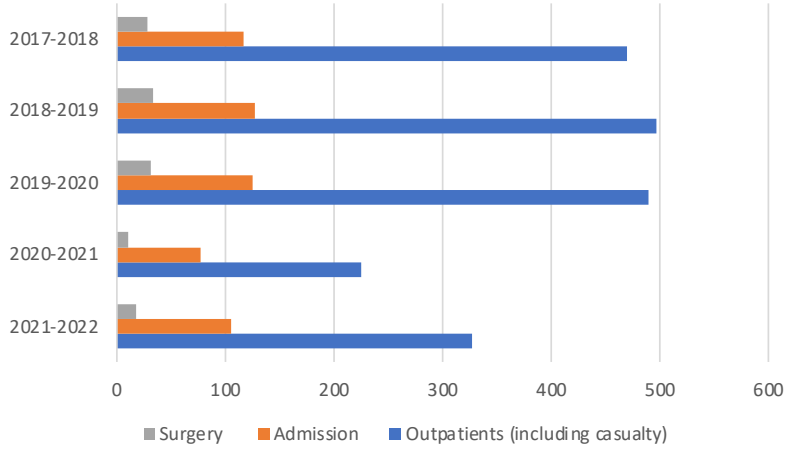
Annual Data

Year	Outpatients (including casualty)	Admission	Surgery
2021-2022	1,19,669	38,530	6827
2020-2021	82,392	28,225	3650
2019-2020	1,78,700	45,725	11,660
2018-2019	1,81,566	46,405	12,069
2017-2018	1,71,778	42,687	10,329



Daily Data

Year	Outpatients (including casualty)	Admission	Surgery
2021-2022	327	105	18
2020-2021	225	77	10
2019-2020	489	125	31
2018-2019	497	127	33
2017-2018	470	116	28



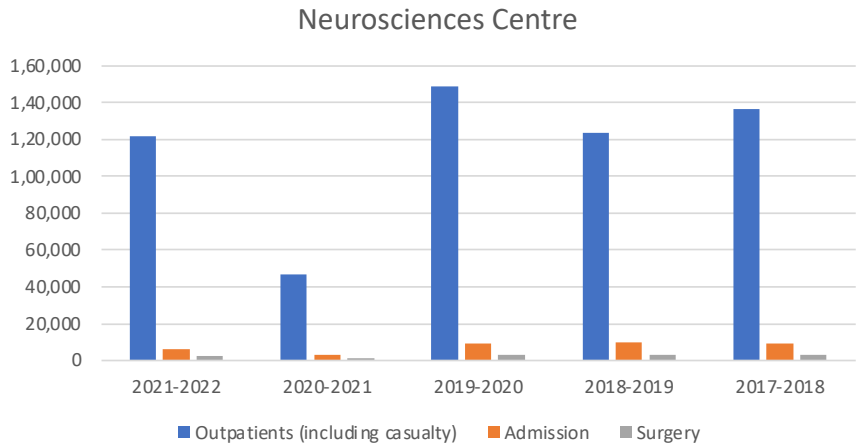
- people coming to IRCH daily : 100 to 500 approx.
- People admitted : 50 to 200 approx.

Figure 16 DR BRA IRCH Centre Annual Report

Neurosciences Centre

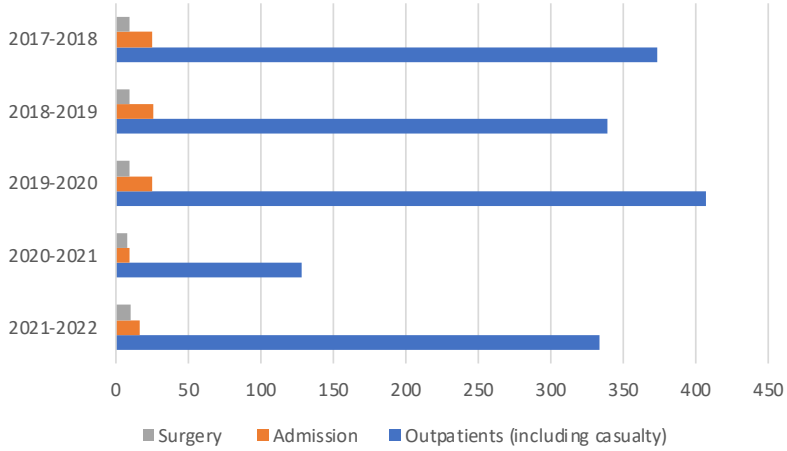
Annual Data

Year	Outpatients (including casualty)	Admission	Surgery
2021-2022	1,21,767	6,130	2695
2020-2021	47,002	3,116	1513
2019-2020	1,48,566	9,188	3,137
2018-2019	1,23,754	9,744	3,346
2017-2018	1,36,300	9,414	3,314



Daily Data

Year	Outpatients (including casualty)	Admission	Surgery
2021-2022	333	16	10
2020-2021	128	9	8
2019-2020	407	25	9
2018-2019	339	26	9
2017-2018	373	25	9



- people coming to Neuro : 100 to 450 approx.
- People admitted : 5 to 25 approx.

Figure 17 Neurosciences Centre Annual report

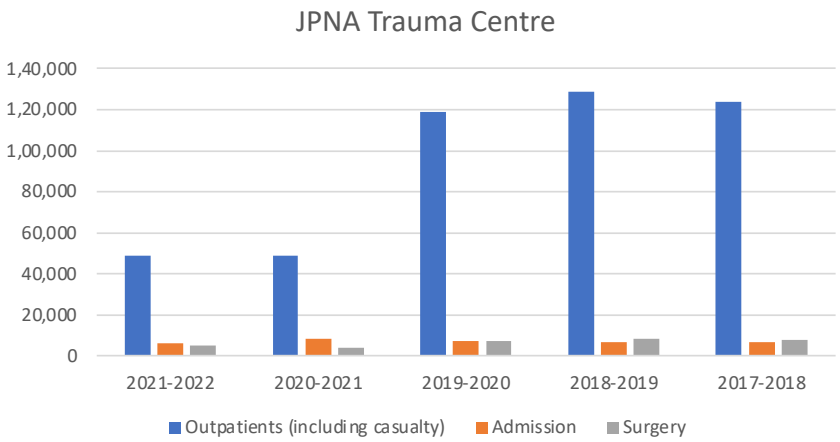
JPNA Trauma Centre

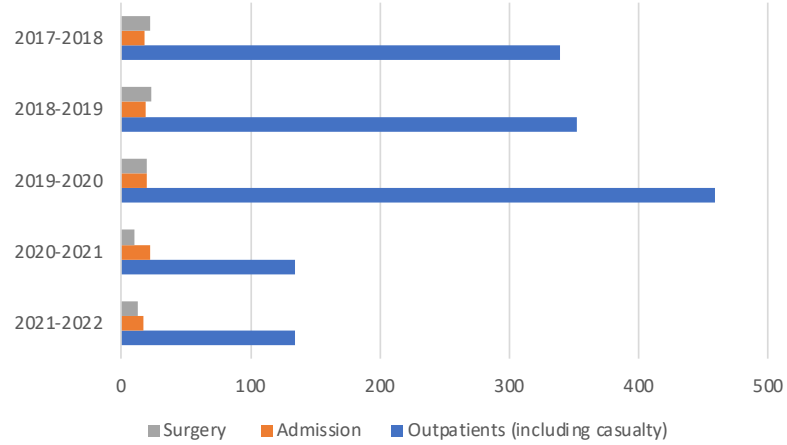
Annual Data

Year	Outpatients (including casualty)	Admission	Surgery
2021-2022	48,948	6420	5046
2020-2021	49,041	8348	3919
2019-2020	1,18,786	7,532	7,458
2018-2019	1,28,799	7,080	8,672
2017-2018	1,23,845	6,910	8,142

Daily Data

Year	Outpatients (including casualty)	Admission	Surgery
2021-2022	134	17	13
2020-2021	134	22	10
2019-2020	459	20	20
2018-2019	352	19	23
2017-2018	339	18	22





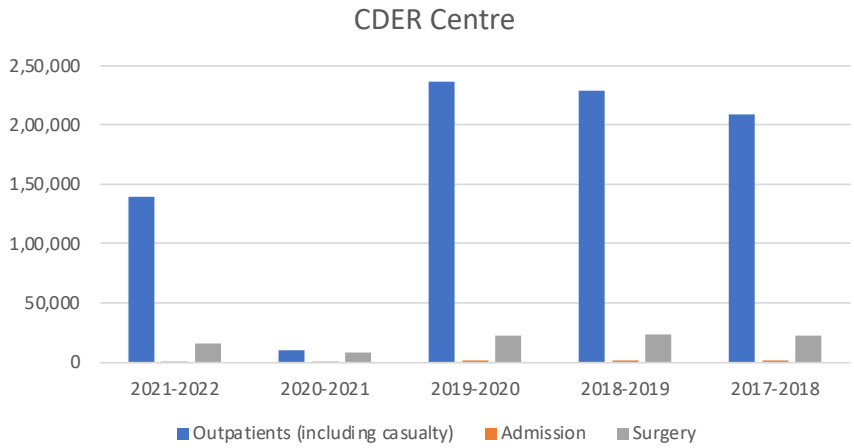
- people coming to JPNA daily : 100 to 500 approx.
- People admitted : 10 to 50 approx.

Figure 18 JPNA Trauma Centre Annual report

CDER Centre

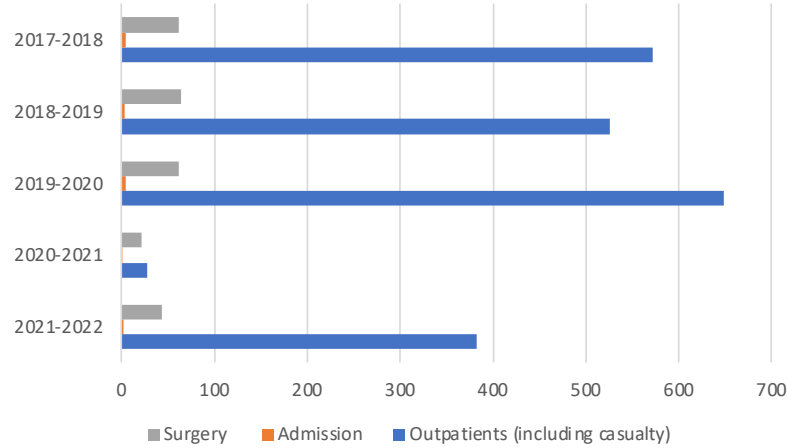
Annual Data

Year	Outpatients (including casualty)	Admission	Surgery
2021-2022	1,39,592	696	15754
2020-2021	10,131	255	8142
2019-2020	2,36,873	1,948	22,835
2018-2019	2,28,659	1,189	23,496
2017-2018	2,09,045	1,377	22,918



Daily Data

Year	Outpatients (including casualty)	Admission	Surgery
2021-2022	382	2	43
2020-2021	27	1	22
2019-2020	648	5	62
2018-2019	526	3	64
2017-2018	572	4	62



- people coming to CDER daily : 20 to 500 approx.
- People admitted : 5 to 10 approx.

