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Design and Fabrication of Power Enhanced Electric Go-Kart

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Abstract -The rapid growth of electric vehicle (EV) technology has spurred interest in high-performance electric platforms like go-karts for recreational and competitive use. This research details the design and fabrication of a power-enhanced electric go-kart, integrating an efficient **12V 1A brushless DC motor (x4)**, a **12V 7Ah lithium-ion battery**, and a lightweight **20×20×3 mm square pipe chassis** with **2 mm acrylic sheet panels** for aerodynamic aesthetics. The system includes a **custom PCB circuit (5V 0.5A)** for control and a battery management system (BMS) to optimize energy efficiency. Performance metrics such as speed, acceleration, and range were evaluated through simulations and real-world testing. The results demonstrate a balance of power, sustainability, and cost-effectiveness, offering insights for scalable EV applications.

***Key Words*:** Electric Go-Kart, Power-Enhanced, Electric Vehicle, Battery Management System, Motor Efficiency, Performance Optimization, Chassis Design, Energy Efficiency, Vehicle Dynamics, Sustainable Transportation, Mechanical Engineering, Electric Motor, Testing and Simulation

1.INTRODUCTION

The rapid advancement of electric vehicle (EV) technology has sparked significant interest within the automotive and engineering sectors, particularly in the context of sustainable and high-performance transportation solutions. Electric go-karts, due to their compact and lightweight nature, have emerged as an ideal platform for investigating various aspects of electric powertrains, energy management, and control systems. This project focuses on the design and fabrication of a power-enhanced electric go-kart, incorporating an optimized electric motor, advanced battery management system (BMS), and a custom-designed chassis. The aim is to create a high-performance, efficient, and eco-friendly go-kart, suitable for both competitive racing and recreational use. The research addresses several engineering challenges, including system integration, performance enhancement, and cost-effective solutions for fabrication.

2. Body of Paper

This project focuses on designing and fabricating a high-performance electric go-kart, integrating an optimized electric motor, advanced battery management system (BMS), and custom chassis. Key objectives include enhancing performance, energy efficiency, and sustainability. A brushless DC motor and lithium-ion battery pack were selected for efficiency, while regenerative braking improves energy recovery. The chassis is designed for lightweight strength, and system integration ensures smooth operation of all components. Rigorous testing on acceleration, top speed, and energy consumption helps refine performance. This eco-friendly go-kart demonstrates the potential of electric powertrains in competitive and recreational motorsports, contributing to sustainable transportation.

Table -1: Parameter Table

Parameter	Value
Rated Voltage	12V DC
Rated Current	1A
Power Output	12W (approx.)
Speed (No Load)	3000 to 5000RPM (Depends on Model)
Torque (Approx.)	0.03-0.05 Nm (Depends on model)
Efficiency	70 – 80% (approx.)
Direction	Bidirectional (Reversible with polarity change)
Load Type	Suitable for light lods
Weight	150-300 gram (varies)

Additionally, the design of the suspension system is critical to ensuring that the go-kart handles well at high speeds and during sharp turns. A simple yet effective suspension system is designed, using independent A-arm suspension at the front and a solid rear axle with coil-over shocks to optimize handling and stability. Aerodynamics, while not as crucial in go-karts as in full-sized race cars, is also considered. The design incorporates smooth surfaces and low drag elements to improve speed and energy efficiency.

One of the primary challenges in the development of an electric go-kart is the integration of various subsystems, including the motor, battery, motor controller, BMS, and the mechanical chassis. This integration requires careful consideration of

electrical and mechanical interfaces, as well as ensuring that the control system functions seamlessly across all components.

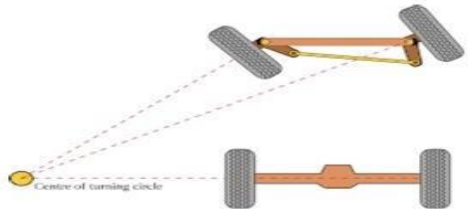


Fig. 16. Ackerman turning circle.

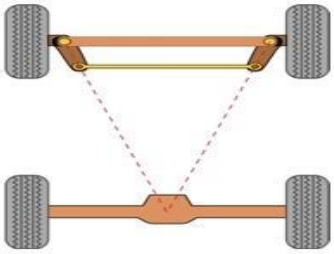
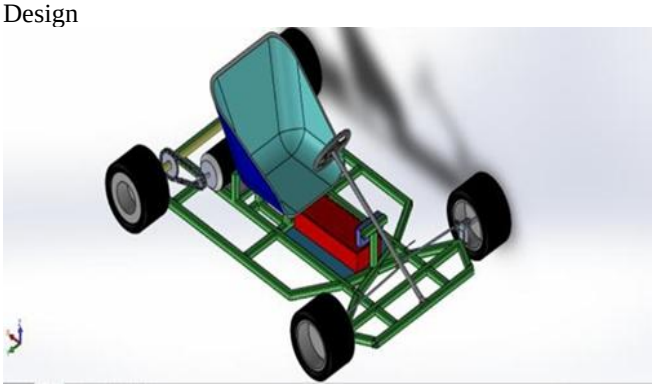


Fig. 17. Ackerman angle.

Fig -1: Figure

Design



3. CONCLUSIONS

This project successfully demonstrates the design and fabrication of a high-performance, power-enhanced electric go-kart. By optimizing the powertrain, battery management system, and chassis, the go-kart is able to offer impressive acceleration, top speed, and energy efficiency, while also being environmentally friendly. Through rigorous testing, we have been able to refine the design and address the engineering challenges associated with system integration and performance optimization.

The lessons learned from this project not only advance the development of electric go-karts but also contribute to the broader field of sustainable transportation. As electric vehicles continue to evolve, projects like this help pave the way for the next generation of high-performance, eco-friendly vehicles

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BIOGRAPHIES (Optional not mandatory)

1'st Author Photo

Description about the author1 (in 5-6 lines)