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DIGITAL ASSIGNMENT 1
LEAN STARTUP MANAGEMENT

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Presented To: Prof Jose S

Question 1. Design a bed cum wheel chair for elderly people to navigate within the house (to be autonomous) Age group 65 to 74 (15 marks)

Ans:

Concept-

The low budget autonomous wheelchair uses a Robotic Operating System (ROS) for autonomous navigation. It creates a map of the surrounding space, along with static and dynamic obstacles, using a laser sensor and displays it through a smart phone app. The user can then touch any point on the generated map, and the wheelchair will drive to that place automatically without user intervention.

These automated wheelchair maps the surrounding environment, including dynamic and static obstacles such as people, walls, pillars, tables, chairs, etc. using a laser sensor called LiDAR. The map is automatically loaded onto an Android smart phone or tablet through a specially developed app.

Autonomus Wheelchair-

The project's goal is to enhance an ordinary ordinary powered wheelchair using sensors to perceive the wheelchair's surroundings, a speech interface to interpret commands, a wireless device for room-level location determination, and motor-control software to effect the wheelchair's motion. The robotic wheelchair learns the layout of its environment (hospital, rehabilitation center, home, etc.) through a narrated, guided tour given by the user or the user's caregivers. Subsequently, the wheelchair can move to any previously-named location under voice command (e.g., "Take me to the cafeteria")..

<u>Literature survey</u>

This technology is appropriate for people who have lost mobility due to brain injury or the loss of limbs, but who retain speech. The technology can also enhance safety for users who use ordinary joystick-controlled powered wheelchairs, by preventing collisions with walls, fixed objects, furniture and other people. We envision that a voice-commandable wheelchair could improve the quality of life and safety of tens of thousands of users. Moreover, considerable health improvements and cost savings could accrue through the reduction or elimination of collision-induced injuries such as wounds and broken limbs.

Challenges-

The development of an algorithm for the self-driving wheelchair to perfectly map the environment and plan the proper path to the destination is the first challenge. Robotic Operating System (ROS) is used to address this successfully. The second challenge is avoiding dynamic obstacles like people and pets while the vehicle was navigating to the destination. The LiDAR sensor along with the Robotic Operating System helped by detecting such obstacles and recalculating a new path to the destination. Developing a cost efficient self-driving wheelchair was another issue. We used a single LiDAR sensor to keep the overall costs of the product as low as possible. Making the vehicle enter and exit through a door was a difficult task but we could succeed in this after fine-tuning the system."

ROS navigation-

The Navigation Stack is fairly simple on a conceptual level. It takes in information from odometry and sensor streams and outputs velocity commands to send to a mobile base. Use of the Navigation Stack on an arbitrary robot, however, is a bit more complicated. As a pre-requisite for navigation stack use, the robot must be running ROS, have a transform tree in place, and publish sensor data using the correct ROS message types. Also, the Navigation Stack needs to be configured for the shape and dynamics of a robot to perform at a high level. To help with this process, this manual is meant to serve as a guide to typical Navigation Stack set-up and configuration.

Sensors-

LiDAR-

The primary "vision" unit on the autonomous vehicle is a LIDAR system, short for Light Detection and Ranging. The LIDAR system provides accurate 3D information on the surrounding environment. Using this data, the processor implements object identification, motion vector determination, collision prediction, and avoidance strategies. The LIDAR unit is well-suited to "big picture" imaging, and provides the needed 360º view by using a rotating, scanning mirror assembly on the top of the car.

For close-in control, such as when parking, lane-changing, or in bumper-to-bumper traffic, the LIDAR system is not as effective. Therefore, it is supplemented by radars built into the front and rear bumpers and sides of the vehicle.

This is highly valuable information as it allows the vehicle to sense everything in its environment, be it vehicles, buildings, pedestrians or animals. Hence why so many development vehicles feature a large 360-degree rotating LiDAR sensor on the roof, providing a complete view of their surroundings.

