



Urban Glide Two-Seater Smart E-Car: An Innovative Approach to Urban Mobility

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ABSTRACT

The Two-Seater Smart E-Car is a compact, electric vehicle designed to address urban transportation challenges such as traffic congestion and environmental pollution. This project integrates cutting-edge smart technologies and sustainability principles to create an efficient, eco-friendly, and user-friendly vehicle optimized for urban environments. This paper presents the design, development, testing, and potential impact of the Two-Seater Smart E-Car, outlining its role in reducing emissions and promoting shared mobility.

Keywords: Smart E-Car, urban mobility, electric vehicle (EV), sustainability, traffic congestion, smart technology.

1 Introduction

The Two-Seater Smart E-Car is a compact, electric-powered vehicle designed for city driving. Urban areas worldwide face increasing traffic congestion, pollution, and limited parking space. This paper proposes a solution by leveraging electric mobility and smart connectivity, making it an environmentally sustainable option. By addressing key challenges in urban mobility, this project aligns with global goals of reducing carbon emissions and improving air quality.

2 Recent Works

The Two-Seater Smart E-Car is a compact, electric-powered vehicle designed for city driving. Urban areas worldwide face increasing traffic congestion, pollution, and limited parking space. This paper proposes a solution by leveraging electric mobility and smart connectivity, making it an environmentally sustainable option. By addressing key challenges in urban mobility, this project aligns with global goals of reducing carbon emissions and improving air quality. The history of electric Smart cars dates back to 2007, when the first electric Smart For two emerged. Today, models like the Smart EQ For two represent the continued evolution towards a greener urban transportation solution.



3 Proposed Work Explanation

3.1 Vehicle Chassis and Material Selection

The car's chassis, constructed from AISI 4130 steel, provides durability and safety. Detailed structural analysis confirms the vehicle's ability to withstand front, rear, and side impacts.

3.2 Steering and Braking System Design

Utilizing Ackerman steering geometry, the vehicle ensures manoeuvrability and stability. The braking system includes hydraulic disc brakes for optimal stopping power, analyzed for efficiency and reliability under various conditions.

3.3 Power and Battery Configuration

The vehicle employs a lead-acid battery due to cost-effectiveness, paired with a BLDC motor for reliable propulsion. Calculations for power needs, energy consumption, and range are detailed to ensure the vehicle meets urban driving requirements.

3.4 Performance Analysis and Testing

Several performance metrics were analyzed, including the vehicle's torque, braking efficiency, and battery range. The vehicle can reach a top speed of 30 km/h and offers a range of approximately 40 km on a single charge.

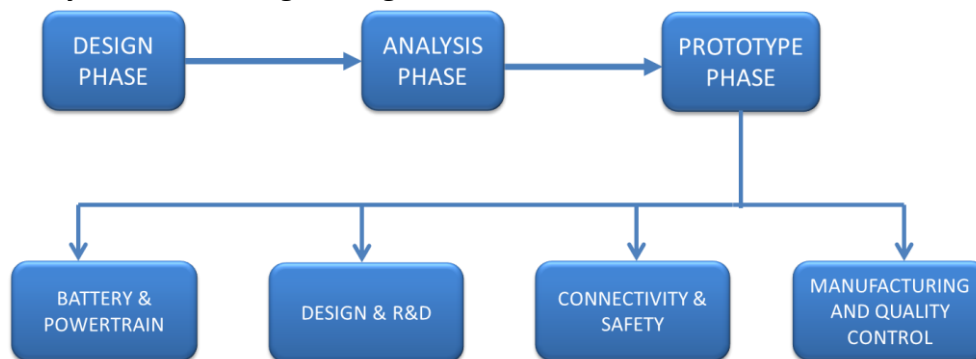


Figure 1: Proposed block diagram

4 Results and Discussion

The performance evaluation of the Two-Seater Smart E Car highlights its capability as a sustainable urban vehicle. Through CAD simulations and real-world testing, the chassis and frame proved resilient under impact forces, ensuring safety in potential collision scenarios. The Ackerman steering design achieved precise manoeuvrability, which is essential for urban driving, while the hydraulic disc brakes demonstrated high efficiency, delivering reliable stopping power even under stress. Power and range assessments showed that the selected lead-acid battery and BLDC motor provided adequate energy for daily urban commutes, with calculated power consumption meeting expected thresholds. These results underscore the vehicle's practicality for city use, and the integration of smart technologies enhances the driving



experience by allowing for real-time adjustments based on traffic conditions, further validating the vehicle's role as a viable eco-friendly solution for modern urban transportation.

The final prototype of the Two-Seater Smart E-Car successfully met its design goals of compactness, efficiency, and sustainability. The analysis of the chassis and impact tests shows that the vehicle can withstand typical urban driving conditions without compromising safety. Additionally, the incorporation of smart technology allows for real-time traffic data integration and enhanced driver assistance, providing a safer driving experience.

4.1 Design of Two Seater Smart E-Car

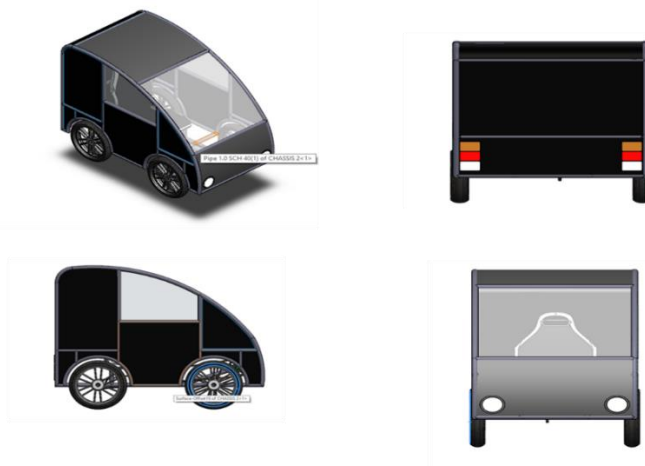


Figure 2: 3D CAD models indicating the structure of Two-Seater Smart E-Car

5 Conclusions

The Two-Seater Smart E Car project provides a promising solution for sustainable urban mobility. By combining a compact, electric-powered design with smart technologies, the vehicle offers an efficient and eco-friendly alternative to traditional gasoline-powered cars. The project emphasizes addressing urban issues such as traffic congestion and pollution while aligning with global sustainability goals. The robust design and use of advanced materials, along with energy-efficient systems like the lead-acid battery and BLDC motor, ensure both durability and performance, making the car a practical choice for daily city commutes.

Looking ahead, the integration of smart connectivity and real-time traffic data further enhances the vehicle's appeal by promoting safer, more informed driving. The modular approach in design and the selection of reliable components enable future scalability and potential upgrades, such as transitioning to lithium-ion batteries for longer range. This innovative project not only demonstrates the feasibility of compact electric vehicles for urban transportation but also sets the stage for future research and improvements in electric mobility, making it a valuable contribution toward reducing urban environmental impacts and fostering sustainable development in cities worldwide.



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