E-PROCEEDINGS

INTERNATIONAL TINKER INNOVATION & ENTREPRENEURSHIP CHALLENGE (i-TIEC 2025)

"Fostering a Culture of Innovation and Entrepreneurial Excellence"

23 January 2025
PTDI, UiTM Cawangan Johor
Kampus Pasir Gudang

ORGANIZED BY:

Electrical Engineering Studies, College of Engineering
Universiti Teknologi MARA (UiTM) Cawangan Johor
Kampus Pasir Gudang
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PREFACE

It is with great pleasure that we present the e-proceedings of International Tinker Innovation & Entrepreneurship Challenge (i-TIEC 2025), which compiles the extended abstracts submitted to the International Tinker Innovation & Entrepreneurship Challenge (i-TIEC 2025), held on 23 January 2025 at **PTDI, Universiti Teknologi MARA (UiTM) Cawangan Johor, Kampus Pasir Gudang.** This publication serves as a valuable resource, showcasing the intellectual contributions on the invention and innovation among students, academics, researchers, and professionals.

The International Tinker Innovation & Entrepreneurship Challenge (i-TIEC 2025), organized under the theme "Fostering a Culture of Innovation and Entrepreneurial Excellence," is designed to inspire participants at various academic levels, from secondary students to higher education students and professionals. The competition emphasizes both innovation and entrepreneurship, encouraging the development of product prototypes that address real-world problems and have clear commercialization potential. By focusing on technological and social innovations, i-TIEC 2025 highlights the importance of turning creative ideas into viable, market-ready solutions that can benefit users and society. The extended abstracts in this e-proceedings book showcase the diverse perspectives and depth of research presented during the event, reflecting the strong entrepreneurial element at its core.

We extend our sincere gratitude to the contributors for their dedication in sharing their innovation and the organizing committee for their hard work in ensuring the success of the event and this publication. We also appreciate the support of our collaborators; Mass Rapid Transit Corporation Sdn. Bhd. (MRT Corp), Universitas Labuhanbatu, Indonesia (ULB), Universitas Riau Kepulauan, Indonesia (UNRIKA) and IEEE Young Professionals Malaysia, whose contributions have been instrumental in making this event and publication possible.

We hope that this e-proceedings book will serve as a valuable reference for researchers, educators, and practitioners, inspiring further studies and collaborations in both innovation and entrepreneurship. May the knowledge shared here continue to spark new ideas and market-ready solutions, advancing our collective expertise and fostering the growth of entrepreneurial ventures.

B-ST010 - B-ST152

B-ST082: ELECTRIC BIKE USING RENEWABLE ENERGY CONCEPT

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ABSTRACT

The level of polution caused by combution engine every day is increasing in big cities like Batam. Therefore, the use of electric vehicles as Eco-Friendly transportation is an urgent need. The biggest challenge for electric vehicles as main transportation is the short distance traveled due to the limited electric power battery and the longer time for battery charge time. It can be overcome by charging the battery at anytime and wherever the electric vehicle. In this study, electric bike is uses a battery with 3 (three) ways of charging, which are using a solar panel when stopping or parking, a DC generator when running and a 220 V PLN power while in the room or house. The driver power for electric bike uses a brushless DC motor and as a electric power storage uses lead acid battery. The offers a combination of manual pedaling, battery-powered assist, and renewable energy charging for versatile functionality. By reducing vehicular emissions, electric bikes contribute to cleaner air, which has positive health effects, particularly in cities where pollution levels are high. As an alternative of transportation to reduce the level of air pollution due to exhaust emissions, reduce dependence on fuel oil and develop similar vehicles in the future.

Keywords: Electric bike, Eco-friendly, brushless DC motor, Maximum distance.

