

# 360 Degrees Wheel Rotation Vehicle

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## ABSTRACT

The design and fabrication of 360-degree wheel rotation vehicle using DC motor and steering is done to reduce time to turn from one direction to other direction. This vehicle can move in all direction at a same position by using of DC stepped motor.

Main function of this vehicle is easy to move from one direction to other direction. Modern development and economical progression of Indian society resulted in increase of population on railway platform, increase of vehicle on the road, due to space constraints, in hospital is major problem of the country. Present study aims for development of a system to reduce the turning radius of vehicle. In this system at first vehicle is stopped and wheels are then turned in the required direction with help of several dc gear motors, servo motors and a control unit operated by a motor driver with the help of Arduino and the control unit would be governed by an android Bluetooth application through a Bluetooth module, mecanum wheels. There are 4 Dc motors drive to move the vehicle in forward and reverse directions. 360-degree rotating wheel is controlled by RF remote. Accordingly, we will use this 360-degree rotating vehicle for different perspectives wish to transport things overpowering bags and additionally in vehicles, which can help in decreasing hour gridlock and spare time.

It has turning radius nearly equal to negligible of length of the vehicle itself. This vehicle used to carry the goods in various area such as, railway platform, hospital, industries and market.

**Keywords:** Several dc gear motors, servo motors and a control unit, Arduino and the control unit, Bluetooth module, Mecanum wheels.

## I. INTRODUCTION

This project is about 360-degree rotating vehicle. This vehicle moves in all directions and this design provides better comfort and also saves the time, most of the people uses this vehicle to carry goods, emergency patients etc.

The normal wheel vehicles face lot of problems like parking, U turn and much more which consumes more time. So, we have designed a 360-degree wheel rotating vehicle to reduce and eliminate problems in the industry as well as common life of people. The vehicle can take a turn without moving the vehicle.

No extra space is required to turn the vehicle. In this system, each of the 4 wheels has given drive with DC motors, so it can rotate 360 degree. 360-degree rotating wheel is controlled by RF remote. Consequently, we can utilize this 360-degree rotating vehicle from various perspectives like to transport things overwhelming bags and furthermore in vehicles, which will help in decreasing rush hour gridlock and spare time.

## II. LITERATUREREVIEW

The advanced new technology has led to various modifications in the automobile sector. Out of these, zero Degree turning radius which is being analysed in various vehicle e.g. hurricane jeep, JCB, Nano Pixel etc. The turning circle of a vehicle is the diameter described by the outside wheels when turning on full lock.

There is no hard and fast formula to calculate the turning circle but it can be calculated using this;

Turning circle radius=  $(\text{track}/2) + (\text{wheelbase}/\sin(\text{average steer angle}))$  presented zero turn four wheel steering system, the various functions of the steering wheel are, to control the angular motion 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, the road irregularities must be damped to the maximum possible extent. This project the use of steering is to rotate front wheels.

Mr. Sharad P. Mali, presented zero turn fourwheel mechanism, in this project people have used DC motor and wheel to vehicle rotate 360 degree at a same position. So in this project, the idea is to arrange of DC motor and wheel.

### COMPONENTS USED IN 360 DEGREES WHEEL ROTATION VEHICLE

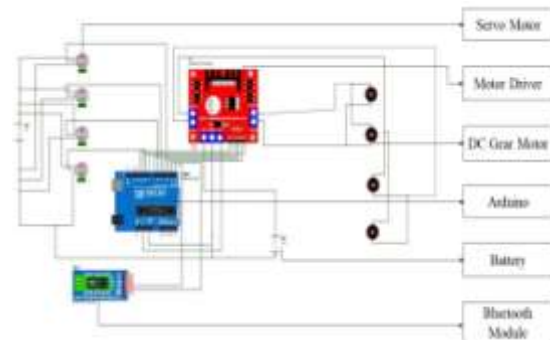
1. ARDUINO UNO MICRO CONTROLLER
2. L293D MOTOR DRIVER SHEILD
3. 12 VOLT 5 AMP SMPS
4. HC 05 BLUETOOTH MODULES
5. MECHANUM WHEEL
6. DC GEAR MOTOR
7. FRAME
8. RIBBON WIRE
9. DTDP ROCKER SWITCH

