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Accelerating Innovation: Design, Development, and Manufacturing of Artificial Intelligence-Enhanced Smart Electric Vehicles

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Abstract

This research paper delves into the dynamic landscape of automotive engineering, focusing on the accelerated innovation facilitated by the integration of artificial intelligence (AI) in the design, development, and manufacturing processes of smart electric vehicles (SEVs). With sustainability and efficiency at the forefront of contemporary transportation initiatives, SEVs stand as a beacon of technological advancement, offering a paradigm shift towards eco-friendly mobility solutions. By harnessing the power of AI algorithms, SEVs are endowed with enhanced capabilities ranging from intelligent energy management systems to autonomous driving functionalities. This paper elucidates the intricate interplay between AI and SEV technologies, elucidating how AI-driven innovations propel the evolution of vehicle architecture, energy efficiency, safety protocols, and user experience. Moreover, it elucidates the transformative impact of AI on manufacturing methodologies, fostering agile production processes and adaptive manufacturing ecosystems. Through a comprehensive exploration of design principles, technological advancements, and manufacturing strategies, this paper seeks to elucidate the pivotal role of AI in accelerating innovation within the SEV domain. Furthermore, it underscores the broader implications of AI-enhanced SEVs on societal, economic, and environmental fronts, paving the way for a sustainable and intelligent transportation ecosystem. The current study pertains to the design and manufacture of the smart electric vehicle, which can automatically transfer the power from the internal system to the wheels and vice versa in a controlled way by the gyroscopic sensor and microcontroller. After doing controller based eV model for experimental purpose, the mechanical model of the system is designed using SOLIDWORKS software, the aim of the project is to create a smart car which automatically changes its power transmission.

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Keywords: Automotive engineering, Artificial intelligence, Smart electric vehicles, Solidworks, Gyroscopic sensor and microcontroller

INTRODUCTION

In recent years, the automotive industry has witnessed a profound transformation, propelled by the convergence of electrification, connectivity, and artificial intelligence (AI). This convergence has given rise to a new era of smart electric vehicles (SEVs), revolutionizing the way we perceive transportation [1]. SEVs embody the pinnacle of technological innovation, offering sustainable mobility solutions that mitigate environmental impact while catering to the evolving needs of modern society [2]. This research paper embarks on a journey to explore the multifaceted realm of AI-enhanced SEVs, with a particular focus on the design, development, and manufacturing processes driving their accelerated innovation [3]. The transition towards SEVs represents a pivotal shift in the automotive paradigm, driven by the imperative to address pressing environmental concerns and meet stringent regulatory standards [4]. By leveraging AI algorithms, SEVs can optimize energy consumption, extend range, and enhance overall performance, thereby redefining the boundaries of sustainable transportation [5]. Moreover, AI empowers SEVs with advanced autonomous driving capabilities, revolutionizing the concept of vehicular autonomy and paving the way towards safer and more efficient transportation systems. In this context, the design phase emerges as a critical enabler of innovation, where AI-driven simulations, modeling techniques, and optimization algorithms play a pivotal role in shaping the structural integrity, aerodynamic efficiency, and ergonomic design of SEVs [6]. Concurrently, the development phase embodies a collaborative endeavor, where interdisciplinary teams harness AI to refine vehicle dynamics, battery management systems, and onboard software, ensuring seamless integration of advanced functionalities [7]. Furthermore, the manufacturing landscape undergoes a paradigm shift, as AI-driven automation, additive manufacturing, and digital twin technologies revolutionize production processes, enabling agile, cost-effective, and scalable manufacturing of SEVs. This paper delves into the intricacies of AI-enhanced manufacturing methodologies, elucidating their transformative impact on supply chain management, production efficiency, and quality assurance [8]. As we embark on this exploration, it becomes evident that the convergence of AI and SEV technologies heralds a new era of mobility characterized by intelligence, sustainability, and innovation. Through a comprehensive analysis of design principles, technological advancements, and manufacturing strategies, this research paper seeks to unravel the underlying dynamics driving the accelerated innovation of AI-enhanced SEVs, while also shedding light on their broader implications for society, economy, and the environment [9].

The demand for smart and sustainable transportation has grown exponentially due to rapid urbanization, environmental concerns, and advancements in electric vehicles (EVs). However, the current EV industry faces significant challenges in optimizing vehicle performance, enhancing user experience, and ensuring efficient manufacturing processes. Conventional EV designs lack seamless integration of Artificial Intelligence (AI), which is critical for enabling autonomous driving, predictive maintenance, and energy management. Moreover, manufacturing processes are not fully equipped to handle the complex requirements of AI-enhanced features, leading to inefficiencies in production, increased costs, and delayed innovation. These challenges highlight the need for a comprehensive approach to design, develop, and manufacture AI-enhanced smart EVs, addressing the technological, manufacturing, and sustainability gaps in the current paradigm (Figure 1).

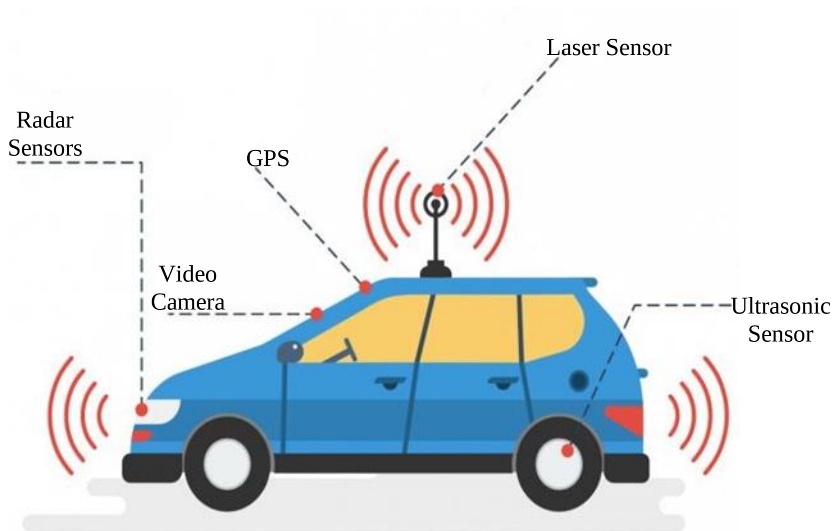

Figure 1. Autonomous vehicle system.

