

## **TRICYCLE FOR HANDICAPS BY USING STEERING PROPULSION WITH CRANK MECHANISM**

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**ABSTRACT :** *Mobility of physically disabled persons could be a regarding social issue these days. Numerous hand driven tricycles, wheelchairs, retrofitted vehicles etc. are normally available for disabled individuals as a mode of transportation. The essential wheeled vehicle could be a simple machine style, pedaled by disabled persons at intervals the side and seat at intervals the center for sitting arrangement. They use only 1 hand to steer the handle as a result of different hand is employed to rotate the pedal. Our aim is to style and fabricate an occasional worth wheeled vehicle for the handicap people to be propelled by the novel link mechanism hooked up to the steering column changing into cranking, victimization the advantage of leverage, with correct balance and distribution of mass and center of gravity to crank the wheel shaft for propellant. As he can use each the hands on the steering, higher management of the vehicle is ensured.*

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

### **I.INTRODUCTION**

There are lot of technological advancement, in wheel chair propulsion other than manual wheel turning. A normal wheel chair used for handicap and the tricycle users for normal people use hand drive or propulsion or foot pedal propulsion. The manual propulsion has become increasingly important because the population of propulsion of individuals using wheelchairs is growing and requires efficient mobility to maintain a quality of life equivalent to the general population. Several attempts have been made at improving manual wheel chair propulsion, such as changes in the wheels and tires, adding gears and designing alternative propulsion systems. Still, experts and consumers generally agree that innovation in propulsion is still needed. Improved propulsion technologies will reduce physical fatigue and effort maneuverability. Pain and upper extremity injury is common among manual wheel chair users. Shoulders related injuries have been shown to be present in up to 51% of manual wheel chair users. In addition, the prevalence of elbow, wrist and hand pain has been reported to be 16%. During wheel chair propulsion, users must exert large forces in order to propel the chair forward. In addition, the component of force that is directed in towards the hub does not contribute to forward motion but is necessary in order to provide friction between the hand and the push rim. There are two popular types of propulsion assist devices on the market today. One is a manual assist that uses gear ratios to reduce the effort required to propel the vehicle and the other is a power assist that uses a battery powered motor to reduce the effort. Mechanical advantage is a measure of the force amplification achieved by using a tool, mechanical device or machine system.

### **II.LITERATURE SURVEY**

**Rahul Mishra :** 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

**V. B. Vaidya:** 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.

**Mr. A. R. Gabhane:** 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 there search papers related various technologies of tricycle. Various kinds of technology of tricycles are here discussed as well as compared also.

**Chi-Sheng Chien :** Design and development of tricycle .the cycle has a modular design and can be disassembled and folded for ease of transportation or storage. **Shikhar**

**Agarwal:** Analysis and optimization of all terrain tricycle .study is divided into two parts ,first part deals with comparative study of push rim cycle and all terrain cycles .second part is deals with optimization of all terrain cycles. The optimization mainly focused on position of lever-drive-system.

### **III. METHODOLOGY & BLOCK DIAGRAM**

There are lot of technological advancement, in wheel chair propulsion other than manual wheel turning. A normal wheel chair used for handicap and the tricycle users for normal people use hand drive or propulsion or foot pedal propulsion.

**Electric-powered:** An electric-powered wheelchair is a wheelchair that is moved via the means of an electric motor and navigational controls, usually a small joystick mounted on the armrest, rather than manual power. For users who cannot manage a manual joystick, head switches, chin-operated joysticks, sip-and-puff or other specialist controls may allow independent operation of the wheelchair.



The foremost electric wheelchair was invented by George Klein with the purpose to help the wounded soldiers of the World War II. With time, it has evolved into many designs and forms. The power chairs comprise a range of functions like reclining, tilting, seat elevation, chin controller, hand controller and many more. Some of the models are portable that is

they can be disassembled and carried along while travelling. The electric wheelchair is characteristically categorized into three categories.

**Other variants :**

A Standing wheelchair is one that supports the user in a nearly standing position. They can be used as both a wheelchair and a standing frame, allowing the user to sit or stand in the wheelchair as they wish. They often go from sitting to standing with a hydraulic pump or electric-powered assist. Some options are provided with a manual propel model and power stand, while others have full power, tilt, recline and variations of power stand functions available as a rehabilitative medical device.[6] The benefits of such device includes.

**Manual Wheelchair Propulsion :**

The wheelchair is one of the most commonly used assistive devices to promote mobility and enhance quality of life for people who have difficulties in walking (e.g. a person with spinal cord injuries resulting in quadriplegia or paraplegia, muscular dystrophy, etc).

Wheelchair mobility opens up opportunities for wheelchair users to study, work, engage in social activities and access services such as healthcare. In addition to providing mobility, an

**BASIC MANUAL WHEELCHAIR PARTS**



appropriate wheelchair benefits the physical health and quality of life of the users by helping in reducing common problems such as pressure sores, progression of deformities and improve respiration and digestion.

