

A Review on Continuous Track Chair for Disabled Person

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Abstract: One of the basic problem of the user on manual wheelchair is architectural barrier and overcoming obstacles by a wheelchair always remains as topic of discussion for many researchers. In our project a motor operated stair climbing chair is our concept, which can overcome the architectural barriers to a considerable extent has to be develop to increase the independence of wheelchair users. This project involves the design of an ergonomically designed battery powered chair & slight balancing of user seat for multipurpose use. Stair climbing functionality is embedded in the design throughout its structure and mechanism. This multipurpose wheelchair is uses continues-track which can run on non-ideal surfaces, which gives for flexibility for user comfort. Our objective is to modify in the continuous-track and design an electric powered stable wheelchair without compromising the comfort and functionalities. From this project we hope to build an alternative wheelchair and their mechanism system for the needful users.

Wheelchair research includes both qualitative and quantitative approaches, primarily focuses on functionality and skill performance and is often limited to short testing periods.

Keywords: Continuous track

1. Introduction

Product design is the concept of systematic approach in understanding the user requirement, existing deficits, possible improvement and inventing new designs through idea generation, concept development, and concept realization thereby bringing newer products and solutions for the better quality of life. Wheelchair may include specialized seating adaptations, individualized controls, and may be specific to

particular activities, as seen with sports wheelchairs. The most widely recognized distinction is between powered wheelchairs. The purpose of the project is to design and implement a safe, effective, and less expensive modification system that helps the user maintain stability on “non-ideal” surfaces.

2. Literature analysis

After conducting an intensive literature review, it was found that wheelchairs with stair climbing capacities can be categorized into two types; the battery powered and the manual powered. Although there are plenty of powered wheelchairs available in the market place, there are limited scholarly reviews published on manual or battery powered wheelchairs. Instead, patent certificates, wheelchair descriptions, and operation manuals are available. Indeed, no peer reviewed literature was found for manual wheelchairs. Some researchers have built scale models or full size prototypes of their designs but little documentation has been published on this type of wheelchairs.

3. Problem statement

Stair climbing wheelchairs directly available for sale in market are expensive for the users and are not easy to afford. An automatic Stair-climbing wheelchair can be a good solution for the user and can enhance the mobility to access most of the buildings. The number of different wheelchair designs being distributed around the world is growing at an accelerating pace,

Table 1
Literature survey

S. No.	Author	Title	Conclusion
1.	Mohan Kumar R., Lohit H. S., Manas Ranjan Mishra, Md. Basheer Ahamed.	Design of Multipurpose Wheel Chair for Physically Challenged and Elder People	Perhaps the most basic work is the collection of anthropometric data for wheelchair users (ergonomics). This shape measurement technique is now used to produce numerical data for the automatic shaping of custom contoured cushions that are currently under evaluation.
2.	Shivam Sharma Anshul Manocha	Literature Review on Solar Powered Wheelchairs	To a considerable extent, mobility is dependent upon seating, as it is one of the ergonomic factors. Equally important are the rolling characteristics of the wheelchair itself. At one time, hard rubber tires were prescribed for low resistance.
3.	Jesse Leaman, and Hung M. La	A Comprehensive Review of Smart Wheelchairs	Ergonomics is the scientific discipline concerned to understand the interaction between human beings and elements of the system where he is living. Ergonomics is employed in fulfilling the goals of health and productivity.
4.	Colin A. McLaurin, ScD	Future Developments Current Directions in Wheelchair Research	Human Dimensions for Wheel Chair Design These figures are at a median value between the 95th percentile male (largest) and 5th percentile female (smallest). This thumb rule is used for both designing the seat for both male female, In this standard it is explained that 95th percentile for male and female are found to be 449 to 529mm respectively and combined 95th percentile value i.e. 479mm for general purpose seat design.

whereas information about the performance of these designs under different settings of user and terrain is lacking.

The problems which are facing disabled people in daily life that are needed to be focused:

- a) The commercial available wheel chairs do not have functionality for climbing staircase.
- b) If the disabled person wants to reach higher floor during lift failure, it's inconvenient for person to move upstairs with the conventional wheel chair

4. Gap Analysis

Previously wheelchairs were self-powered, worked by a patient to turning the wheels of their chair manually and another option is to drive the wheelchair is, by a caretaker/attende. This type of wheelchairs only drive on ideal surfaces. Non ideal surfaces and inclination are the disadvantage of manual wheelchairs, if it is worked by patient.

