



FABRICATION OF 360 DEGREE ROTATING WHEEL IN ELECTRIC VEHICLE

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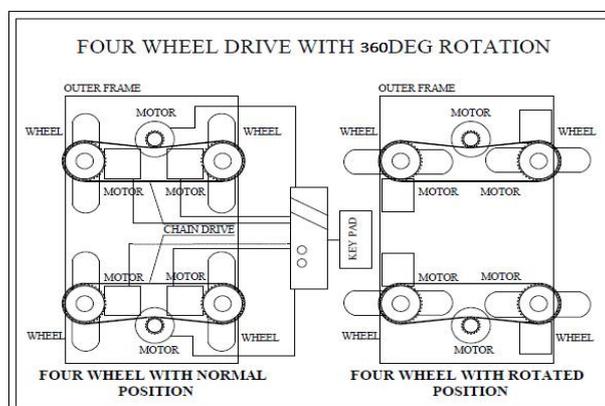
Abstract: Main function of car is to move from one place to another place. Most of the people use car in their daily life, but they face the problems like parking, taking U-turns etc... So here we have designed a 360 degree rotating car to eliminate this problem. This design will provide better comfort and also saves the time of customers.

Introduction: As mentioned above, this project is about design of 360 degree rotating car to move in all direction. This design will provide better comfort and also saves the time of customers, that's why it is also the reliable for the customer. As it is also battery operated car thus no fuel is required. Hence it is economical to the environment. This will also reduce the cost of the car. The brief about this project and details of design, materials, its estimation etc. described in subsequent section. Most of the people use car in their daily life, But most of the time, they have to face the problems like parking, taking U-turns etc. So here we have designed a 360 degree rotating car to reduce and eliminated problems to maintain the traffic. An automotive manufacturer is a company that produces vehicles.

Project objective:

- In this vehicle, the wheel of the car is turn to 360degree 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.

Block Diagram:



Parts Requirements:

- Dc motor
- Sprocket
- Chain drive
- Frame
- Switches
- Battery
- Wheels
- Bearings
- Connecting wires

Dc motor: In this vehicle one DC motor are provide in each wheel to move forward and backward direction. The specification of motor used is 12 V. When power supply from battery to DC motor then DC motor rotate in clockwise direction and when reverse current supply from battery to DC motor then DC motor will anticlockwise direction. Which will forward and backward movement of vehicle. The DC motor is also used to rotate the wheel at 360degreeAn electric motor uses electrical energy to produce mechanical energy machine that converts DC electrical power into mechanical power is known as a Direct Current motor. DC motor working is based on the principle that when a current carrying conductor is placed in a magnetic field, the conductor experiences a mechanical force. The direction of this force is given by Fleming's left-hand rule and magnitude is given by;

$$F = BIL \text{ Newtons}$$

According to Flemings left-hand rule when an electric current passes through a coil in a magnetic field, the magnetic force produces a torque which turns the DC motor. The direction of this force is perpendicular to both the wire and the magnetic field.

Flemings Left Hand Rule: Basically, there is no constructional difference between a DC motor and a DC generator. The same DC machine can be run as a generator or motor.

Working of DC Motor: Consider a part of a multipolar DC motor as shown in the figure below. When the terminals of the motor are connected to an external source of DC supply: the field magnets are excited developing alternate North and South poles the armature conductors carry currents. Part of Multi-polar DC Motor All conductors under North-pole carry currents in one direction while all the conductors under South-pole carry currents in the opposite direction. Since each armature conductor is carrying current and is placed in the magnetic field, a mechanical force acts on it. On applying Fleming's left-hand rule, it is clear that force on each conductor is tending to rotate the armature in the anticlockwise direction. All these forces add together to produce a driving torque which sets the armature rotates. When the conductor moves from one side of a brush to the other, the current in that conductor is reversed. At the same time, it comes under the influence of the next pole which is of opposite polarity. Consequently, the direction of the force on the conductor remains the same. It should be noted that the function of a commutator in the motor is the same as in a generator. By reversing current in each conductor as it passes from one pole to another, it helps to develop a continuous and unidirectional torque

