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IoT Network Security Optimization in Renewable Energy and Smart Agriculture Applications

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Abstract:

The integration of Internet of Things (IoT) technologies in renewable energy and smart agriculture has revolutionized operational efficiency and sustainability. In renewable energy systems, IoT devices facilitate real-time monitoring and optimization of energy production, distribution, and storage, enhancing the reliability and efficiency of power grids . However, the proliferation of IoT devices introduces significant security challenges, including vulnerabilities to cyberattacks that can disrupt energy systems and compromise data integrity . In smart agriculture, IoT-enabled sensors and devices enable precision farming by monitoring soil conditions, crop health, and environmental factors, leading to optimized resource utilization and increased crop yields . Yet, these advancements also expose agricultural systems to cybersecurity threats, necessitating robust security measures to protect sensitive data and ensure system resilience . To address these challenges, the implementation of advanced encryption standards, secure communication protocols, and intrusion detection systems is critical. Furthermore, adopting a holistic security framework that encompasses threat modeling, risk assessment, and continuous monitoring can significantly enhance the security posture of IoT networks in both renewable energy and smart agriculture applications.

Keywords: IoT Security, Renewable Energy, Smart Agriculture, Cybersecurity, Intrusion Detection, Secure Communication

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