Figure 19 CDER Centre Annual Report

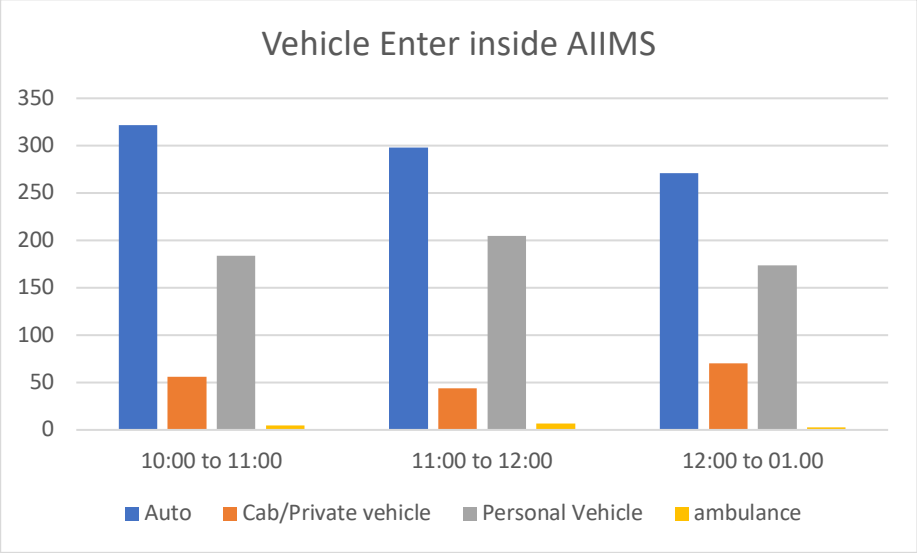
3.1.5 Scenario at Main Gate (gate no 3)



Figure 20 AIIMS Gate 3 Scenario

The objective of the study was to analyse the large numbers of Patient using transportation to come inside the AIIMS campus per hour in a day from a main gate (gate3).

Time	Auto	Cab/Private vehicle	Personal Vehicle	ambulance
10:00 to 11:00	322	56	184	5
11:00 to 12:00	298	44	205	7
12:00 to 01.00	271	70	174	3



- It is seen that mostly people prefer auto to travel
- Approx. 250 auto are coming daily in hr. inside AIIMS campus

Observation

Outside the main entrance of AIIMS (All India Institute of Medical Sciences), it is observed that patients and their families, are encountering difficulties in accessing transportation to enter the AIIMS campus.

- The area outside the AIIMS main gate is characterized by heavy traffic, including private vehicles, taxis, and auto-rickshaws. This congestion makes it challenging for patients and their families to navigate the entrance safely.
- Parking spaces near the main gate is limited, which causing frustration for the people, they have to wait for available spots or park at a distance from the entrance.
- Mostly People travel from metro as they get the autorickshaw easily for entering inside the campus
- E Shuttle a common mode of transportation for many Patients, often have long queues
- The lack of designated wheelchair-accessible vehicles or transportation options can be a significant challenge for patients with mobility issues, making it difficult for them to enter the hospital comfortably.
- Taxis are available outside the metro station, but their fares are higher compared to auto-rickshaws, causing financial strain for patients and families.



Figure 21 AIIMS Metro station view





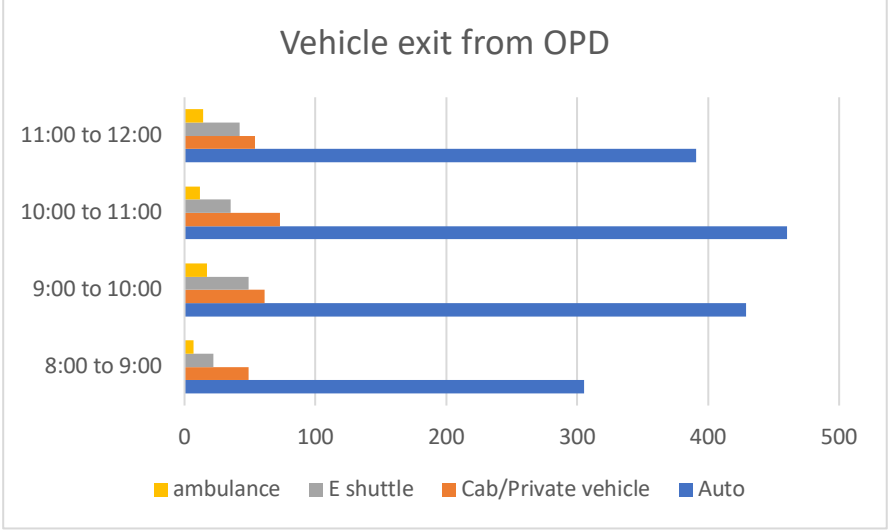
3.1.6 Scenario at Rajkumari OPD



Figure 22 OPD Scenario

The objective of the study was to analyze the large numbers of Patient using transportation to go Outside the OPD block per hour in a day .

Time	Auto	Cab/Private vehicle	E shuttle	ambulance
8:00 to 9:00	305	49	22	7
9:00 to 10:00	429	61	49	17
10:00 to 11:00	460	73	35	12
11:00 to 12:00	391	54	42	14



Observation

Outside the AIIMS OPD, It is observed that there is designated area where people are waiting for the E-Shuttle service or other mode of transportation.

- There's a clearly marked E-Shuttle stop with a waiting area.
- The crowd waiting for the E-Shuttle is diverse, with patients, family members, and even hospital staff awaiting transportation. People of various ages, from elderly patients to young children, are observed
- One of hospital staff member or a security guard helps manage the queue, ensuring that passengers board the E-Shuttle correctly to prevent overcrowding and ensures a smooth flow of passengers.
- Passengers patiently board the E-Shuttle, with hospital staff assisting those who may need help.







Figure 23 Existing E- Shuttle at OPD

4 User Study

4.1 User 1



Name: Virender Kumar (Attendee with Patients

Age: 28 yr.

Gender: Male

Place of residence: Soniya Vihar (Delhi)

Relation with Patient: Son

What is the Primary reason for using wheelchair: Problem at Hip and thigh area

How often you Visit to AIIMS hospital: 2 to 3 times in month

How much distance you travel from home to Hospital: it takes me around 26 km from my home to AIIMS

Primary mode of transportation for travelling: I usually Prefer Auto but sometimes I take cab When there is Severe pain in her back

Problem faced during travelling: She can't sit for long time at one particular place.

Why you don't use Ambulance: I have travel with ambulance once and its very expensive so I go with auto.

During your hospital visits, how often do you require transportation within the hospital? Very frequently, I need to travel a lot within the hospital

How you travel within AIIMS campus: I use Auto or sometimes just walking within campus

Ever used E shuttle for Travelling within campus: I have travelled once

How you feel while travelling, it is comfortable: yes, the vehicle seat is good and its comfortable;

Why you don't use E shuttle regularly: Due to overcrowding, she can't wait for long time and secondly it takes her lots of time to board the e shuttle.

Any suggestion regarding transport facility within campus: need for good vehicle during emergency time.

4.2 User 2

Name: Tara Singh

Age : 26yr

Gender: Male

Place of residence: Bulandshahr

What is your Primary reason for using wheelchair: Problem in knee joint

How often you Visit to AIIMS hospital: I have visited AIIMS two time

How much distance you travel from home to Hospital: it takes me around 120 km from my home to AIIMS

Primary mode of transportation for travelling: I take bus from my home town to visit AIIMS

Problem faced during travelling: sometimes feel vomiting(motion sickness)

Have you used Ambulance: No, I didn't use ambulance yet

During your hospital visits, how often do you require transportation within the hospital? Sometimes when I need to go to Xray department

How you travel within AIIMS campus: I use Auto

Ever used E shuttle for Travelling within campus: I have travelled 2 to 3 times

How you feel while travelling, it is comfortable: No issue with the seats , but leg area is small

Why you don't use E shuttle regularly: Due to overcrowding, I feel problem to place my crutches

Any suggestion regarding transport facility within campus: More no of vehicle to avoid overcrowding

4.3 User 3



Name: Manoj
Age: 29
Designation: Supervisor in Transport department AIIMS
Gender: Male
How does patient travel inside the campus: There are many transportation modes you may use to travel inside the campus.
People usually prefer E shuttle, mostly go with autos, cabs and some prefer their personal vehicle.
For whom is the shuttle intended: for transport patients, staff member and local public within the campus. ,
How many shuttles are there inside a campus: there are right
now 30 shuttles working inside the campus

Which route does the shuttle take: it started from New OPD to gate no 1 and again travel back to new odd (work in circular path)

What is the operating time for shuttle: there are two kinds of shuttle in AIIMS, one is INDIA TV sponsored which start at 7:30 am to 7:00 pm and one is ICICI sponsored which start at 8:00 am to 5:00 Pm

Why exactly was this vehicle chosen: As we know there are thousands of people coming daily for their treatment, so for massive population a vehicle is needed which can transport more no of people at a time and secondly AIIMs are planning to remove all the autos, cabs etc inside the campus to make pollution free campus

Why isn't there a regular bus service inside campus: Buses can't go inside AIIMS as the campus is having narrow roads

How much it cost for AIIMS: it is a sponsored vehicle from INDIA TV and ICICI bank
What is the maximum speed of shuttle: 25 KM

Does it work in all-weather condition: Yes it works in all-weather condition but we feel problem in rainy days as the vehicle is open from sides.

How long does the trip from the opd stop to the hospital's main entrance take? Its take around 7 to 10 min to reach if there is no traffic congestion
Is it possible to board the autonomous shuttle by wheel chair: AIIMS have taken initiative to bring few wheelchairs accessible shuttle, in that patient can board with wheelchair but in older shuttle they can't,

During Research it is found that wheelchaired patient not using these shuttles why? theses shuttle takes lots of time to open the ramp and board the patient, so people prefer to go with auto or cabs and secondly patient can't wait in queue.

If we design the Shuttle only for wheelchair and stretcher patient, will it work: yes, it works but if the patient is not there then what is the alternate use of it.
Any suggestion from your side: There should be more no of vehicle to avoid overcrowding and dedicated space for wheelchair patient with one attendee.

