



CHAINLESS WHEELCHAIR TRICYCLE

Dr. Vijay Kumar	Department of Mechanical Engineering IIMT College of Engineering, Greater Noida, UP, India
Deepak Singh	Department of Mechanical Engineering IIMT College of Engineering, Greater Noida, UP, India
Deepak Kumar	Department of Mechanical Engineering IIMT College of Engineering, Greater Noida, UP, India
Girish Chander Bhatt	Department of Mechanical Engineering IIMT College of Engineering, Greater Noida, UP, India
Gauree Shankar Sitaram	Department of Mechanical Engineering IIMT College of Engineering, Greater Noida, UP, India

ABSTRACT

In the village of India, the main method of traveling is to ride a bicycle or to walk. A hand-powered tricycle, therefore, provides great freedom for a disabled individual. It enables him to go to work and school and to interact with other people. These tricycles are built in the village by a man who worked as an apprentice in another town to learn the skill. The tricycle frame consists primarily of square steel tubing, and the mechanical components are bicycle parts that are available at the local market. The purpose of this project was to make improvements to the current design. The team was able to identify problems by testing a tricycle brought back. A main concern was to utilize technology appropriate, so that the nationals can continue to build the tricycles with their resources. The team will be presenting the new design to the nationals in IIMT.

KEYWORDS :**1. INTRODUCTION**

In underdeveloped nations, diseases such as polio affect many people, where many of the victims may never walk again. In the society where contributing to the family's survival by working in the fields is so important, the disabled people are seen as a dead weight. They are outcasts in their society, confined to education. A missionary in the village has started a project for the disabled people in order to provide rehabilitation, schooling, and jobs. There is a centre where they can go to work every day, making crafts or working in a garden that is owned by the project. This has drawn in disabled people from the surrounding area as it gives them another chance at life.

1.1 PROBLEM STATEMENTS

As per Census 2011, in India, out of the 121 Cr population, about 2.68 Cr persons are 'disabled' which is 2.21% of the total population. In an era where 'inclusive development' is being emphasised as the right path towards sustainable development, focused initiatives for the welfare of disabled persons are essential. This emphasises the need for strengthening disability statistics in the Country. [1]

**Fig.1. Design of wheelchair**

I. Moving forward

- ii. Moving backward
- iii. Turning to the right
- iv. Turning to the left
- v. Stop condition

This project describes the design and development of the motion control using steering for a wheelchair application. [2]

2. LITERATURE REVIEW

- Commercial tricycles are made for activities ranging from athletics to recreation. Literature from various companies shows that the majority of hand-powered tricycles are front wheel drive with hands side by side rather than in opposing positions. There are exceptions, however, with rear wheel drive and opposing handles. Most have the wheels positioned like the traditional tricycle, although several have two wheels in the front and one in the rear. Some have the seat mounted in front of the rear wheels, allowing it to be low to the ground. There are also models built for high speed racing that have the rear wheels tilted or cambered. Even modern wheelchairs are starting to make use of cambering rear wheels. This provides a wider base for more stability, especially on turns.
- Each designer offered different pieces of advice regarding front versus rear-wheel drive. Compiling all of the information they supplied, it seems that they all agree that rear-wheel drive would supply greater traction over the rough terrain, but would increase the radius required for turning and require a complex chain system. Front wheel drive, though it would offer less traction, would allow for a much more simple combination drive and steering shaft.

3. OBJECTIVES OF PROJECTS

- To develop a steering controlled wheelchair system by using four bar mechanism for wheelchair control.
- To implement the hand user as an input to control the movement of wheelchair.
- Provide the facilities for disabled people and elderly people who can't move properly.

3.1 STEERING SYSTEM

- The user must be able to steer the chair at all times, unless an attendant is pushing the wheelchair. Maintaining control of the direction of the wheelchair at all times is essential not only for user safety, but also to maximize the independence of the individual. When there is not an attendant pushing the chair, the user must have full control to be able to safely maneuver it.
- The modification accessory cannot interfere with an attendant's ability to push/control the chair. This will be accomplished by providing a means of disengaging the steering to allow free motion of the casters. [4]

