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# **360 Degree Wheel Rotating Vehicle**

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**ABSTRACT:** 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, 7which will help in decreasingrush hour gridlock and spare time.

The aim of project is to foster a zero turning vehicle. Rather than working by gear framework, we are involving automatic framework for activity of this vehicle. Supplanting two wheel drives by four wheel drive makes more advantageous for the vehicle to proceed. Traditional controlling includes either the Ackerman or Davis directing framework which has significant weakness that it can't take least sweep turn. We attempt to take care of the issue of turning span by new idea of zero turning vehicles with mechanical linkages and automatic shifting. The primary reason for this venture is to lessen the turning sweep and turning space by pivoting at same spot without leaving its focal point of gravity. In this framework, the wheels associated with the front axles are gone inverse to each other, as are the wheels associated with the back hub. The wheels on the one left half vehicle pivot in one bearing and the ones on the right 50% of the vehicle. To conquer issue like vehicle moving on tight streets and during leaving this framework has been proposed.

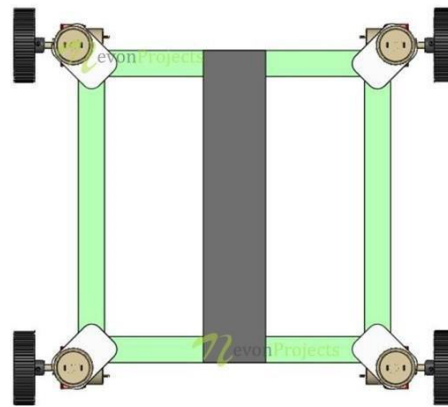
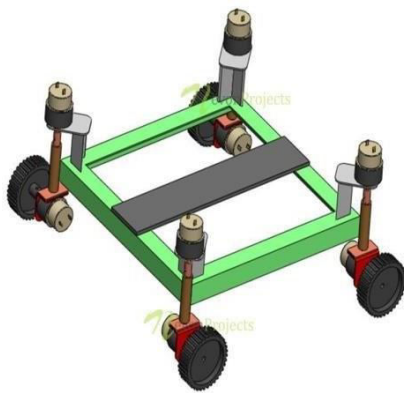
## **I. INTRODUCTION**

This project is about plan of 360 degree wheel turning vehicle. This vehicle moves every which way and this plan gives better solace and furthermore spares the season of clients, the vast majority of the general population utilizing this vehicle to co nvey products, understanding and so on. In any case, more often than not, they need to confront the issue like taking U turn and so forth. So need to structure a 360 degree wheel turning vehicle to lessen and dispose of issues in the business and at the railroad stage. This structure will give better solace and furthermore spares the season of clients, that is the reason it is additionally the dependable for the client. As it is likewise battery worked vehicle consequently no fuel is required. Consequently it is affordable to the earth. This will likewise diminish the expense of the vehicle. Zero degree turning span of a vehicle suggests the vehicle pivoting around a hub going through the focal point of gravity of vehicle for example the vehicle turning at a similar spot, where it is standing. No additional room is required to turn the vehicle. So vehicle is to be turned in the space equivalent to the length of the vehicle itself. In this framework, controlling is associated with sprocket and this sprocket is associated with sprocket of front wheel by chain drive. Guiding is utilized to give the course of front wheel. The DC engine is associated with sprocket jolt at above of casing. At the point when control supply from battery to DC engine then revolving movement exchange from DC engine to the wheel. The headings are give beneath sprocket which permit to wheel turn 360 degree about vertical pivot. At that point this equivalent rotating movement is exchange to the back wheels by sprockets and chain drive course of action. So accordingly this game plan of the vehicle wheels to turn 90 degrees left and 90 degree directly from unique position, however front wheels of this vehicle pivot 360 degree by controlling, sprocket and chain drive game plan. Without moving from the spot, for example the vehicle has zero turning span.