Cameras-

Autonomous vehicles are no different. Almost all development vehicles today feature some sort of visible light camera for detecting road markings – many feature multiple or panoramic cameras for building a 360-degree view of the vehicle’s environment. Cameras are very good at detecting and recognizing objects, so the image data they produce can be fed to AI-based algorithms for object classification.

The RGB data is converted to multiple gray scale images for different feature extractions. The gray scale data is filtered for noise and enhanced to improve feature contrast. Edge detection is used to enhance feature extraction. Isolated terrain obstacles are converted to binary representations. The terrain data is converted to a nearest obstacle edge histogram and combined with LRF data for obstacle avoidance and path planning. Multiple, color coated, binary images are combined for the terrain map visual interface.

Radar-

Radar works best at detecting objects made of metal. It has a limited ability to classify objects, but it can accurately tell you the distance to a detected object. However, unexpected metal objects at the side of the road, such as a dented guard rail, can provide unexpected returns for development engineers to deal with. Operating frequency for this radar is usually 77GHz, which has been allocated for this use, has good RF propagation characteristics, and provides sufficient resolution.

Much of the system-level operation involves measuring and managing the power requirements to control power, overall consumption, and thermal dissipation.

Ultrasonic sensors-

Ultrasonic sensors have been commonplace in cars since the 1990s for use as parking sensors, and are very inexpensive. Their range can be limited to just a few metres in most applications, but they are ideal for providing additional sensing capabilities to support low-speed use cases.

Putting It All Together-

Camera, radar and lidar sensors provide rich data about the car's environment. However, much like the human brain processes visual data taken in by the eyes, an autonomous vehicle must be able to make sense of this constant flow of information.

Self-driving vehicles do this using a process called sensor fusion. The sensor inputs are fed into a high-performance, centralized AI computer, such as the Nvidida Drive GTX platform, which combines the relevant portions of data for the car to make driving decisions.

So rather than rely just on one type of sensor data at specific moments, sensor fusion makes it possible to fuse various information from the sensor suite — such as shape, speed and distance — to ensure reliability.

It also provides redundancy. When deciding to change lanes, receiving data from both camera and radar sensors before moving into the next lane greatly improves the safety of the maneuver, just as current blind-spot warnings serve as a backup for human drivers.

The DRIVE AGX platform performs this process as the car drives, so it always has a complete, up-to-date picture of the surrounding environment. This means that unlike human drivers, autonomous vehicles don’t have blindspots and are always vigilant of the moving and changing world around them.

Conclusion-

For the autonomous vehicle, the navigation and guidance subsystem must always be active and checking how the vehicle is doing versus the goal. For example, if the originally "optimum" route has any unexpected diversions, the path must be re-computed in real time to avoid going in a wrong direction.

We do know that such a vehicle demands a complex integration of sophisticated algorithms running on powerful processors, making critical decisions based on large streams of real-time data coming from a diverse and complex array of sensors.

