IJITCE

ISSN 2347- 3657

International Journal of Information Technology & Computer Engineering

Email : ijitce.editor@gmail.com or editor@ijitce.com

International Journal of Information Technology & Computer Engineering

ISSN 2347–3657

Volume 12 , Issue 2, April 2024

DESIGN OF SOLAR TRICYCLE FOR PHYSICALLY CHALLENGED PEOPLE

K. Murali Krishna Raju[1] G.Bhavana[2] K.V.V.Pawan Kumar[3]
M. Deepika[4] R. Hemanth[5] V.Achyuth Kumar[6]
[1]Assistant Professor, [2,3,4,5,6]UG Scholars
Department of Electrical and Electronics EngineeringChalapathi Institute of Engineering and Technology,Guntur
Email: cieteeehod@chalapathiengg.ac.in

Abstract

The solar tricycle is a revolutionary form of sustainable transportation that combines the efficiency of a tricycle with the eco-friendly benefits of solar power. This innovative vehicle harnesses the energy of the sun through solar panels mounted on its roof, which convert sunlight into electricity to power the electric motor. This means that the solar tricycle produces zero emissions and are completely self-sufficient, making it an ideal mode of transportation for environmentally conscious individuals. In addition to its green credentials, the solar tricycle offers a smooth and comfortable ride, thanks to its ergonomic design and lightweight construction. The vehicle is equipped with high-quality components, including a durable frame, reliable brakes, and responsive steering, ensuring a safe and enjoyable journey for the rider.Furthermore, the solar tricycle is equipped with a range of features to enhance convenience and practicality. These include storage compartments for carrying groceries or other items, LED lights for visibility at night, and a digital display for monitoring battery levels and performance. With its cutting-edge technology and sleek design, the solar tricycle represents the future of sustainable transportation and offers a glimpse into a world where clean energy powers our everyday lives.

I. Introduction

The solar tricycle project is a pioneering initiative that aims to revolutionize the way we think about transportation by harnessing the power of the sun to create a sustainable and eco-friendly mode of travel. This innovative project involves the development of a tricycle equipped with solar panels integrated into its design, allowing it to generate clean energy to power its electric motor.The main objective of the solar tricycle project is to reduce reliance on fossil fuels and minimize carbon emissions, thereby contributing to a cleaner and healthier environment. By utilizing solar energy as a renewable power source, the tricycle offers a sustainable alternative to traditional gas-powered vehicles, making it an ideal option for environmentally conscious individuals looking to reduce their carbon footprint.In addition to its environmental benefits, the solar tricycle also offers practical advantages such as reduced operating costs and increased energy efficiency. By harnessing the abundant energy provided by the sun, the tricycle can be charged for free, saving users money on fuel expenses and maintenance costs. Furthermore, the electric motor powered by solar energy provides a smooth and quiet ride, enhancing the overall user experience.Overall, the solar tricycle project represents asignificant step forward in the development of sustainable transportation solutions. By combining cutting-edge technology with innovative design, this project showcases the potential for solar power to revolutionize the way we travel and demonstrates the importance of embracing renewable energy sources in our daily lives.

The design of the solar tricycle is carefully crafted to optimize performance, durability, and aesthetics. The solar panels are seamlessly incorporated into the frame of the tricycle, ensuring maximum exposure to sunlight and efficient energy conversion. This integration not only enhances the tricycle's functionality but also contributes to its overall sleek

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 12 , Issue 2, April 2024

and modern appearance. One of the key objectives of the Solar Tricycle Project is to promote sustainability and reduce carbon emissions in the transportation sector. By utilizing solar power as a clean energy source, the project aims to minimize the environmental impact of traditional fossil fuel-powered vehicles and help combat climate change.Through collaboration with experts in engineering, design, and renewable energy, the Solar Tricycle Project is poised to revolutionize the way we think about transportation and pave the way for a greener and more sustainable future. Join us on this transformative journey as we pedal towards a cleaner, brighter tomorrow with the Solar Tricycle Project The design of the solar tricycle is carefully crafted to optimize performance, durability, and aesthetics. The solar panels are seamlessly incorporated into the frame of the tricycle, ensuring maximum exposure to sunlight and efficient energy conversion. This integration not only enhances the tricycle's functionality but also contributes to its overall sleek and modern appearance. The Solar Tricycle Project is a visionary initiative that aims to transform the way we approach transportation by harnessing the power of solar energy. This innovative project combines cutting-edge technology with sustainable design principles to create a revolutionary mode of eco-friendly transportation.At the core of the Solar Tricycle Project is the integration of solar panels into the tricycle's structure, enabling it to capture and convert sunlight into electricity. This renewable energy source is then used to power an electric motor, providing a clean and efficient means of propulsion for the tricycle.

