



Full Wheel Steering

K. Murali¹, M. Hari Chidambaram²

Assistant Professor¹, Student²

Department of Mechanical

University College of Engineering, Arni, India

Abstract:

Now a days the four wheeler is the most important and necessary one for every body in day to life. But most of them find difficulties in driving a four wheeler due driving system and even the person find difficulties in turning the vehicle very narrow space and even parking in narrow gap according to four wheeler system which has been practicing now required minimum distance of 2.4meters*4.8meteres it may differ from vehicle and steering which can able to at some respect particular angle only .these is major drawback of the steering system which has been using in practice To overcome these draw back we have find an new type of steering set up which can able to turn at angle of 0 degree to 360 degree so parking area is reduced effectively and we can able to turn the car in any direction and ordinary person also able to drive the four wheeler using this type of steering set up

I. INTRODUCTION

Nowadays most of the vehicles use the two wheel steering mechanism as their main handling system. But the efficiency of the two wheel steering vehicle is proven to be low compared to the four wheel steering vehicle. In standard 2 Wheel Steering System, the rear set of wheels are always directed forward and do not play an active role in controlling the steering. While in 4 Wheel Steering System, the rear wheels do play an active role for steering, which can be guided at high as well as low speeds. Four wheel steering system can be employed in some vehicles to improve steering response, increase vehicle stability while moving at certain speed, or to decrease turning radius at low speed. Four-wheel steering is a technologically, tremendous effort on the part of automotive design engineers to provide near-neutral steering. In situations like low speed cornering, vehicle parking and driving in city conditions with heavy traffic in tight spaces, high speed lane changing would be very difficult due to vehicle's larger wheelbase and track width which brings high inertia and traction into consideration. Also in situations like low speed cornering, vehicle parking and driving in city conditions with heavy traffic in tight spaces, driving would be very difficult due to a sedan's larger wheelbase and track width. Hence there is a requirement of a mechanism which result in less turning radius. In this system, all the four wheels are connected to each other by means of a single chain with the help of a sprockets and the same chain is coupled to steering wheel rod with another sprocket mounted on it. This arrangement of the wheels enables the vehicle to turn 90 degrees, without moving from the spot, i.e. the vehicle has zero turning radius. This help in maneuvering the vehicle in tight space such as parking lots within small compounds. Modern development and economical progression of Indian society resulted in increase of cars on roads. Due to space constraints, car parking is the major problem faced in most parts of the country. Present study aims for development of a system to reduce the turning radius of a car. The indigenously developed system consists of Ackerman steering and various mechanism with arrangement of the various kinematics links. In this system at first vehicle is stopped and wheels are then turned in the required direction with the help of

steering system. It has turning radius nearly equal to negligible of the length of car itself. This system can be useful in better parking, traffic jam, back turning on narrow roads, etc.4-Wheel Steering System is not a new technology but it has not gained popularity over 2-Wheel Steering System even though experiments have proved that it has excellent maneuverability, high stability and it is a solution to oversteer /understeer. If 4-Wheel Steering is a better placement for age old 2-Wheel Steering, why has it not replaced it yet?

II. BASIC STEERING AND TYPES OF STEERING USED

The various functions of the steering wheel are, to control the angular motion of the wheels; direction of motion of the vehicle, to provide directional stability of the vehicle while going straight ahead, to facilitate straight ahead condition of the vehicle after completing a turn .Automotive steering mechanisms are divided as either manual or power steering. In both types, the arrangement and function of the linkage are same. The major difference is that manual steering requires more human efforts to steer the vehicle. Some construction equipment has articulated steering which is facilitate by hydraulic system. We are going to use the steering similar to that of Go-kart. This system gives nearly perfect steering. Its working is purely on the movements of linkages. Linkages are connected by ball joints to have accurate motion in one plane. As this type of steering system is simple and hence its design and maintenance is also easy. This system does not consist of any gear mechanism. It is light in weight. Hence its overall weight reduces which helps in turning of wheel. We also have another option of utilizing the Ackermann and Power steering mechanism. But this will become costly and bulky. The basic aim of steering is to ensure that the wheels are pointing in the desired directions. This is typically achieved by a series of linkages, rods, pivots and gears. One of the fundamental concepts is that of caster angle - each wheel is steered with a pivot point ahead of the wheel; this makes the steering tend to be self-cent usually conforms to a variation of Ackerman steering geometry, to account for the fact erring towards the direction of travel. The steering linkages connecting the steering box and the wheels that in a turn, the

inner wheel is actually travelling a path of smaller radius than the outer wheel, so that the degree of suitable for driving in a straight path is not suitable for turns. The angle the wheels make with the vertical plane also affects steering dynamics as do the tyres. Today cars use rack and pinion steering mechanisms, where the steering wheel turns the pinion gear; the pinion moves the rack, which is a linear gear that meshes with the pinion, converting circular motion into linear motion along the transverse axis of the car (side to side motion).

