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Design and Manufacturing of Electronic Detachable Wheelchair

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Abstract: ***The electric-powered wheelchair is a wheelchair that is propelled by means of an electric motor rather than manual power. Motorized wheelchairs are useful for those who are not able to impel a manual wheelchair or who may need to employ a wheelchair for distances or over terrain which would be strenuous in a manual wheelchair. They may also be used not just by people with conventional mobility impairments, but also by people with cardiovascular and fatigue-based conditions. Electric wheelchairs have enhanced the quality of life for many people with physical disabilities through the mobility they afford. The selection of power chair will rely on many factors; including the kind of surface setting the chair will be driven over, the need to settle thresholds and curbs, and clearance widths in accustomed environment. The most fundamental job of the chair is to take input from the user, usually in the form of a small joystick, and decipher that motion into power to the wheels to move the person in the preferred direction. The last few years have seen abundant improvements and models that give the user unmatched control of the wheelchair in terms of both user effort and vehicle aptitude***

First wheelchair model evolved long back in 18th century, but rapid development in this field initiated since mid of 20th century. Since then, many varieties of models had been designed, extending into broad range of products. This project involves the design of an ergonomically designed electric wheelchair for domestic use by Indian old aged people.

Wheelchairs are excellent devices for providing mobility to handicapped persons worldwide. The typical wheelchair can navigate the paved streets and halls of any Indian town with relative ease. However, without the intricate system of lifts, ramps, and roads even the most basic travel can be almost impossible.

I. INTRODUCTION

The history of wheelchairs can be traced way back to the time before Christ when both chair and wheel were invented. However, the first self-controllable wheeled chair ever build was invented by Stephan Farfel in 1665. Over the next few thousands of years, many types of wheelchairs have been developed, but it was not until the 20th century that the first electric-powered wheelchair was invented by George J. Klein for quadriplegics. Power wheelchairs are mainly designed for those people who are physically unable to propel a manual wheelchair. Generally, they use electric motors as the source of propulsion. One way to decrease the cost of a power wheelchair is to use an attachment such as hub motors on a manual wheelchair. This allows a manual wheelchair to be motorized and be capable to performing similarly as a commercial power wheelchair. Today, there are a number of such attachable devices available on the market. This paper focus on the design of a speech control system for such a system. Since the first folding, tubular steel wheelchair was invented in 1932 and the first electric wheelchair was designed in the 1950's (1), the functionalities of the manual and electric wheelchair have been improved significantly. The electric wheelchairs have become more efficient, quieter and lower-maintenance in general. They also grant users more freedom with less assistance including in the control, styles, range or travel distance, maneuverability, seating and other user options. In contrast, the mobility of the manual wheelchair was limited by the user's physical condition and restricted his or her daily activities.

Most of the wheelchairs being used are imported, which are not fitting too pathological and environmental (i.e., interior and external) conditions. The present designs available in the market do not provide optimal qualities required for internal and external wheelchair use. Developing a wheelchair tricycle attachment will provide an effective means of a common wheelchair which is appropriate to the given environmental conditions for a person with lower limb problems which will be simple enough to be performed by an average person which is also cost effective. The main objective of this project was to develop a wheelchair tricycle attachment for easier accessibility and increased performance to the wheelchair users. Mobility aids currently used do not suit user needs, wheelchair is exhausting to push on rough grounds, while hand powered tricycles, which are more efficient to propel, are too large to use in the house. A tricycle drive, together with wheelchair, is easy to carry in most forms of transport.

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II. PROBLEM STATEMENT

A healthy person discharges his duties efficiently without taking help of other person but unfortunately on the other hand, physically handicapped person either from birth or due to some misshaped in his life or at some stage of life is dependent on others to perform any kind of work. They need support of other person for performing their routine tasks such as for going hospital, malls for marketing etc. On the basis of gathered information design the wheelchair which has low cost and approachable for poor and middle-class population. It is suitable for such person who has no leg(s). The designed wheel chair is battery operated and can take turn in either direction (left/right) through handle and can be used as an attachment.

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III. OBJECTIVE

The objective of this project is to analyze and prototype a motorized wheelchair based on extensive fact findings and research on existing models, technology used, market scenario and customer requirements. The course of our work begins with the planning phase involving initial research, literature review and background study. It is followed by concept generation phase that includes evaluating customer requirements, outlining specifications and generating concept designs.

IV. SCOPE

The available product in market is very high cost and cannot be affordable by poor people, this motivates us to make the low-cost project for them. The above paper shows manual power wheel chair which is hard to drive. Also, some researchers are using electronics systems in wheel chair to operate which will again increase the cost of project.

Hence, we will fabricate the model with just what is required like detachable attachment for motor with handle assembly which will consume less extra space and low cost also, also all existing chairs can be motorized by our idea.

V. GOAL

The ultimate goal of this entire project is to lower the cost of a motorized wheelchairs unit by designing an attachable device that translates a manual wheelchair into a powered one. The attachment device should be portable and powerful enough to propel a person setting on a standard manual wheelchair. The primary focus is affordability. The end solution of the project should provide an inexpensive solution to the people are in need of a motorized wheelchair but cannot manage to pay for a wheelchair on the market.





