International Journal of Advance Research in Science and Engineering
Vol. No.10, Issue No. 04, April 2021
www.ijarse.com
IJARSE
ISSN 2319 - 8354

DEVELOPMENT AND STUCTURAL ANALYSIS OF AUTOMATIC WHEELCHAIR FOR PHYSICALLY CHALENGED PERSONS

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ABSTRACT

Some of the typical issues that wheelchair users have to utilize the small separate corridors to be provided in older buildings, parking lots that are challenging to the get around , even just shopping or going to visit loved ones. The leg fractured persons cannot be comfortable in the existing type of wheelchair for his/her personal needs to go somewhere. observation show that there is no adjustable arm rest, knee rest, smooth breaking control and difficulty in shifting the patient from wheel chair to auto rickshaw and other vehicles. The current issues the physically challenged persons and the injured persons due to accident can require assistance for their survival. The idea should overcome by designing a mechanism in the existing type wheel chair to address the above problem. The automatic toilet assistance wheel chair has a electronic control mechanism to provide the various movements required by the physical challenged person and the injured persons. This system will have a hydraulic jack and motors for the linear, vertical motion control. The developed system further investigated mechanically for the structural strength, Ergonomics aspects and operating characteristics.

Keywords: *wheelchair, Hydraulic jack, Accessibility, Disabled persons, joystick control*

1. INTRODUCTION

The number of physically impaired people is increasing rapidly in recent years. Recent statistics shows that around 15% people (700 million) of total world population are physically and mentally disabled. Among them 100 million people are physically challenged. One study presents that the number of physically challenged people in Bangladesh is around 5.6% (8.4 million) of total population, whereas, the actual scenario is much more acute.

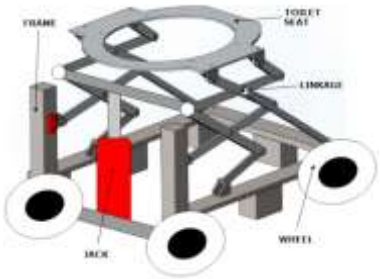

Fig1.1 Wheelchair

The majority of physically challenged persons of countries like Bangladesh either use crutches or manual wheelchairs for their maneuvering. Because of physical weakness, many wheelchair users cannot control the wheelchairs properly by using their hands. Moreover automated wheelchairs are not available everywhere in developing countries and the cost is high with respect to the economic status of the common people

2. LITERATURE SURVEY

The main purpose of scientific research is to facilitate every human being through the scientific inventions. Though automated wheelchair is the gift of modern science, most of the common people of developing countries do not have its access because of its high price and less availability. From the last decades of 19th century, researchers had been working on this purpose. In 1994, MITRE Corporation published their research on low cost automated wheelchair which was a theoretical modification of manual wheelchair. Their practical implementation was found in 1995. Later, in the research of Talisman raze, 2012, EMG signal was used for controlling the wheelchair, but its practical implementation is still a long way to go. The smart wheelchair showed by Thrived (2013) is a laptop assembled wheelchair and such kinds of wheelchair are too expensive for the common people of developing countries. Wheelchair and other joystick controlled wheelchairs are difficult for those users having wrist weakness. Vision based EOG system for wheelchair, voice operated wheelchair, voice enabled device, and gesture recognition based wheelchair are not feasible yet for the application in developing countries. The signal ICMIEE the first wheel chair was invented in the 1595 called as invalids chair was made for the king of Spain called Phillip. Later in the year 1655 Stephen Farfel built a self-propelling chair on a three wheel chassis as shown in the year 1783 John Dawson of Bath Town England invented a wheel chair named as bath wheel chair. The chair was with two large wheels and one small one as shown In the year 1869 patent for a wheel chair with rear push wheels and small front casters were invented, in the year 1881 the push rims for self propulsion wheel chair was invented as shown in figure . In 1900 the first spoke wheel chair was invented and in the year 1916 first motorized wheel chair was invented by British Engineers as shown In the year 1932, Harry Jennings built the first foldable wheel chair

3. METHODOLOGY

Developing a new product requires the use of a proper design method that may integrate and reunite all the necessary data referring that product in a A.S. Tavares and G.N. Montenegro Toilet for Physically challenged Persons with Disabilities 4755 thematic It is necessary to organize and analyze all the acquired information

that may contribute to an effective and appropriated solution to the existing problem. The methodological steps taken to develop such product design demonstrate the complexity and multidisciplinary aspects involved in that process. It means that an Industrial Designer must always be in touch with other fields of knowledge and researches such as Production Engineering, Material engineering, among others. Ergonomics is in this context and this paper is based upon that. As a way to present this project regarding users' demands, usability questions will be subsequently detailed while technical and production.

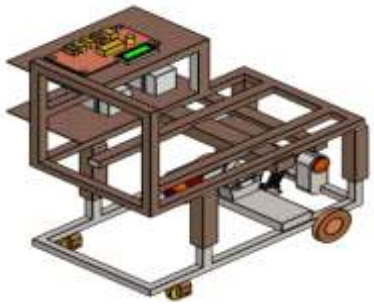

Fig3.1 CAD Model

4. RESULT AND DISCUSSION

Always objective of the wheel chair is to transport a physically challenged person from one place to another independently or through attendee. Although the existing motorized wheel chairs fulfill the requirements of physically challenged person but they have great disadvantage is of higher cost. The cost of existing Wheelchairs starts from low cost the common people cannot afford this high price of wheelchair. Also all the times all facilities are not required such as hand arm for putting associated things (glass, notebook etc.) Small bag for keeping papers, pen by the user. In this condition the designed chair fulfill both the purposes. It has low cost if the designed chair is manufactured at mass level the manufacturing cost may be lowered as mentioned earlier. It has safety belt for the safety of the person. Further, the users of electric wheelchairs increase their mobility, maneuverability and independence On the other hand it needs attention not only to just fulfill the requirements of the physically challenged people but it should be upgraded over a period of time to provide comfort safety multi-purpose.

5. CONCLUSION

The recent research works of automated wheelchairs are mostly concerned about control mechanisms. Though some low cost wheelchair projects are done, no new design is proposed for low production cost and multiple function facilities. This research work presents a new multifunctional wheelchair which will diminish the inaccessibility of automated wheelchair for the common people of developing countries. This project develops a new design of wheelchair which can be accessible to every people and a unique concept of wheelchair seat movement is developed with practical feasibility through simulation software. The future work of this research can focus on engaging more sensors and developing sophisticated control system that will add more freedom for the disabled user.

6. ACKNOWLEDGEMENT

I Would Like to express my thanks of gratitude to my Mechanical Assistance professor Mr.P.Chakravarthi For their able guidance and support in completing my project .I Would also like to extend my gratitude to the principle Dr.M.Venkatesan and Head of the department Dr.P.Gopinath for providing me with all the facility that was require.

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