### CONSTRUCTION AND WORKING

A chassis consists of an internal framework that supports a manmade object in its construction and use. An example of a chassis is the under part of a motor vehicle, consisting of the frame. Four wheels are attached to the frame, which are driven by 30rpm DC motor. DC motors are used in each wheel to provide forward and backward movement of this vehicle, also a battery is used to provide electrical energy of each DC motor. Here the amount of driving force is irrelevant as long as it is sufficient to overcome the wheels of the vehicle by 360 degree using remote. Transmitter receiver concept in electronics is used to control the rotation of vehicle. Remote of the vehicle consist of keypad by which we operate the vehicle. Transmitter is in the remote from which signals are transmitted to the receiver in the vehicle. The transmitter in remote send radio frequency of 433MHz by using encoder. Encoder is used to convert the frequency into digital format which is able to receive by the receiver. In receiver circuit in the vehicle consist of decoder which converts the digital frequency transmitted from the transmitter into analog frequency. This transmitted frequency is lost while transmitting. The frequency received by the receiver is given to the decoder & then to microcontroller. The signal is then passed to the DC driver which gives power to the motor.



### Control Circuit Diagram :

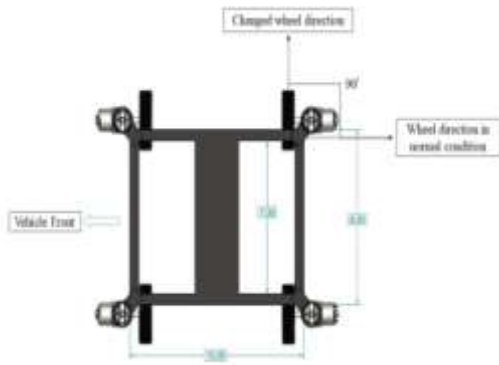


First, make sure your Arduino is powered off by unplugging it from the USB cable. Now, take the required parts and connect them up. It is essential for this project that you check and double-check all of your connections are as they should be before supplying power to the circuit, as failure to do so may result in damage to your components or even your Arduino. The diode, in particular, is essential to protect the Arduino from back EMF, which we will explain later.

### FEATURES OF VEHICLE

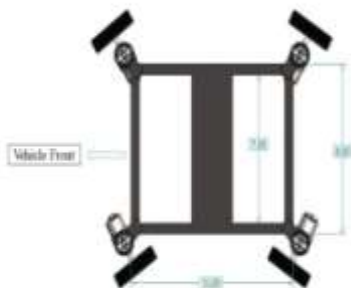
1. Sideways movement
2. Four-wheel steering
3. 360-degree turning mode
4. Crab steering Sideways Movement

In order to achieve sideways movement, all the wheels of the vehicle would be turned at 90-degree along with the normal direction of the wheels. For example, in order to move right side parallelly, front right wheel and rear left wheel would be turned 90° clockwise whereas rear right wheel and front left wheel would be turned 90° anti-clockwise.



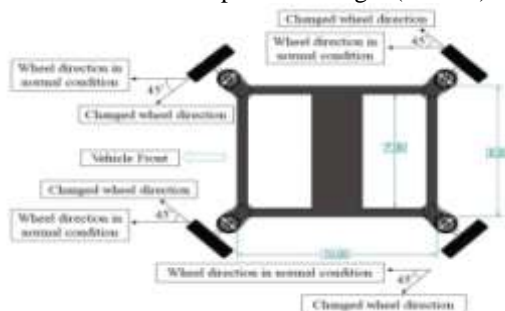
### The Four-wheel Steering

In four-wheel steering mode, both of the rear wheels can turn opposite to the direction of turning of the front wheels. For example, in order to have left side turn both the front wheels would be turned left whereas the rear wheels would be turned to the right.



### 360-degree Turning Mode

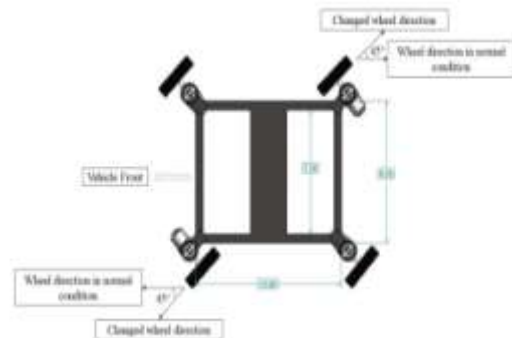
This model of vehicle can rotate 360° at the same place where it is standing by using only the length of vehicle itself. In order to achieve this, front right wheel and rear left wheel would be turned anticlockwise at a particular angle (i.e. 45°) and front left wheel and rear right wheel would be turned clockwise at a particular angle (i.e. 45°).



