

# **FOUR WHEEL STEERING WITH ARDUINO-UNO SYSTEM**

**A.S. Thenge<sup>1</sup>, P.D. Adhav<sup>2</sup>, A.U. Sable<sup>3</sup>, C.R. Patekar<sup>4</sup>, G.D.Wagh<sup>5</sup>**

<sup>1</sup> Student at mechanical engineering Guru Gobind Singh Polytechnic Nashik, (India)

<sup>2</sup>Lecturer in mechanical engineering Gurubind Singh Polytechnic Nashik, (India)

## **ABSTRACT**

*Four wheel steering system is also called rear-wheel steering or all wheel steering , provides a means to actively steer the rear wheels during turning regulated movement.It improves the handling and makes the vehicle make tighter turns.If a car could automatically compensate for an under steer or over steer problem, the driver would enjoy nearly neutral steering under varying conditions.Four wheel steering is a serious effort on the part of automotive design engineers to provide less turning radius The front do most of the steering.Rear wheel's turning is limited to half during an opposite direction which is controlled by arduino uno system with stepper motor. Whose aim is to provide a low cost to create devices that interact with their environment using sensors, and actuators.In conventional vehicle only the differential is located at rear, But in our system at the rear of vehicle the differential as well as steering linkage that is Rack and Pinion is provided which gives the half turning movement to rear wheels.*

**Keywords : Arduino Uno System, B) Stepper Motor, C) Rear Wheel Steering Linkage, D) Battery For Motor, E) Two Conventional Rack And Pinion Steering System.**

## **I INTRODUCTION**

In conventional steering system the driver required more space for turning the vehicle which increases the turning angle.In Four Wheel Steering system all the wheels of vehicle are turn at same time but rear wheels turn in opposite direction .

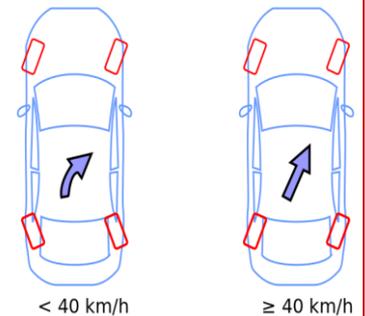
Now a days in the four wheel steering system the shaft is used to turn the rear wheels.Which causes required more steering efforts on the steering wheel to turn all wheels of the vehicle.

The main purpose of our project is to reduce the turning effort required by the driver on the steering wheel to turn the all wheels of vehicle. Which improves the comfort to driver and also improves the stability and handling of the vehicle.

## II MECHANISM

### 2.1 Construction

In our project we have provided Rack And Pinion Steering System at the rear side of the Differential which is connected to rear stub axle. Stepper motor is connected to Pinion and controlled by Arduino Uno System. Battery is used for power supply. A pinion is provided at the steering column which works as a sensing element and send signal to Arduino Uno System.



### 2.2 Working

When the front wheels turn the sensing pinion is also rotate with the steering column and send the signal to the Arduino Uno System which allows the battery to supply the electric current to the stepper motor. When motor rotates in either clockwise or anticlockwise direction the rack also rotate in left or right direction according to the direction of motor. The direction of motor is controlled by the Arduino Uno System. If the front wheel turns at right side then rear wheels turn at left side.

## III PARTS OF A FOUR WHEEL STEERING SYSTEM STEERING SYSTEM

- Steering Wheel
- Steering Column
- Rack And Pinion Steering System
- Stub Axle
- Front And Rear Axle (Half Axle)
- Arduino Uno System
- Stepper Motor
- Battery

### 3.1 Steering Wheel

The steering wheel is the part of the steering system which is controlled by the driver. The rest of the steering system works with respect to the steering input.