Parts and Preparatory Cost Analysis

1:GPS Trackers: 3000rs

2:PROXIMITY SENSOR 600rs

3:MICROCONTROLLERS 2000rs

4:HYDRAULICS SYSTEM 2900 rs

5: Chassis and Mechanical Systems 8000rs

6:TYRES 1000rs

7:RIMS 2000rs

8:USER INTERFACE device: 3000rs

9:Battteries 4000rs

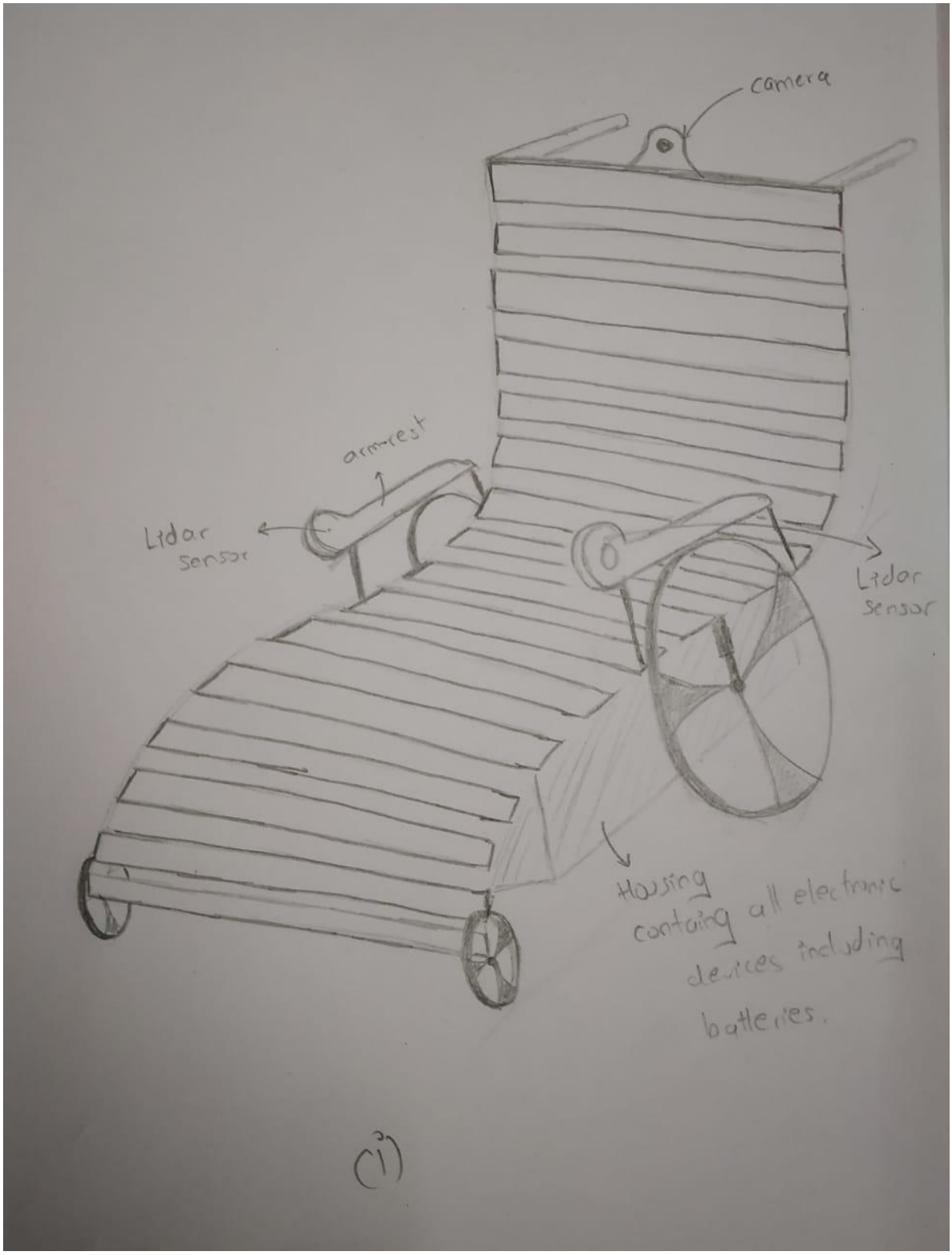
10:Electrical systems (mic and receivers) 1000rs