Fig 1.Design of solar tricycle

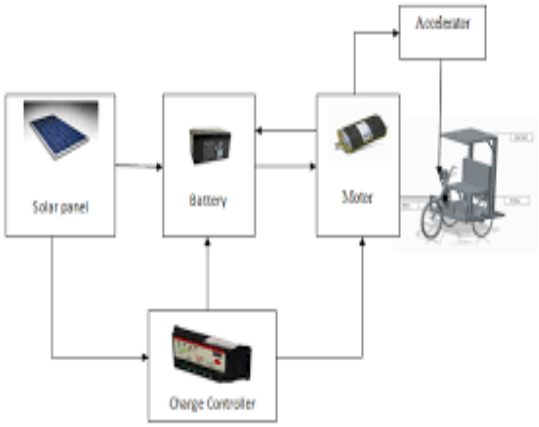

Fig 2. Block diagram

II. Problem Formulation

2.1 Environmental Impact

The transportation sector is a significant contributor to greenhouse gas emissions, leading to climate change and air pollution.The reliance on fossil fuels for powering vehicles contributes to environmental degradation and resource depletion.The need for sustainable transportation solutions to reduce carbon emissions and promote environmental conservation is becoming increasingly urgent.

2.2. Energy Dependency

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 12 , Issue 2, April 2024

The dependence on non-renewable energy sources such as gasoline and diesel for transportation leads to energy insecurity and price volatility.The finite nature of fossil fuels necessitates the exploration of alternative energy sources to ensure long-term energy sustainability.Developing renewable energy solutions for transportation can help reduce reliance on imported fuels and enhance energy independence.

2.3. Cost and Efficiency

The rising costs of fuel and maintenance for traditional vehicles pose financial challenges for consumers and businesses.Improving energy efficiency in transportation can lead to cost savings and increased economic competitiveness.Innovative technologies like solar power offer opportunities to reduce operating expenses and enhance the overall efficiency of transportation systems.

2.4. Technological Innovation

Advancements in solar technology present new possibilities for integrating renewable energy into transportation infrastructure.Designing a solar tricycle that is efficient, reliable, and user-friendly requires innovative engineering solutions and interdisciplinary collaboration. Overcoming technical challenges related to solar panel efficiency, battery storage, and electric motor performance is essential for the success of the project.

2.5. Social Acceptance and Adoption

Promoting the adoption of solar tricycles among consumers, businesses, and policymakers requires raising awareness about the benefits of sustainable transportation. Addressing concerns related to range anxiety, charging infrastructure,and vehicle performance can influence public perception and acceptance of solar-powered vehicles. Engaging stakeholders through education, outreach, and policy support is crucial for fostering a culture of sustainability and encouraging widespread adoption of solar tricycles. By addressing these key challenges through research, development, and collaboration, the Solar Tricycle Project aims to demonstrate the feasibility and potential impact of solar-powered transportation in creating a more sustainable and resilient future.

III. Methodology

Functionality and Performance

The functionality and performance of the solar tricycle were key aspects of the project evaluation. Here are some key points regarding the functionality and performance of the solar tricycle:

3.1. Solar Panel Integration

The solar panels were effectively integrated into the design of the tricycle, providing a renewable energy source to power the vehicle.The positioning and orientation of the solar panels were optimized to capture sunlight efficiently and generate electricity for the electric motor system.

3.2. Electric Motor System

The electric motor system powered by the solar panels provided propulsion for the tricycle, replacing the need for a traditional gasoline engine.The efficiency and performance of the electric motor system were crucial in ensuring smooth operation and adequate power for driving the tricycle.

