

Design and Fabrication of Tricycle for Handicapped People

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Abstract - Mobility of physically handicapped people is a concerning social issue nowadays and various hand driven tricycle, wheelchair, retrofitted vehicles etc. Its commonly available in the market for as a handicapped people mode of Transportation. A conventional tricycle for handicapped people is requiring a lot of human effort to operate. An existing model is generally come with separate arrangements for providing motion and giving direction to the vehicle. The basic tricycle is design as on one side chain drive is installed which will be driven manually by rotary mechanism and seat provided at the center for sitting arrangement. A person uses only one hand to steer the handle and other hand is used to rotate the pedal. Using the advantage of leverage, with proper balance and distribution of mass and center of gravity to crank the wheel shaft for propelling. As he can use both the hands on the steering, better control of the vehicle is ensured. The purpose of this paper is to design and fabricate a low-cost tricycle for the handicap people to be propelled by crank lever mechanism attached to the steering column. Push and pull motion of the steering result in forward and backward motion of the chair, while rotational motion of the same gives direction to the chair. As the result a person can use both the hands on the steering for the better control of the vehicle.

Key Words: Tricycle, Propulsion System, Crank lever Mechanism, Steering wheel, etc.

1. INTRODUCTION

Disability could be caused by birth, by injuries sustained mainly from motor accidents or during turnkey project work or in manufacturing industries as well those caused naturally. Due to the enormous number of disabled people in the society, a wheelchair tricycle has been fabricated and designed to specification. In response to demand of wheelchair user for equal access, hand-propelled wheelchair, electrically controlled wheelchair, and automated guided wheelchair have been developed is carried out to benefit the user conveniently, physically, and comfortably such that when a little effort is exerted, a greater output (movement) is achieved as a result of the fast transmission generated by the single slider mechanism.

The design of wheelchair cum tricycle is an improvement on the existing ones. It is carried out to benefit the user conveniently, physically, and comfortably such that when a little effort is exerted, a greater output (movement) is achieved as a result of the

fast transmission generated by the single slider mechanism. In this project chain drive mechanism is replaced by using single slider mechanism which allows the user much more efficient propulsion than would be provided by the hand pedal wheelchair. This tricycle gives both advantages of wheelchair and tricycle in one machine to handicapped person. The project's goal is to provide a good living condition for people considered to be physically challenged (disabled), to transport themselves around their environment.

1.1 HANDICAPPED STEERING CYCLE

Handicapped Steering Tricycle uses a crank-lever mechanism for its forward and backward motion. It is equipped with a small diameter steering wheel which can provide both: direction and motion to the tricycle. By pushing and pulling this steering, the rider can move the tricycle and by rotating the steering the rider can direct the tricycle. A braking lever is provided just beneath the steering wheel to apply the brakes. The tricycle wheelchair is work on the single slider mechanism which is operated by steering. On comparison with old traditional hand pedal wheelchair which have of chain mechanism, instead that we use single slider mechanism. The following fig shows overall view of tricycle.

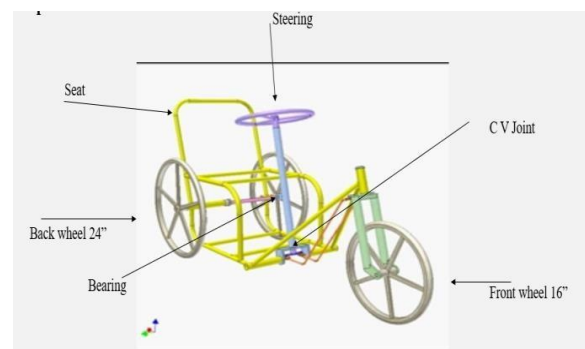


Fig. Experimental set up Handicap steering cycle

The Fig. shows a complete mechanical system in which the single slider mechanism is the main component. On that single slider mechanism, a steering is mounted for operating the tricycle, which define the direction to tricycle and used to take turning to the left or right.