Chain & sprocket: A chain drive is used for transmission of mechanical power between two sprockets. Chain drive is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles. Most often, the power is conveyed by a roller chain, known as the drive chain or transmission chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force into the system. Another type of drive chain is the Morse chain, invented by the Morse Chain Company of Ithaca, New York, United States. This has inverted teeth. Sometimes the power is output by simply rotating the chain, which can be used to lift or drag objects. In other situations, a second gear is placed and the power is recovered by attaching shafts or hubs to this gear. Though drive chains are often simple oval loops, they can also go around corners by placing more than two gears along the chain; gears that do not put power into the system or transmit it out are generally known as idler-wheels. By varying the diameter of the input and output gears with respect to each other, the gear ratio can be altered. For example, when the bicycle pedals' gear rotate once, it causes the gear that drives the wheels to rotate more than one revolution.

A sprocket is a profiled wheel with teeth, cogs, or even sprockets that mesh with a chain. The sprockets are used for the power transmission between steering and wheel through the roller chain drive. A sprocket[1] or sprocket-wheel[2] is a profiled wheel with teeth, or cogs,[3][4] that mesh with a chain, track or other perforated or indented material.[5][6] The name 'sprocket' applies generally to any wheel upon which radial projections engage a chain passing over it. It is distinguished from a gear in that sprockets are never meshed together directly, and differs from a pulley in that sprockets have teeth and pulleys are smooth.

Sprockets are used in bicycles, motorcycles, cars, tracked vehicles, and other machinery either to transmit rotary motion between two shafts where gears are unsuitable or to impart linear motion to a track, tape etc. Perhaps the most common form of sprocket may be found in the bicycle, in which the pedal shaft carries a large sprocket-wheel, which drives a chain, which, in turn, drives a small sprocket on the axle of the rear wheel. Early automobiles were also largely driven by sprocket and chain mechanism, a practice largely copied from bicycles.

Sprockets are of various designs, a maximum of efficiency being claimed for each by its originator. Sprockets typically do not have a flange. Some sprockets used with timing belts have flanges to keep the timing belt centered. Sprockets and chains are also used for power transmission from one shaft to another where slippage is not admissible, sprocket chains being used instead of belts or ropes and sprocket-wheels instead of pulleys. They can be run at high speed and some forms of chain are so constructed as to be noiseless even at high speed.

Bearing: A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. In this vehicle bearing is use easy to move wheel from one direction to other direction; each bearing is connected with each wheel with the help of sprocket. A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may *prevent* a motion by controlling the vectors of normal forces that bear on the moving parts. Most bearings facilitate the desired motion by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts.

Rotary bearings hold rotating components such as shafts or axles within mechanical systems, and transfer axial and radial loads from the source of the load to the structure supporting it. The simplest form of bearing, the *plain bearing*, consists of a shaft rotating in a hole. Lubrication is often used to reduce friction. In the *ball bearing* and *roller bearing*, to prevent sliding friction, rolling elements such as rollers or balls with a circular cross-section are located between the races or journals of the bearing assembly. A wide variety of bearing designs exists to allow the demands of the application to be correctly met for maximum efficiency, reliability, durability and performance.

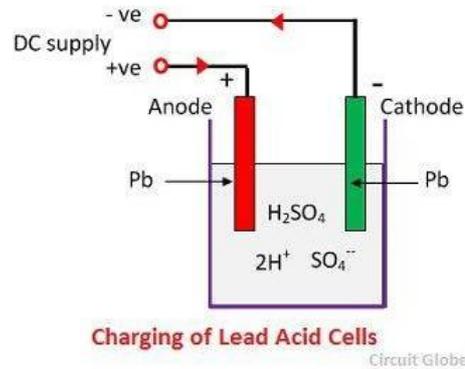
The term "bearing" is derived from the verb "to bear" a bearing being a machine element that allows one part to bear another. The simplest bearings are bearing surfaces, cut or formed into a part, with varying degrees of control over the form, size, roughness and location of the surface. Other bearings are separate devices installed into a machine or machine part. The most sophisticated bearings for the most demanding applications are very precise devices; their manufacture requires some of the highest standards of current technology.



