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360 Degree 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 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.**

I. INTRODUCTION

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 provided below sprocket which allow to wheel rotate 360 degreeabout 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 co-exist with the road feel for the driver so that

2. Working principle and components

This project consists 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 degrees. 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 is connected by chain drive and bearing has provide with sprocket which allow to wheel rotate. So, as a result rear wheels also rotate 90 degrees left from original position and reverse current flow from battery to DC motor then rear wheels rotate 90 degrees right from original position.
- When power supply from battery to DC motors of each wheel 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.

II. METHODOLOGY

- Design Process: Describe the design phase, including software tools used (e.g., CAD software) and design considerations (e.g., weight distribution, stability).
- Mechanism of Rotation: Explain the engineering behind the 360-degree rotation, including the type of wheels or tracks used, and the control systems implemented.
- Simulation and Testing: Outline the simulation methods (e.g., physics engines, virtual testing environments) and the criteria for evaluating performance (e.g., speed, agility, stability).

The concept of a 360-degree rotating vehicle typically refers to vehicles that can rotate or maneuver in a full circle without needing to reverse or turn in a traditional manner. This capability can be particularly useful in tight spaces or for specific applications such as urban mobility, robotics, or specialized industrial vehicles. Here are some methodologies and technologies that can enable 360-degree rotation in vehicles.

1. The main components used to fabricate the model are: Battery
1. Steering
2. Sprocket
3. Chain drive
4. Wheel
5. Iron pipe
6. DC motor
7. Bearing
8. Fixed frame
9. Battery

Fig. 1.1 Components of Project

2. APPLICATION

1. It consumes very less time to turn from one direction to other direction.
2. It is more efficient compare to other type of load carry vehicle.
3. This type of load carry vehicle is easily parked in any direction.
4. It is less costly load carry vehicle.
5. Eco friendly.
6. Less noise operation
7. Battery is using in this 360-degree wheel rotation vehicle to move forward and backward, so it is a kind pollution free vehicle.

III. EXPERIMENTAL ANALYSIS

A. Conducting 360-degree rotating vehicle experimental analysis involves several key components, including the design of the vehicle, the methodology for testing, data collection, and analysis. Below is a structured approach to conducting such an analysis:

1. Objective of the Experiment

Define the purpose of the analysis. Common objectives might include:

- Evaluating the stability and control of the vehicle during rotation.
- Assessing the impact of rotation on passenger comfort.
- Measuring the vehicle's performance metrics (speed, acceleration, etc.) during rotation.

2. Vehicle Design

- Type of Vehicle: Determine whether the vehicle is a car, drone, or another type of vehicle capable of 360-degree rotation.
- Rotation Mechanism: Design a mechanism that allows for smooth 360-degree rotation. This could involve a gimbal system, a rotating platform, or a specialized chassis.
- Sensors and Instruments: Equip the vehicle with necessary sensors (gyroscopes, accelerometers, GPS, etc.) to collect data during the experiment.