2.LITERATURE REVIEW

a) Literature Review on “Handicapped steering cycle
Rahul Mishra, Abhishek Sharma, Amitesh Sharma:
Handicapped Steering Cycle: -

This paper is about traditional manual wheelchairs require considerable use and control of both arms for operation, thus adaptations are required for individuals with asymmetrical use of their arms. After preliminary testing and analysis of three one-arm propulsion designs, the project team developed a design for a removable, lever operated accessory which could be adapted to fit a range of the most popular standard wheelchair models. The propulsion system, connected to the main lever by a coupler link, consists of a dual gear pawl assembly in which the desired direction of motion is chosen by moving a shifter to Joint one of the two gears press-fit around clutches, each of which allows motion in only one direction, either forward or reverse.

a) V. B. Vaidya: Design and Fabrication of Wheelchair cum Tricycle (2016): -

This paper is about the development of traditional manual operated wheelchair cum tricycle is rear wheel drive in which chain drive mechanism replaced with single slider drive mechanism Design and Fabrication of Wheelchair.

This wheelchair cum tricycle is useful for handicapped person and modified tricycle gives the both advantages of wheelchair for short distance or in-door use & for long distance use. The wheelchair cum tricycle is very efficiently design and can be proved as better replacement for tricycle having chain drive mechanism.

b) Mr. A. R. Gabhane, Ms. K. G. Baje, Mr. D. B. Lakade Modern Hybrid Tricycle for Handicapped Person (April 2017):

This paper is about rural and city areas, tricycle is cheap for transporting purpose for short distance. Tricycle is generally propelled by human energy. The disabled person generally used the Hand Powered Tricycles in this community, but some most of the hand powered tricycles do not have the physical strength or co-ordination to propel themselves on the tricycles with their arms and hands. This paper gives the idea about the research papers related various technologies of tricycle. Various kinds of technology of tricycles are here discussed as well as compared also.

3. WORKING

The tricycle wheelchair is work on the single slider mechanism which is operated by steering. On comparison with old traditional hand pedal wheelchair which have of chain mechanism, instead that we use crank lever mechanism.

When we have to go in forward in direction then just move steering from backward to forward with little effort which move the tricycle in forward direction and when we have to go in reverse direction then we have to first stable the tricycle and then move steering from forward to backward in direction which move tricycle in reverse direction. The steering is provided for giving direction and for too & flow motion which move tricycle in forward & reverse direction.

The following fig shows overall view of tricycle.

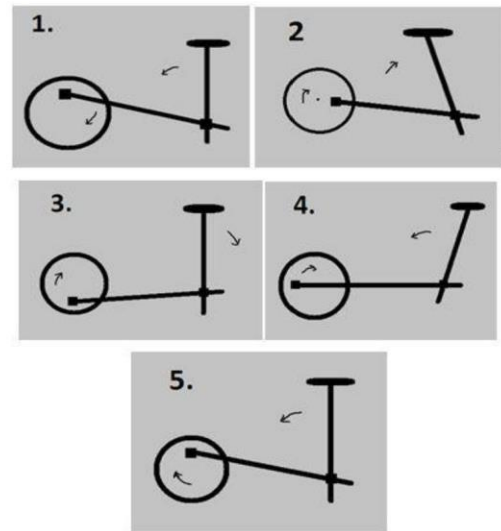


Fig: Overall view of Tricycle

The above Fig. shows a complete mechanical system in which the crank lever mechanism is the main component. On that mechanism a steering is mounted for operating the tricycle, which define the direction to tricycle and used to take turning to the left or right.