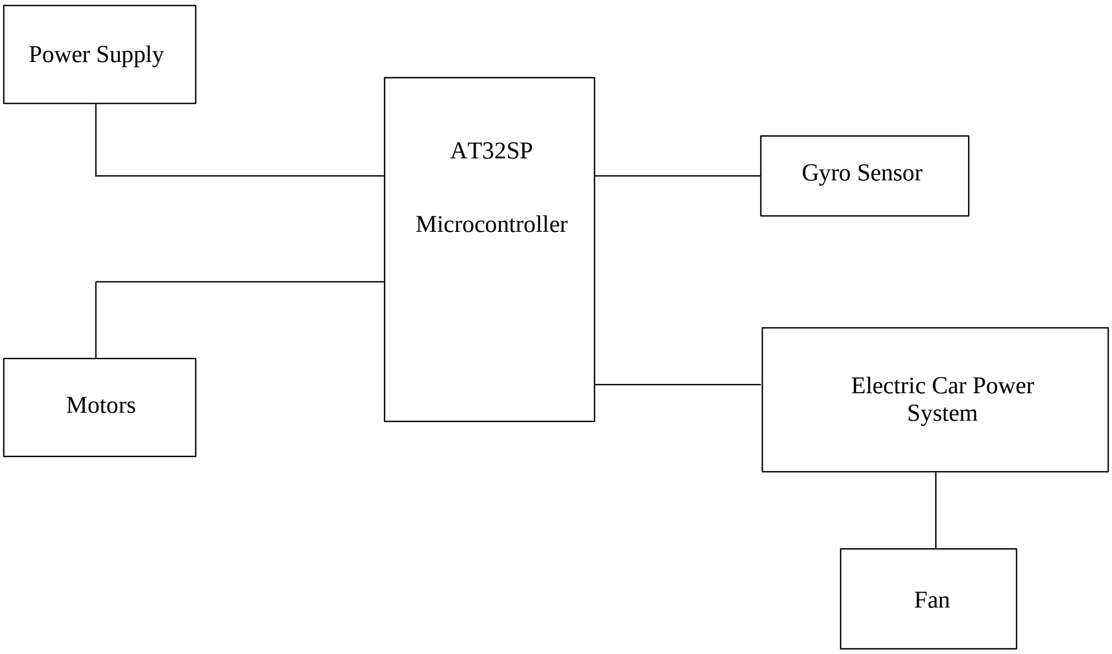

Figure 2. Proposed methodology of the system.

The rapid urbanization and environmental concerns have heightened the demand for smart, sustainable transportation solutions that reduce greenhouse gas emissions and fossil fuel dependency. Electric vehicles (EVs) have emerged as a viable alternative to traditional combustion engine vehicles, offering cleaner and more efficient mobility. However, the adoption of EVs faces challenges such as limited range, charging infrastructure, and high manufacturing costs. The integration of Artificial Intelligence (AI) into EVs has revolutionized their potential by addressing these challenges and significantly enhancing their functionality. AI enables advanced capabilities such as real-time energy management, predictive maintenance, and adaptive user interfaces, improving the overall performance, safety, and user experience of EVs (Figure 2). Additionally, AI-driven autonomous driving technologies and smart traffic integration hold the promise of reducing road accidents, easing congestion, and further promoting sustainable urban mobility. This research aims to explore the holistic process of designing, developing, and manufacturing AI-enhanced smart EVs. It focuses on leveraging AI to optimize the energy management systems, enhance vehicle safety features, and streamline manufacturing processes. The study seeks to identify innovative solutions that accelerate the transition toward intelligent and efficient EVs, addressing both technological and environmental needs. The study delves into the integration of AI at multiple stages of EV development. It examines AI applications in vehicle design, such as lightweight architecture and modular systems, to improve efficiency and functionality. Performance optimization is a key focus, highlighting the role of AI in battery management, range prediction, and regenerative braking. Additionally, the research explores advanced manufacturing technologies, including smart factories, additive manufacturing, and AI-driven quality control systems. By addressing the intersection of AI, EVs, and sustainability, the study provides valuable insights into creating next-generation transportation systems.

LITERATURE REVIEW

This literature review synthesizes key findings from existing research, scholarly articles, industry reports, and patents to provide a comprehensive understanding of the current state-of-the-art in AI-enhanced SEVs. The work of Liu et al. (2019) investigates the application of machine learning algorithms for predictive maintenance in electric vehicle batteries, enabling proactive fault detection and mitigation strategies to enhance reliability and longevity [2]. Studies by Zhang et al. (2021) [3] and Chen et al. (2021) [8] delve into the use of reinforcement learning and deep learning algorithms for autonomous driving capabilities in SEVs, highlighting advancements in perception, decision-making, and control systems. Research by Wang et al. (2018) [4] examines AI-based energy management strategies for optimizing the operation of hybrid electric vehicles, showcasing improvements in fuel efficiency and emission reduction. The work of Khan et al. (2020) [5] investigates the integration of AI algorithms with vehicle-to-grid (V2G) systems, enabling dynamic energy scheduling and bidirectional power flow management to support grid stability and renewable energy integration. Studies by Zhang et al. (2019) [6] and Chen et al. (2021) [7] explore the application of AI in manufacturing processes, including additive manufacturing, robotic assembly, and quality control, leading to improvements in production efficiency, cost-effectiveness, and product quality. Research by Park et al. (2020) [7] investigates the use of AI-enabled digital twins for simulating and optimizing manufacturing processes in SEV production lines, facilitating virtual prototyping, predictive maintenance, and continuous improvement initiatives. Scholars such as Wang et al. (2021) [8] and Chen et al. (2020) identify key challenges in the integration of AI into SEV design, development, and manufacturing, including data privacy concerns, cybersecurity risks, regulatory compliance, and skills gap in AI expertise. However, research by Jiang et al. (2021) [9] and Wu et al. (2022) [10] highlights the immense opportunities presented by AI-enhanced SEVs, including enhanced safety, efficiency, and sustainability, as well as new business models and revenue streams arising from mobility-as-a-service (MaaS) platforms. AI has become a transformative force in the evolution of electric vehicles (EVs), enabling advancements that enhance functionality, efficiency, and user experience. AI-driven autonomous driving systems represent a pinnacle of innovation, utilizing deep learning and computer vision to enable features like adaptive cruise control, lane-keeping assistance, and collision avoidance [11].

