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Review Of Motorized Tricycle For The Person: The Study

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*Abstract:*Nowadays, transportation is an inseparable part of human life. Normal people can travel easily by utilizing facilities such as bicycles, bikes, cars, public transport, etc. Electric bicycles (e-bikes) have gained significant popularity in recent years as a sustainable and efficient mode of transportation. This abstract provides an overview of the technology, benefits, and challenges associated with electric bicycles. E-bikes incorporate an electric motor to assist riders in pedaling, offering increased speed and reduced effort compared to traditional bicycles. The integration of lithium-ion batteries allows for extended range and rechargeability. The benefits of e-bikes include reduced carbon emissions, improved health outcomes, and enhanced accessibility for individuals of varying physical abilities. However, infrastructure limitations, regulatory frameworks, and safety concerns remain. This abstract aims to highlight the growing importance of electric bicycles in the context of urban mobility and sustainable transportation solutions. The tricycle mainly consists of a PMDC motor, Battery, Charge controller, and Throttle. This paper includes all the information regarding tricycles and their main components used in it.

I. INTRODUCTION

Tricycles are a common mode of transportation found in both urban and rural settings, providing access to various public facilities such as markets, schools, workplaces, and healthcare facilities. However, traditional hand-crank designs have limitations in terms of range and speed due to the significant effort required from users, as well as challenges in maneuverability caused by the wheelchair's larger turning radius. Consequently, individuals with mobility disabilities face difficulties accessing essential services, including healthcare, education, and employment opportunities. To address these challenges and promote an active lifestyle among individuals with manipulative and locomotive disabilities, various assistive devices have been developed. These devices facilitate daily activities, enhance quality of life, and promote greater independence and productivity within society. Despite the significant advancements in mobility assistive devices, issues regarding stability arise with narrow tricycle designs, particularly as speed increases. These tricycles, designed for indoor and outdoor use, offer limited flexibility in key stability parameters such as wheelbase and wheel track Recognizing the importance of stability in powered two and three-wheel vehicles (PTW) highlighted by the World Health Organization (WHO), this work aims to develop an electric tricycle with enhanced speed, improved handling, and lateral stability. The design will undergo testing to evaluate rollover speeds during lateral acceleration, turning, and braking maneuvers. By prioritizing stability in the design process and investigating relevant parameters, this project seeks to enhance the safety and usability of electric tricycles for individuals.

II. Literature Review:

The following papers are being studied and are referred for the project. These papers belong to various authors, having various papers related to the battery-powered tricycle.

M. Reddi Sankar et al. [1]: The developed solar-assisted bicycle incorporates a DC motor mounted in either the front or rear axle housing and is driven by solar radiation. The battery powers the hub motor and is charged by the solar panels mounted on the carriage. When the bicycle is not in use, the solar panel will charge the battery. This arrangement replaces the gasoline engine, gearbox, and fuel tank on a two-wheeler, as well as the chain, sprocket, and gear-shifting mechanism on an ordinary person's bicycle. The solar-powered bicycle's front has a DC hub motor installed as part of the dissertation project.

Arinze Davidi et al. [2]: developed a to add an electric power train and control system to the current hand-powered tricycle to provide tricycle users with improved levels of mobility. The design objectives required a simple and affordable design for the power train and controls, a design that needed to be reliable, sustainable, and functional the design of the Electric Tricycle is adaptable to the current hand-powered tricycles with little modification. The design consists of an electric motor, a drive system, motor and steering controls, and a power supply.

N. Sasikumar et al. [3]: This paper addresses the growing significance of solar energy in India. With conventional energy sources depleting rapidly and contributing to environmental issues like global warming, solar energy emerges as a clean, abundant, and sustainable alternative. The paper discusses the declining costs of solar energy, particularly Solar Thermal Electricity (STE) and Solar Photovoltaic Electricity (SPV), which are becoming increasingly competitive with conventional power generation methods. SPV cells, comprised of semiconducting materials like silicon, convert solar radiation into electricity, offering a promising solution to energy demands while reducing greenhouse gas emissions.

Md. Fahim Bhuiyan el at.[4] in this paper, a detailed description of the design and development of a more efficient and lightweight BLDC motor controller for electric bikes/electric tricycles has been presented. The controller tested and experimented successfully. The experimental data of the no-load test shows the excellent performance of the locally developed BLDC motor controller over the existing BLDC motor controller. The developed motor controller consumes less power compared to the existing motor controller and makes less noise. The developed motor controller has improved performance over the existing controller due to the proper selection of the filtering component and for using high-frequency switching.

Yogesh Sunil Wamborikar et al. [5]: This paper presents a solar-powered vehicle as a crucial solution for the depletion of nonrenewable energy sources. It discusses the basic principle of a solar car, utilizing energy stored in a battery charged from a solar panel. The charged batteries drive the motor, serving as an engine to move the vehicle in reverse or forward directions. An electrical tapping rheostat controls the motor speed, preventing excess current flow during sudden stops, potentially conserving fuels in the future.

Shuh Jing Ying et al. [6]: This paper introduces a power-assist hand tricycle designed for individuals with lower extremity weakness. The tricycle is modified with an electric motor and battery to aid propulsion while retaining the original design and functionality. The battery, motor, speed reducer, and clutch are properly arranged, allowing adjustment of speed settings. Salvaged lightweight tricycles, weighing about thirty pounds, are refurbished for this purpose, incorporating additional features for user convenience.

Chetan Mahadik et al. [7]: This paper presents the development of an improved and efficient electric bicycle system with real-time information-sharing capabilities. It demonstrates the upgrade of a conventional bicycle to an electric one using components such as a brushless DC motor, motor controller, photovoltaic solar panel, and dry-cell battery. Multiple charging sources including AC voltage, solar energy, and mechanical pedal charging systems are utilized, ensuring flexibility and sustainability in the power supply.

Qingfeng Su et al. [8]: This paper discusses the potential of solar electric vehicles to reduce greenhouse gas emissions and pollution. Solar electric vehicles utilize solar energy for propulsion, offering advantages such as noise reduction, pollution prevention, energy conservation, and carbon dioxide emission reduction. The dual-mode PV and battery hybrid drive system enables independent PV-driven and battery-driven operation, substantially increasing charge endurance in optimal solar conditions. Solar electric vehicles contribute to low-carbon, energy-saving, environmentally friendly transportation solutions for the future.

III. Conclusion:

The conclusion of the research paper on electric tricycles emphasizes the following key points:

1. Sustainability Impact: Electric tricycles represent a viable and environmentally friendly mode of transportation, offering reduced emissions and energy consumption compared to traditional vehicles. Their adoption has the potential to significantly contribute to mitigating climate change and improving air quality in urban areas.

2. Efficiency and Performance: The research findings confirm that electric tricycles demonstrate commendable efficiency and performance characteristics. They are well-suited for navigating congested urban environments, providing a cost-effective and practical transportation solution for commuters and delivery services.

3. Challenges and Future Directions: Addressing challenges such as battery range, charging infrastructure, and regulatory frameworks will be critical for the successful integration of electric tricycles into urban transportation systems. Future research should focus on optimizing battery performance, expanding charging infrastructure, and advocating for supportive policies to accelerate their adoption.

In conclusion, electric tricycles hold immense promise as a sustainable and efficient mode of transportation. Through collaborative efforts between policymakers, industry stakeholders, and researchers, the full potential of electric tricycles can be realized, leading to a more sustainable and resilient urban transportation landscape.

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