4.4 User Research (Shadowing Technique

The Main objective of the study is to understanding the user Journey

User 1



There is one lady patient with 2 attendees and one child
There are going outside the OPD building while walking



Then suddenly one guard stop them for taking wheelchair outside the opd block as it's a hospital property



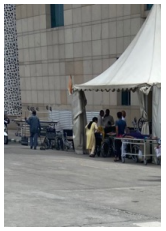
One of the attendee requested guard to take the wheelchair outside but guard refuse



Then they are going back inside the opd block



Then they reached to the opd counter where they need to submit wheelchair



Then they are waiting for the vehicle



Then they finally got an auto



User 2









4.5 Problem Identified

- Outside the AIIMS OPD, it is seen that there is a shortage of vehicles to transport patients in wheelchairs and stretchers, causing inconvenience and distress for patients and their families.
- There is a shortage of dedicated vehicles equipped with ramps or lifts to accommodate wheelchairs and stretchers.
- Patients and their families may experience long waiting times for the few available wheelchair-accessible vehicles. This delay can be distressing, especially for patients who are in pain or discomfort.
- Due to Overcrowding patient with wheelchair or stretcher are unable to board at Free shuttle so they need to manage their transportation by themselves
- Outside OPD Wheelchairs are not allowed they have to submit within campus so patient need to bring personal wheelchair or they have to manage their transportation accordingly



Figure 24 Wheelchair area outside OPD



Figure 25 Patients using Autorickshaw



Figure 26 Patients waiting for vehicle

4.6 Study of existing solution in AIIMS Campus

The study was conducted to understand the details about the existing transportation system called AIIMS free Shuttle

INDIA TV and ICICI Bank has tie up with the Speedway electric company to manufacture E shuttle and donate to AIIMS hospital

- Number of E shuttle - 30 (20: INDIA TV sponsored and 10 ICICI bank sponsored)
- . Frequency:3 to 4 shuttle per hour, it started from Rajkumari OPD and then end at Rajkumari OPD only.
- Shifts: Double shifts from 7:30 am to 7:00 pm For INDIA TV shuttle and 8:00 am to 5:00 pm for ICICI bank shuttle.
- Trial at night is going on

By observing the user research and the data above, it is found that frequency of the buses was less and people had to wait for the Shuttle for long time.



Figure 27 Existing E shuttle in AII



Figure 28 Speedway Shuttle Dimensions

4.7 Specifications of Speedway Electric SEMB-14

Dimensions

Length : 5120 mm
Width : 1440 mm
Height : 1900 mm
Clearance : 130 mm
Tyers : 165/80D12 LT

Energy

Battery : Lead Acid
Capacity : 225Ah
Charging : electric

Drive

Drive Wheel : 2
Engine : Electric
Motor : 7.5 Kw
Max speed : 25

Capacity

Total : D +13
Passengers
Sitting. : 13
Standing : 0

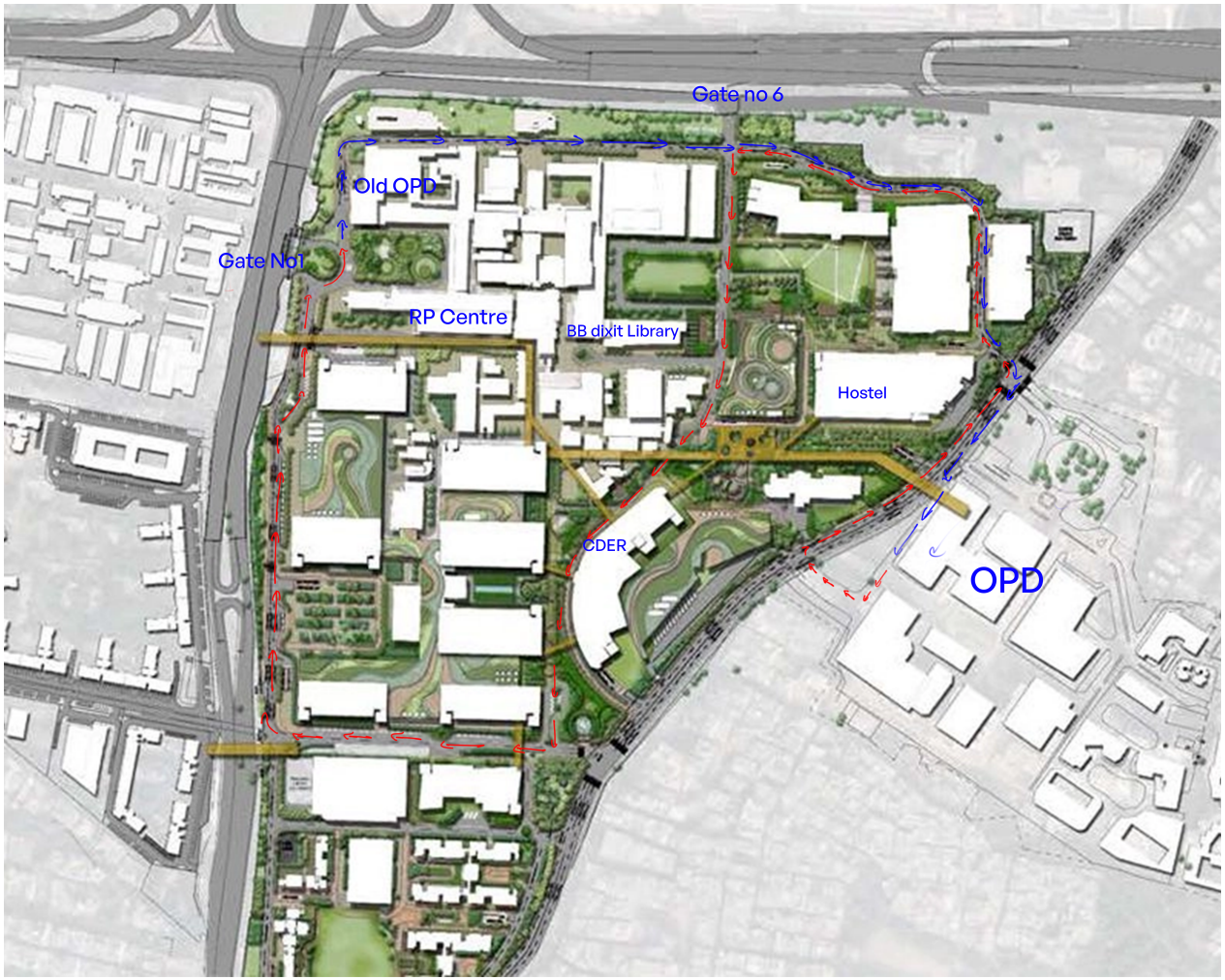


Figure 29 AIIMS Campus Map

4.8 Routes

Routes are mapped by AIIMS for the convenience of patient so that they can cover nearly all the departments within AIIMS

The E-shuttle covers a circular round
From OPD to Gate no 1
OPD >> hostel >> gate no 6 > Bb dixit library>>. CDER>> mother dairy >> Gate no 1

From Gate no 1 to OPD
Gate No1 >> old OPD >> gate no 6>> Hostel >> new OPD

4.9 Road study

The campus usually has an extensive network of internal roads connecting different parts of the facility. These roads are designed to accommodate both pedestrian and vehicular traffic, and they often have clear signage indicating directions to various departments. Alongside roads, there is dedicated pedestrian walkways, ensuring safe and convenient movement for those on foot, including patients using wheelchairs or stretchers.

- Problem:
- AIIMS campus have Narrow Roads which causes a traffic congestion
- Due to narrow roads a big public vehicles like bus cant move inside a campus



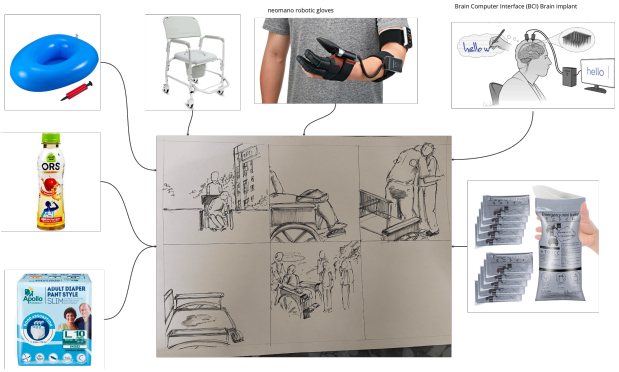


Figure 30 Road view

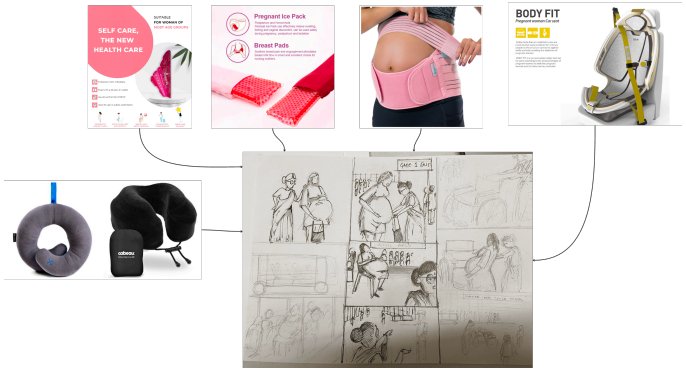
5 Scenario Building And Benchmarking

5.1 Scenario Building

In this situation , a paralysed patient with diarrhoea visits the aiims hospital for checkup. On the way back, the patient is unable to control the diarrhoea and ends up having it in the wheel chair



A Pregnant lady goes to AIIMS for her ultrasound. On the way back, she suddenly feels pain in her stomach, making her mother worry. in a hurry, her mother rushes to get a wheelchair to help her daughter.



In this situation, there is a person who has a wound on his legs. He comes to AIIMS regularly to get his wound dressed. On his way back, he is traveling in an auto with someone accompanying him. Suddenly, his legs start bleeding.



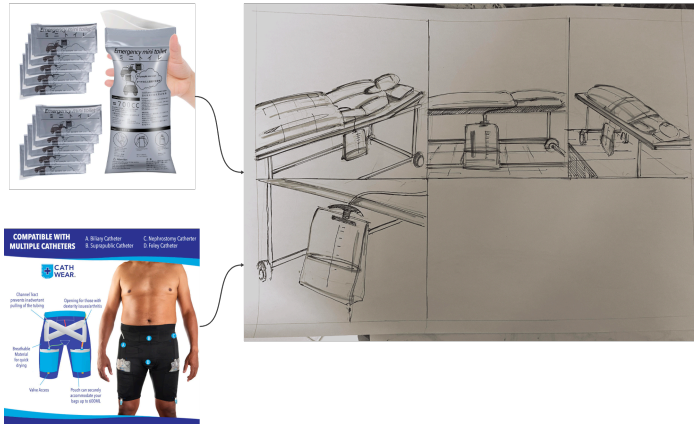
In this situation, a man is on a wheelchair, and his wife is taking him to the hospital. However, she also has a small kid in her arms, and there is another 6-year-old kid with them. Suddenly, the child in her arms starts crying, and the 6-year-old begins running around. She is finding it challenging to manage both the kids while taking her husband to the hospital.



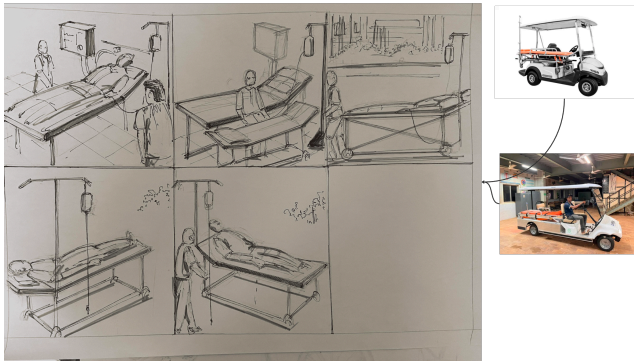
n this scenario, a wheelchair is stuck in a pothole, and due to the weight of the patient, a woman is having difficulty lifting and moving the wheelchair.



