

Electrical Attachment of Wheelchair for Handicapped Person

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ABSTRACT

This project involves simple design of wheelchair attached electric front wheel power drive that can be attached to manual wheelchair for better mobility on road. The front wheel power drive consists of electric bike motor, rechargeable battery, a controller electric throttle, solar panel and mechanical brakes. The front wheel power drive is designed to be safe, light weight and aesthetic look. This electric hand bike can be easily detachable for wheelchair. This explains how an electric hand bike is made within limited budget for handicapped people. This report covers the background for the project, design development, an in-depth description of the final design, a testing plan, a project management plan, and the conclusion to date.

Keywords: Electric Wheelchair, Electric Attachment, E bike, Eco-tricycle, Solar Wheelchair, front wheel power drive

I. INTRODUCTION

For the disabled people who use manual wheel chair they often experience shoulder pain due to steering wheel chair with only the upper limb muscles for a long time. The sprocket chain drive tricycle which is used from several decades and still heavily consumed in Indian market, is also not appropriate as manual efforts are required there which causes extreme discomfort the handicapped person. Some disable peoples need medical treatment and also have surgical treatment in serious case, to this potential muscle disorders several type of electrical hand bike have been recently introduced in which docking method is easy and it is possible to easily move by using electrical system after docking.

In case of relatively high speed on various terrains after easy installation using a connecter, the mechanical loads are continuously applied to the

connecting parts between manual wheel chair and electric front wheel drive and the resultant force accumulated at the connecting parts is determined to affect the structural stability of connecting parts. However related research on this area are still rear therefore this study aims to implement a three dimensional dynamically model that can simulate durability test through computational analysis, and to evaluate dynamic structure stability of parts between manual wheelchair and electric front wheel drive during durability experiment by verifying model through motion analysis

II. LITERATURE SURVEY

Firefly electric attachable wheelchair bike Sherpa electric power bike this companies are producing E-hand bike for disable peoples. This companies are developing new technology to hand bike. The company's focus on Safety Performances Handling Maintains etc, factors. George Klein invented the first PW for people with quadriplegia injured in world war II while he was working as a mechanical engineer for the National Research Council of Canada. By 1956 Everest & Jennings and the American Wheelchair Company began producing PWs for mass sales. Co-author, Dr. Jesse Leaman, began a quest to improve the PW user experience in 1998 while a summer intern at NASA's Marshall Space Flight Center. By 2007, an invention, the information technology upgrade package for PWs, dubbed "Gryphon Shield", was recognized as one of the the year's top 25 inventions by the History Channel and the National Inventors Hall of Fame

Motorized Hand bike for Manual Wheelchair:

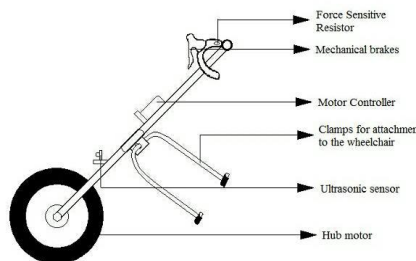


Figure 1. basic model of attachment

III. PROBLEM STATEMENT

1. Range of the vehicle is limited because of the limited capacity of battery.
2. The chances of toggle are there for the vehicle while taking stiff corners at higher speeds.
3. The brakes if applied at front wheels only, it can create the imbalance and drift which can cause injuries to the person.

IV. GOALS AND OBJECTIVES

1. Simple initial goal is, to convert the ordinary wheelchair in to composite electrical power wheelchair , Ability to convert the wheelchair into a performance oriented tricycle for disable users without the need to get out of the chair.
2. Designing a proper clamping mechanism.
3. When mechanism is attached the front two wheels of wheelchair should be lifted up
4. Engagement & disengagement should be easy.
5. To increase the range of the operation using a alternative power source of solar energy.
6. Providing the mechanisms to avoid the issues of imbalance and the toggle.
7. To provide the facility for carrying day to day things with the system for the convenience of the one who is using it.