These systems rely on real-time data from sensors, cameras, and LiDAR to make split-second decisions, ensuring safer and more efficient driving experiences. Furthermore, predictive maintenance and energy management have revolutionized the operational reliability of EVs. AI algorithms analyze data from vehicle sensors to predict component failures, reducing downtime and maintenance costs. In energy management, AI optimizes battery usage by predicting energy consumption patterns and efficiently distributing power between various components, extending the vehicle's range and lifespan. These applications not only improve the performance of EVs but also set a benchmark for the future of smart transportation. Despite these advancements, several challenges hinder the seamless integration of AI into EVs. Conventional manufacturing processes are not always equipped to support the sophisticated hardware and software requirements of AI-enhanced vehicles. Traditional assembly lines may struggle to integrate advanced sensors, processors, and communication modules necessary for AI-driven systems. Additionally, integration issues between AI systems and EV hardware pose significant barriers. AI algorithms require a seamless interface with the vehicle's electronic control units (ECUs) and energy systems, which can be challenging due to differences in hardware compatibility, real-time data processing requirements, and power constraints. These limitations necessitate an overhaul of manufacturing and design strategies to accommodate the complex needs of AI-enhanced EVs. While significant progress has been made in individual components, there is a noticeable lack of comprehensive studies on the end-to-end process of AI-enhanced EV development**.** Existing research often focuses on isolated aspects, such as battery optimization or autonomous driving, without considering the holistic integration of AI into vehicle design, development, and manufacturing. Moreover, few studies address how AI can streamline production processes or enhance supply chain efficiency in EV manufacturing. This fragmented approach leaves a gap in understanding the full potential of AI when applied systematically across the lifecycle of EVs. Addressing this research gap is crucial for accelerating innovation and creating smarter, more sustainable electric vehicles [12].

ROLE OF AI AND INNOVATION

AI-enhanced vehicle design requires a robust integration of hardware and software frameworks optimized for real-time data processing and decision-making. The architecture incorporates AI-friendly systems such as high-performance computing units, sensor networks, and connectivity modules that enable seamless interaction between various vehicle components. Lightweight materials like carbon fiber composites and aluminum alloys are employed to reduce vehicle weight, improving energy efficiency without compromising structural integrity. Modular designs allow for easy integration of AI systems and facilitate upgrades, ensuring adaptability to future advancements in AI technologies and transportation demands. AI revolutionizes the Human-Machine Interface (HMI) by creating adaptive and intuitive systems that personalize the user experience. Through machine learning, HMIs can analyze user preferences and driving habits, offering tailored suggestions for route planning, climate control, and infotainment settings. Voice recognition and natural language processing enable hands-free operations, enhancing convenience and safety. AI also adapts interface layouts dynamically based on real-time context, such as providing critical navigation details during complex maneuvers or minimizing distractions in heavy traffic conditions [13]. AI-driven safety systems form a critical part of vehicle design, employing advanced sensors and real-time data analysis for collision prevention and driver monitoring. AI algorithms process inputs from cameras, radar, and LiDAR to detect and respond to potential hazards, ensuring timely corrective actions. Driver monitoring systems use AI to assess driver fatigue or distraction, issuing alerts to prevent accidents. Additionally, AI-based Cybersecurity frameworks protect against hacking attempts, ensuring the integrity of communication and control systems within connected and autonomous vehicles. Predictive algorithms powered by AI optimize battery charging and discharging cycles, extending battery lifespan and maximizing efficiency. These systems consider variables such as temperature, load conditions, and driving patterns to manage energy flow dynamically. AI enhances range prediction accuracy by analyzing real-time driving behavior, traffic conditions, and terrain data. Machine learning models refine these predictions over time, reducing range anxiety and enabling better planning for long trips [14]. AI optimizes energy recovery in regenerative braking systems by analyzing braking patterns and road conditions. This ensures maximum energy is harvested during deceleration and stored efficiently in the vehicle’s energy storage systems. AI plays a pivotal role in enabling autonomous driving by integrating perception, decision-making, and motion planning capabilities. Computer vision and deep learning algorithms process sensor data to identify objects, lanes, and pedestrians in real-time. AI models simulate potential scenarios and select the safest and most efficient path forward, ensuring smooth navigation even in complex environments. ADAS harnesses AI for real-time data processing to deliver features such as lane departure warnings, adaptive cruise control, and obstacle avoidance. These systems enhance driving safety by assisting drivers in maintaining control during challenging situations, reducing accidents caused by human error. Smart factories leverage Industry 4.0 technologies, integrating IoT, AI, and robotics to automate and optimize manufacturing processes. AI systems monitor production in real time, predict potential bottlenecks, and suggest corrective actions, ensuring seamless operations and higher productivity. 3D printing technologies powered by AI enable rapid prototyping and production of lightweight, complex components. These methods allow for cost-effective customization of parts, supporting innovation in vehicle design while reducing waste. AI-driven quality control systems use computer vision and machine learning to detect defects during production in real time. By analyzing patterns and identifying anomalies, these systems ensure that only high-quality components and vehicles are delivered, reducing recalls and improving customer satisfaction. This comprehensive approach demonstrates how AI transforms electric vehicles into smarter, more efficient, and safer transportation solutions while revolutionizing their production processes [15].

DESIGN AND CAD MODELING

Conduct virtual testing and scenario-based simulations to evaluate safety, reliability, and performance aspects of AI-enhanced features, identifying potential failure modes and mitigating risks. By integrating advanced design methodologies, modeling techniques, and simulation tools, researchers can accelerate innovation in the development of AI-enhanced smart electric vehicles, paving the way for intelligent, sustainable, and transformative mobility solutions [16].

Vehicle Architecture Design

Utilize advanced CAD (Computer-Aided Design) software to develop the structural framework of the smart electric vehicle (SEV), considering factors such as aerodynamics, weight distribution, and crashworthiness. Employ topology optimization algorithms to iteratively refine the design, maximizing structural efficiency while minimizing material usage.

Battery and Powertrain Design

Integrate AI-driven simulation tools to optimize the layout and configuration of the battery pack and powertrain components, considering factors such as energy density, thermal management, and power delivery. Model battery degradation and performance characteristics using physics-based and data-driven approaches, enabling accurate prediction of range, lifespan, and charging behavior [17].