12:Suspensions 2500rs

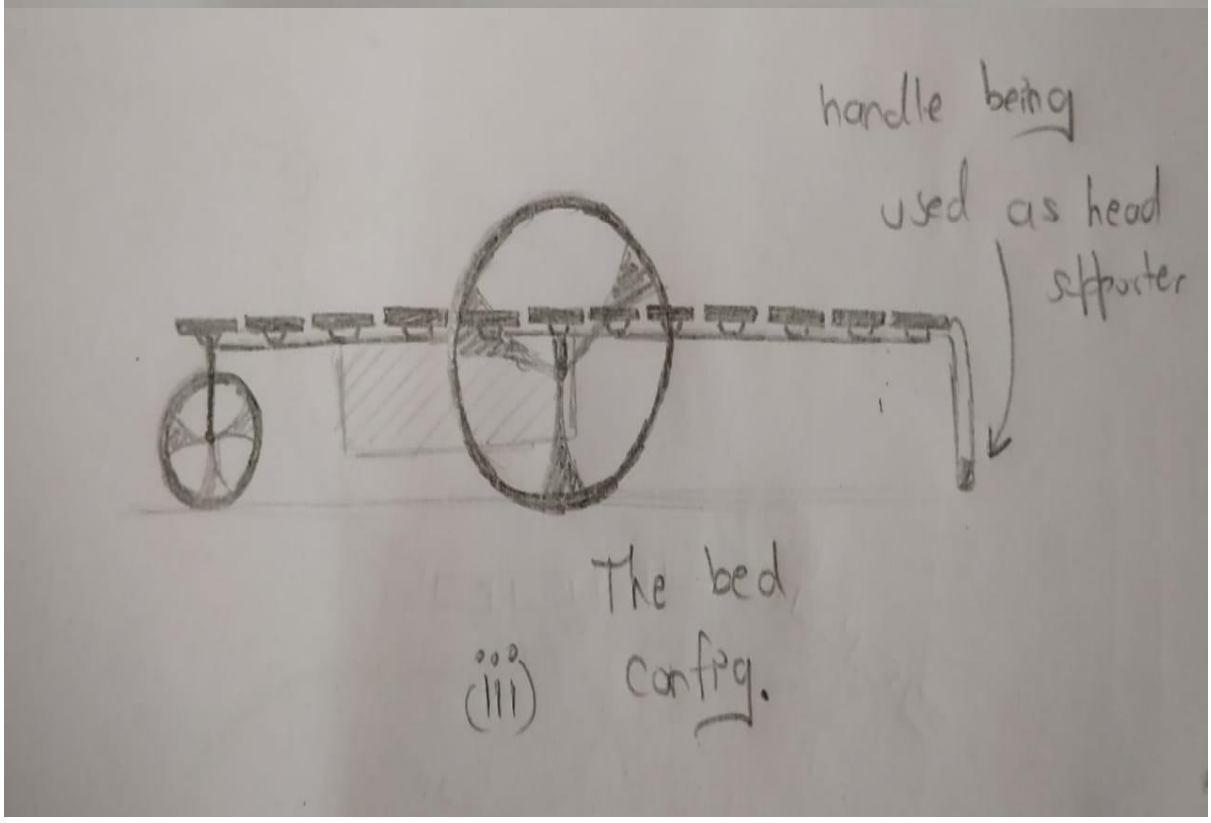
13:Lidar 5600rs

GRAND Total 27000rs

Design:

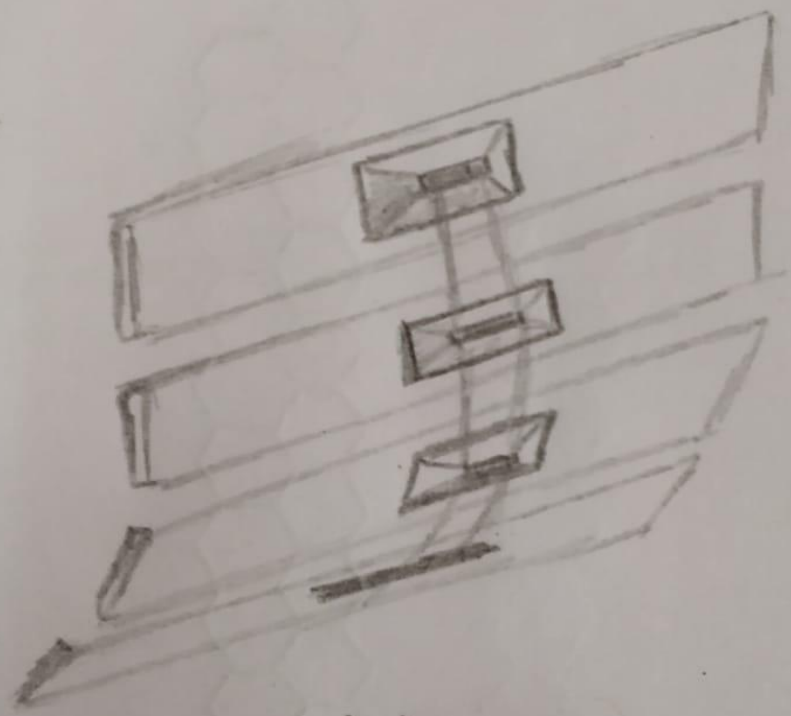

camera
armrest
Lidar sensor
Lidar sensor
Housing containing all electronic devices including batteries.
(1)