As referenced over, this task is about plan of 360 degree turning vehicle to move toward all path. This plan will give better solace and furthermore saves the hour of clients that is the reason it is additionally the dependable for the client. As



it is additionally battery worked vehicle hence no fuel is required. Consequently it is affordable to the climate. This will likewise diminish the expense of the vehicle. The brief about this task and subtleties of plan, materials, its assessment and so forth portrayed in resulting segment. The majority of individuals use vehicle in their regular routine, However more often than not, they need to confront the issues like stopping, taking U-turns and so forth So here we have planned a 360 degree turning vehicle to decrease and dispensed with issues to keep up with the traffic. A car producer is an organization that produces vehicles.



This project is about design of 360 degree wheel rotating vehicle. This vehicle moves in all directions and this design provides better comfort and also saves the time of customers, most of the people using this vehicle to carry goods, patient etc. But most of the time, they have to face the problem like taking U turn etc. So have to design a 360 degree wheel rotating vehicle to reduce and eliminate problems in the industry and at the railway platform. Zero degree turning radius of a vehicle implies the vehicle rotating about an axis passing through the center of gravity of vehicle i.e. the vehicle turning at the same place, where it is standing. No extra space is required to turn the vehicle. So vehicle is to be turned in the space equal to the length of the vehicle itself. In this system, steering is connected to sprocket and this sprocket is connected to sprocket of front wheel by chain drive. Steering is used to provide the direction of front wheel. The DC motor is connected to sprocket bolt at above of frame. When power supply from battery to DC motor then rotary motion transfer from DC motor to the wheel. The bearings are provide below sprocket which allow to wheel rotate 360 degree about vertical axis. Then this same rotary motion is transfer to the rear wheels by sprockets and chain drive arrangement. So as a result this arrangement of the vehicle wheels to turn 90 degrees left and 90 degree right from original position, but front wheels of this vehicle rotate 360 degree by steering, sprocket and chain drive arrangement. Without moving from the spot, i.e. the vehicle has zero turning radius. This helps in maneuvering the vehicle in tight spaces such as parking lots and within small compounds. 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 should coexist with the road feel for the driver so that he can feel the road condition without experiencing the effects of moving over it.

#### Working principle:

In this project battery provides the power supply to the control unit. The equipment contains totally six motors, two motors are 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 360 degree by the chain drive arrangements. The keypad in the control unit has six keys they are left, right, forward, reverse, park left, and park right. We press the left key in the keypad the vehicle turns left side in a required angle, we press the right key in the keypad the vehicle turns at right side in a required angle, similarly the forward and reverse motion of the vehicle are controlled by the forward and reverse key in the keypad. We want to park the vehicle in left side by press the park left key then the motor connected in the chain drive is turns the wheel left side 360 degree automatically, then the vehicle is parked in the left side, this process is same as right side. Using this we can easily park the vehicle in various areas.

### **Aim & objectives**

**Aim** - The aim of this project is to develop a zero turning vehicle. Instead of operating by gear system, we are using pneumatic system for operation of this vehicle. Replacing two wheel drive by four wheel drive makes more convenient for the vehicle to take the turn. Conventional steering involve either the Ackerman or Davis steering system which has major disadvantage that it can't take minimum radius turn. We try to solve the problem of turning radius by new concept of zero turning vehicle with mechanical linkages and pneumatic cylinders. The main purpose of this project is to reduce the turning radius and turning space by rotating at same place without leaving its centre of gravity. In this system, the wheels connected to the front axles are turned opposite to each other, and so are the wheels connected to the rear axle. The wheels on the on left half vehicle rotate in one direction and the ones on the right half of the vehicle

### **Objectives**

- Designing model system Reduce in revolving time
- Overcome in parking difficulty
- To turn the vehicle with no leaving its centre of gravity
- In this vehicle, the wheel of the car is turn to 360 degree angle.

