

DESIGN AND FABRICATION OF FOUR WHEEL 90 DEGREE STEERING SYSTEM FOR ADVANCED PARKING

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ABSTRACT

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.

Thus we developed a system to ease the parking by reducing the turning radius of the car. The disadvantages associated with the conventional steering system is the minimum turning radius of the car and this difficulty is eliminated by employing four wheel 90 degree steering system.

Key words: 90 degree steering system, electrical motor, turning radius, four wheel steering.

INTRODUCTION:

An automobile car is a wheeled motor vehicle for transporting passengers, which also carries its own engine or motor. Most definitions of the term specify that automobiles are designed to run primarily on roads, to have seating for one to eight people, to typically have four wheels, and to be constructed principally for the transport of people rather than goods. However, the term "automobile" is far from precise, because there are many types of vehicles that do similar tasks.

Parking is the act of stopping a vehicle and leaving it unoccupied for more than a brief time. It is against the law virtually everywhere to park a vehicle in the middle of a highway or road; parking on one or both sides of a road, however, is commonly permitted. Parking facilities are constructed in combination with most buildings, to facilitate the coming and going of the buildings' users.

Steering is the term applied to the collection of components, linkages, etc. which will allow for a vessel (ship, boat) or vehicle (car) to follow the desired course. An exception is the case of rail transport by which rail tracks combined together with railroad switches provide the steering function.

The most conventional steering arrangement is to turn the front wheels using a hand operated steering wheel which is positioned in front of the driver, via the steering column, which may contain universal joints to allow it to deviate somewhat from a straight line. But 90 degree turning of the wheel is not possible. The 90 degree steering system can turn the wheels of the vehicle in 90 degrees towards the left or right direction for the all four wheels thus the turning radius of the conventional steering system is eliminated and by this system the vehicle can actually go sideways which makes the parking of the vehicle being more easier.

LITREATURE SURVEY:

Four-wheel steering (or all wheel steering) is a system employed by some vehicles to improve steering response, increase vehicle stability while maneuvering at high speed, or to decrease turning radius at low speed.

In most active four-wheel steering systems, the rear wheels are steered by a computer and actuators. The rear wheels generally cannot turn as far as the front wheels. Some systems, including Delphi's Quadra steer and the system in Honda's Prelude line, allow for the rear wheels to be steered in the opposite direction as the front wheels during low speeds. This allows the vehicle to turn in a significantly smaller radius sometimes critical for large trucks or vehicles with trailers.

Many modern vehicles offer a form of passive rear steering to counteract normal vehicle tendencies. For example, Subaru used a passive steering system to correct for the rear wheel's tendency to toe-out. On many vehicles, when cornering, the rear wheels tend to steer slightly to the outside of a turn, which can reduce stability. The passive steering system uses the lateral forces generated in a turn (through suspension geometry) and the bushings to correct this tendency and steer the wheels slightly to the inside of the corner. This improves the stability of the car, through the turn. This effect is called compliance under steer and it, or its opposite, is present on all suspensions. Typical methods of achieving compliance under steer are to use a Watt's Link on a live rear axle, or the use of toe control bushings on a twist beam suspension. On an independent rear suspension it is normally achieved by changing the rates of the rubber bushings in the suspension. Some suspensions will always have compliance over steer due to geometry, such as Hotchkiss live axles or a semi trailing arm IRS.

As vehicles have become heavier and switched to front wheel drive, the effort to turn the steering wheel manually has increased often to the point where major physical exertion is required. To alleviate this, auto makers have developed power steering systems. There are two types of power steering systems hydraulic and electric/electronic. A hydraulic-electric hybrid system is also possible.

Rather than this in our system four wheel steering system is done by the chain drive mechanism and by this mechanism the four individual wheels can be steered 90 degree angles.

PROBLEM STATEMENT:

Due to the huge number of cars and the constrained spaces the parking of cars always been an difficult process for every driver. Normally during the parallel parking the turning radius of the car has been making it really difficult. The most frequently used type of steering, are using the front two wheels of the vehicle. This type of steering suffers from the comparatively larger turning circle and the extra effort required by the driver to negotiate the turn. The rack and pinion design has the advantages of a large degree of feedback and direct steering feel, but the turning radius is large.

Due to the high turning radius, parking is really difficult. In small parking areas it is really difficult to steer and park. Thus to overcome this difficulty, we designed a new steering system which can steer the four individual wheels by using chain and drive mechanism.