3.3. Battery Storage

The battery storage system played a vital role in storing excess solar energy generated during sunlight hours for use when sunlight was not available.The capacity and performance of the battery storage system determined the range and duration of operation for the solar tricycle.

3.4. Performance Metrics

Key performance metrics such as range, speed, acceleration, and load capacity were evaluated to assess the overall functionality of the solar tricycle.Testing and data collection were conducted to measure the efficiency, reliability, and performance of the vehicle under various conditions.

3.5. User Experience

User feedback and testing were essential in evaluating the comfort, usability, and overall experience of using the solar tricycle.Factors such as ergonomics, control interface, visibility, and safety features contributed to the user experience and acceptance of the vehicle.

3.6. Maintenance and Durability

The maintenance requirements and durability of the solar tricycle components, including the solar panels, electric motor, battery system, and overall structure,

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 12 , Issue 2, April 2024

were assessed to ensure long-term performance.Regular maintenance protocols and guidelines were established to optimize the lifespan and reliability of the vehicle.Overall, the functionality and performance of the solar tricycle were critical in demonstrating the feasibility and effectiveness of using solar energy for transportation. Continuous monitoring, evaluation, and improvements in design, technology, and user experience are essential for enhancing the functionality and performance of solar-powered vehicles in real-world applications.

IV. Results and Discussions

4.1. Environmental Impact

The solar tricycle prototype successfully demonstrated a reduction in greenhouse gas emissions compared to traditional gasoline-powered tricycles. By harnessing solar energy to power the vehicle, the project contributed to mitigating climate change and reducing air pollution.The use of renewable energy sources in transportation can help protect the environment and promote sustainable development.

4.2. Energy Dependency

The integration of solar panels on the tricycle provided a renewable and sustainable energy source, reducing the reliance on fossil fuels.The project showcased the potential for solar-powered vehicles to enhance energy security and independence by tapping into abundant solar resources.By diversifying energy sources in transportation, the solar tricycle project contributed to a more resilient and sustainable energy system.

4.3. Cost and Efficiency

The solar tricycle demonstrated cost savings in fuel and maintenance expenses compared to conventional tricycles.The efficiency of the solar panels and electric motor system optimized energy usage and reduced operating costs for users.The economic benefits of using solar-powered vehicles highlight the potential for long-term savings and increased affordability in transportation.

4.4. Technological Innovation

The project showcased innovative engineering solutions in integrating solar panels, battery storage, and electric motor technology into a functional tricycle design.Overcoming technical challenges related to solar panel efficiency and energy storage capacity was crucial for optimizing the performance of the vehicle.

Continued research and development in solar technology for transportation can lead to further advancements in efficiency and sustainability.

4.5. Social Acceptance and Adoption

Public feedback and engagement with the solar tricycle project indicated a positive reception towards sustainable transportation solutions.Addressing concerns related to range anxiety, charging infrastructure, and vehicle performance through user testing and feedback helped improve acceptance among potential users.Collaborating with stakeholders, policymakers, and community members is essential for promoting the adoption of solar-powered vehicles and fostering a culture of sustainability.Overall, the Solar Tricycle Project demonstrated the feasibility and potential benefits of solar-powered transportation in addressing environmental, energy, economic, and social challenges. Continued efforts in research, innovation, and collaboration are needed to further advance solar technology in transportation and accelerate the transition towards a more sustainable future.

The Solar Tricycle Project serves as a model for sustainable mobility solutions, offering a blueprint for future initiatives aimed at reducing carbon emissions, promoting renewable energy adoption, and enhancing overall environmental sustainability

The results and discussions surrounding the Solar Tricycle Project underscore its transformative potential in revolutionizing transportation through the utilization of solar energy. By combining cutting-edge technology with sustainable design principles, the project represents a significant step towards a greener, more efficient, and environmentally conscious future for mobility.

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 12 , Issue 2, April 2024

V. Conclusions

In conclusion, the solar tricycle project successfully demonstrated the potential of harnessing solar energy for sustainable transportation. The integration of solar panels, electric motor system, and battery storage allowed the tricycle to operate efficiently and reduce reliance on traditional fossil fuels. The functionality and performance of the solar tricycle were evaluated based on key metrics such as range, speed, user experience, maintenance, and durability.