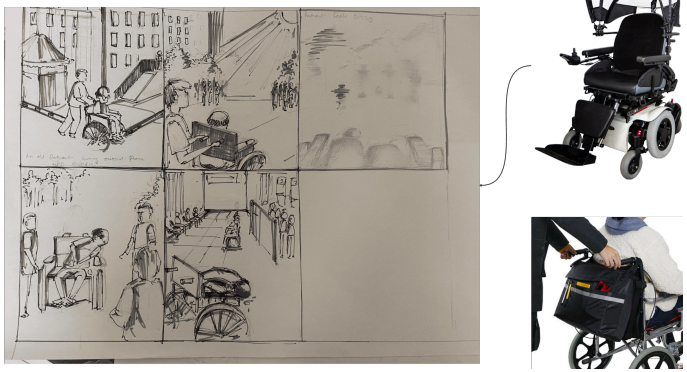
In this scenario, a wheelchair is stuck in a pothole, and due to the weight of the patient, a woman is having difficulty lifting and moving the wheelchair.



In this scenario, a tube from the cannula got broken while traveling from one department to another.



In this situation, the patient became dizzy due to a heat stroke.



5.2 Benchmarking

Ambient Experience, such as dynamic lighting and sound, to allow patients and staff to personalize their environment to create a relaxing atmosphere



Integrating ramp mechanism in shuttle



Foldable seats













Overhead luggage space

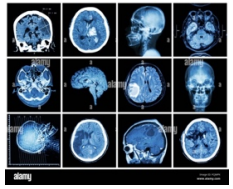
Self sanitizing handgrip





5.3List of material

- MRI report: 17inch X 14 inch
- Xray report: 12 inch X 10 inch
- Medical report (A4,A3): 8.3inch X11.7 inch/ 11.7inchX 16.5inch
- Water bottle: 8inchX 2.5 inch
- Medicine bag: 11.2 inch X 4.33 inch X 9.44 inch
- Tiffin box: 10 inch X 8.5inch X 8.5 inch
- Tote bag: 19 inch X 16 inch
- Bag pack: 18 inch X 13 inch X 8 inch
- Luggage bag: 24 inch X 17 inch X 9 inch
- Blanket
- Pillow: 20 inch X 26 inch









Key Insights

People looking for low budget vehicle

Patient feels long waiting time due to overcrowding

Shortage of Vehicle dedicated for Wheelchair and stretcher patient

AIIMs is planning to remove all auto inside campus

Wheelchair Patient with one attendee will be good for the vehicle

Everyone need fast service no one need to stand in queue

Wheelchair was not allowed outside OPD

patient don"t use E shuttle as it take lots of time to sit inside vehicle

Wheelchair and stretcher person need to manage there vehicle for travelling

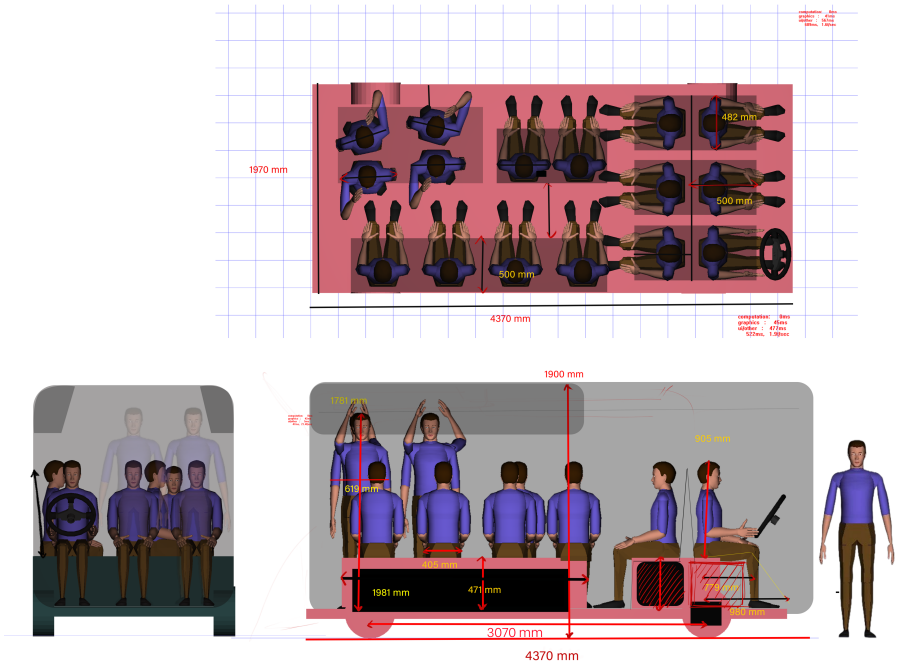
Problem faced in Rainy season

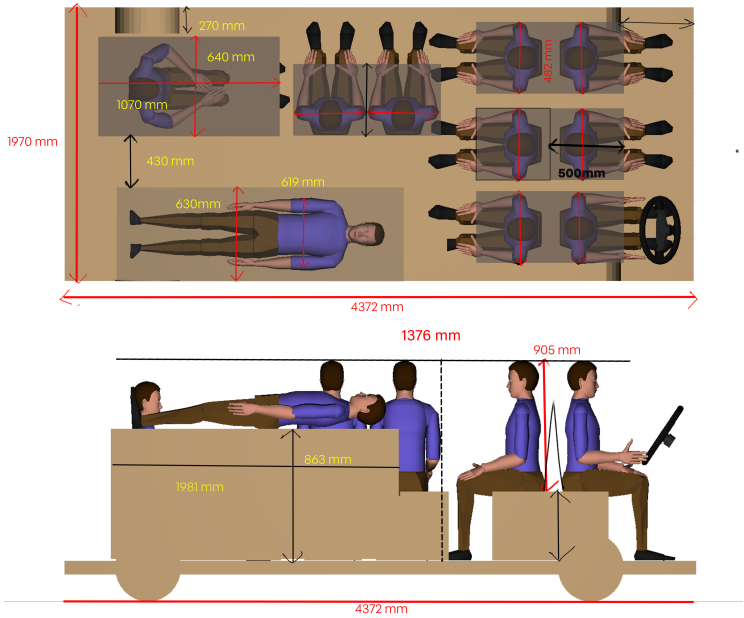
Cant increase length of vehicle as road is small

6 Packaging

6.1 Occupant Packaging

The results of user research leads to the package design which fulfil all the requirements.





6.2 Technical Packaging

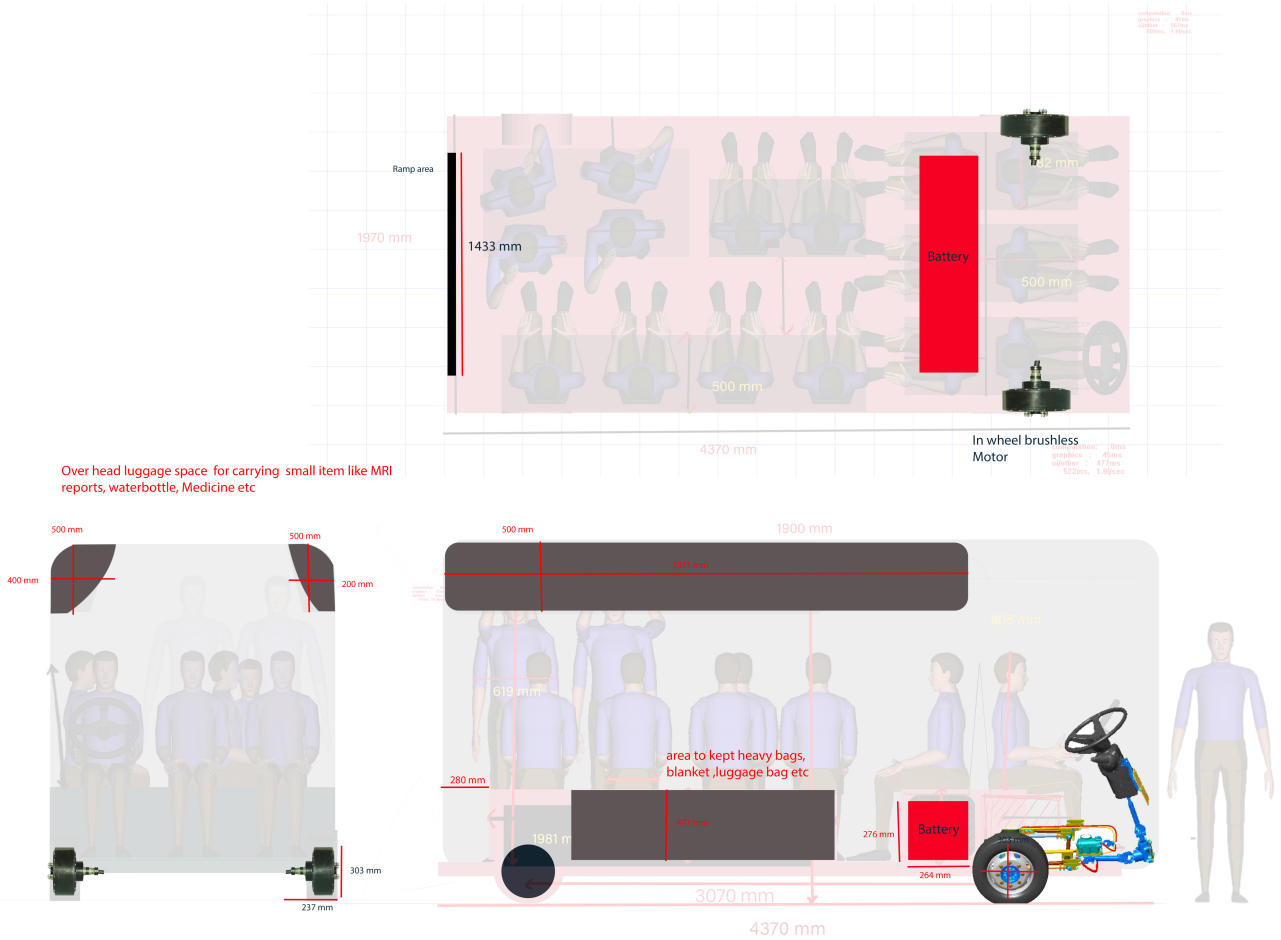


Figure 31 Technical Packaging

7. Design

7.1 Design Brief

Design an exterior and ergonomic interior of an electric shuttle vehicle that caters to the specific transportation needs of wheelchair and stretcher patients within the hospital. The goal is to provide a safe, comfortable, and efficient mode of transport, ensuring accessibility and enhances the overall experience.
The electric shuttle should meet the following specifications:

Dimension

Length: Approximately 4.3m
Width: Approximately 1.9 m
Height: Approximately 1.9 m
Wheel clearance : 0.15 m

Features

- The shuttle should accommodate a minimum of 12 passengers, including space for at least one wheelchair and stretcher patient.
- There should be dedicated 2 seat embedded with advance features for paralyzed people like, reclining seats etc
- The shuttle should have ramp or lift for easy boarding and disembarking.
- Handles and support bars for passengers with limited mobility.
- The shuttle should have overhead luggage space to keep documents and small stuff.
- The design should have ergonomic seating with ample legroom and headroom and there should be a enough space below to keep heavy luggage bags
- The design should align with the hospital's branding and aesthetics