V. PROPOSED SYSTEM

The team selected this subject for the project because it is the need for disable peoples who cannot move from one place to another place at long distance and require an extra person to push the wheel chair.

Main reason behind making the project is we watched the video and we thought that we should bring this type of concept in our city for disable people. This project can be made at as possible as low cost so that the disables can afford it and the need of pushing the wheel chair may eliminate.

❖ Part Requirements:

- Motor
- Controller Circuit
- Solar Panel
- Connecting Frame
- Clamping Mechanism
- Wheel
- Arduino Board

❖ CAD Model:

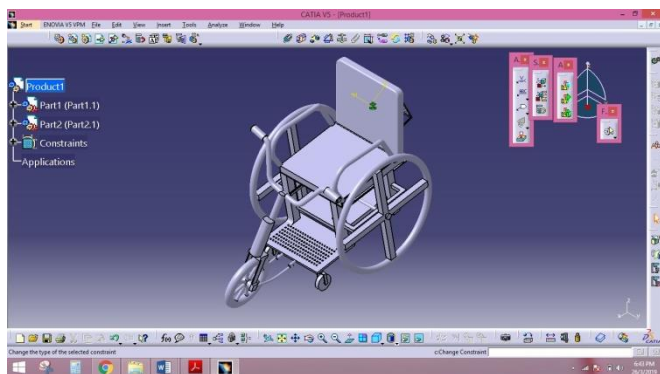


Figure 2. CAD model of the wheelchair created using the CATIA V6

The electric hand is to be attached to the wheelchair with the help of suitable clamping mechanism so the wheelchair can be converted into a three wheeled bike which can be driven without any manual efforts. The arrangement will pull the wheelchair at the required speed. The direction of movement can be controlled using the handle. The handle can be detached from the system to make the wheelchair more convenient to use indoor.

VI. ADVANTAGES AND APPLICATIONS

Advantages

- i. Adding a power assist unit to a three-wheel base chair will increase the weight and may offset the distribution of mass or balance and centre of gravity possible making it more difficult for the user to propel when power assist is disengaged, the present innovation eliminates all these and simplify the propulsion.
- ii. This unit can be used for handicap and normal people also.
- iii. Individuals who have lower extremity weakness, paralysis, or amputation making walking unsafe or difficult, patients, can use this propulsion which is easy to operate and will be not require more effort.
- iv. This is inexpensive, portable unit, light weight and easy carried or shifted.

- v. This becomes a best alternate to powered propulsion or hand push propulsion, which has good control with less energy expenditure.
- vi. Lower running cost and higher range of operation because of the solar powered alternative at daytime.
- vii. Brakes are there for the rear wheels also which eliminates the chances for drift and the imbalance.
- viii. Camber is provided to the rear wheel which makes the system safer while taking stiff turns at higher speeds.

Applications

- i. It can be used in the campus for the drive for the normal persons, to move within the campus in the smooth road.
- ii. It is best useful for the small city drive for anybody including the handicap.
- iii. It can be used for material transportation without using fuel propulsion.
- iv. It can be used by the handicap for the normal transport and even for the self-employed handicap persons for their daily livelihood.

VII. CONCLUSION

As we are preparing the attachable electrical front wheel power drive for wheel chair we faced certain problem. As the foreign companies are manufacturing it to their standards they have the mass production in which they have proper machines with them to create mechanism for connecting the wheel chair with the hand bike. The team are creating it and manufacturing it to our standards with good quality of material. We have tried to match the standard with foreign companies. Main advantage is we have added another power source as solar energy, which also contributes to the increased operational range other than the reduction in operational cost. Along with that we have added the camber angles to the rear wheels of the wheelchair to solve the problem of toggle while taking sharp corners at higher speeds. The brakes are

applied to the rear wheels to avoid the imbalance rather than the front brakes. The carriage is also attached to make it easier to carry the materials especially for the handicapped person. Now we will analysis that how companies can price their product (hand bike) and how can we manage to make or develop it at affordable price.

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VIII. REFERENCES

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