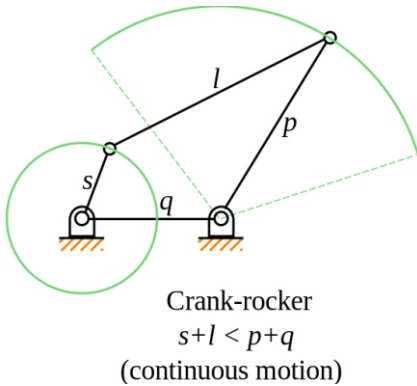


Fig.2.Steering system

3.2BRAKING & PROPULSION

- The propulsion system must move the wheelchair and be steerable in both the forward and reverse directions.
- Brakes must be able to slow the wheelchair in addition to bringing it to a complete stop.
- The basic function of brakes is to slow or stop a moving object (i.e. wheels) to prevent loss of control of the object.
- The brake lever cannot require more than 35 pounds of grip force to actuate.[5]



Fig.3.Braking System

3.3MECHANISM

FOURBAR MECHANISM

Main Function of link Mechanism is to produce rotating, oscillating and reciprocating motion from rotation of crank and vice versa. Mechanism can be used to convert Continuous oscillation or reciprocation into rotation (or the reverse).



GRASHOF LINKAGES

A Grashof linkage is a planar four-bar linkage with $s+l < p+q$

Where, s = length of the shortest link l = length of longest link, p and q are the length of the two remaining links. [6]

4.WORKING PRINCIPAL

- When we apply the force on steering in forward and backward direction liver and crank provide the motion to wheel chair by converting the oscillating motion into rotary motion.
- The motion of direction of wheelchair is controlled by steering.
- The device is operated by to and fro motion of steering which help to rotate the wheel, the turning action takes place by tilting the steering clockwise and anticlockwise direction.
- It provides a means of propelling a wheelchair using only one hand. This mechanism must allow the chair to move both forward and backward direction.
- In order to propel the chair in a straight line, it must also move three wheels simultaneously. The following description outlines several possible ways of accomplishing these goals. [7]



Fig.4.Model of Wheelchair

4.1FORMULA USED

Weight: $W=Mg$
 Torque: $T=F*r$ (Nm)
 Power: $P=T*\omega$ (Watt)
 Where, M= mass of driver
 g=acceleration due to gravity (9.81 m/s²)
 F= force (N)
 r=perpendicular Distance (m)
 ω =angular speed(rad/sec) [8]

4.2ADVANTAGES AND APPLICATIONS

Physically Challenged People

Physically Disabled People can use it as per their purposes. People who are suffering from certain Paralysis and able to use their hand can use chainless wheelchair.

Patients in the Hospitals

People who met an accident and lose their feet can use their hand movement as per requirement.

Old Age Homes

People at old age homes can use this wheelchair as per their requirement.[9]

5. CONCLUSION

The vehicle which we are introducing by doing this project will be help full for many of the people who are disabled by their legs can make use of this vehicle without the requirement relying on others. So, this is a multifunctioning medicinal aid focusing on the improvement and self-reliability of multiple disable people. Innovations made in the prevailing equipment meant for the disabled ones will be of great use in upcoming time. And we were able to apply our theoretical knowledge into practice. All data provided are precise to the best of our ability.

REFERENCES

[1] <https://www.mospi.gov.in>, Social Statics Division Ministry of Statics and programme implementation Government of India.
 [2] Cooper, Rory A., Rosemarie Cooper, and Michael L. Boninger. "Trends and issues in wheelchair technologies." *Assistive Technology* 20.2 (2008): 61-72

- [3] Georgie Gergiev, karp and Cooper, Literature review from journal
- [4] Cyders, Timothy J. Design of a Human-Powered Utility Vehicle for Developing Communities. Diss. Ohio University, 2008.
- [5] Khurmi, R. S., and J. K. Gupta. Machine design. S. Chand, 2005. [6] Marlowe, Christie. Car Mechanic. Mason Crest, 2014.
- [6] Khurmi, R. S., and J. K. Gupta. Theory of machines, S. Chand, 2005.
- [7] Bhandari, V. B. Design of machine elements. Tata McGraw-Hill Education, 2010.
- [8] Panero, Julius, and Martin Zelnik. Human dimension and interior space: a source book of design reference standards. Watson-Guptill, 2014.
- [9] Panero, J., and M. Zelnik. "HUMAN DIMENSION AND INTERIOR SPACE: A SOURCEBOOK OF DESIGN REFERENCE STANDARDS." (1979).