7.2 Mood board



Figure 32 Mood board Image

Serene & Calm

7.3 Theme board

Exterior





Sturdy & Caring





Figure 33 Exterior Theme board

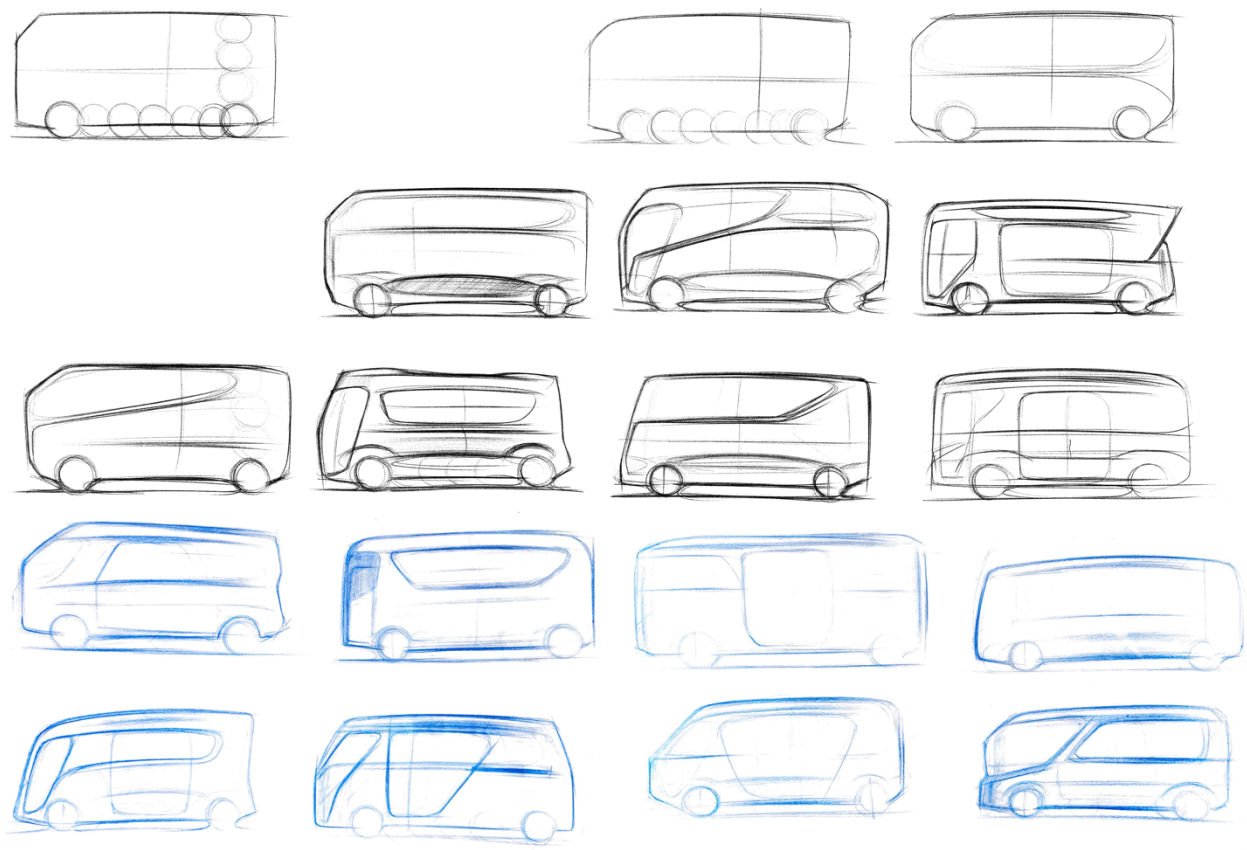
Interior



Soothing And Comforting

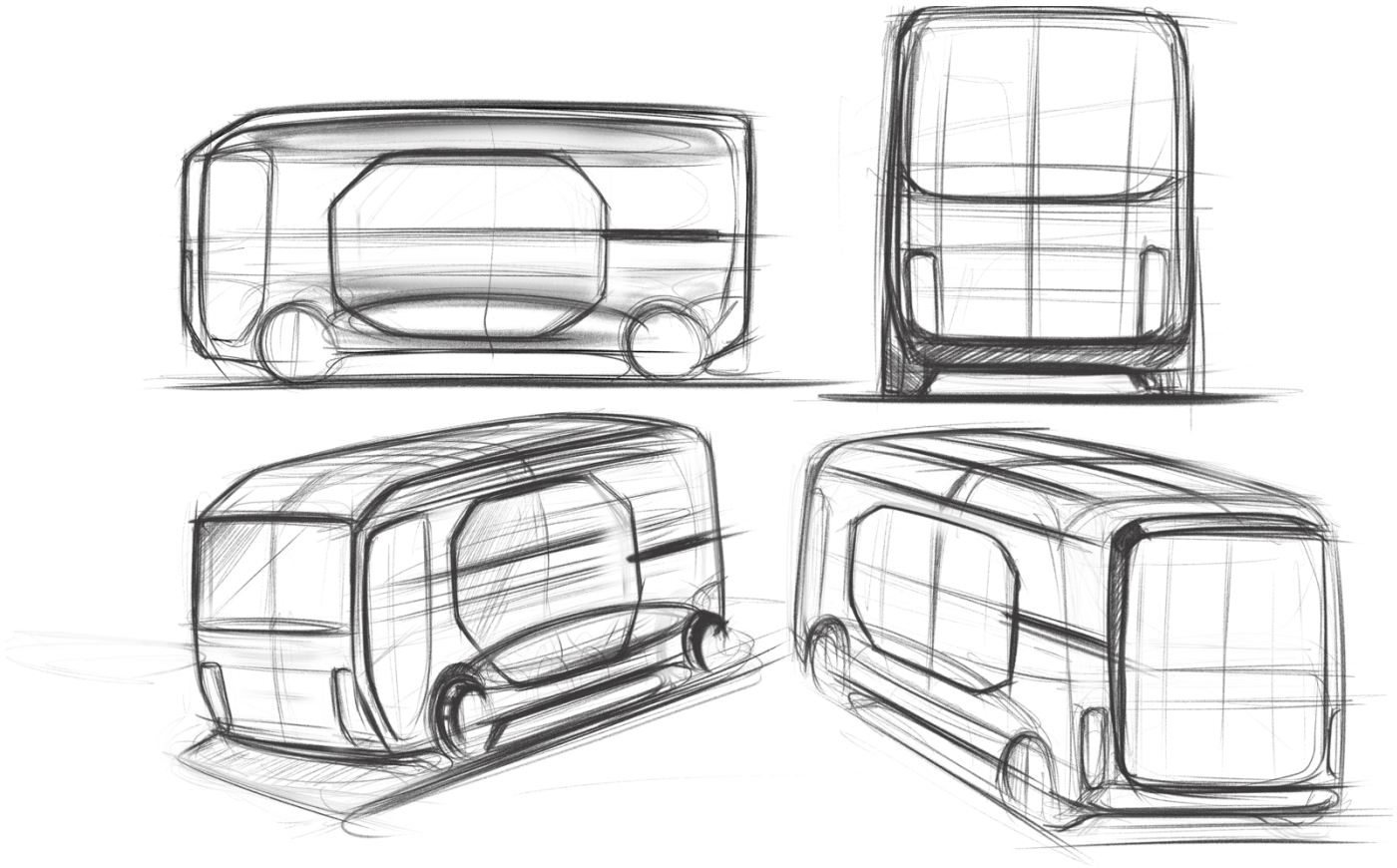