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VI. BAISC CONCEPT OF PROJECT DESIGN

Decision making comes in every stage of design. Consider two cars of different makes. They may both be reasonable cars and serve the same purpose but the designs are different. The designers consider different factors and come to certain conclusions leading to an optimum design. Market survey gives an indication of what people want. Existing norms play an important role. Once a critical decision is made, the rest of the design features follow. For example, once we decide the engine capacity, the shape and size, then the subsequent course of the design would follow. A bad decision leads to a bad design and a bad product. Design may be for different products and with the present specialization and knowledge bank, we have a long list of design disciplines e.g. ship design, building design, process design, bridge design, clothing or fashion design and so.

VII. CONCLUDING REMARKS AND SCOPE FOR FUTURE

A. Concluding Remarks

The project was designed using SolidWorks software. The physical capabilities of the user will be very helpful in designing the way that the user is able to manipulate the attachment during attaching/detaching, as well as how the device will be moving. SolidWorks provides powerful tools for creating and simulating 3D models, allowing for precise design and analysis of mechanical components and assemblies.

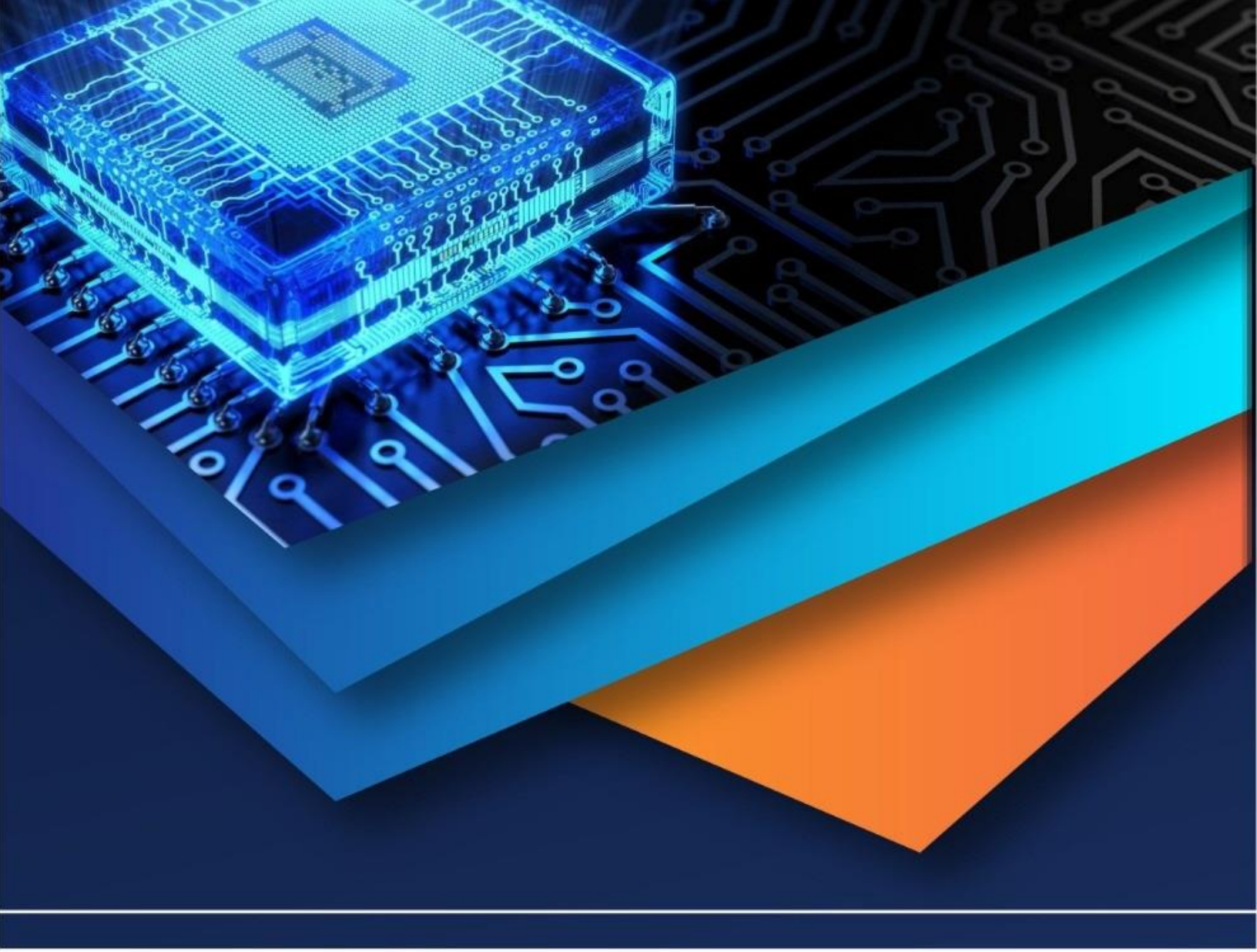
B. Scope for Future Work

Alternator can be used to charge the battery.
Gear system can be used to increase the speed of the tricycle.
It can be foldable by using different types of linkages and nut and bolt also.

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