(ii)



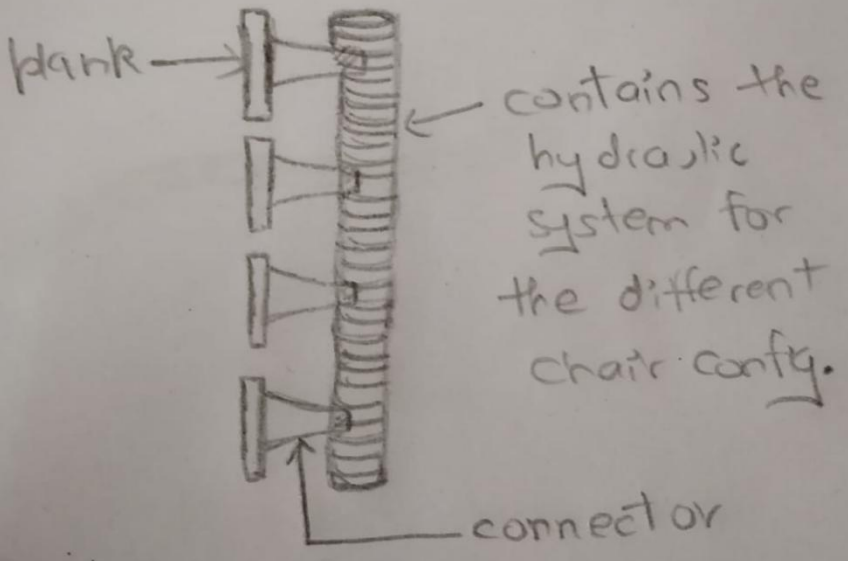
(iii) The bed config.