Figure 34 Interior Theme Board

Proportion Study



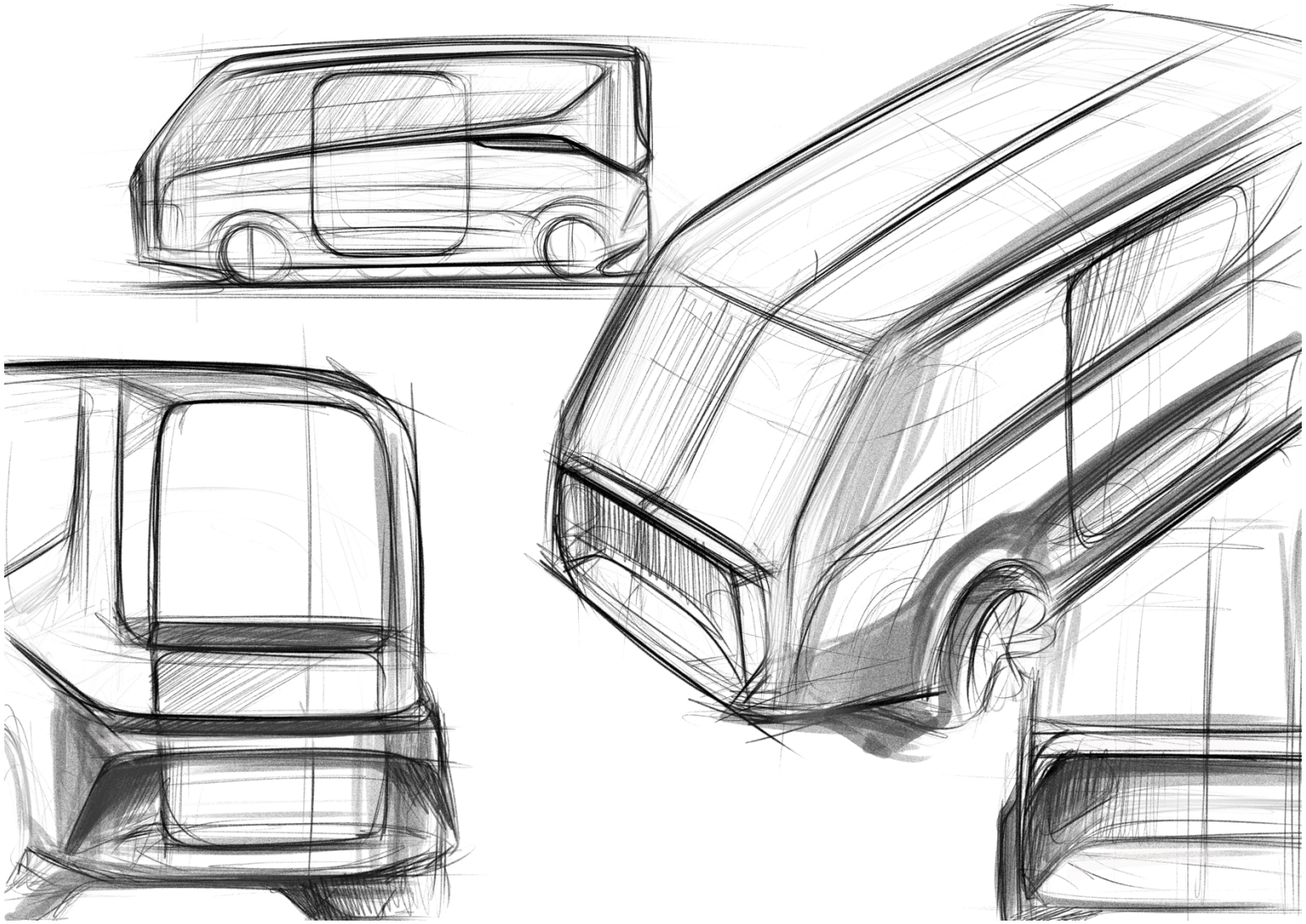
Ideations

Concept 1

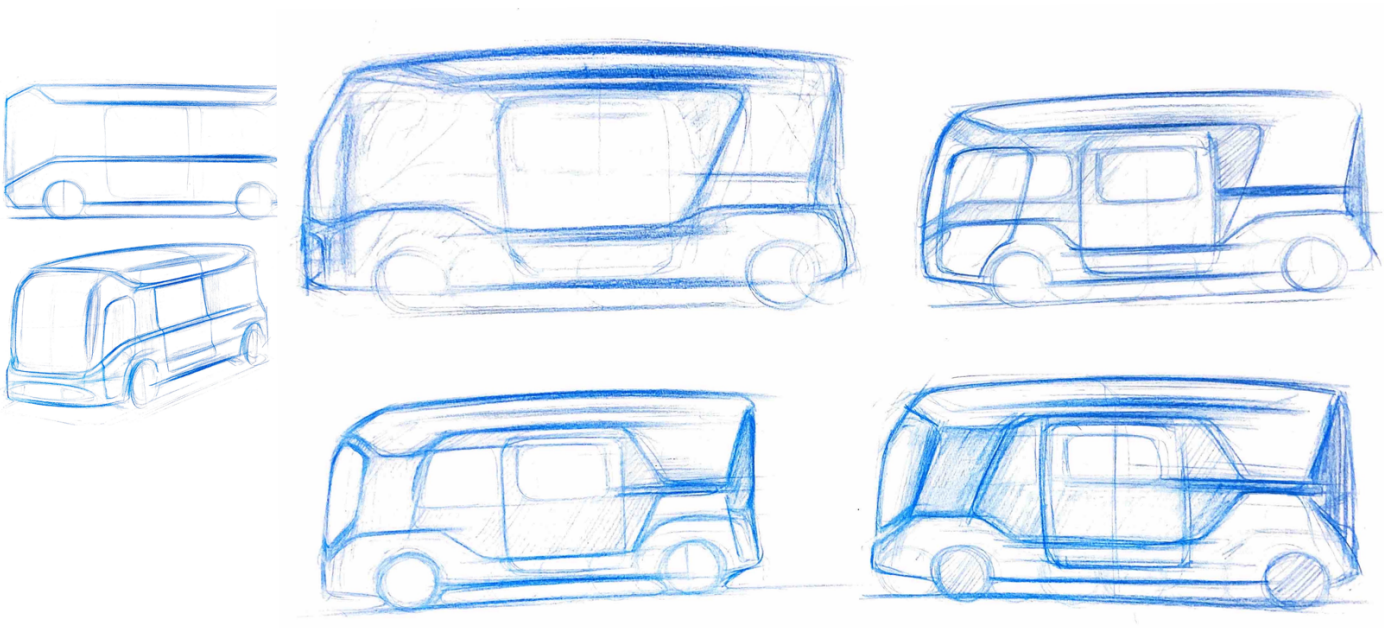


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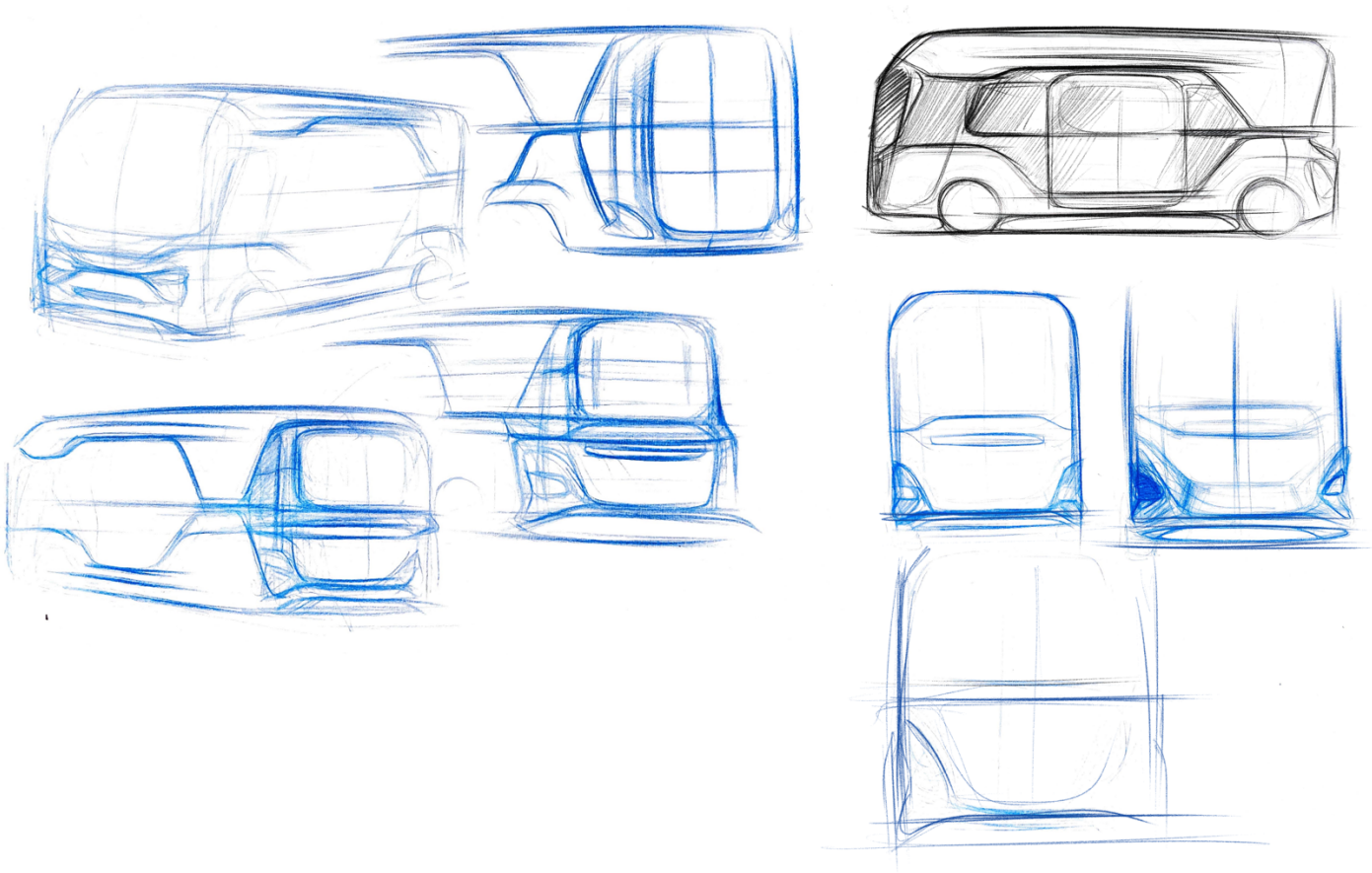
Concept 2