OBJECTIVE:

The objective of our project is parking the vehicle with ease by 90 degree steering control. Thus to reduce the parking difficulty in constrained parking spaces. For better parking and motion of the vehicle in constrained spaces the turning radius of the conventional steering system has to be eliminated. Thus for better and easier driving and parking of the vehicle has been made the objective of our project. The main objectives of the project are

- Better parking in narrow space.
- This type of car can be taken through traffic jam.
- Car can be moved easily
- Use of electrical drives to optimize power consumption.
- Maintenance is low.
- Saving of Fuel.
- Saving of Time.

MATERIALS:

CHAIN DRIVE:

Here the chain drive is used for turning the wheels to 90 degree rotation. The chain drive is run by the DC motor and is controlled by using the key pad. When the chain drive rotates the wheels began to turn in the direction of rotation thus the 90 degree rotation can be achieved.



DC MOTOR

The 12V DC motor is used for running the vehicle. The system consists of 6 DC motors, four motors are used for running the four individual wheels of the vehicle and the rest two motors are used in chain drive system for turning of the wheels of the vehicle.



KEYPAD :



The keypad is used for controlling the motion of the vehicle. It consists of six switches, the first two switches are used for the forward and reverse motion of the wheels, the next two switches are used for the rightward turning and leftward turning of the front chain drive, which is used for the turning of the wheels. The next two switches control the rear chain drive of the vehicle. Thus the whole motion of the vehicle is controlled by the keypad.

WHEELS :

The wheels are used for the motion of the vehicle and the each individual wheel in the vehicle is controlled by the individual DC motor which is run by the battery. Thus the wheels of the vehicle are run by using electric power.



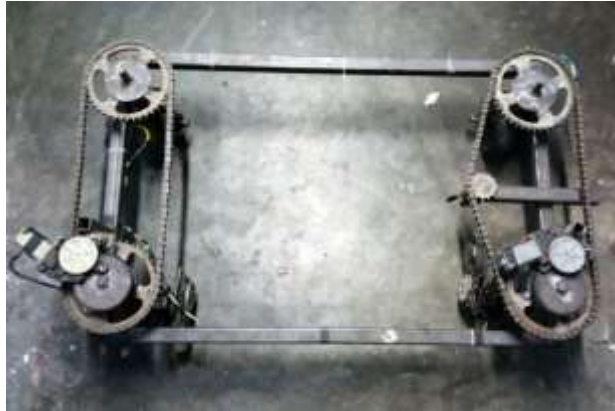
BATTERY :

The whole vehicle is run by electric power from the battery, thus it is a complete electric vehicle. The battery is used to run the six DC motors, i.e., for driving the wheels and also the chain drive system.



WORKING:

In this project battery provides the power supply to the control unit. The equipment contains totally six motors, two motors coupled with the vehicle's left and right wheels of the front side, the next two motors are connected to the vehicle's left and right side of the back side. The four motors are used to run the vehicle. Another two motors are connected to rotate the vehicle wheel 90 degree by the chain drive arrangements. When the chain drive starts to rotate the wheels also turns, thus the corresponding 90 degree rotation of the wheels is achieved. The keypad in the control unit has six keys which are used for the controlling the motion of the vehicle. The forward and reverse switch helps in the forward and reverse motion of the wheels and the turn left and turn right keys rotates the chain drive which leads to turning of the wheels towards right or left side and can rotate to achieve the 90 degrees, thus leading the sideway motion of the vehicle.

ASSEMBLY SETUP :**FUTURE SCOPE:**

This steering system has made the parking a lot more easier and the parking in constrained spaces possible. Thus our system would bring a better future in parking systems in automobile industries. The following system does not limit itself to the benchmark used in this project, but can be implemented over a wide range of automobiles, typically from forklifts to go karts.

CONCLUSION:

As per the focus of the project we have created an innovative 4 wheel 90 degree steering mechanism which is feasible to manufacture, easy to install and highly efficient in achieving 90 degree steering for vehicles. This system assists in parallel parking of vehicles. It combats the problems faced during the parking in constrained parking spaces. It reduces the turning circle radius of the car and gives better maneuverability and control while parking. Moreover components used in this system are easy to manufacture, material used is feasible, reliable and easily available in market. The system assembly is easy to install and light in weight and can be implemented in all sections of cars efficiently.

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