IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 3, July 2025
Impact Factor: 7.67

Security Challenges in IoT Networks: A Block chain-Based Approach

A. Madhavi[1] and Chandana Tara Sai Prathyusha[2]
MCA, Lecturer in Computer Science[1]
MCA, Student[2]
Sir. C. R. Reddy College of Engineering, Eluru

Abstract: *The evolution of agriculture from traditional to precision-based practices has been significantly accelerated by the integration of Internet of Things (IoT), edge computing, and Artificial Intelligence (AI). This research presents a comprehensive study on the design, implementation, and evaluation of an IoT-based smart agriculture system enhanced with edge computing and AIoT (Artificial Intelligence of Things) capabilities. Unlike conventional cloud-based models, the proposed edge-AIoT architecture enables real-time decision-making for irrigation, pest detection, and environmental monitoring through localized data processing using lightweight AI models. Experimental results show that edge systems reduce inference latency by over 80%, lower bandwidth consumption by up to 75%, and maintain comparable accuracy levels (above 91%) in pest detection and irrigation forecasting when benchmarked against cloud-based systems. The study also compares communication protocols, highlighting the superior efficiency of LoRaWAN in rural deployments compared to NB-IoT. Furthermore, the paper explores the feasibility of deploying lightweight Large Language Models (LLMs) at the edge for multimodal reasoning, enabling autonomous agricultural analytics with minimal cloud reliance. The findings suggest that edge-AIoT frameworks not only enhance operational efficiency and scalability in smart farming but also offer a viable, cost-effective solution for smallholder and rural farmers. The research concludes with future directions including LLM-powered edge assistants, drone integration, federated learning, and sustainable energy models to further advance autonomous agriculture ecosystems.*

Keywords: Edge Computing, Smart Agriculture, Artificial Intelligence of Things (AIoT), Precision Farming, IoT Sensor Networks

DOI: 10.48175/IJARSCT-28534