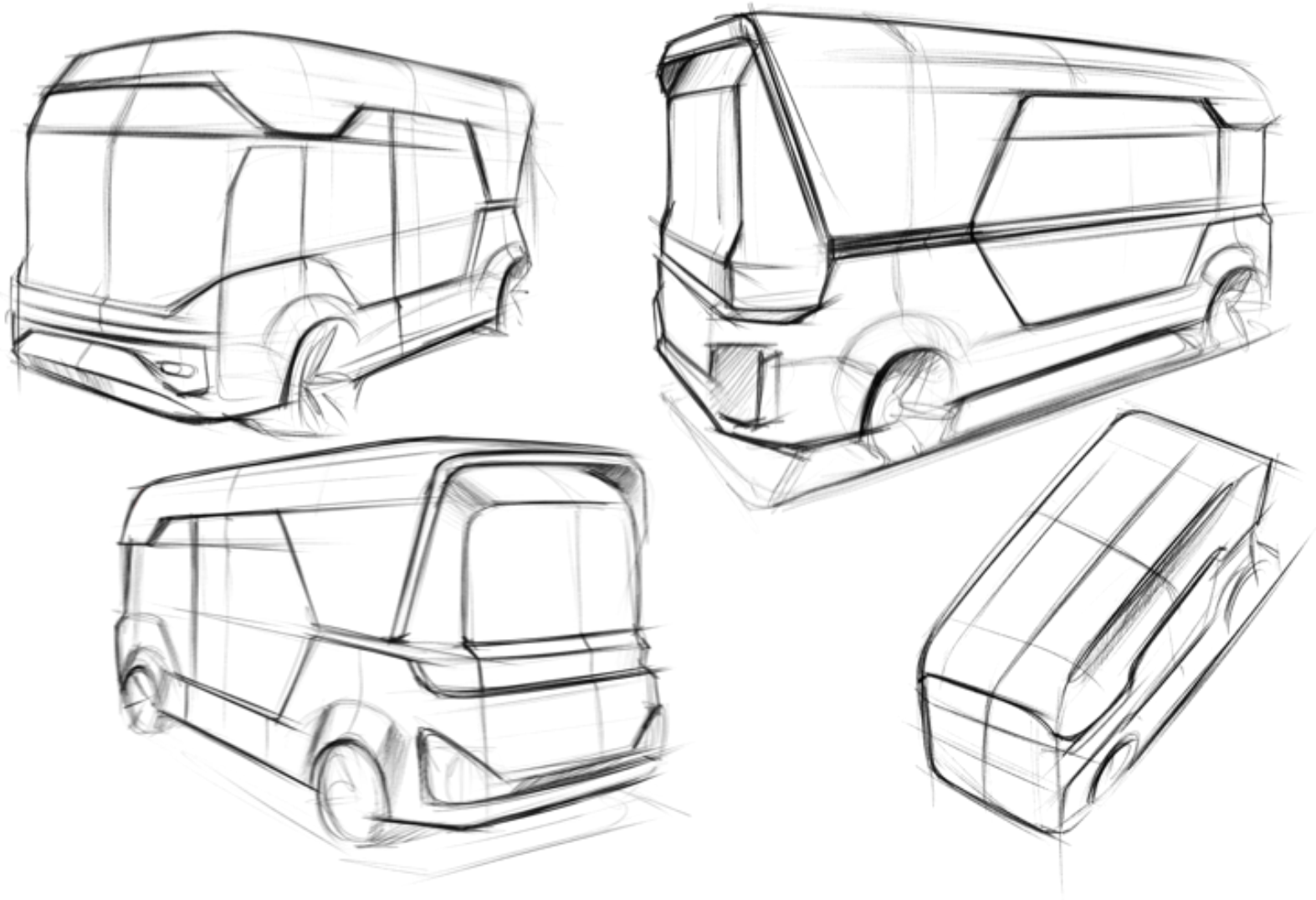


Concept 3



Final concept



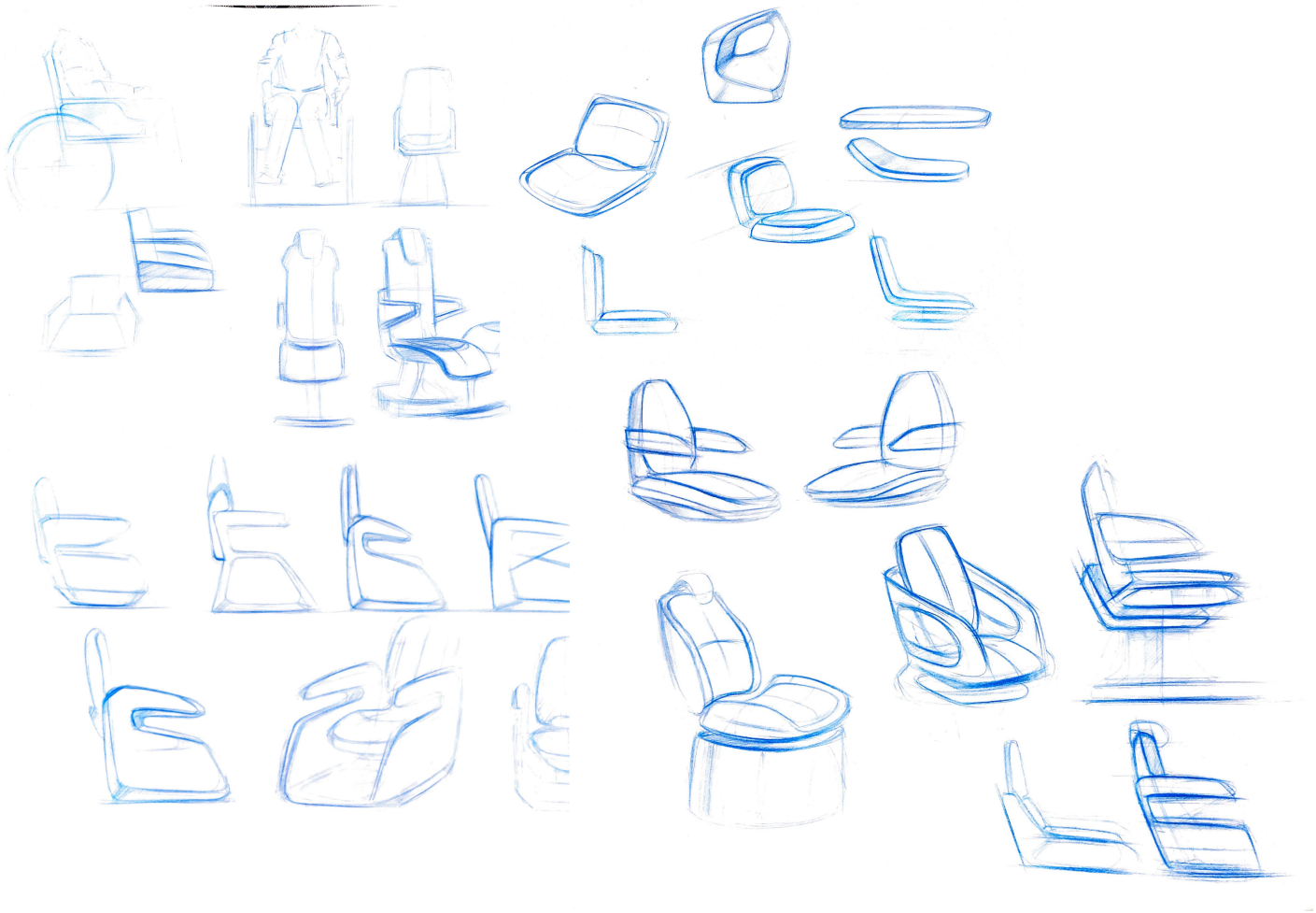


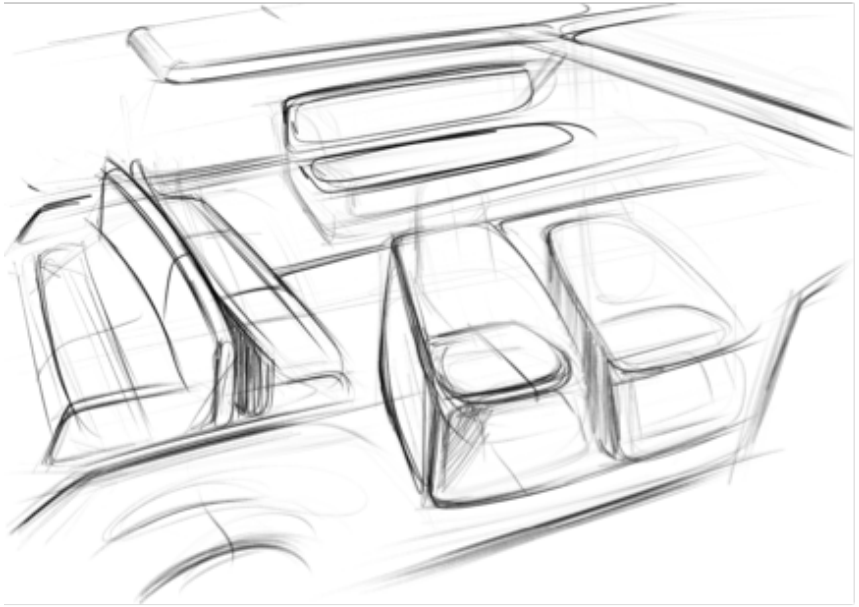
Final Hand Renders

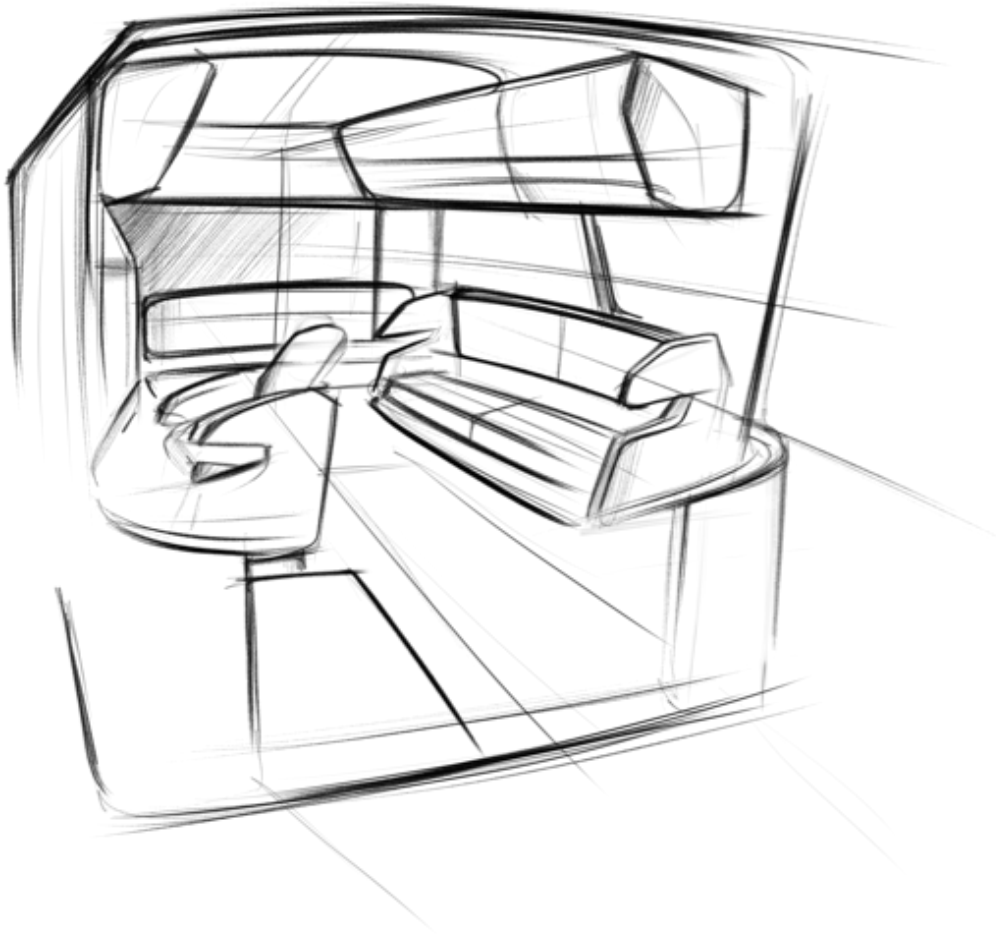


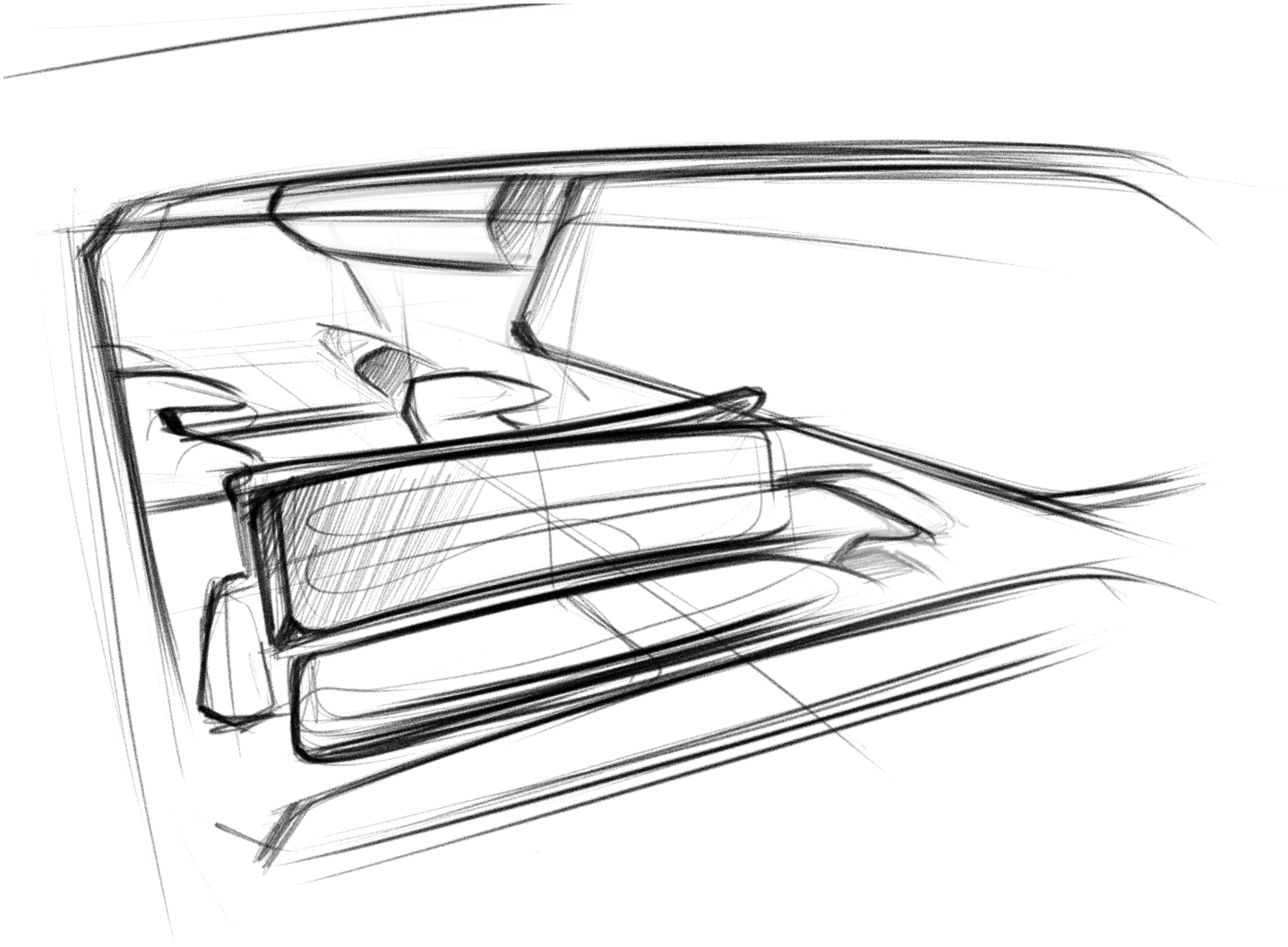


Interior Concept Sketches



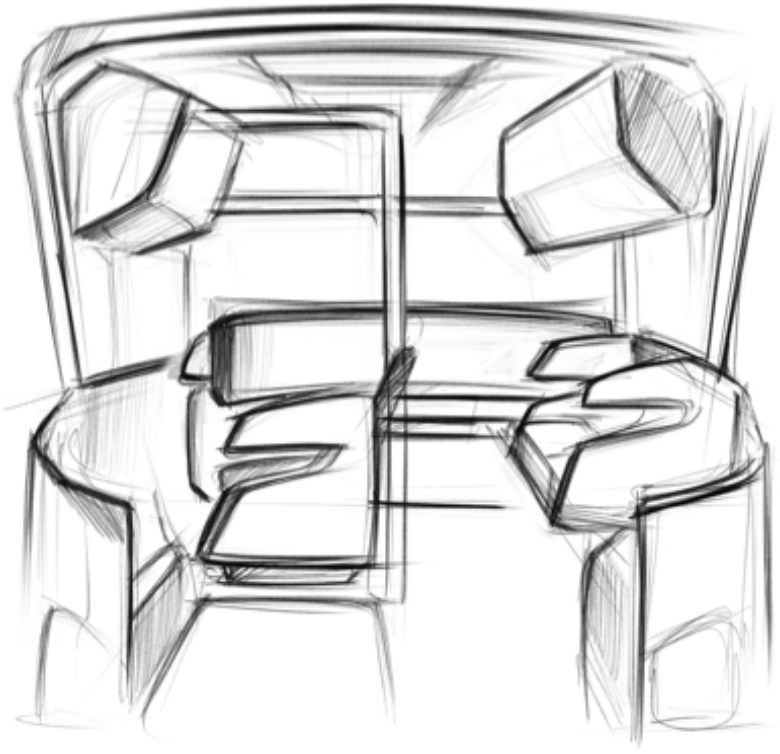


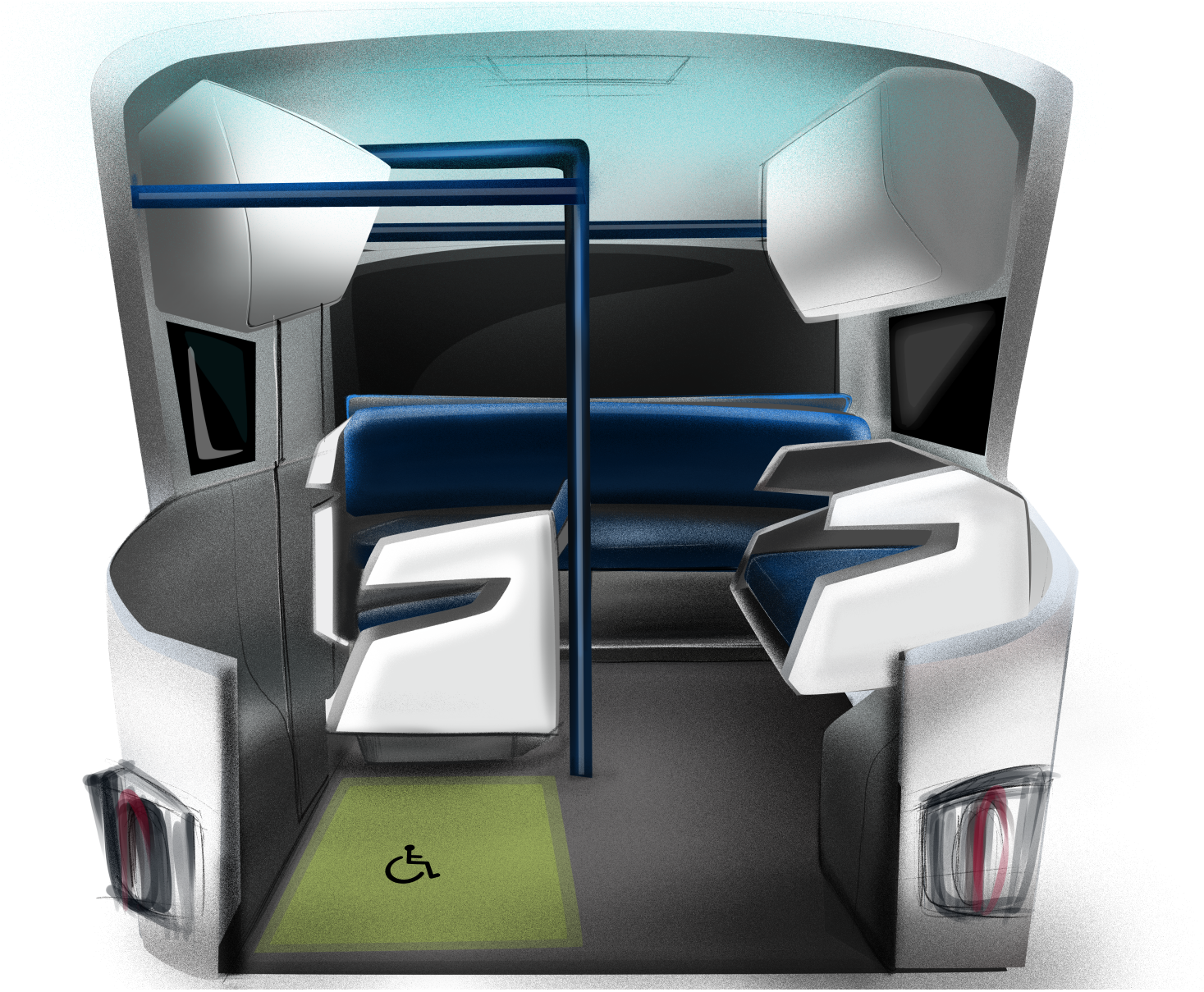




Final Interior Renders







Final Design Model




O.P.D
AIIMS




O.P.D
AIIMS


O.P.D
AIIMS


<<< O.P.D <<<
AIIMS


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Interior final Model