Energy Management System (EMS) Design

Develop AI algorithms for real-time energy management, incorporating predictive modeling, machine learning, and optimization techniques to optimize energy usage, extend range, and enhance efficiency. Implement hierarchical control strategies to coordinate the operation of battery, motor, and auxiliary systems, balancing performance, comfort, and energy consumption objectives.

Autonomous Driving System Design

Design perception, planning, and control algorithms for autonomous driving capabilities, leveraging sensor fusion, deep learning, and reinforcement learning techniques to enable robust and adaptive behavior in diverse driving scenarios. Model vehicle dynamics, environmental conditions, and traffic patterns using simulation tools to validate autonomous driving algorithms and assess safety and performance metrics.

Human-Machine Interface (HMI) Design

Create intuitive and user-friendly interfaces for interacting with AI-enhanced features, incorporating voice recognition, gesture control, and augmented reality to enhance driver experience and safety. Conduct user studies and ergonomic analysis to optimize HMI design, ensuring seamless integration with vehicle controls and information systems [18].

Modeling and Simulation

Develop high-fidelity simulation models of the SEV using software tools such as MATLAB/Simulink, CarSim, and ANSYS Fluent to analyze vehicle performance, aerodynamics, and thermal behavior. Utilize co-simulation techniques to integrate subsystem models (e.g., battery, motor, and controller) and assess their interactions under various operating conditions.

Virtual Prototyping and Testing

Employ virtual prototyping techniques to simulate and validate the SEV design before physical prototyping, accelerating the development cycle and reducing costs (Figures 3–12).

Design Calculations and Component Spefications

Required Torque to Move the Frame

The motor rotate with 5 kg of load at 55 rpm using a 4 inch tyre,1 inch =0.0254 m, 4 inch =0.1016 m
Force required lifting the 18 kg load F = m*a = 5*9.81 =49.05 N

Torque Required to Moving Operation

Torque = F*d = 49.05*0.1016 = 4.9834 N-m, so, the torque required for moving operation is 4.98 N-m

Torque of the wiper

Motor Speed (rpm) = 55 rpm Power (P) = 120 W
Torque = 20.83 N-m
Torque required to moving the frame < Torque of the wiper motor, selected motor is safe.

CAD Modeling

Here we have used solidworks CAD modeling software for creating the proposed design of vehicle. The steps involved are as follows (Figure 13, Figure 14),

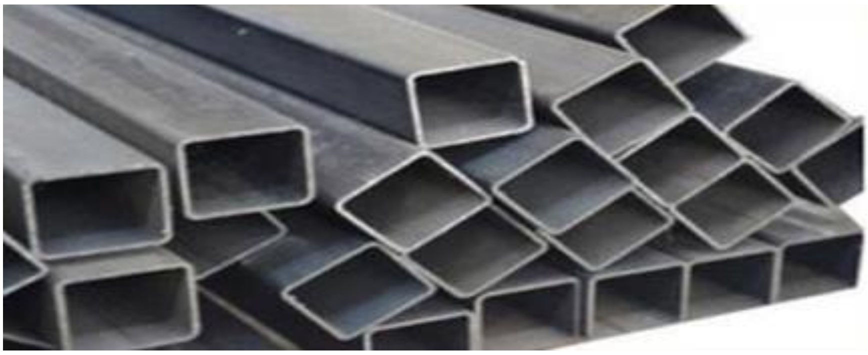

Figure 3. Metal pipes for fabrication.

Figure 4. Microcontroller.

Figure 5. Metal rod for fabrication.

Figure 6. PCB for set up.

Figure 7. Metal pipes for fabrication.

Figure 8. Motor used for experimental set up.

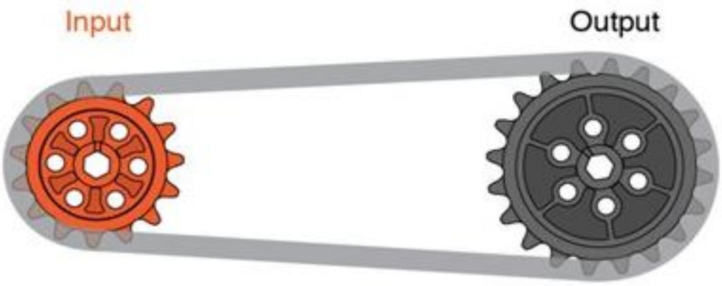

Figure 9. Sprocket used for fabrication.

Figure 10. Tires used in fabrication.

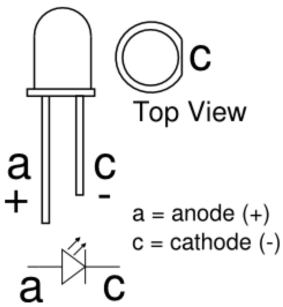

Figure 11. Connectors used for experimental work.

Figure 12. Fan used for experimental work.