Hence it is easy to take the car from the parking area if any object is placed at front and back side of the car and also avoid the traffic in road. The vehicle can able to turn at difficult bends.

### **Problem identification**

Continuous improvement and progressive development of modern technology has brought about the increment of vehicles on streets in a large scale. Besides, due to rapid increase of financial stability, a large number of people use their personal vehicles in their daily life. Most often they need to deal with the issues like short parking places, taking more time to park the vehicle or to take risky U-turns and so on. In that case, 360-degree rotating vehicle is probably the sole solution to park as many cars as possible in small, tight parking spaces with a short amount of time as this vehicle is capable of moving through all directions with respect to the vertical axis.



### **Conceptual design**

In this project battery gives the power supply to the control unit. The gear contains absolutely six engines, two engines are combined with the vehicle's left and right wheels of the front side, the following two engines are associated with the vehicle's left and right half of the rear. The four engines are utilized to run the vehicle. Another two engines are associated with turn the vehicle wheel 360 degree by the chain drive plans. The keypad in the control unit has six keys they are left, right, forward, switch, park left, and park right. We press the left key in the keypad the vehicle turns left side in an expected point, we press the right key in the keypad the vehicle turns at right side in a required point, also the forward and switch movement of the vehicle are constrained by the forward and turn around key in the keypad. We need to leave the vehicle in left side by press the recreation area left key then the engine associated in the chain drive is turns the wheel left side 360 degree consequently, then the vehicle is left in the left side, this process is same as right

side. Utilizing this we can undoubtedly leave the vehicle in different regions.

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 used of steering, sprocket, DC motor, bearing and chain drive. 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 people 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 steering system and DC motor. 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.

### **FABRICATION PROCESS**

1. Fabrication of the frame structure,
2. Fabrication of the brackets of motors
3. mounting the wheels on the axle by interference fit,
4. Mounting and aligning the simplex chain to all four sprocket

### **II. LITERATURE REVIEW**

This project consist of steering, chain sprocket, DC motor, wheel, bearing, iron pipe, battery and chain drive. In this system first the vehicle is stopped and wheels are then turned in the required direction with help of steering system and DC motor. Teeth of sprocket are completely mesh with chain drive which has used to provide rotary motion to rear wheels by help of DC motor. Steering is used to provide direction of rotation to front wheels by help of sprocket and chain drive arrangement. 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. It has turning radius nearly equal to negligible of length of the vehicle itself. This system is to be useful in hospitals, small industries and also on railway platforms. 360 degree wheel rotation vehicle consist of steering, chain sprocket, chain drive, iron pipe, battery, DC motor and wheel. In this vehicle sprocket of front wheel and sprocket of steering are connected by first chain drive and sprocket of rear wheel connected to second chain drive and DC motor has is given to each wheel to provide forward and backward movement of vehicle. When steering is to rotate clockwise and anticlockwise direction by hand then sprocket is connected with steering also rotates clockwise and anticlockwise direction. This rotary motion transfers to front wheels by chain drive because teeth of sprocket and chain drive are completely mesh to each other. Bearing is provided with sprocket which allows the wheel to rotate 360 degree. So as a result front wheels of this vehicle rotates in 360 degree direction by steering at a same position. When power is supplied from the battery to DC motor then DC motor starts to rotate in clockwise direction and also sprocket will rotate in clockwise direction because sprocket bolt is connected to DC motor, the same rotary force is transferred to other rear wheels by chain drive because sprocket of rear wheel are connected by chain drive and bearing has provide with sprocket which allow to wheel rotate. So as a result rear wheels also rotate 90 degree left from original position and reverse current flow from battery to DC motor then rear wheels rotate 90 degree right from original position. When power supply from battery to DC motors of each wheels then each DC motor starts rotate then wheels also rotate with DC motor because wheels and DC motors are connected by bolts and nuts. As a result vehicle moves in forward direction and when reverse current flow from battery to DC motors, then DC motors start rotate in opposite direction. As a result vehicle is move in backward direction