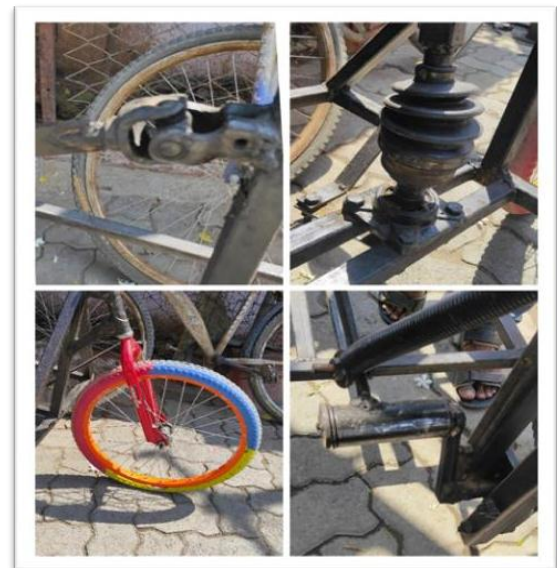


Fig: Model of Handicap Cycle

4. TECHNICAL OVERVIEW

1. Steering:

The Steering is collection of linkages, components etc and which allows any vehicle to follow the desired course. The Steering basic aim of steering is to ensure that the wheels are pointing in the desired directions. Steering is the typically achieved by a series of rods, linkages, gears and pivots. It helps to control the tricycle and also give the motion to the vehicle.



2. Crank lever Mechanism:

A crank is an arm connected at the right angles to the rotating shaft by the reciprocating motion is an imparted to or received from shaft. it's used to convert circular motion into reciprocating motion, or vice-versa. The arm may be a bent portion of the shaft, or a separate arm or disk connected to it. connected to the end of the crank by a pivot is a rod, usually known as a connecting rod. the top of the rod attached to the crank moves in a circular motion, while the opposite end is typically constrained to manoeuvre in a linear slippery motion.

3. Universal Coupling:

A coupling is a device used to connect two shafts together at their ends for the purpose of transmitting power. The primary purpose of couplings is to join two pieces of rotating equipment while permitting some degree of misalignment or end movement or both.



4. C. V. Joint:

Constant-velocity joints (also known as homokinetic or CV joints) allow a drive shaft to transmit power through a variable angle, at constant rotational speed, without an appreciable increase in friction or play. They are mainly used in front wheel drive vehicles. Modern rear wheel drive cars with independent rear suspension typically use CV joints at the ends of the rear axle half shafts and increasingly use them on the drive shaft.



5. Braking System:

Bicycle brakes system is used to decelerate or decrease the speed of a vehicle. By stepping on the brake pedal, the brake pads compress against the rotor attached to the wheel, which then forces the vehicle to slow down due to friction.



5.COMPONANTS USED IN THE MODEL

Sr. No.	Name of part	Material	Dimensions
1.	Front wheel	Steel, Rubber	24"
2.	Back wheel	Steel, Rubber	16"
3.	Steering	--	46cm
4.	Rod	Mild Steel	--
5.	Seat	Plywood	
6.	Brake wire	Steel, Rubber	--
7.	Bearing	Steel	--
8.	Univer s l Coupling	Steel	--

6. CONCLUSION

In our project we utilized single slider mechanisms for operating tricycle hence it is most useful and economical as compared to the other tricycle. This tricycle is made of material which is available easily in market. This tricycle is mostly useful for elder and handicapped people. It is simple in design and easy to operate. The efforts made for operating tricycle is less this is an advantage of this tricycle. The tricycle cost is less as compare to other tricycle. Even in rehabilitation, hand cycling is being advocated as a good training alternative in early rehabilitation of also frail individuals. Within that context there is a need for further research into optimal hand cycle design and fitting for different user groups. Apart from optimizing the wheelchair-user interface, one needs to carefully consider maximizing overall work capacity of users and further reduction of the vehicle mechanical losses to ensure a real optimum level of mobility. It is expected that the current booming development of crank propelled tricycles in the industrialized countries serves not only the young and active wheelchair user, but also the less well-trained individual or those with more extensive limitations. In the end, the frequent active use of other than hand rim propelled wheelchairs may help prevent some of the secondary complications among the wheelchair user population today.

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