

Research on building information security solutions for IoT devices and applications

Nguyen Thi Hong Hanh

Abstract: This study investigates the development of comprehensive information security solutions for Internet of Things (IoT) devices and their associated applications. Given the inherent resource constraints and heterogeneous nature of IoT ecosystems, traditional security protocols often prove inadequate. The research proposes a multi-layered security framework integrating lightweight cryptographic algorithms, secure authentication mechanisms, and anomaly-based intrusion detection systems tailored for low-power devices. A hybrid encryption model combining elliptic curve cryptography with advanced encryption standards is designed to ensure data confidentiality and integrity during transmission. Furthermore, a blockchain-based decentralized identity management system is implemented to mitigate risks of unauthorized access and device spoofing. The proposed solutions are validated through simulation and real-world testing on typical IoT platforms, demonstrating significant improvements in resistance against common attacks such as man-in-the-middle, replay, and denial-of-service attacks, while maintaining acceptable performance overhead. The findings offer a practical and scalable approach to fortifying IoT security, contributing to safer deployment in smart homes, healthcare, and industrial automation.

Keywords: IoT security, information security, IoT devices, security solutions