Mechanisms: The two types of steering mechanisms are;

- 1) Davis Steering Gear
- 2) Ackermann Steering Gear

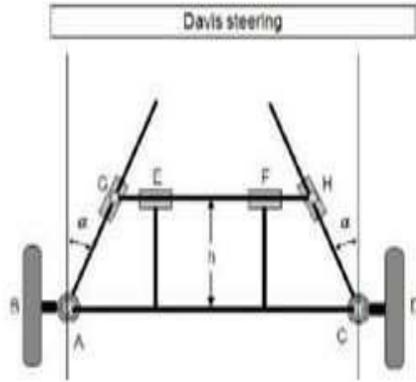


Figure.No.1.2.1 Davis Steering Gear

1) Davis Steering Gear: The Davis steering gear has various sliding pairs resulting in high friction, wear and tear in the component parts. Therefore, this makes the design inaccurate and hence is no more used in vehicles.

2) Ackermann's Principle: The Ackermann principle states that when a vehicle takes a turn, its wheels should make arcs round the same Centre. In other words, the front wheels must move in relation to each other and the axis of front wheels should meet the axis of rear wheels at a point. This point about which the wheels rotate is known as the instantaneous centre (o). This situation makes sure true rolling motion to all the wheels and avoids lateral slip and minimizes wear of tyre. Here we are going to the coupled Ackerman steering mechanism.

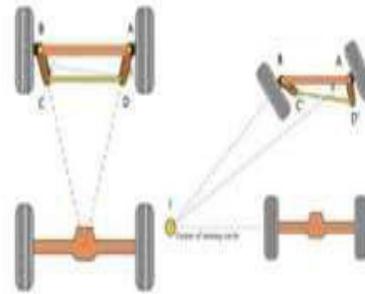


Figure.No.1.2.2 Ackermann Principle

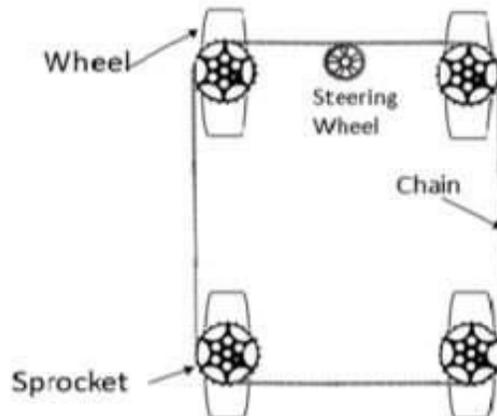
Advantages of Ackermann Mechanism:

- i.Lesser wear of tyres
- ii.Lower friction in pair
- iii.Simplicity and durability of pin joints

WORKING: This project consists of steering chain sprocket, wheel bearing, iron hollow pipe and chain drive the system first the vehicle is stopped and wheels turn in required directional with the help of steering set up teeth of the sprocket are completely meshed with chain drive which has used to provide rotatory motion to wheel by power steering is used to provide due to direction of motion vehicle