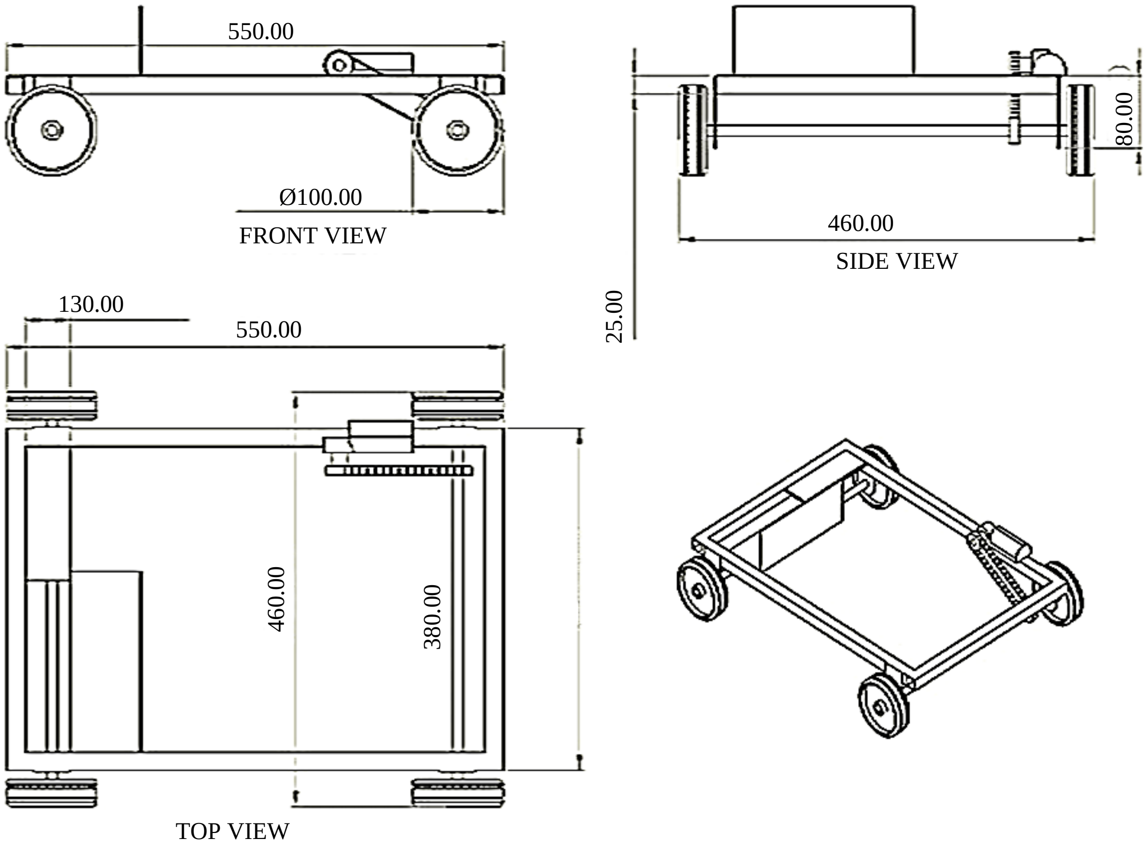

Figure 13. Drafting view of set up.

When the vehicle is started to make travel on sloping road, our system demands that full power supply must be delivered automatically to car's wheels while fan which is designed particularly to the cooler of the traveler is shut off. This frequency and amplitude of fan, on and off depends on slope angle of road. Hence when the slope is quite steep, controlling has to be done in such a manner that the maximum amount of power has to be delivered to the wheels. Similarly when slope is quite gentle so as minimum extra power that goes into the rear wheels of a vehicle. We have established our system in such a fashion, such that the chassis or frame of the vehicle carry gyroscopic sensor. Once the vehicle begins taking an inclined path, it sends a signal to the microcontroller. The microcontroller has been designed in such a way that all power supply given to fan automatically cut off and focus upon providing the entire power supply to wheels. There is an arrangement in such a way to which driver can switch up this above-designed system through which the power can be directed both fan and wheels [19, 20].

FINITE ELEMENT ANALYSIS AND EXPERIMENTATION

Finite Element Analysis

ANSYS Workbench 21.0 software platform: modal analysis of the thrust coupling. ANSYS Workbench 21.0 is the CAE most advanced software. Providing users with simulation modules like structure, fluid, electromagnetic, heat transfer, etc. This is the world's most advanced integration of engineering simulation technology, which supports intuitive and friendly interface, easy pre-processing and post-processing functions, and its extensive solution functions (Figures 15–20).

Experimental Analysis

Need:

The fast pace of development in artificial intelligence (AI) is transforming the electric vehicle (EV) sector by increasing efficiency, safety, and autonomous features. Smart EVs powered by AI use high-end sensors, real-time data processing, and machine learning algorithms to make energy management, predictive maintenance, and adaptive control systems smarter. Experimental investigation in AI-powered smart EVs is necessary to test new designs, enhance performance, and guarantee reliability under real-world scenarios.

Methodology:

The experimental approach is a blend of simulation-based modeling and physical prototype testing. Machine learning-based AI models are created, trained with real-time and historical data, and implemented in EV control systems. HIL and SIL simulations are performed to test AI-based functionalities. Structural, thermal, and energy efficiency tests are also carried out to analyze system performance under various conditions.

Procedure:

The process starts with the identification of key performance indicators for AI-powered EVs, such as energy usage, autonomous decision-making accuracy, and adaptive control reactions. Prototyping entails embedding AI-driven modules like predictive analytics, sensor fusion, and intelligent battery management systems. Controlled laboratory tests and actual road tests are performed to verify AI-driven features. Data from these tests are analyzed to improve AI algorithms and optimize vehicle performance. The last step is iterative optimization and verification by additional experimental research and simulations.

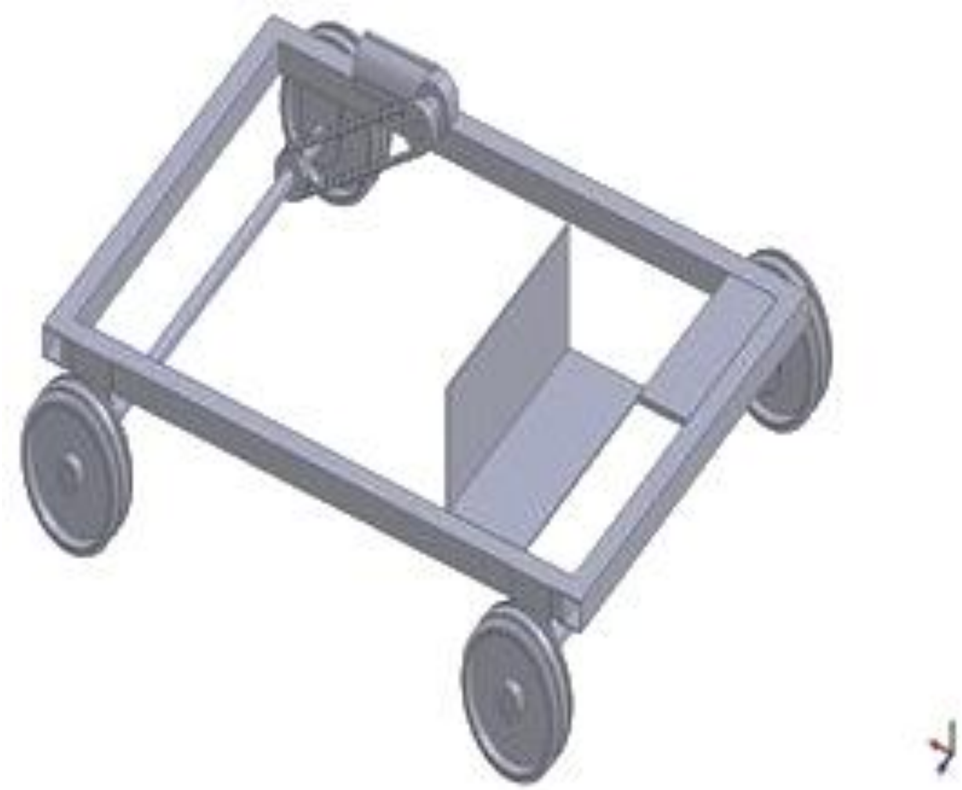

Figure 14. CAD model of set up assembly.