**Benefits of an Appropriate Wheelchair:**

Mobility devices are appropriate for people who experience a wide range of mobility difficulties as a result of a broad spectrum of health conditions and impairments, including amputation, arthritis, cerebral palsy, poliomyelitis, muscular dystrophy, spinal-cord injury, spina bifida, stroke and are also relevant for older people who experience mobility difficulties. Assistive technologies such as wheelchairs have been shown that, when appropriate to the user and the user's environment, they have a significant impact on the level of independence and participation which people with disabilities are able to achieve. This also reduces the burden of care and has been reported to reduce the overall need for formal support services.

**IV. EXPERIMENTAL WORK**

Mobility of physically disabled persons is a concerning social issue nowadays. Various hand driven tricycles, wheelchairs, retrofitted vehicles etc. are commonly available for disabled people as a mode of transportation. The basic Tricycle is a three-wheeled design, pedalled by disabled persons in the side and seat in the middle for sitting arrangement.

They use only one hand to steer the handle because other hand is used to rotate the pedal. Our aim is to design and fabricate a low cost tricycle for the handicap people to be propelled by the novel link mechanism attached to the steering column converting into cranking, using the advantage of leverage, with proper balance and distribution of mass and centre 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.

**V. RESULT AND DISCUSSION**

The obtained results from conducting the experiment

**FRONT PART DESIGN:**

Rear wheel radius = 34 cm Rear axle length = 95 cm Bearing diameter = 7 cm Front wheel radius = 30 cm Bar OA = 43 cm

Bar AB = 9 cm Bar AC = 53 cm Bar BD = 53 cm Bar CE = 45 cm

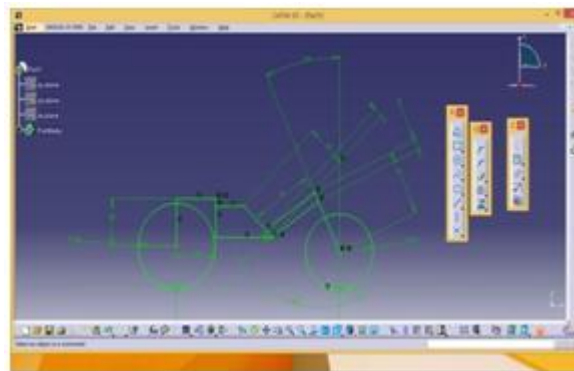
<OAC = 80 degree

<AOX = 25 degree

CM length = AC sin(80-25) = 43.5 cm

OM length = OA sin(25) = 18.17 cm

**TRICYCLE ASSEMBLY:**



$$TR \text{ (Time ratio)} = \frac{\text{time take by forward stroke}}{\text{time take by backward stroke}} = \frac{\theta_f}{\theta_b} = 1.11$$

Center of gravity of axel is at center = 245N , Xc<sub>1</sub> = 34cm

Center of gravity of axel is at rider = 686N , Xc<sub>2</sub> = 51.5cm

Center of gravity of right side of section MN , Xc<sub>3</sub> = 114cm , W<sub>3</sub>= 100N

$$\begin{aligned} \text{CG of total vehicle and rider } X_c &= \frac{245 \times X_1 + 686 \times Xc_2 + 100 \times 114}{245 + 686 + 100} \\ &= \frac{245 \times 34 + 686 \times 51.5 + 100 \times 114}{1031} \\ &= 53.4\text{cm} \end{aligned}$$

Reaction on rear wheel = 2R<sub>2</sub>

Reaction on front wheel = R<sub>1</sub>

From static equilibrium analysis  $\sum F_y = 0$

$$\Rightarrow W = 2R_2 + R_1$$

$$\Rightarrow 1031 = 2R_2 + R_1 \text{ ----- (1)}$$

Moment about rear wheel  $\sum M = 0$

$$\Rightarrow 1031 \times X_c = R_1 \times 141.67$$

$$\begin{aligned} \Rightarrow R_1 &= \frac{1031 \times 53.4}{141.67} \\ &= 388.80\text{N} \end{aligned}$$

$$2R_2 = 1031 - 388.8$$

$$\Rightarrow 2R_2 = 641.2\text{N}$$

$$R_2 = 321.09\text{N on each rear whe}$$

### **CONCLUSIONS**

The tricycle is so designed to meet the needs of a disabled person, adding to transportation & entertainment purpose. From the start of the project till the completion, we have utilized as many mechanical ways to make the driving smooth and convenient. In the conventional tricycle we have analyzed the problems and sorted out using simple technology to make it efficient and user friendly. The tricycle will be so designed that by providing appropriate links it can take a complete revolution at a particular point. It will be very effective because of less operational difficulties and being eco-friendly. The tricycle can also be designed and modified to give it an amphibian vehicle working.

### **FUTURE SCOPE**

solar panel Use the Ultra Efficient Solar Cell. Battery Use Nickel-cadmium battery 1) Nickel cadmium batteries are less affected by overloads. 2) Nickel cadmium battery can be discharge completely unharmed. 3) Nickel cadmium batteries have lower maintenance and longer life. Angle of solar panel

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