1. Product Description

To design and make an electric bike with a battery charging system combining three electricity sources, namely a 220 V PLN electricity source, solar panels and a DC generator. The prototype is a three-wheeled electric bike that can cover longer distances and better speed because the battery remains charged with sufficient electrical power to drive the electric motor. The electric bike can be charged anywhere and at any time when in the room or house using a 220 V PLN electricity source, using solar panels when outside the house or parking area or when the bicycle is running on the road during the day, while using a generator when the bicycle is running on the road. The offers a combination of manual pedaling, battery-powered assist, and renewable energy charging for versatile functionality. So that this three-wheeled electric bike can be used as an environmentally friendly means of transportation and able to meet the needs of the community as an alternative means of transportation to reduce the level of air pollution due to exhaust emissions, reduce dependence on fuel oil and develop similar vehicles in the future.

2. Block Diagram, Charging Power System, and Electic Bike Design

The design of electric bike uses three source of electricity namely PLN power, solar panel and DC generator. The control battery charging by SCC. To regulate the speed of electric bike is controlled using speed controller which regulated voltage to BLDC motor.

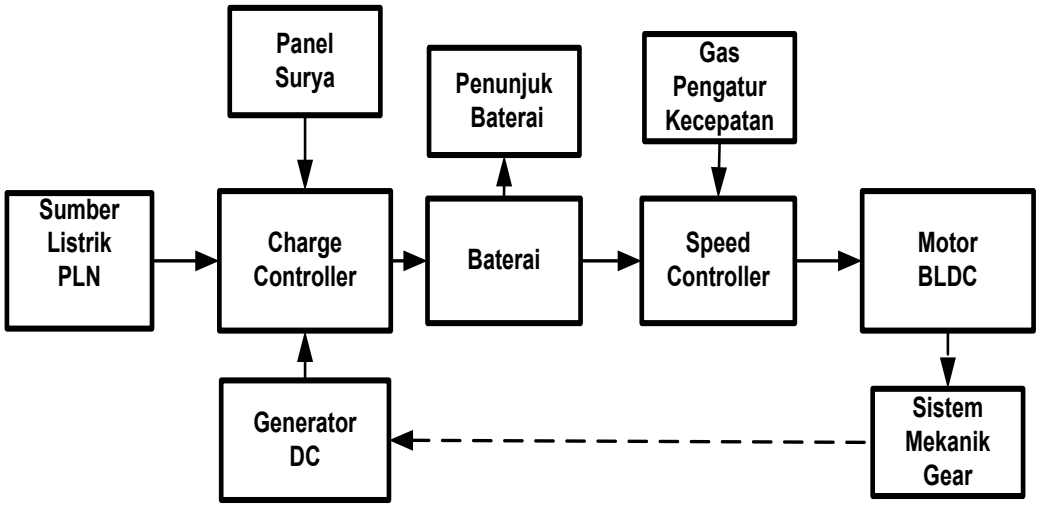

Figure 1. Diagram block

At figure 2 below shows the placement of the battery, speed controller and electrical wiring.

Figure 2. Solar panel and control system

Figure 3. Electric bike design

3. Novelty and uniqueness

The design an electric bike with a battery charging system combining three electricity sources, namely a 220 V PLN electricity source, solar panels and a DC generator. To recharge from renewable energy-powered charging stations, reducing dependency on fossil fuels. It can charge independently of the grid, making it ideal for remote areas or outdoor adventures where traditional charging infrastructure is unavailable. The offers a combination of manual pedaling, battery-powered assist, and renewable energy charging for versatile functionality. A pioneering approach to integrating renewable energy technologies into personal transportation, offering a sustainable alternative to traditional electric bikes. The customizable systems allow users to select renewable energy modules (e.g., foldable solar panels or wind generators) based on their environment and usage patterns. In the future, the equipment with IoT-enabled sensors to monitor energy usage, optimize power distribution, and provide real-time data on renewable energy efficiency. Suitable for urban, rural, and off-road environments due to its ability to generate power on the go.

