

Foot Operated Steering Mechanism

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ABSTRACT

The Foot Operated Steering mechanism is a mechanism controlled by a foot or both the feet in order to steer the vehicle in the desired direction. By this means it will prove very helpful for the handicapped people. Hence the project aim is to focus on the Foot Operated Mechanism which can be used for various applications like material handling, cleaning, etc. on a slow speed vehicle. The steering geometry parameters are camber angle, castor angle, turning radius. The purpose of this paper is to present the foot operated steering mechanism with reference to normal steering mechanism.

This concept can be used by Hydraulic actuation, Dc motor actuation or manually operated resulting into desired turning of the wheels. A lever operated or a push button will be provided at the feet of the driver to get the desired turn, whether left or right. This paper summarizes the study of all threemechanismsmentioned above and selecting an optimized mechanism by comparing them.

Keywords— Kingpin, Tie rods.

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I. INTRODUCTION

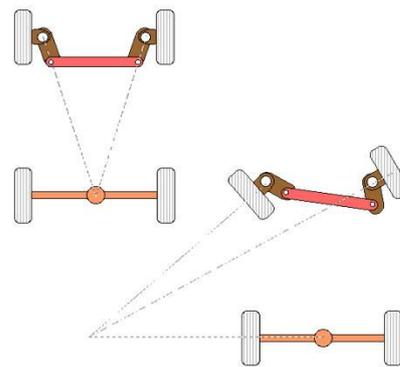
Mechanical Engineering is one of the biggest sectors in engineering which over takes many other disciplines. It provides area for the interest and development for a student. Automobile was a common area of interest of the members of the project team. Foot Operated Steering was something new to come up with and we had an interest to make something innovative.

Conventional Steering System:

Steering is the combination of components, linkages, etc. which allow the vehicle to steer in the desired path and direction. In the most conventional steering system using a hand operated steering wheel is positioned in front of the driver, via steering column, which may contain various universal joints.

Many modern cars use rack and pinion steering mechanisms, where the steering wheels turns the pinion gear and the pinion moves the rack linearly, converting rotary motion of the pinion to the linear motion of the rack.

Ackermann Steering Geometry:



A simple approximate Ackermann steering geometry can be generated by moving the steering pivot points inwards so as to lie on a line drawn between the steering kingpins and the centre of rear axle. The steering pivot points are connected by a rigid link called as tie rod which can also be the part of steering mechanism, in the form of rack and pinion for instance. Modern cars do not use Ackermann steering, because it ignores dynamic and compliant effects, but it is very much sound for low-speed maneuvers.

II. PROBLEM STATEMENT

The problem that needs to be solved by the final product is multi-faceted. If a person without hands has to drive a vehicle this concept can be very helpful. This needs to be done with no assistance from the arms as possible. The design should allow the product to be easily maintained and not overly complex in function. A slow speed vehicle used for cleaning, material handling purposes in Malls, Industries, Institutes, Hospitals where the person has to walk fair amount of distance, Hence we utilize this idea for a quick movement of a person without the use of hands simultaneously handling certain materials or while cleaning.

Moreover it is a time saving or a quick process where the cleaner's hands are more into cleaning purpose while the feet are engaged with driving and steering the vehicle. Since all the standard steering systems available are right hand drive we convert it into centrally aligned steering system.

III. FOOT OPERATED STEERING METHODOLOGY:

The regular steering systems are turning by hand or are hand operated. In foot operated steering we make the provision at the feet to steer either left or right. The rotating motion of a steering wheel ensures the rotation of wheels in the cars. Here we use a pedal operated or lever for its operation for wheels to steer.

Two pedals at the left foot will be mounted so as to steer the vehicle. The left pedal ensures the turning of wheels in the left direction and similarly the right pedal ensures the turning of the wheels in the right direction. Or a single two way pedal can be used, where if the pedal is pressed forward the vehicle steers left and if the pedal is pressed backward the vehicle steers right.

Consideration:

- This application can only be used with a slow speed vehicle around 20 km/hr. of speed.
- The terrain or the floor must be flat i.e. it is not applicable for muddy terrains, inclined roads.

Application of DC Motor with Bevel Gears:

In order to steer the vehicle to make the steering system easy to operate we found out the application of DC motor with the bevel gears could make the system much easier to operate. The pinion will be connected to the motor shaft whereas the gear will be mounted on the base which will be connected to tie rods for achieving the movement. As the motor shaft rotates, the pinion will rotate with the same speed and hence rotating the bevel gear which is further connected to the tie rods. For this application the motor should be controlled direction wise and speed wise.

IV. FUTURE SCOPE

There are several sides of the project in which one of the most important are there is no such an application yet to be invented as simple as this. There are no present systems accomplishing this problem. So as per our perspective this project leads towards the revolution in present scenario.

The concept of foot operated steering can also be used for wheel chair. As we know, this vehicle is generally used for indoor applications. Hence by some extensions we can make it more usable.

- Foot operated steering mechanism can be combined with a cleaning vehicle in order to cleaning the in house area.
- It can be used on a shop floor for carrying objects, burr, and scrap from one place to another.
- It can be used in military bases to carry arms and ammunitions.
- By attaching hooks we can carry trollies for good carrier at floor level.
- It can lead to employment of handicapped people specifically for driving purpose.

V. 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.

VI. APPLICATIONS

The foot steered car has wide range of applications where all the working is focused onto the feet of the driver keeping the hands free for other works.

- This mechanism can be used in any slow speed vehicle.
- It use completely applicable for handicapped person.
- It can be used for cleaning purposes in malls, hospitals, institutes, etc.
- It can be used at floor level in industries for material handling.
- Military bases to carry arms and ammunition.

VII. CONCLUSION

In this paper replacement of conventional steering system is analysed by introducing a foot operated steering for a slow speed vehicle providing an employment opportunity for handicapped people as a driver for material handling and cleaning purposes for indoor applications. The next step for the project will be to determine the calculations of the design choices. Once the calculations for the design choices have been completed, the decision of the subsystems to be used and further modifications will be determined.

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