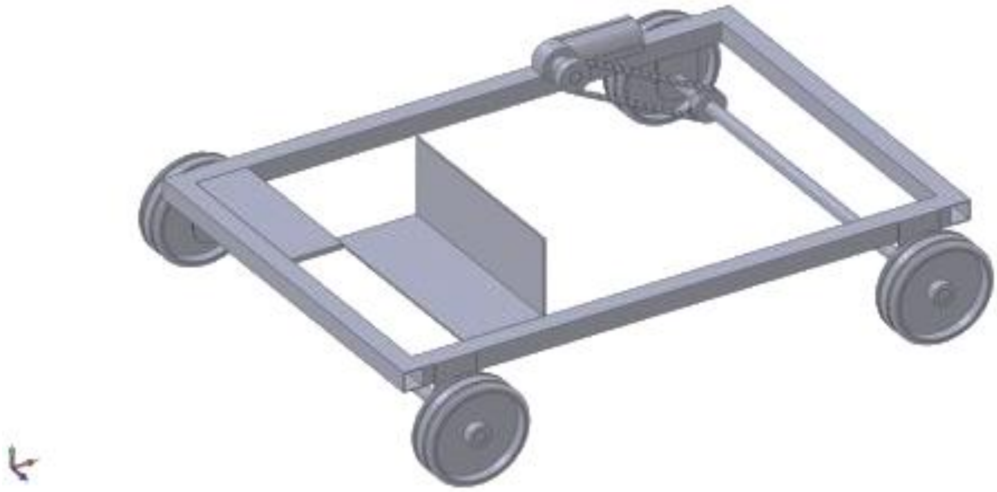

Figure 15. CAD model of set up assembly in FEA.

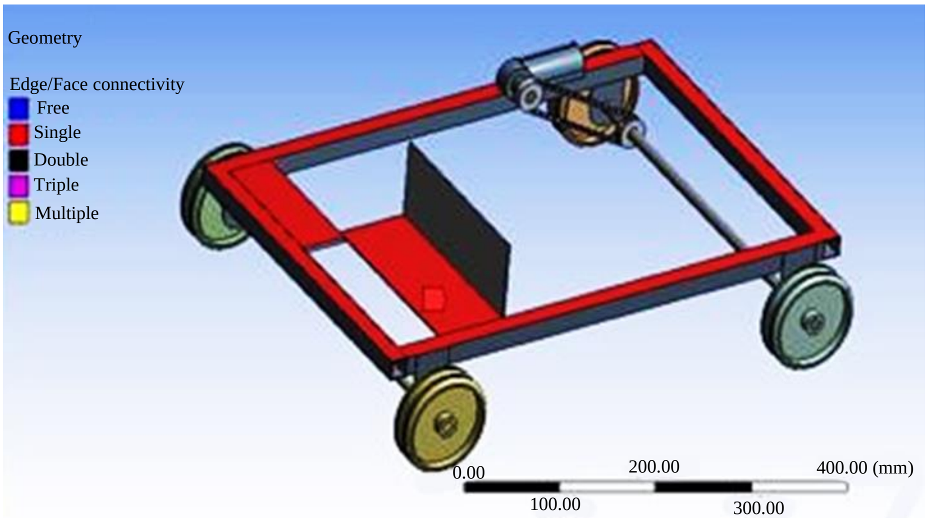

Figure 16. FEA geometry of set up assembly in FEA.

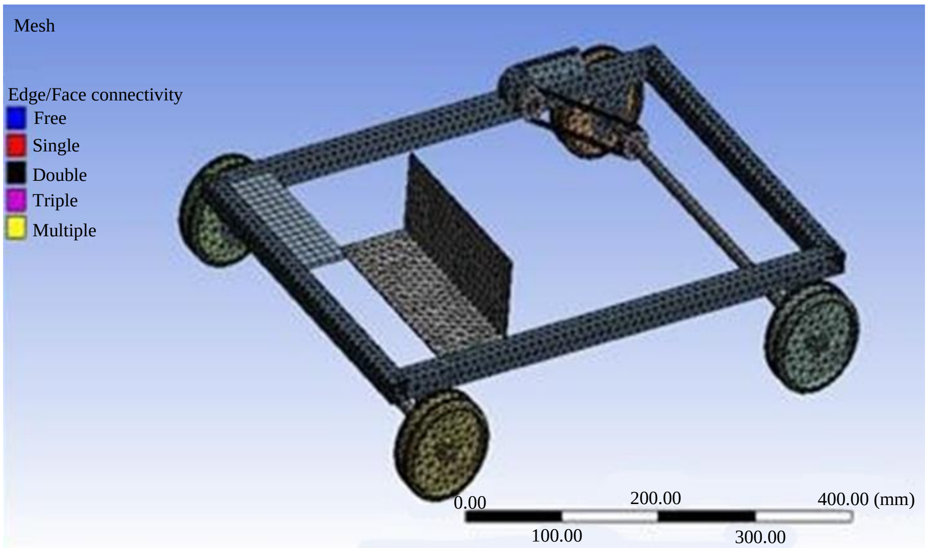

Figure 17. Mesh model of set up assembly in FEA.