#### **Literature survey**

Arunkumar S M, Chandan Kumar Sahu, Yubaraj G M, Jahangeer A B [18] Proposed a system of consist of steering, chain sprocket, DC motor, wheel, bearing, iron pipe, battery and chain drive. In this system first the vehicle is stopped and wheels are then turned within the required direction with help of steering mechanism and DC motor. For the forward and backward movement of this vehicle, DC motors are used in wheel and a battery is used to provide electrical energy for the DC motor. It has turning radius nearly equivalent to negligible of length of the vehicle itself. This arrangement is to be helpful in hospitals, miniature industries and also on railway platforms. [2] Sudip Kachhia Proposed the idea of all electric concept of vehicle is that if it becomes a reality would prove to be a lot of fun to drive in the city. The vehicle works on 8 electric motors, four motors attached uniquely to each wheels and it can rotate 360 degrees. The wheels of



the car are magnetically coupled and it is controlled by magnetic fields. Hence the car is rotate fastly and effectively [3]. Jaishnu Moudgil 360 degree rotating car to beat the matter of parking zone. This car has zero degree turning radius of a vehicle implies the vehicle rotating about an axis passing through the axis of gravity of vehicle i.e. the vehicle turning at the similar place, where it's standing. No extra space is required to revolve the vehicle. So vehicle is to be turned within the space like to the length of the vehicle itself. during this presentation, so got idea of 360 degree wheel rotation vehicle and have plane to make 360 degree wheel rotation load carry vehicle, this vehicle is to be utilized in different area like industries, hospital, railway platform, etc.

### III. METHODOLOGY

To start of this project, a meeting with guide in the first week is done to manage the schedule of weekly meetings. The purpose is to inform the guide on the progress of the project and guided by the guide to solve difficulty. Briefing based on the introduction and next task of the project is given by guide. Make research of literature review with the means of the internet, books, available published articles and materials that is related to the title.

Designing phase start of by sketching few model models using manual sketch on A4 papers. Do it comparison for choose the best concept. Software applications are downloaded from internet to design the model based on the sketches. Software Creo parametric

2.0 helps to draw the better dimension. The preparation of mid-presentation of the project is next. Before presenting, the guide will see through the slide presentations and comment on corrections to be made. Then, presentation on the knowledge attained and instilled in the design phase is presented to a panel of three judges. Following up, is the fabrication of make some method for this project. Choose the material, make some list for the material and dimension. Doing it planning of fabrication process for this project. After that, start the fabrication process. It would take seven weeks to get this design and fabrication process alteration done.

#### Design calculations

Motor calculation Specification and calculation 60 rpm, 12V, 18W, Torque of motor:  $\tau = P \times 60 \div 2 \times 3.14 = 18 \times 60 \div 2 \times 3.14 \times N = 2.866 \text{ Nm}$

If load apply on the vehicle is 4 kg and length 385mm width of vehicle 270 mm. Find the reaction developed by each wheel and find the torque of each Wheel.

Weight=4 kg Length=385 mm Width=270 mm

To find the reaction force on each wheel (r)

$$R = \sqrt{\left(\frac{l}{2}\right)^2 + \left(\frac{b}{2}\right)^2}$$

$$R = \sqrt{\left(\frac{385}{2}\right)^2 + \left(\frac{270}{2}\right)^2}$$

$$R = 235.11$$

$$R = 236 \text{ mm}$$

Reaction per wheel =  $W/4 = 4/4 = 1$

$$\text{Weight} = Mg = 1 \times 9.81$$

$$= 9.81 \text{ N}$$

Torque on each wheel (T)

$$T = R \times r$$

$$T = 9.81 \times 236$$

$$T = 2.315 \text{ N.m}$$

Calculation of Motor Specification and calculation N=10rpm

Calculation of Motor Specification and  
calculation N=10rpm

Voltage=12

volt I=2 Amp

Power =  $V \times I$  Power=

12×2 VA Speed ratio

N1=10 rpm,

T1=15

N2=?

