

# Foot Controlled Steering System

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**Abstract:** Transportation has become an integral part of people's day to day life. At certain times, in large countries like India, people are forced to travel long distance from their work place to their place of residence. People with upper limb amputation and hands have difficulties in travelling and cannot travel these long distances. They use devices such as wheel chair, crutches and artificial limbs for mobility. These however cannot be used for long distance outdoor transportation. Therefore, the aim of this project is to design and fabricate 'Foot operated system' for armless people.

The Foot Operated Steering mechanism is a mechanism controlled by foot or both the feet in order to steer the vehicle in the desired direction. This system consists of a steering which can control brake along with steering. The main objective of the project is to design a foot operated system for handicapped people.

**Keywords:** Foot controlled Handicapped, Steering system.

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## I. INTRODUCTION

Now a days transportation has become great difficulty to an individual to reach the destination on time. Everyone has their own vehicle and people with all body parts are fortunate. But it is unfortunate for partially disabled people with hands. Disability is the repercussion of an impairment which can be mental, physical, emotional, vision, sensory. Disabilities can occur in upper extremities and in lower extremities. These people become more dependants and lose their confidence. Due to this effect, they stand a great disadvantage in using public as well as private transportation facilities. Foot Operated Steering was something new to come up with and we had an interest to make something innovative. The main objective of the project is to design a foot operated system for handicapped people.

## II. LITERATURE REVIEW

**A. Pranchal Srivastava, Raj Kumar Pal "A Low Cost Mobility Solution for Physically Challenged People"., International Journal of Mechanical Engineering and Technology (IJMET) Volume 6, Issue 12, Dec 2015:**

The most common approach used in most powered wheelchairs is having two motors for traction each driving a wheel on either side of the machine. The motion is achieved by keeping the speeds of the motors identical in one direction and the other direction for reverse motion. Turns are executed by making the speeds of the motors different. The radius of turn depends on the speed difference.

**B. Challenged People Using Arm Processor". International Journal of Mechanical Engineering and Technology (IJMET), Volume 6, Issue 12, Dec 2015:**

The aim of the technology is to help those handicapped who don't have healthy hands to run a vehicle by giving the voice commands. In this the driver need not use the steering instead his head. This vehicle is only for those handicapped those who can nod head well. Four switches are interfaced over the neck of the driver, and the vehicle can be controlled by the

head movement. Corresponding tactile switches are activated according to the movement of the head, and towards the conclusion the practical difficulties are described and the possible solutions are discussed.

**C. Clinical Survey Of Upper Extremity Amputees In India:**

Brig. I.C. Narang, MS, FICS

Lt. Col. B.P. Mathur, MS, M.Phil. (UK)

Lt. Col. Pal Singh, MS

Mrs. V.S. Jape, MA, MA(SW)

A survey of upper limb amputees has been carried out at the Defence Services Artificial Limb Centre, Poona, India. The aim of the survey was primarily to gather information directly from the patients about the utility of upper limb prostheses which are being provided at present.

**Table: 1 Age and gender determination**

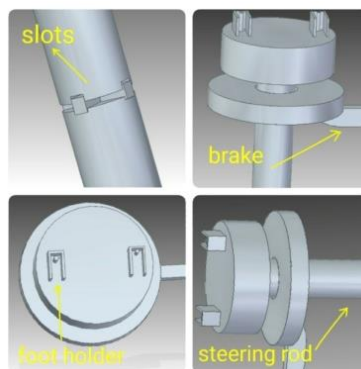
Age group	0-10	11-20	21-30	31-40	41-50	51-60	Above 60	Total
Males	2	3	38	45	21	11	4	124
Female	-	3	1	2	-	-	-	6
Total	2	6	39	47	21	11	4	130

**III. METHODOLOGY**

The system consists of a foot operated steering which can control braking of the vehicle along with the steering and acceleration as a separate unit .The steering is disc shaped having foot holders which help to rotate the steering in 360 degree .The steering wheel can be moved in up and down position. The steering rod is connected to rack and pinion via universal joint and the rod has two divisions connected by together by slots in provided in the rods.The foot holder is pivoted on the steering disc.

Such that it can rotate 360 degree about the pivot. The steering mechanism consists of rack and pinion arrangement.The vehicle is a electric operated one. A DC geared motor is used as the driving unit .The drive is transmitted to rear wheel through gear arrangement.

