

# **Revolutionizing the Smart Car Systems: Embracing Industry 4.0 with AI and IoT Technology A Review**

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**Abstract:** *The exponential rise in vehicle usage across metropolitan areas has intensified traffic congestion, environmental pollution, and delays in urban logistics, necessitating the development of intelligent transportation systems. This research introduces a novel Adaptive Traffic Management (ATM) system that combines smart car technologies, IoT-enabled sensors, artificial intelligence (AI), and smart materials to create an efficient and responsive urban traffic solution. Grounded in fundamental machine design principles, the proposed system integrates three key domains: vehicle dynamics, infrastructure, and traffic-related events. IoT sensors embedded within vehicles and traffic infrastructure collect real-time data on vehicle flow, road conditions, and environmental factors. Advanced AI algorithms, including the DBSCAN clustering technique, analyze this data to detect anomalies such as congestion surges and accidents. In response, the ATM system dynamically adjusts traffic signals and routing strategies to optimize flow and reduce waiting times. Additionally, the incorporation of smart materials in vehicle and road components enhances sensor responsiveness and structural adaptability. Experimental evaluations reveal that the proposed system significantly outperforms conventional traffic control methods by reducing travel time, minimizing accident risks, and improving commuter satisfaction. This integrated approach offers a scalable, data-driven framework for sustainable and intelligent urban mobility in future smart cities.*

**Keywords:** Adaptive Traffic Management (ATM), Smart Cars, Smart Materials, Urban Mobility, DBSCAN