O.P.D
AIIMS


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AIIMS

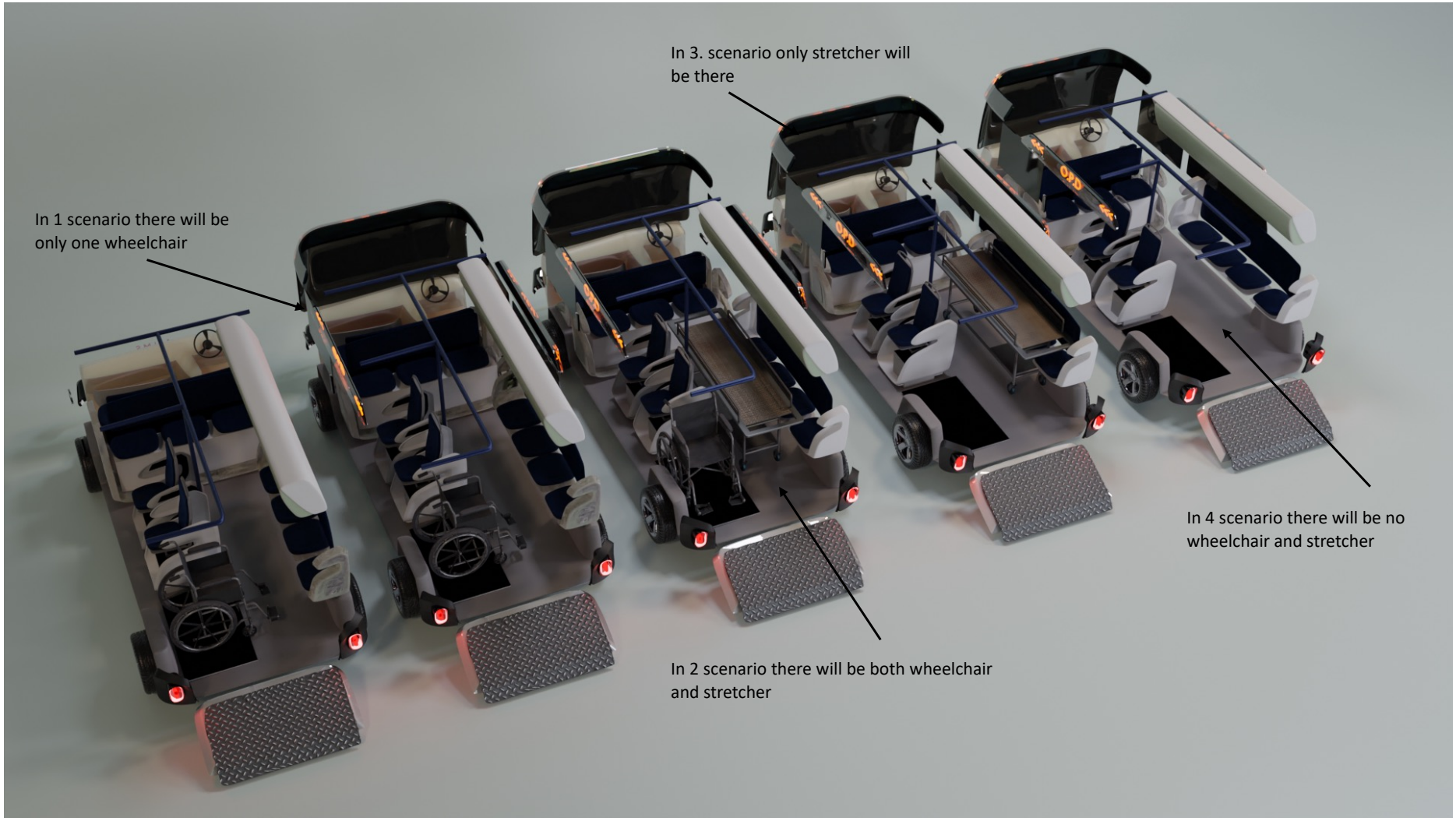

O.P.D
AIIMS
O.P.D
AIIMS


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AIIMS
AIIMS

The stretcher can be seamlessly attach to the rear passenger seats.



4 main scenarios





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https://youtu.be/LpqwubzxgM0?feature=shared
https://youtu.be/oKkC6SNfC7I?feature=shared
https://www.youtube.com/watch?v=xT3l81WbuGE
https://www.youtube.com/watch?v=6B_y7e1SKfw
https://www.youtube.com/watch?v=xv-ckTgoa9Y