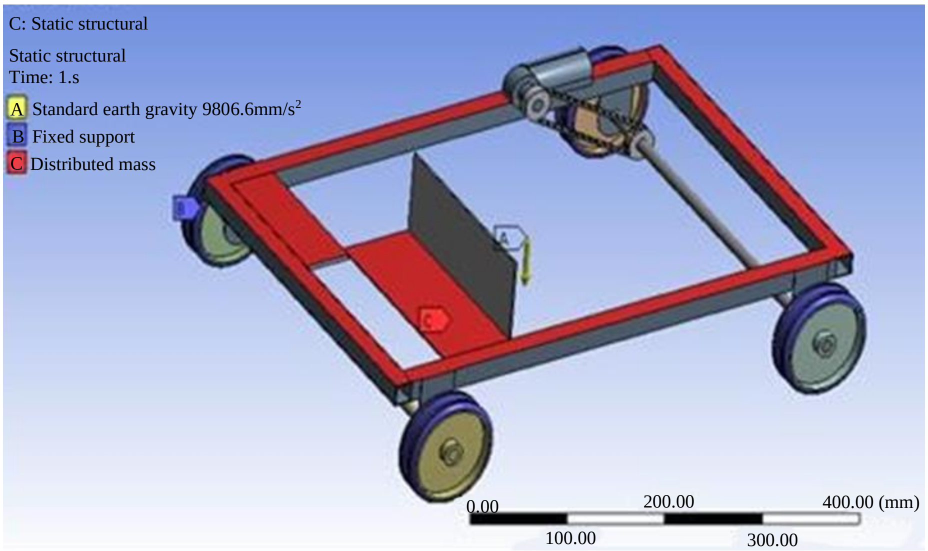

Figure 18. Structural analysis of set up assembly in FEA.

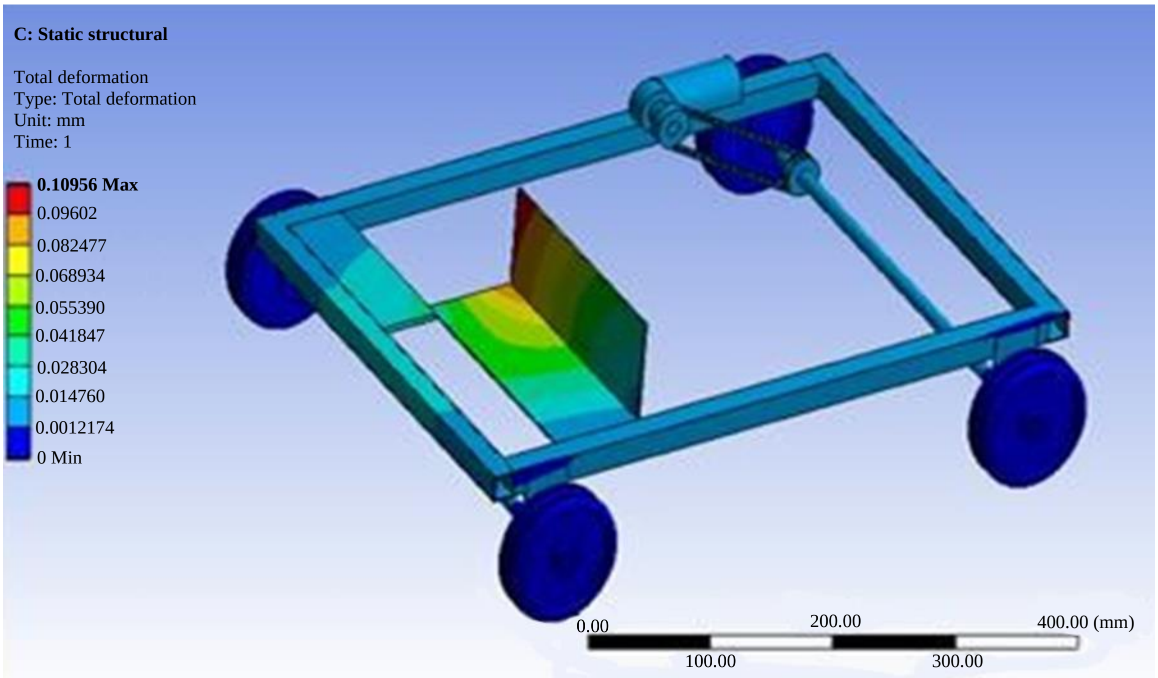

Figure 19. Deformation model of set up assembly in FEA.

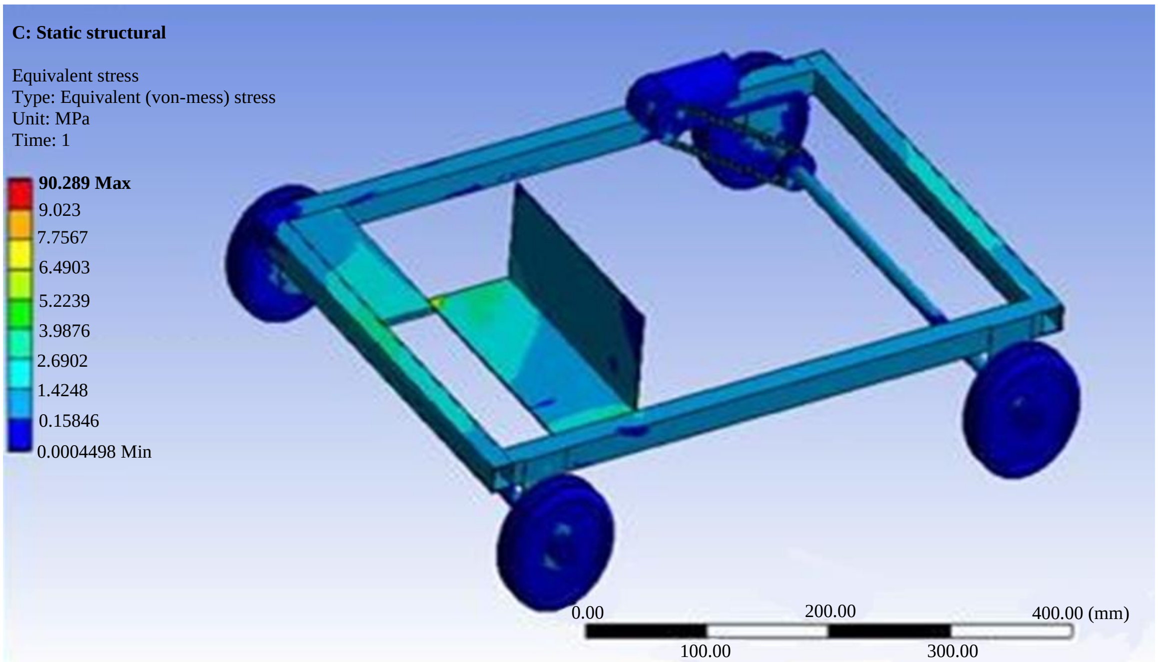

Figure 20. Experimental stress model of set up assembly in FEA.

