Low Power Consumption Data Security Implementation for Artificial Intelligence Based Smart Systems

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Abstract: Power consumption optimisation is becoming more crucial in the design of artificial intelligence (AI)-powered smart systems. Data security is becoming a major issue in an era where the use of these systems is growing, particularly in applications that demand low power consumption. Due to their high sensitivity and complexity, artificial intelligence applications typically handle massive volumes of data, making data security crucial. Nonetheless, it seems that low-power AI systems are pushing the boundaries of conventional security techniques and algorithms. In this context, researchers are working on realistic approaches for ensuring data security and privacy in artificial intelligence-based systems that require less power. One strategy for improving energy efficiency and ensuring data security is to employ lightweight cryptography (LWC) algorithms, which are suitable for microprocessors with limited memory and power in various architectures used in smart system design. Lightweight cryptography techniques on the Internet of Things (IoT) platform allow a wide range of low-resource and resource-constrained devices to compute, make decisions, and communicate securely across networks. Numerous advantages have been achieved through the design and optimization of various structured algorithms. This study investigated the integration and optimization of lightweight cryptography algorithms with a focus on data security in the application field, as well as the wide application field of artificial intelligence-based systems that require low power consumption. Furthermore, a RISC microprocessor was used to model image processing, and data security and confidentiality were evaluated by integrating an algorithm chosen from a list of lightweight cryptography algorithms that complied with the model. Performance metrics such as memory usage area and power consumption were identified, and the analysis's results are presented.

Keywords: Artificial Intelligence (AI), RISC Processor, Low Power Consumption, Lightweight Cryptography (LWC).

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