er

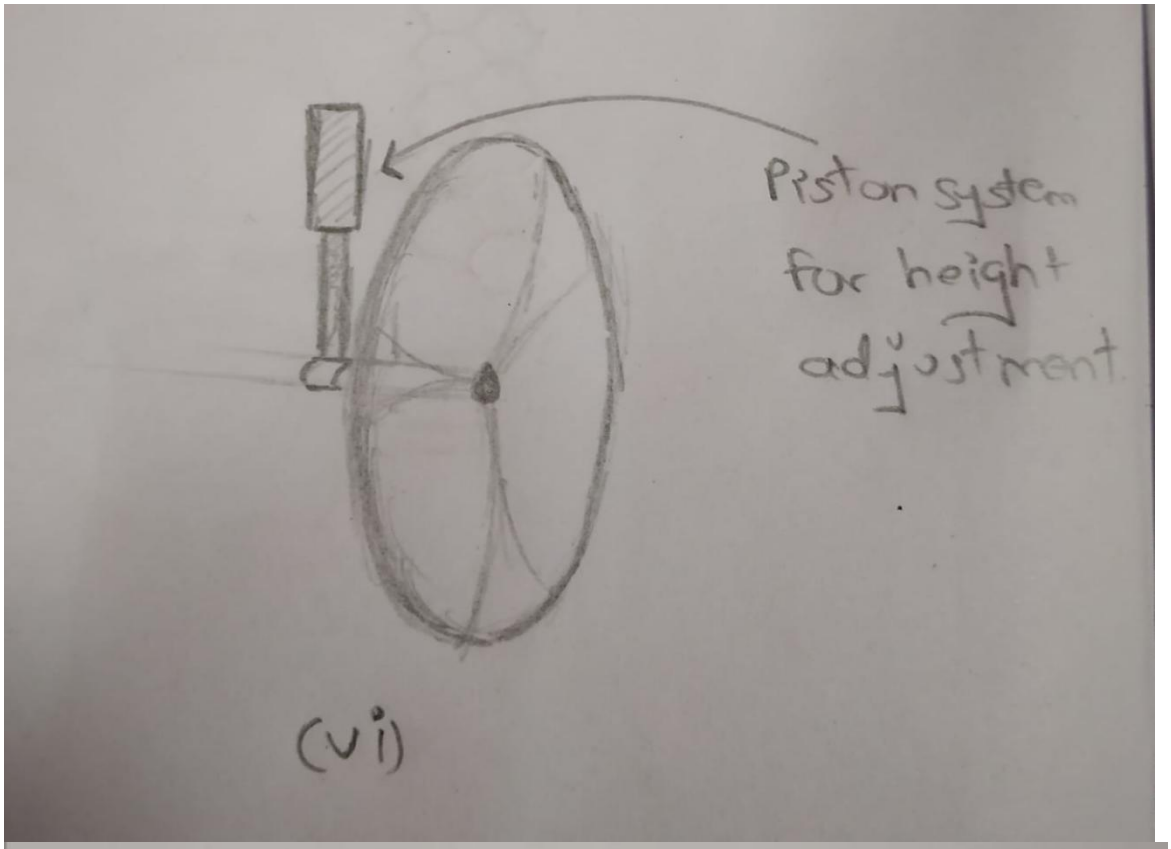


back-
view

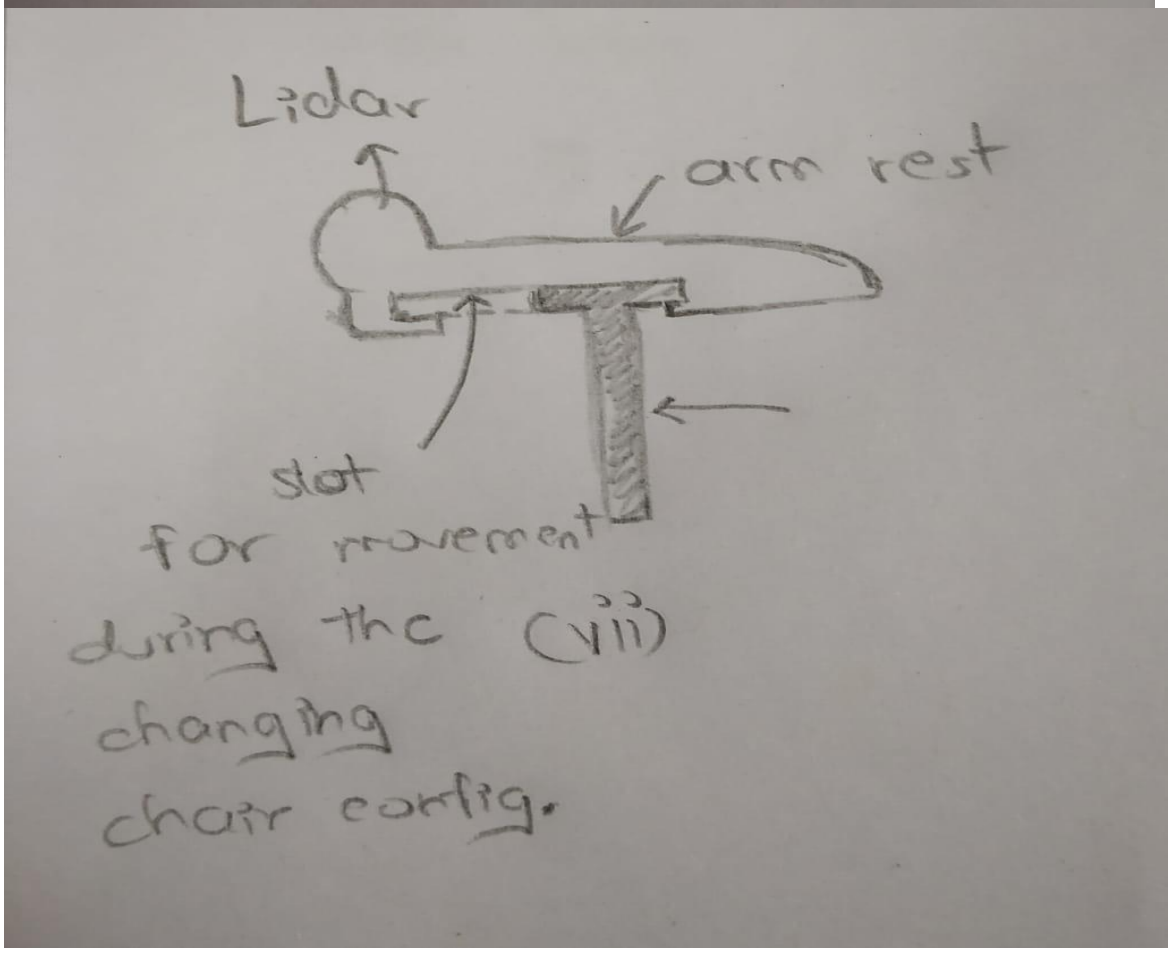
(IV)