Frame: The fixed frame forms the base of the 360 degree wheel rotation vehicle. This frame is made of Mild Steel (MS). All parts are attached with the frame.

Battery: A automotive battery is a rechargeable battery supplies electrical current to a motor vehicle. Its main purpose is to feel the starter, which starts the engine Once a engine running, power for the cars electrical system is applied by the alternator. The various parts of the lead acid battery are shown below. The container and the plates are the main part of the lead acid battery. The container stores chemical energy which is converted into electrical energy by the help of the plates. When the sulfuric acid dissolves, its molecules break up into positive hydrogen ions ($2H^+$) and sulphate negative ions (SO_4^{2-}) and move freely. If the two electrodes are immersed in solutions and connected to DC supply then the hydrogen ions being positively charged and moved towards the electrodes and connected to the negative terminal of the supply. The SO_4^{2-} ions being negatively charged moved towards the electrodes connected to the positive terminal of the supply main (i.e., anode). Each hydrogen ion takes one electron from the cathode, and each sulphates ions takes the two negative ions from the anodes and react with water and form sulfuric and hydrogen acid.

The oxygen, which produced from the above equation react with lead oxide and form lead peroxide (PbO₂.) Thus, during charging the lead cathode remain as lead, but lead anode gets converted into lead peroxide,



chocolate in colour If the DC source of supply is disconnected and if the voltmeter connects between the electrodes, it will show the potential difference between them. If wire connects the electrodes, then current will flow from the positive plate to the negative plate through external circuit i.e. the cell is capable of supplying electrical energy.

Wheel: The wheel bearing assist the wheels in turning smoothly. Basically, the function of the wheel hub is to keep the wheel spinning freely on the bearing while keeping it attached to the vehicle. Rolling is an efficient way to reduce friction. When you slide a block across a smooth surface, it will slide for a short distance and then come to a stop. When you roll a ball across that surface, it will roll a long way. There are two basic parts of wheels; the wheel and the axle. The wheel itself is a round disk. The axle is a shaft positioned in the center of the disk. Sometimes the disk itself spins on the axle. Often the axle is fixed to the disk and the wheel and axle turn together. When a wheel is rolling along the ground, a fraction of the surface touches the ground. Yet this surface doesn't have to slide on the ground. Friction mainly occurs in the axle and is greatly reduced. Rolling friction is much weaker than sliding friction. By rolling, wheels make it easier to move things from place to place.

Wire: A wire is a single, usually cylindrical, flexible strand or rod of metal. Wires are used to bear. Wire is commonly formed by drawing the metal through a hole in a die or draw plate. Wire gauges come in various standard sizes, as expressed in terms of a gauge number. The term *wire* is also used more loosely to refer to a bundle of such strands, as in "multistranded wire", which is more correctly termed a wire rope in mechanics, or a cable in electricity. Wire comes in solid core, stranded, or braided forms. Although usually circular in cross-section, wire can be made in square, hexagonal, flattened rectangular or other cross-sections, either for decorative purposes, or for technical purposes such as high-efficiency voice coils in loudspeakers. Edge-wound^[1] coil springs, such as the Slinky toy, are made of special flattened wire

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.

Advantages:

- Eco Friendly
- Less Noise Operation
- Battery Operated thus No Fuel Required
- Non Toxic And No Hazardous
- Less Costly
- Less Maintenance except battery requirement
- More Efficient
- Car Can Easily Parked



Application:

- It is used in Automated Guided Vehicle
- In Automobiles Application
- In industries For Transportation of Raw Material

Conclusion:

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.

Future development:

- 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 the four wheels in future development.
- The seperate motor is used to run the wheel for movement. Hence single motor can used to run the wheel for movement in future development.

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