RESULT AND DISCUSSION

The research paper on "Accelerating Innovation: Design, Development, and Manufacturing of Smart Electric Vehicles with Finite Element Analysis (FEA)" has yielded significant insights into the integration of FEA techniques in the design, development, and manufacturing processes of smart electric vehicles (SEVs) (Figures 21-24).

AI systems in electric vehicles (EVs) require large, high-quality datasets to train algorithms for accurate decision-making and predictions. Collecting, storing, and processing this vast amount of data can be a significant challenge, especially in ensuring data diversity and real-time application.

Figure 21. Components of the system.

Figure 22. Frame of the system.

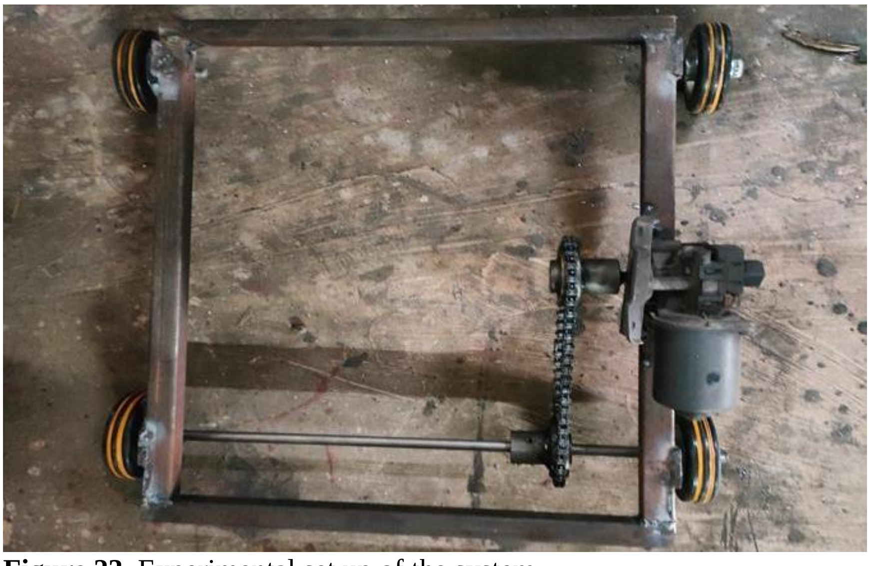

Figure 23. Experimental set up of the system.


Figure 24. Final assembly of the system.

Integrating AI into EVs involves substantial costs, including the development and deployment of advanced AI algorithms, sensors, and specialized hardware. Additionally, implementing cutting-edge manufacturing technologies for smart EVs increases production costs, which could affect vehicle affordability and widespread adoption [21-25].

AI-enhanced EVs must comply with stringent global safety and environmental regulations, which vary by region. These regulatory requirements can slow down development, requiring manufacturers to ensure that AI systems meet standards for both safety and environmental impact before they are brought to market.

AI-enhanced EVs are ideal for urban mobility solutions, offering smart transportation options that align with the needs of smart cities. They can optimize traffic flow, reduce congestion, and provide eco-friendly solutions for city dwellers, contributing to more sustainable urban environments.

In logistics and public transportation, AI-driven EVs offer numerous benefits such as autonomous freight delivery, optimized route planning, and energy-efficient bus systems. These applications reduce operational costs, increase productivity, and support cleaner, more efficient transportation for goods and people [26-28].

AI-enhanced EVs play a crucial role in reducing carbon footprints by improving energy efficiency, enhancing battery management, and promoting the use of renewable energy sources. Their widespread adoption can contribute significantly to reducing greenhouse gas emissions in both urban and commercial transportation.

The integration of AI in EVs leads to notable improvements in efficiency, safety, and user experience. AI systems optimize energy consumption, enhance driving safety with autonomous features, and provide a more personalized driving experience, demonstrating the transformative potential of AI.

Compared to traditional EVs, AI-enhanced designs offer significant advantages, such as more precise energy management, improved performance through predictive algorithms, and enhanced safety features like autonomous driving and collision avoidance. These innovations make AI-driven EVs more efficient, safer, and cost-effective in the long term [29, 30].

CONCLUSION AND FUTURE SCOPE

The integration of artificial intelligence (AI) into the design, development, and manufacturing processes of smart electric vehicles (SEVs) represents a watershed moment in the automotive industry, heralding a new era of innovation, sustainability, and intelligent mobility. Through a Comprehensive exploration of AI-driven design methodologies, energy management systems, autonomous driving capabilities, and manufacturing innovations, this research paper has elucidated the transformative potential of AI-enhanced SEVs and the underlying dynamics driving their accelerated innovation.

The convergence of AI and SEV technologies has unlocked a myriad of opportunities for revolutionizing transportation, empowering vehicles with unprecedented intelligence, efficiency, and functionality. By harnessing AI algorithms, SEVs can optimize energy consumption, extend range, and enhance safety, thereby addressing critical challenges facing the automotive sector, such as climate change, urban congestion, and air pollution. Moreover, AI-driven innovations in SEV design, development, and manufacturing have the potential to reshape the future of mobility, fostering a sustainable and interconnected transportation ecosystem that prioritizes environmental stewardship, user experience, and societal well-being.

However, as we embrace this era of accelerated innovation, it is essential to acknowledge and address the challenges and considerations inherent in the integration of AI into SEV technologies. From data privacy concerns and cyber security risks to regulatory compliance and skills gap in AI expertise, the road ahead is fraught with obstacles that must be navigated with diligence and foresight. Moreover, the broader societal and ethical implications of AI- enhanced SEVs, including job displacement, equity issues, and algorithmic biases, necessitate careful consideration and proactive measures to ensure inclusive and equitable access to transformative technologies.

In conclusion, the accelerated innovation in the design, development, and manufacturing of AI-enhanced smart electric vehicles represents a remarkable testament to human ingenuity and technological prowess. By harnessing the power of AI to reimagine transportation, we have the opportunity to create a future where mobility is not merely a means of transportation but a catalyst for progress, sustainability, and social advancement. As researchers, engineers, policymakers, and stakeholders collaborate to shape this future, let us remain committed to the principles of innovation, responsibility, and inclusivity, ensuring that AI-enhanced SEVs propel us towards a brighter, more sustainable tomorrow.

- As the project name states, this mechanism could be implemented in various electric vehicles in coming years.
- Even in transport vehicles this technology could save a lot of energy and utilize it in emergency situations.

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