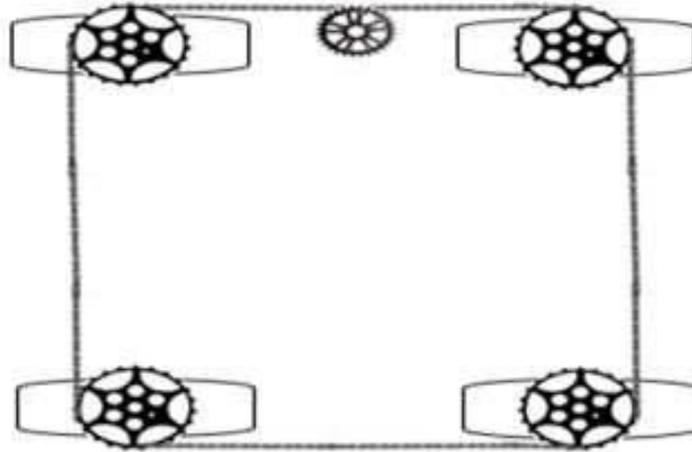
MECHANISM: The name of our project is chain operated Quadra steering. We would achieve Quadra steering by using sprockets and chain.The movement or turning motion of all the wheels takes place simultaneously. Each wheel is connected with a sprocket of designed parameters. The steering wheel is also connected with a sprocket at the bottom. All these sprockets are coupled together by using single chain. As we rotate the steering wheel in desired direction, the sprocket at the bottom also turns in the same direction with the same angle. This results into movement of chain attached to sprocket of steer wheel and simultaneously the chain will rotate all the sprockets of each tyre turning the vehicle is desired direction This simultaneous motion of all the wheels makes it possible to move vehicle in horizontal motion or turn the vehicle in 0 degree to 360 degree

DESIGN



It is position of wheel when it is idle

If it takes turn 90 degree it position will be like this



We concluded that

- (i) To increase the easy movement while parking Quadra steering or commonly known as four-wheel turning is more efficient.
- (ii) Horizontal movement of vehicle is possible. This will help in operating industrial Vehicles
- (iii) Cost of chain and sprocket would be less as compared to conventional steering.

Advantages

- I. It consumes very less time to turn from one direction to other direction.
- II. It is more efficient compare to other type of load carry vehicle.
- III. This type of load carry vehicle is easily parked in any direction.
- IV. It is less costly to load carry vehicle.
- V. Eco friendly.
- VI. Less noise operation.
- VII. More efficient.
- VIII. Battery is using in this 360 degree wheel rotation vehicle to move forward and backward, so it is a kind of pollution free vehicle

Disadvantages

- I. This type of load carry vehicle is not applicable to carry more weight
- II. Battery power is required to move of the vehicle.

Application

- I. In Industries for automation of raw material moving from one place to another like automated guided vehicle.(robotics) In automobile sector there are so many types of vehicle are using to carry goods from one position to another position, there is space problem in the industry so this vehicle is used in automobile applications because this vehicle consumes very less space compare to other type of vehicle. This vehicle is used in small Industries for transportation of raw material from one position to another position.
- II. Modern development and economical progression of Indian society resulted in increase of vehicle in park so there are also problem. In park other vehicle are taking more space to move from one direction to other

direction and 360 degree wheel rotation vehicle have capability to move parallel direction so this vehicle is easily move from one direction to other direction in park. Take easily U-turn because front wheel of this vehicle are rotating freely by steering, chain drive and sprocket arrangement.

- III. It is used in hospitals to carry the patient from one room to another room. Because there are lots of patients those are staying in one room.

III. CONCLUSION

A prototype for the proposed approach was developed by introducing steering to wheel rotate 360 degree. This prototype was found to be able to be maneuvered very easily in tight spaces, and after manufacture of 360 degree wheel rotation vehicle consumed very less space to turn from one direction to another direction and it consumes less time to turn and this vehicle used in various area such as small industries, railway platforms.

IV. REFERENCES

- [1]. Jaishnu Moudgil, Shubhankar Mengi and Mudit Chopra,2015, 360 Degree Rotating Vehicle to Overcome the Problem of Parking Space, International Journal of Research in Mechanical Engineering and Technology, 5(2), 22-25.
- [2]. Sudip kachhia, Design of 360 Degree Rotating Car,2016, International Journal of Advance Research and Innovative Ideas In Education, 2(5), 15-16.
- [3]. K. Lohith, K. Lohith, Dr. S. R. Shankapal, M. H. Monish Gowda, 2013, Development of Four Wheel, Scholars Journal of Engineering and Technology,12(1), 52-53.
- [4]. Er. Amitesh Kumar, Dr.Dinesh.N.Kamble, Zero Turn Four Wheel Steering System, International Journal of Scientific & Engineering Research,5(12), 22-24. [5] Mr. Sharad P. Mali, Mr. Sagar Jadhav, Prof. D.U.Patil, Zero Turn Four Wheel Mechanism, International Engineering Research Journal,2(2), 484-486