



## Study of Multifunctional Wheelchairs

<sup>1</sup>Ahmed Ali, <sup>2</sup>Dr. M. Sohail Pervez,

<sup>1</sup>M.Tech 2nd year Mechanical Engineering Design, <sup>2</sup>Associate Professor,

<sup>1</sup>Mechanical Engineering Department,

<sup>1</sup>Anjuman College of Engineering and Technology, Nagpur, India.

**Abstract:** This study paper aims to perform a brief study of different types of multifunctional wheelchair available and what can be done for improving the design. The effective design of multifunction chair for disabled person is to reduce the transferring time inside the home. The design is also used for sleeping, eating, drinking, reading, writing and other utilities is possible for in a single design of chair. In India the number of handicapped people expanding each year. Probability help are valuable for patient for transportation and trade for strolling particularly Understanding the different issue with respect to mobility equipment and presenting a superior structure will be benefit for the medical field and assistance for incapacitated people.

**Keywords:** – *Fabrication, Hospital, Stretcher, Wheelchair*

### I. INTRODUCTION

The idea of smaller, more compact and a multifunctional wheelchair is been around but to make is more versatile there are salient features which are added with the design of chair to improve the performance of the existing design. The distance between the front and rear axle distance can be adjustable for threaded rod and fixed bolt. The vertical height also adjustable for with respect to our requirement. The adjustable threaded rods are rotated with respect to the battery-operated motor. The forward and reverse direction moment can be possible by operating the needles. The direction also controlled by the front wheel with respect to needle movement. The sliding backbone movement bed is possible by using connecting lever. The frame is made of strong materials. The design of all the operation occurs with respect to needle movement and connecting lever. The battery is rechargeable and the sliding tray, number of boxes are used to protect the various things in tray and boxes such as laptops, books, documents, water bottles, remote and mobile phones. The sliding table is provided for writing and eating purpose. In the design is very helpful to disabled person free to move at any place in home.

### II. LITERATURE REVIEW

- A. *Design and Fabrication of Wheelchair cum Stretcher* <sup>[1]</sup>: The main object of the project Design and Fabrication of Wheelchair cum stretcher i.e. eliminate the use of a separate wheelchair and stretcher in Hospital. It is one that can fulfil utility of Hospital. Patient's mobility are useful for transportation especially in Hospital and indoor and outdoor environment wheelchair are commonly used for transportation. In India the number of handicapped people expanding each year. Probability help are valuable for patient for transportation and trade for strolling particularly Understanding the different issue with respect to mobility equipment and presenting a superior structure will be benefit for the medical field and assistance for incapacitated people. Here we are building up frame work which fit for different position manually. From the identified need, new features like convertible wheelchair which can be converted into stretcher is introduced which can be controlled by electrical and mechanical system.
- B. *Design and analysis of commode type manual wheel chair* <sup>[2]</sup>: According to WHO **75% Million** people uses wheel chair but 20.3 percent population are wheelchair worthy. It is estimated that more than 70 million people need wheel chairs. But only 5 to 15 % people have access to one. The number of people aged 65 or older is estimated to grow from 534 million in 2010 to nearly 1.5 billion in 2050. This strategy represents the requirement of wheel chair is high. This project aims at modelling and analysing manual wheel chair with commode facility, easy foldable and detach with low weight such that it can be handled easily. Modelling is done by considering standard design considerations of manual wheel chair centre folding type. Additional facilities are provided in this wheel chair with easy to detach the commode plate, easy positioning of the wheel chair on commode and also space is provided where the commode can be attached to seat base itself. The seat is modelled with a metal plate with pin joint at one end and free to open on other end which helps in folding wheel chair. On top of the seat thick PU cushioning is arranged which provide comfort for the user even during long duration seat on wheel chair. Front table board which helps to place food, books etc. it increases the user's comfort. Double rimmed wheels with more strength compared to standard wheels. Analysis is performed using T6-6061, T6-6063 material which is light in weight and also with SS material. Further analysis is done on wheel chair with different body weights using all three materials. Analysis results show the modelled wheel chair can withstand even for over obesity category person.