(V)


Piston system
for height
adjustment.

(vi)


Lidar
arm rest
slot
for movement
during the
changing
chair config.

(vii)

Question 2. Critically analyse the two start ups Cardback - launched in 2012,Stayzilla – 2005 and present your views.

Ans 2:

Part 1:Stayzilla was a successful homestay network in India and it raised $33.5 million in funding. Yogendra Vasupal, the founder, launched the company, under the name Inasra Technologies, in 2005. He then changed the name to Stayzilla in 2010, because the owner wanted to expand his services in all the cities and Zillas (Districts) in India. The company was an early Airbnb business type that provided an online platform in which homestays, 'alternative stays', as well as hotels could be listed. Stayzilla had over 15000 stays in about 1100 cities across the country and in 2013 it reached the 500 bookings in a day milestone.

CAUSE OF FAILURE

Throughout its 12 years of operation, Stayzilla had to deal with a varied number of challenges.

The potential for a business like Stayzilla was huge, especially because they were among the first companies in India to venture into the sector and make use of technology. However, being the first mover meant also that people were not very familiar with the concept, nor how to take advantage of the service and basically many didn't even know how to use the internet. So Stayzilla's first efforts and resources had to be directed towards both educating the market as well as essentially creating homestays.

As more competitors joined the market, various companies tried to differentiate themselves by offering frequent discounts. But Stayzilla's operations costs were already too high and they were losing money every year. The CEO also mentioned that they had also lost focus on the essential mission they had envisioned for the company.

The company has not been declared officially closed, though, as the CEO considers this a pause to regain clarity and plans to return on the scene with an improved service and a 'clean slate' soon.

Part 2: Analysis of CardBack-

CardBack was one of the first such fintech product in the space in India which recommended the best credit card to pay for a particular service or product. It was founded in 2012, Delhi-based online platform for loyalty cardholders. The platform recommended the best credit card or wallet to pay for a particular service or product.

Market research, competitor analysis, understanding of market challenges within the industry, customer demands and requirements, analysis of the customers and market trends are some of the most important aspects of the business that are most important to be studied well before entering into any industry.

Undoubtedly the start-up had fulfilled the requirements of the major aspect of the study. But what market research explicates the reason behind failure are-

1- Lack of trust in consumers

2- Fear of fraud

3- Networking chain dilemma

4- Safety and security

5- Unawareness of using credit card

6- Very few credit card users as compared to debit card users.

Unawareness of the use of cards and importantly the lack of trust as the misuse of the card, spamming with the card is the most common in a country like India. In India, the literate people were also unaware of the use of the cards only 27 million credit cards are in circulation in comparison to 740 million debit cards.

In India, the product was not a successful one because this type of idea needed a deep pocket or money to educate people about their safety and security of the products.

So, overall study shows that Cardback has shutdown, owing to fund crunch and less demand in India for multiple credit cards.

Work Distribution:

1: Harsh Vardhan Singh(18BME0030):Literature Survey,Cost analysis of Wheelchair and analysis of the startups.

2: Shashank Shukla(18BCE2522):Introduction and Working of wheelchair with current market scenario and analysis of startups.

3: Lakshya Mishra(18BME0096):Complete design of wheelchair according to the needs and different views.