5. Development trend of Electric Power Wheelchair (EPW)

EPW designed for the elderly and persons with disabilities still need improvements to meet the wider range of demands for further use. After the review of the existing EPW technology and common EPWs, the current situation and trend of EPW will be discussed.

- Low cost, lightweight, and high adaptability of EPW.
- Stair-climbing stability evaluation and prediction.
- Control system and intelligent control algorithms.
- Operation mode and human-machine interface technology.

The wheel chair that runs by means of Electric motor is known as electric-powered wheelchair, this wheel chair requires navigational controls, usually a small joystick mounted on the armrest. For users who cannot manage a manual joystick, head switches are provided and chin-operated joysticks are provided, other specialist controls may also be provided for independent operation of the wheelchair. Motorized wheelchairs are useful for those unable to propel manually or who require travelling for a long distance which creates difficulty for manual operation. These wheel chairs are not only used by traditional mobility impairments but also by cardiovascular patients.

6. Seating Comfort and Support

Much has been said about the inadequacies of the sling seat, but very little has been documented to support this opinion. However, it requires little observation to note that just minor differences in wheelchair seating, usually only width and depth, can hardly accommodate the range of sizes, disability types, personal attributes, and activities that exist in the user population. It is the first duty of researchers to establish information regarding these individual requirements, and such work is underway.

7. Mobility

To a considerable extent, mobility is dependent upon seating, as it is one of the ergonomic factors. (Ergonomic factors are more fully described by Brubaker elsewhere in this publication) Mobility also depends upon the rolling characteristics of the wheelchair. One of the most important factors contributing to propulsion efficiency is mechanical advantage, since it determines if muscles perform at optimum speed and force. Experimental models have been built with a geared transmission in the hub, allowing two or more ratios between the hand rim and the drive wheel. Lever or crank drives, or hand rim drives that are separate from the drive wheels, provide a simpler means for obtaining an optimum mechanical advantage through a bicycle-type chain and sprocket transmission.

8. Sensors

To avoid obstacles, smart wheelchairs need sensors to clear their ground surroundings. the sensor most frequently used by smart wheelchairs is the ultrasonic acoustic range finder. i.e., sonar, Sonar sensors are very accurate when the sound wave emitted by the sensor strikes an object at a right angle or head on. As the angle of incidence increases, however, the likelihood that the sound wave will not reflect back toward the sensor increases. This effect is more effective, if the object is smooth or sound absorbent. Sonar sensors are also susceptible to "cross talk," which happens when the signal generated by one sensor produces an echo that is received by a different sensor.

9. Summary

From the many types of stair climbing wheelchairs, we can see that some of them like Manus, Vardaan (wheelchair companies) use manual method for movement and high effort might be needed to climb the stairs. The person on the power wheelchair can sit in comfort while it climbs the stairs but those wheelchairs are not available in India in cheaper price range. Even if they can be imported from other countries, the total cost would be very high (i.e. around 1.8 lakhs and above). Hence an attempt is required to make an indigenous and cost effective stair-climbing wheelchair.

10. Future Scope

Since olden times man is always trying to gain more and more luxury. Man is always trying to develop more and more modified technique by improving the aesthetic look and economic consideration. But we can ignore the topic of aesthetics since it is about helping the crippled people. But us being engineers and having the capability to think and plan, we brought up this following idea. But due to and due to lack of funds required, we could mention the following modifications can be done for the project to make it even more efficient. Smart wheelchairs will remain connect ground for technological research for many years to come. Smart wheelchairs are excellent test beds. Smart wheelchairs also provide an

opportunity to study human-robot interaction, adaptive or shared control, and novel input methods, such as voice control, EOG, and eye-tracking. Furthermore, smart wheelchairs will continue to serve as test beds for robot control architectures

11. Conclusion

Outcomes generated from the continuous track chair for disable persons offer valued information on how individuals interact with different designs. We can use various types of sensors in it for better working of the continuous track chair. More specifically, this research shows that continuous track operated chair for disable persons will be use in rural areas over an extended period of time.

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