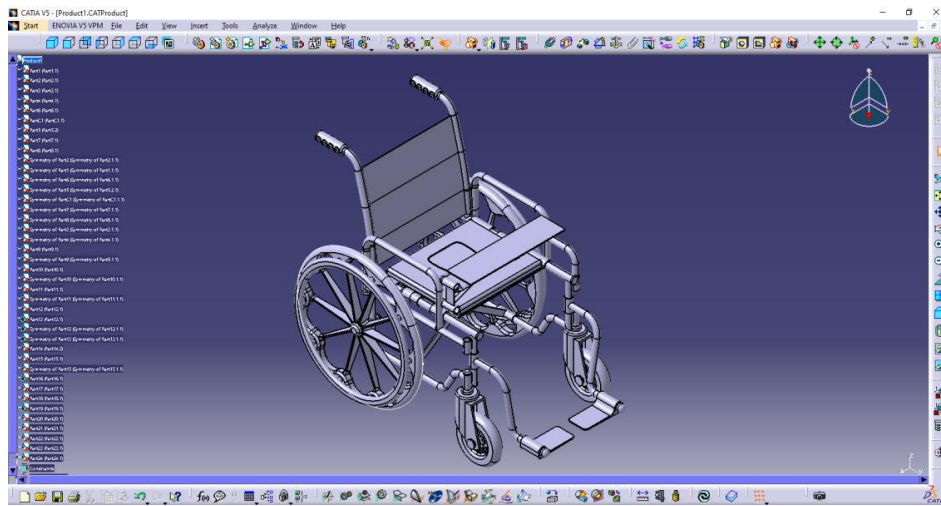


Fig. 2.1: Cad model of commode type manual wheel chair

- C. *Design And Fabrication of Automatic Wheelchair Cum Stretcher/Bed*<sup>[3]</sup>: A chair with wheels designed as a replacement for walking is known as wheel chair. This is used for movement of physically disabled, elder people, children who have difficulty and are unable to walk. This device comes in many variations like self- propelled, propelled by the motor or with the help of an attendee to push. Chairs are used to shift the patients from one ward to another in hospitals and from one room to another at home, as a walker for the people who are unable to walk. Figure shows few situations where wheel chairs are used. The examination brings an exceptional change in the field of clinical portability gadgets in most recent couple of many years. Wheel seat is one of the most well-known versatility gadgets broadly utilized by debilitated individuals. Versatility helps are valuable for patients for transportation and a swap for strolling particularly in indoor and outside climate. Wheelchairs and bed are the most generally involved clinical hardware for the transportation of patients. Moving the patients from wheelchair to cot or to the clinical bed is dependably an issue for the specialist or nurture. Understanding the different issues in regards to the versatility gear and presenting a superior plan will be a resource for the clinical field and some assistance for handicapped people. There is a requirement for a wheelchair cum cot to work with the incapacitated patient's versatility and to give novel clinical hardware to use in the medical clinics. In this period of changing innovation there are quite a large number new advancements developed in clinical field. The improvement in bury disciplinary science give new desires to actually impaired individuals. In this task we attempt to foster a wheel seat cum cot monetarily. This paper uncovers the plan and manufacture of wheel seat cum cot which assists the overseer with trying not to weighty lift circumstances that put their back in danger of injury, and permit the overseer more energy toward the finish of the normal business day. This is a well-disposed helping gadget for the actually tested patients who can't move from their bed freely. This gadget comprises of basic mechanical and pneumatic control component which doesn't need gifted people to work. The principal objective is to deliver a gadget for moving patients in a compelling and agreeable manner for the patient and the overseer, and have low creation cost contrasted with existing model where the design is same.
- D. *Design and Fabrication of Wheelchair cum Stretcher with Multi Fold*<sup>[4]</sup>: Disabilities have affected thousands of families in the world. As of today 650 million people are suffering from disability. Their disabilities can be empowered and enable them to live a normal and independent life with the help of wheelchair. New and modified wheelchairs can satisfy the need of disable people rather than the old and conventional ones. To help the disabled various design changes have been done. One is by introducing a detachable defecation system to it. It provides ease to the patients and the staffs. Engineers are continuously applying their ideas to make these products more and more sophisticated so as to facilitate the doctors, patients and staffs more. Wheelchair is one of the easiest modes which serves the purpose of transportation for patient and is considered as basic necessities in hospital. Studies showed that 40% of the helpers who helped physically challenged person for the translation from bed to chair and vice versa are suffering from the back and joint pains. To tackle this problem many people have designed wheelchairs with various applications which could be converted into a bed or visa-versa using mechanical linkages or with the help of an electrical motor. A slipping mechanism or pulling mechanism is used for lowering the back portion. Then the implementation of hydraulics and pneumatics improved the efficiency as well as eliminated the need of external help but it had a drawback as it created noise and it was bulky. To overcome the problem, the new proposed work came which uses an electrically driven conversion system for the disabled patients. This is even helpful when the patient want to take a nap/sleep by converting the wheelchair to an easy chair where the person can stop the chair at a particular position where they would feel comfortable. The driving and conversion mechanism is both based on the electric motors.

### III. CONCLUSION

The main objective of this product is to make the helper life easy and to make sure the patient is not hurt during the process of treatment. This product eliminates the step of shifting patient from bed or stretcher to wheelchair and vice versa as handling of old age people is very difficult. It makes the patient comfortable when sitting for a long time. This will reduce the effort of the caretaker and provide a safer transfer for the patients in hospitals. . Most modern-day technologies use sensors such as accelerometer, gyroscope, to take interactive input and in this project, we also have tried to make the robot interactive and close to human. Also, we wanted to know about the accelerometer, android app, Joystick, and its working in detail and also wanted to develop a fast and real time project that can help others people. These conditions made Automatic wheel chair cum bed a suitable project for us. Completion of this project needed sheer determination as there were many things that could go wrong. As the electronic circuits meant a lot in this project, creating the programming & circuit proved to be a difficult task being mechanical student. Though some difficulties aroused and many remodelling was needed and the chair had some limitations which we learned while building it, at last the Automatic wheel chair cum bed created very close to the adapted design

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