4. Benefit to mankind

The electric bike uses renewable energy, eliminating harmful emissions and significantly reducing air pollution. This contributes to cleaner air, mitigating climate change, and protecting ecosystems. By utilizing renewable energy sources such as solar or wind power, electric bikes reduce reliance on fossil fuels, helping to preserve non-renewable resources for future generations. Electric bikes provide a fast and efficient alternative to cars, especially in urban areas. They can navigate through traffic more easily, reducing congestion and enhancing mobility. By reducing vehicular emissions, electric bikes contribute to cleaner air, which has positive health effects, particularly in cities where pollution levels are high. Using renewable energy to power the bike reduces energy costs compared to traditional fuels or grid electricity. Additionally, maintenance costs for electric bikes are typically lower than conventional vehicles. Overall the electric bike contributing to environmental sustainability,

improved public health, energy independence, and economic savings. By promoting clean, efficient, and accessible transportation, it helps build a future where mobility is sustainable, affordable, and healthier for everyone.

5. Innovation and Entrepreneurial Impact

The electric bike represents a groundbreaking integration of renewable energy technologies (solar, wind, or hybrid) into personal transportation. Unlike conventional electric bikes that rely solely on grid electricity, these bikes can recharge through renewable sources, reducing dependency on non-renewable energy and offering self-sustaining transportation options. This innovative design brings renewable energy solutions directly into everyday life, offering a practical demonstration of how clean energy can be seamlessly integrated into consumer products. Many electric bikes with renewable energy capabilities feature hybrid systems, where renewable energy sources like solar panels or wind turbines charge the bike's battery. This provides riders with a sustainable energy supply while also extending the range and usability of the bike, especially in off-grid or remote locations. The development and production of electric bikes create new job opportunities in manufacturing, research and development, retail, and after-sales services. As the market grows, more workers are needed to handle production, installation, maintenance, and customer service.

6. Potential commercialization

The electric bikes offer a cost-effective, environmentally friendly alternative for daily commutes in congested cities. Renewable energy integration adds value by reducing charging costs and dependency on the power grid. In regions with limited or unreliable electricity access, the ability to charge using renewable energy is a significant advantage, making these bikes ideal for underserved communities. Logistics companies and delivery businesses can adopt these bikes to reduce operational costs and align with sustainability goals. For offering bikes on a subscription or rental basis for urban commuters, tourists, or delivery services. Policies promoting renewable energy and sustainable transportation can offer subsidies, tax breaks, or funding to businesses involved in their commercialization. The commercialization of electric bikes using renewable energy is highly feasible due to strong market demand, environmental benefits, and alignment with global sustainability goals. Entrepreneurs and businesses have numerous opportunities to monetize this innovative product through diverse revenue streams, strategic partnerships, and a commitment to addressing environmental challenges.

7. Acknowledgment

We express our heartfelt gratitude to all individuals and organizations that contributed to the successful development of the electric bike using renewable energy**.** A special acknowledgment goes to Faculty of Engineering, Universitas Riau Kepulauan and laboratories that provided us with access to state-of-the-art facilities and resources, enabling us to test and refine our designs. We deeply appreciate the support of government agencies and environmental organizations that encouraged our efforts by providing grants, regulatory guidance, and valuable insights into sustainable practices. Finally, we thank our stakeholders, partners, and early adopters for believing in our mission to create a cleaner and greener future through renewable energy-powered transportation. Your feedback and

support have been crucial to our success. This achievement would not have been possible without the collaboration and shared commitment of everyone involved. Together, we move closer to a more sustainable world.

8. Authors' Biography

Endang Susanti, MT is a Senior Lecturer and Researcher at the Universitas Riau Kepulauan, specializing in Electronic and Renewable Energy. With over 18 years of experience, she has design and built for IoT system. She has published several papers in renowned journals on topics such as renewable energy. In addition to his academics contribution, she has collaborated with both industry and goverment organizations on projects aimed the use of technology solar power plant and electric bike.

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