**IV. DESIGN OF STEERING WHEEL**



**Fig: 1 Steering wheel**

The system consists of a foot operated steering which can control braking of the vehicle along with the steering. The steering wheel is disc having foot holders which help to rotate the steering in 360 degree. The steering wheel can be moved in up and down position. Steering rod is jointed together by two different diameter rods which are slotted. The pivoted foot holder helps to rotate steering disc in 360 degree. For the braking purpose steering has to push in downward direction .A spring is connected to the steering rod for the to and fro motion of the steering wheel.

## V. DESIGN CONSIDERATIONS

### 1. This application can only be used with a slow speed vehicle around 30 km/hr of speed:

Since the vehicle is fully controlled by leg itself it is necessary to limit maximum speed of the vehicle to a safe speed.

### 2. The terrain or the floor must be flat:

The vehicle is more suitable to flat or terrain path.

### 3. The system will only applicable to automatically driven car:

It is applicable only to automatically transmission vehicles. It is difficult to the driver to control clutch along with steering. This can apply in the modern automatic vehicles.

### 4. Power will be less compared to mechanically driven vehicle:

As the vehicle is driven by electrical means, output power will be less. Increased power will obtain in mechanically driven automatic vehicles.

## VI. STEERING MECHANISM



Figure : 2 Steering and braking mechanism

Steering system consist of steering wheel and steering rod. Steering rod is Yoke and Teeth helps to move the steering up and down. Yoke and teeth steering rod has grooves in it, therefore the rod height can be adjusted. There is a disc shaped metal is fixed to the end of the rod and a rod is extended from the brake pedal. A spring is attached with the brake pedal. When the steering is pushed down by using leg then the disc at the bottom of the steering rod pushes the rod extended from the brake pedal. This in turn pushes the brake pedal downwards and the brake will apply by using the steering wheel. Also with the conventional brake pedal brake can be applied.

## VII. PARK BRAKE



Figure: 3 Park brake

Park brake is used to apply the brake continuously for a long time when the driver is away from the vehicle or used to park the vehicle. This can easily operated by using legs. By pushing the brake pedal with a leg and then pull the park brake pedal to the conventional brake pedal. This helps to apply brake with continues application. Park brake pedal is constructed by using MS plate and fixed to the chassis of the vehicle by welding.

### **VIII. TURNING RADIUS**

The turning radius is the radius of the smallest circle that the vehicle is capable of making. From the calculation the turning radius of the product is found to be 3.5m. It is comparatively a less turning radius compared to other vehicles. Soothe driver can turn the vehicle in a minimum in a turning distance.

### **IX. CONCLUSION**

In this project the replacement of conventional steering system by introducing a foot operated steering for a slow speed vehicle for disabled people to travel long distance. The Foot Operated Steering mechanism is a mechanism controlled by foot or both the feet in order to steer the vehicle in the desired direction. The main objective of the project is to design a foot operated system for handicapped people. The final product is tested as per the difficulties facing by a handicapped person. The controlling of the vehicle could do easily by using legs and the complete turning of the vehicle during the driving is also done. The project is success to be a great extend. This type vehicle can be manufactured with the some modifications and some future consideration. The product has the following advantages:

- It keeps our hands free. Hence we can utilize them for different applications like cleaning, handling of objects, etc.
- Provides employment for the people who having no hands.
- Quickly tasks can be completed as operator's hands are free to perform working with quick movement from one place to another.

### **REFERENCES**

- [1] Mandar Patil, Prashant Pawar, Swapnil Patil, Swapnil Honrao., "Foot Operated Steering Mechanism", International Engineering Research Journal (IERJ) Special Issue 3 Page 394-396, 2016.
- [2] Choudhari Dilip S., "Four Wheel Steering System for Future", International Journal of Mechanical Engineering and Robotics Research, Vol. 3, No. 4, October 2014.
- [3] Dhuri Chetan, Masur Aditya, Warang Aniket, Sudhir Aditya, "Selection, Modification and Analysis of Steering Mechanism", International Journal of Engineering and Innovative Technology, Vol. 2, Issue 4, 2013.
- [4] Zimerlee John, "Foot Operated Steering and Control System for a variety of Watercraft with Dual Propulsion Units", US 2008/0139059 A.
- [5] Belkhode P. N, Washimkar P. V. and Dhande M. S., "Prediction of Steering Geometry of Front Suspension using Experimental data based Model", IACSIT International Journal of Engineering and Technology, Vol.2, No. 6, December 2010.