

Low Cost Multipurpose Electrical Vehicle

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Abstract: The design of an electric powered tricycle for use as a commercial means of transportation. The tricycle uses an electric brushless direct current motor connected to the rear wheels of the tricycle using the chain and sprocket mechanism. This motor is powered by direct current from the battery bank. Lightweight motorized tricycles have been a hit with senior population who love the fact that the bike has large baskets in the front and rear which allow them to perform nearby errands. Now that we have explained the function and capabilities of motorized electric tricycles, we wanted to provide a brief introduction of our own lineup of electric tricycle. The design of the three-wheeled battery electric vehicle must have many favorable characteristics such as low mass and good aerodynamics. The vehicle designed with one seat to be thrust by brushed motor attached on the rear wheel and powered by 48V Lithium-ion battery. The fabricated three-wheel battery electric vehicle total weight is 75kg. It is tested in different tracks, many attempts, with best result ---km/kWh. Vehicle maximum speed is ---km/h and the maximum efficiency is 70% at 40km/h.

Keywords: Prototype, battery electric, three-wheel vehicles, lithium-ion battery, chassis.

I. INTRODUCTION

The electric tricycle vehicle project aims to develop an alternative transportation solution for short to medium distance travel. The project will focus on designing and building an electric tricycle that is efficient, reliable, and cost-effective. The vehicle will be powered by a rechargeable battery, and it will have three wheels for stability and ease of use. The project aims to promote sustainable transportation and reduce carbon emissions. The introduction of electric bikes to the mainstream market in the previous decade has been met with enthusiasm by individuals who prefer a method of transportation that is more environmentally friendly, less expensive and more convenient than a car in certain circumstances. The enthusiasm has not abated and continues to remain as new technological advances in the motorized electric bike industry keep electric bikes in the forefront for many individuals, who desire to make an environmentally friendly and cost-efficient form of transportation. One of the latest technological advances has been the creation of motorized electric tricycles. Think of your traditional tricycle that was used.

II. ELECTRIC MOTOR (BLDC)

The electric motor is the heart of the tricycle, which provides power to the wheels. Depending on the size and weight of the tricycle, you will need a motor with adequate power to move the vehicle.

2.1 Specification

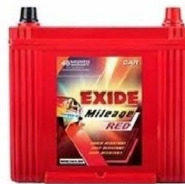
- Rated Voltage (V): 48
- Rated output power: 750w
- Speed after Reduction (RPM): 480
- Gear Ratio: 1:6
- Full Load Current (mA): 32A



2.2 Battery

An electric tricycle requires a rechargeable battery to store the electricity needed to power the motor. Lithium-ion batteries are commonly used in electric tricycles because they are lightweight and have a high energy density.

- Brand- Exide Size-12XL9B
- Voltage-12 Volts
- Battery Cell Composition-Lead Acid
- Item Dimensions-LxWxH20.3 x 8.9 x 19.1 Centimeters
- Number of Battery Required- 4



2.3 Motor Controller

The motor controller regulates the speed and direction of the electric motor, allowing the rider to accelerate or decelerate the tricycle.



2.4 Throttle

The throttle is the device that the rider uses to control the speed of the tricycle. The throttle can be a hand or foot-operated device.

- Control voltage: 0-5V or 1-4V
- Current rating: up to 5A
- Operating temperature range: -20°C to 60°C
- Connector type: typically a three-pin connector with a signal wire, a ground wire, and a power wire.
- Throttle type: twist grip, thumb throttle, or foot-operated pedal. Resistance: typically between 4kΩ and 10kΩ.
- Cable length: typically between 1 and 2 meters.
- Waterproof rating: some throttles may have a waterproof rating, such as IP65 or IP66.



2.5 Brake

Electric tricycles require a braking system to slow down or stop the vehicle. Some tricycles use mechanical brakes, while others use electronic brakes.



2.6 Wheels and Tires

The wheels and tires of an electric tricycle should be durable and able to handle the weight of the vehicle and its load.

- Dimension Of Wheel: 26 Inches



2.7 Frame

The frame of the tricycle must be sturdy and able to support the weight of the rider and any cargo.



2.8 Lighting

An electric tricycle should have proper lighting, including headlights, taillights, and turn signals to ensure safety on the road.

2.9 Accessories

Depending on the purpose of the tricycle, you may need additional accessories such as a cargo box, a canopy, or a seat for a passenger.



III. ADVANTAGES

- **Eco-Friendly:** Electric tricycles produce zero emissions, making them an environmentally friendly mode of transportation. They help reduce air pollution and carbon footprint, which is crucial in addressing climate change.
- **Cost-Effective:** Electric tricycles are generally less expensive to maintain compared to traditional gasoline-powered vehicles. They have fewer moving parts, require less maintenance, and are cheaper to charge than to fuel up a gasoline-powered vehicle.
- **Last-Mile Connectivity:** Electric tricycles can provide a solution to last-mile connectivity, connecting people to public transportation hubs or their final destinations. They can navigate narrow and congested roads and offer an affordable mode of transportation.
- **Mobility for People with Disabilities:** Electric tricycles can be designed to accommodate people with disabilities, offering a means of mobility and independence.
- **Low Noise:** Electric tricycles produce very little noise, providing a quieter mode of transportation, especially in urban areas.

IV. DISADVANTAGE

- **Limited Range:** Electric tricycles have a limited range compared to traditional gasoline-powered vehicles, and long-distance travel may require frequent charging.
- **Limited Speed:** Electric tricycles have a limited speed compared to traditional gasoline-powered vehicles, making them less suitable for long-distance travel.

- **Battery Life:** The battery life of an electric tricycle may decrease over time, and the cost of replacing the battery can be expensive.
- **Limited Cargo Capacity:** Electric tricycles generally have limited cargo capacity, making them less suitable for commercial transportation purposes.
- **Charging Infrastructure:** The availability of charging infrastructure can be a limitation for electric tricycles, especially in developing countries or rural areas.

V. IMPLEMENTATION & FUTURE SCOPE

- **Environmentally Friendly Transportation:** Electric tricycles are an eco-friendly mode of transportation as they produce zero emissions, which helps in reducing air pollution and carbon footprint.
- **Cost-Effective:** Electric tricycles are cost-effective compared to other electric vehicles and even traditional gasoline-powered vehicles.
- **Last-Mile Connectivity:** In urban areas, electric tricycles can provide last-mile connectivity to commuters.
- **Mobility for People with Disabilities:** Electric tricycles can provide a means of mobility for people with disabilities.
- **Delivery Services:** Electric tricycles can be used for last-mile delivery services, such as delivering packages or food orders.
- **Tourism:** Electric tricycles can be used for tourism purposes, such as providing guided tours of cities or scenic routes.

VI. CONCLUSION

The electric tricycle as compared the conventional petrol powered tricycles gives you a cost savings of over three hundred thousand naira on running cost as against the petrol powered which is almost enough to purchase another electric tricycle which means good business for the entrepreneur. It also has a carbon savings of 32 tonnes against the conventional tricycle which makes it absolutely a better option if intelligent steps are to be taken to combat global warming. Safety in automobiles is a very integral part, so the Design was done in such a way the driver does not speed beyond the set limits of 30Km/hr and this helps minimize the hazards that accompany over speeding and it's also helps the brake to be fully initiated at any instance in time. In conclusion, this project seeks to provide an alternative source of power for vehicles. thereby ensuring that regardless of the various challenges that may affect the petroleum sector in Nigeria, commercial transportation will still be a vibrant sector in the country as total dependence on petrol or diesel will be avoided.

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