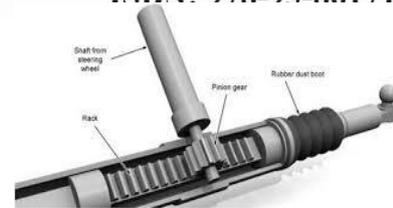
### 3.2 Steering column

The steering column is a device used for connecting the steering wheel to the steering mechanism. It transfer the driver's input from the steering wheel to steering mechanism.



### 3.3 Rack And Pinion Steering System

Rack and pinion steering system converts rotational motion of the pinion into linear motion of rack. Rotational motion applied to the pinion causes the rack to move pinion.



### 3.4 Stub Axle

A stub axle is a device which carries a wheel. The axle allows angular movement to wheels about the axis of king pin.



### 3.5 Front and Rear Axle

Front and Rear Axle are supporting members which support the stub axle and it carries the weight of the vehicle.



### 3.6 Arduino Uno System

The aim of the Arduino Uno system is to provide a low cost to create devices that interact with their environment using sensors and actuators. It sends the output signal to a battery for actuating the motor with respect to the movement of the sensing pinion.



### 3.7 Stepper Motor

A stepper motor is a brushless DC electric motor that divides a full rotation into a number of equal steps. In our project, a stepper motor is used to move the rack at the rear.



### 3.8 Battery

A battery is a device that supplies electric energy to an automobile. It is used in an automobile to start the engine. In our project, a battery is used to actuate the stepper motor.



## IV CONCLUSION

- The main advantage of a four-wheel steering system is to improve parking performance of a vehicle. It also improves steering response to the driver. It improves the turning performance at low speeds and directional stability at high speeds. It also increases the handling of the car and gives more comfort to the driver as the turning effort is very less.

- It increases the overall cost of the vehicle, and due to more components the weight of the vehicle is also increases. As the motor is used to turn the wheels it increases the battery consumption.
- The main application of the four wheel steering system is to improve parking performance of the vehicle because there is very less space available to park the car. The Four Wheel Steering System is used where high degree of accuracy is required such as in racing car and sports car. It is used where turning of vehicle is very difficult in less space like trucks, busses and some long cars like limousine. It is also used where more comfort is required such as passenger car or family car.

## **V ACKNOWLEDGEMENT**

We express deep sense of gratitude towards the entire teacher & non-teaching staff of mechanical department as well as other department who helped us some of other way & showing well enlighten path of success.

No man is able to complete the task alone when it is concerned with a larger group of people, namely the society, the blessing & the helping hands of well-wishers. Realization expectation us to start our carrier with great hopes & high expectations of bright prospects. At last before we cap our pen we sincerely express thanks to our parent for their moral support, understanding & their encouragement during our through time.

## **REFERENCES**

- (1) Dilip S. Choudhari, Assistant Professor, Department of Mechanical Engineering, Atmiya Institute of Technology and Science, Rajkot, Gujrat State, India "Four Wheel Steering System."
- (2) K. Lohith, Dr. S. R. Shankapal, M. H. Monish Gowda, Automotive and Aeronautical Engineering Department, M. S. Ramaiah School of Advanced Studies, Bangalore- 58 "Development of Four Wheel Steering System For A Car."
- (3) Arun Singh, Department of Mechanical Engineering, Delhi Technological University, Delhi, India "Study of Four Wheel steering to reduce turning radius and increase stability."
- (4) B. L. Salvi, J. K. Maherchandani, Dr. B. P. Nandwana, International Journal of Engineering and Innovative Technology (IJEIT) "Development a System For Reducing the Turning Radius of a Car."
- (5) Md. Danish Akhtar, Global Academy of Technology, Bangalore Vishveshvarya Technological University, "Wheel Steering System."
- (6) Sachin Saxena, Vinay Kumar, Sarabjeet Singh Luthra and Alok Kumar, National Conference on "Recent Advances in Mechanical Engineering" "4 Wheel Steering Systems (4was)"
- (7) Theory Of Machine Book by R.S. KRUMI (8) Machine Design Book by BHANDARI.