

Toward Secure and Sustainable Smart Cities: An AIoT Architecture Integrating Edge Intelligence, Blockchain, and Green Computing

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Abstract: *The rapid expansion of Artificial Intelligence of Things (AIoT) technologies has transformed urban infrastructure by enabling intelligent transportation systems, smart grids, environmental monitoring, and public safety networks. However, large-scale AIoT deployments introduce significant challenges in cybersecurity, data privacy, scalability, and energy sustainability. Centralized cloud-based architectures are often insufficient due to latency constraints, single points of failure, and high energy consumption. This paper proposes a Secure and Sustainable AIoT Architecture (SS-AIoT) that integrates edge intelligence, blockchain-based trust management, and green computing strategies to support resilient and energy-efficient smart city ecosystems. The framework incorporates decentralized edge AI processing, distributed ledger-based data integrity verification, adaptive energy-aware workload scheduling, and carbon-efficient orchestration mechanisms. Experimental simulations conducted on smart traffic management, environmental sensing, and smart grid optimization use cases demonstrate improved latency, enhanced security assurance, and reduced energy consumption compared to traditional centralized models. The proposed architecture provides a scalable and environmentally responsible pathway for next-generation AIoT-enabled smart cities.*

Keywords: AIoT, Smart Cities, Edge Intelligence, Blockchain Security, Green Computing, Sustainable AI, Distributed Architecture, Energy-Efficient Computing