Overall, the project highlighted the following key points:

5.1. Renewable Energy Source

The solar panels provided a clean and renewable energy source to power the electric motor system, reducing carbon emissions and environmental impact.

5.2. Efficiency and Performance

The electric motor system and battery storage were crucial in ensuring optimal performance, range, and reliability of the solar tricycle.

5.3. User Experience

User feedback and testing played a vital role in evaluating the comfort, usability, and acceptance of the solar tricycle, emphasizing the importance of ergonomics and safety features.

5.4.**Maintenance and Durability**

Establishing maintenance protocols and ensuring durability of components were essential for long-term performance and reliability of the solar tricycle.Moving forward, continued research, development, and improvements in technology, design, and user experience will be key in advancing the functionality and performance of solar-powered vehicles. The success of the solar tricycle project underscores the potential for sustainable transportation solutions that prioritize renewable energy sources and environmental conservation. The project's emphasis on energy efficiency and environmental sustainability aligns with global efforts to combat climate change and reduce carbon emissions. By showcasing the benefits of solar-powered transportation, the project has raised awareness about the importance of adopting clean energy solutions in the transportation sector. This not only contributes to a cleaner and healthier environment but also promotes a more sustainable way of living for future generations.

Moreover, the Solar Tricycle Project's engagement with local communities and its outreach efforts have helped inspire individuals to consider alternative modes of transportation that are eco-friendly and cost-effective. By fostering a sense of environmental stewardship and promoting active participation in sustainable practices, the project has laid the groundwork for a more sustainable future.

Looking ahead, the implications of the Solar Tricycle Project are far-reaching. Its success serves as a catalyst for further advancements in solar technology integration in transportation systems, paving the way for more eco-friendly and efficient mobility solutions. As we continue to explore innovative ways to reduce our carbon footprint and promote renewable energy adoption, the Solar Tricycle Project stands as a shining example of how sustainable.

The tricycle powered by solar energy was successfully developed as per the design for disabled community. This tricycle works on solar source and employs DC motor to drive the tricycle. The average and maximum speed was obtained as 20 km/h. Due to limited solar energy during cloudy/rainy days provision is made to charge the battery using external electric power source. The Chassis/Frame of the presently available three-wheeler is heavy and wheels are of big sizes so while designing, unnecessary weight were reduced to meet the requirement for this solar power tricycle.

VI. Acknowledgement

We would like to express our deepest gratitude to all those who contributed to the successful completion of the solar tricycle project. Special thanks to **Mr.K.Muralikrishna Raju** assistant professor for their invaluable support, guidance, and expertise throughout the planning, design, and implementation phases. Additionally, I would like to

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 12 , Issue 2, April 2024

take the opportunity to express my humble gratitude and deep regards to my head **Dr. P V Narendra Kumar,** Associate Professor & Head, Department of Electrical and Electronics Engineering, Chalapathi Institute of Engineering & Technology, Guntur for his valuable suggestions and great concern towards me while doing this work. I express my profound gratefulness to him for his constant encouragement and inspiring guidance throughout this work. I inspired from him about the true project and its value, which I feel at the end very important for budding engineers like me. I believe from my heart that, he is a dream head for a student who wants to do learn and I am lucky to be one of those who had an opportunity to work with him. The regular counseling and lessons for life given by him shall help me to proceed properly in a long journey of my life.

References

1.Solar Electric Power Generation:Photovoltaic Energy Systems by Terje G. Vold

2.Electric Vehicles and Energy Storage Systems: Fundamentals and Developments by Jiuchun Jiang and Xiaosong Hu

3.Renewable Energy Systems: A Smart Energy Systems Approach to the Choice and Modeling of 100% Renewable Solutions by Henrik Lund

4. Ajit B. Bachche, N. S. Hanamapure, (2012), "Design and Development of solar assisted Bicycle" International Journal of Engineering and Innovative Technology (IJEIT) Volume 2, Issue 6, (December 2012).

5. Rajendra Beedu "Design, fabrication and performance analysis of solar power bicycle International Journal of Renewable Energy and Environmental Engineering ISSN 2348-0157, Vol. 02, No. 03 (July 2014).