### Crab Steering

In this mode, all the four wheels will be steered in the similar direction and at the similar angle which makes the direction of all the wheels parallel to each other. This steering mode enables

the vehicle to have straight-line stability.



### FABRICATION PROCESS USED FOR MAKING THE VEHICLE

1. Metal Cutting
2. Drilling
3. Boaring
4. Grinding
5. Turning
6. Welding
7. Soldering
8. Sheet metal cutting

### III. APPLICATIONS

- It is used for material moving around the industry
- Movement in sharp and narrow areas
- It is used almost in all types of terrain
- project to use this in efficient way to control the movement of heavy loads in industry
- In Industries for automation of raw material like automated guided vehicle.
- 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.

### ADVANTAGES OF VEHICLE

- It consumes very less time to turn from one direction to other direction.
- It is more efficient compare to other type of load carry vehicle.
- This type of load carry vehicle is easily parked in any direction.
- It is less costly load carry vehicle.
- Eco friendly.
- Less noise operation.

- Battery operated thus no fuel required.
- More efficient.

#### DISADVANTAGES

This type of load carry vehicle is not applicable to carry more weight.

Battery power is required to move of the vehicle.

#### CONCLUSION

A prototype for the proposed approach was developed by introducing steering and DC motor 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.

A model for the proposed approach was created by acquainting controlling and DC engine with wheel turn 360 degree. This model was seen as ready to be moved effectively in tight spaces, and after production of 360 degree wheel pivot vehicle devoured 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 and in a parking area.

#### REFERENCES:

- [1]. JaishnuMoudgil, ShubhankarMengi and Mudit Chopra, 360 Degree Rotating Vehicle to Overcome the Problem of Parking Space, International Journal of Research in Mechanical Engineering and Technology, 5(2), 2015, 22-25.
- [2]. Sudipkachhia, Design of 360 Degree Rotating Car, International Journal of Advance Research and Innovative Ideas In Education, 2(5), 2016, 15-16.
- [3]. K. Lohith, K. Lohith, Dr. S. R. Shankapal, M. H. Monish Gowda, Development of Four Wheel, Scholars Journal of Engineering and Technology, 12(1), 2013, 52-53.
- [4]. Er. Amitesh Kumar, Dr. Dinesh. N. Kamble, Zero Turn Four Wheel Steering System, International Journal of Scientific & Engineering Research, 5(12), 2014, 22-24.
- [5]. Mr. Sharad P. Mali, Mr. SagarJadhav, Prof. D.U. Patil, Zero Turn Four Wheel Mechanism, International Engineering Research Journal, 2(2), 2016, 484-486
- [6]. Neville, A., Stanton, Marsden P. (2001), From implications of automation in Vehicles , Automotive engineering, Vol.109, No.9, Pp.102-106.
- [7]. Rahmaan, Mohammad Ubaid Ur, et al. "360 Degree Wheel Rotation Vehicle."
- [8]. Kumar, ErAmitesh, Dr Dinesh, and N. Kamble. "Zero Turn Four Wheel Steering System." International Journal of Scientific & Engineering Research 5.12
- [9]. Kumar, K. Saravana. "Fabrication Of 360 Degree Rotating Wheel [10] Bulatovsky, V., and L. Pedko. "Four-Wheel Steering System." (2018)
- [10]. W. C. Lee, J. W. Lin, S. M. Lee, "4-wheel Independent In-wheel-motor Drive and Independent Steering Electric Vehicle Safety Analysis Method Based on Mass Redistribution Experiment", 6th International Conference on Automation, Robotics and Applications, Queenstown, New Zealand, 2015.
- [11]. Y. M. Degu, D. Thomas, F. Mersha, F. Hailu, "Design and Manufacturing of Mechanical Steering System for Parallel Parking, Zero-turning Radius, Minimum Turning Radius with Traditional Turning", Science, Technology and Arts Research Journal, 5(1), pp. 88-94, 2016.