IV. DESIGN IF PROJECT

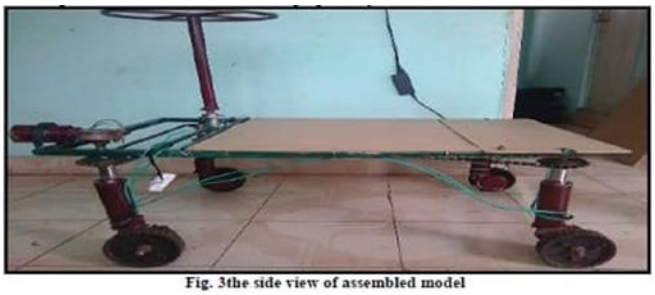

Fig. 3the side view of assembled model

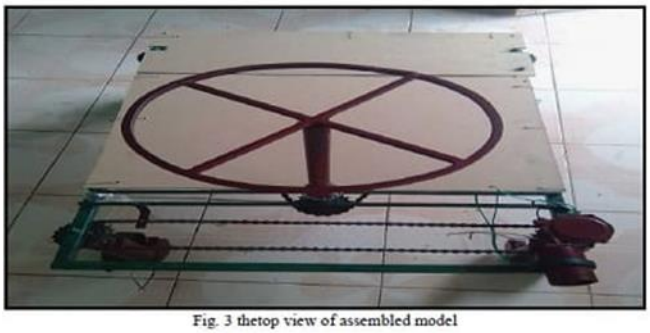

Fig. 3 thetop view of assembled model

Fig.2 360-degree wheel rotating vehicle

V. CHALLENGES AND INNOVATIONS

- Challenges

1. Mechanical Complexity:

- Design and Engineering: Creating a vehicle that can rotate 360 degrees involves complex mechanical systems. Ensuring durability and reliability while maintaining a compact design is a significant challenge.
- Weight Distribution: Balancing the vehicle's weight during rotation is crucial to prevent tipping or instability.

2. Power and Energy Management:

- Energy Consumption: Rotating mechanisms may require additional energy, impacting the vehicle's overall efficiency and range.
- Battery Life: For electric vehicles, managing battery life while powering the rotation mechanism is essential.

- Innovations

1. Advanced Materials:

- Lightweight Composites: Utilizing advanced materials like carbon fiber or lightweight alloys can reduce weight and improve performance.
- Flexible Structures: Innovations in flexible materials could allow for more adaptable designs that

enhance rotation capabilities.

2. Robust Control Systems:

- AI and Machine Learning: Implementing AI-driven control systems can enhance navigation, stability, and user experience by predicting and adapting to user behavior.

- Gyroscopic Stabilization: Using gyroscopes to maintain balance during rotation can improve safety and control.

3. Disadvantages

- This type of load carry vehicle is not applicable to carry more weight**.**
- Battery power is required to move of the vehicle.

1. Battery Life and Power Efficiency Semi-automatic floor cleaners often rely on rechargeable batteries, which need to last long enough for thorough cleaning sessions. However, optimizing battery life without sacrificing power or functionality is challenging, especially for larger areas.
2. Water and Chemical Usag Reducing water and cleaning chemical consumption is increasingly important to minimize waste and costs. Balancing effective cleaning with reduced usage remains a key challenge, especially in areas with strict environmental regulations.
3. Mobility and Maneuverability Semi-automatic models need to be easy to move and navigate around various obstacles. Designing compact yet powerful devices that can handle both small and large spaces can be challenging, especially when factoring in different flooring types.
4. Noise Levels Many commercial and residential spaces need quieter cleaning solutions, particularly in environments where excessive noise would be disruptive, such as hospitals and office buildings. Reducing noise while maintaining cleaning power requires careful engineering.
5. Cost Constraints Advanced features like sensors and IoT integration can increase costs, making the product less accessible. Keeping devices affordable without sacrificing quality and features is an ongoing challenge.
6. Maintenance and Durability Semi-automatic floor cleaners are subject to wear and tear, and finding ways to minimize maintenance needs while improving durability can be a challenge, especially for devices used in commercial or industrial environments.

VI. CONCLUSION

Intechnology conclusion, A 360-degree rotating vehicle represents a significant advancement in transportation, offering unique benefits and applications across various sectors. Here are some key conclusions regarding such vehicles:

1. Enhanced Maneuverability: The ability to rotate 360 degrees allows for greater agility in tight spaces, making these vehicles ideal for urban environments, construction sites, and other areas where traditional vehicles may struggle to navigate.

2. Improved Safety: With the capability to rotate and reposition without needing to reverse or turn around, these vehicles can reduce the risk of accidents, particularly in crowded or complex environments.

3. Versatile Applications: 360-degree rotating vehicles can be utilized in various fields, including logistics, emergency services, agriculture, and entertainment, providing tailored solutions to specific operational challenges.

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