,

T2=3

8

$N1/N2=T2/T1$

$10/N2=38/15$

$N2=3.94 \text{ rpm}$

$P=2\pi NT/60$

$24=2\pi 4T/60$

$T=57.29 \text{ Nm}$

$T=57.29 \times 10^3$

N.mm

#### IV. WORKING

The base frame is manufactured as per the dimensions. At the corners of the frame the clamps are fixed with shafts mounted on them. Above the shaft the sprocket wheel setup is mounted. Totally four wheel sprocket are used in the setup. The wheel sprockets are connected using a cycle chain. Using the clamp the dc motor are mounted in the frame. The wheels are connected to the motor via the shaft. A 12v 7amp/hr battery is placed in the back of the frame. The interfaced electronic setup is then connected to the motor for controlling the motor setup. All the connections are made to connect to the battery. With this the setup is assembled. Now the power supply is given to all the circuits and motors.. The load is loaded in the loading area. Using battery power supply the motor starts to operate. The motor operation is controlled by the remote board. There are two types of key sets for controlling the motor. The first key set controls the forward and reverse operation of the device. This is achieved by varying the power supply to the motors using the relay board. Forward movement is achieved by giving positive supply and reverse motion by reversing the polarity. The second set of keys control the directions of the setup. 360\* rotation of the setup is achieved by this concept. The same principle applied above is done here also. By these processes the load is carried from one location to another without much disturbance. Due to 360\* rotation of wheels the movement of the setup is far more easy than the conventional systems used. Usage of remote control for controlling the movement of the device ensures that human intervention for controlling it is reduced. Because of this human error that occur carelessly or out of consciousness is greatly reduced. Other than that the cost for movement of resources is greatly reduced and unnecessary usage of manpower is reduced. This system increases the working time of the unit. Since humans get tired after some time of hard lifting works



## **V. RESULT AND CONCLUSIONS**

### **RESULT**

Performance analysis The performance analysis of the 360 degree wheel rotation vehicle has clearly shown that it is more efficient, economical and effective. In this project forward and backward movement of vehicle and turning of rear wheel of the vehicle are getting power from the battery in the form of an electrical energy. This energy is stored into a 12V battery and then supplied to the components. As the electrical power is used and transmitted to components by the use of electrical wires in place of any mechanical arrangement, this results in less noise, less wear of components and less vibration. Use of battery provides a smooth flow of current toward the components. Most of the time people are facing problem in parking and railway platform because other vehicles are taking more space to move from one direction to other direction. But developed 360 degree wheel rotation vehicle this problem is easily solved. Because this vehicle has capability to move from one direction to other direction in very less space. In this project a DC motor and battery are used according to load carry capacity which is of 5 kg, but vehicle is able to carry more load if use more than 12V of battery.

### **CONCLUSION**

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 is used in various areas such as small industries, railway platforms and in a parking area.

This project is made with pre planning, that it provides flexibility in operation. This innovation has made the more desirable and economical. This project "fabrication of 360 degree rotating wheel in vehicle" is designed with the hope that it is very much economical and help full to vehicles for parking and other purpose. This project helped us to know the periodic steps in completing a project work. Thus we have completed the project successfully.



#### **VI. FUTURE SCOPE**

In our project, we use two motors for rotating 360deg for the four wheels. Hence the single motor can used to rotating 360deg for the four wheels in future development.

The separate motor is used to run the wheel for movement. Hence single motor can used to run the wheel for movement in future development.

- A. We have built now only a prototype this can be built into a bigger model suiting to the needs and requirements of the customer.
- B. This equipment is semiautomatic in recent fabricated model using suitable technology it could be made fully automatic.
- C. Usage of renewable energy sources to power the device can be applied.

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