Chapter 3
Enhancing Industrial Robotics Performance and Security With AI and Blockchain Technologies

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ABSTRACT

Industrial robotics are becoming more widely used, but their performance and security must be urgently enhanced to satisfy the needs of contemporary industrial contexts. This chapter focuses on how AI and blockchain technology might improve industrial robotic systems' performance while guaranteeing strong security precautions. The capabilities of industrial robots are greatly enhanced by AI technologies. Robots may improve their performance, gain new abilities, and adapt to changing circumstances by utilising cutting-edge machine learning techniques. Robots may learn from their experiences thanks to the incorporation of AI, which improves their operational effectiveness, precision, and decision-making abilities. AI enables robots to optimise their performance, spot anomalies, and proactively resolve potential difficulties, resulting in increased production and less downtime. This is done through real-time data analysis and predictive analytics. Incorporating blockchain technology also provides an industrial robotics system with a safe and open framework.

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INTRODUCTION

Industrial robotics are becoming more widely used, but their performance and security must be urgently enhanced to satisfy the needs of contemporary industrial contexts. The chapter mainly focuses on how AI and blockchain technology might improve industrial robots systems performance while guaranteeing strong security precautions. The capabilities of industrial robots are greatly enhanced by AI technologies. Robots may improve their performance, gain new abilities, and adapt to changing circumstances by utilising cutting-edge machine learning techniques. Robots may learn from their experiences thanks to the incorporation of AI, which improves their operational effectiveness, precision, and decision-making abilities. AI enables robots to optimise their performance, spot anomalies, and proactively resolve potential difficulties, resulting in increased production and less downtime. This is done through real-time data analysis and predictive analytics.

Incorporating blockchain technology also provides an industrial robotics system with a safe and open framework. Data integrity, immutability, and traceability are guaranteed by blockchains distributed ledger system, which is essential for preserving the integrity of industrial operations. Industrial robots can securely store and distribute data, such as performance measurements, maintenance records, and supply chain information, among several stakeholders by utilising blockchain. This decentralised strategy enhances the security of industrial robots systems by preventing unauthorised access, tampering, or harmful activities. Industrial robotics gains from the synergistic effects of AI and blockchain technology. AI algorithms are capable of analysing data gathered from sensors, cameras, and other sources to uncover insightful trends. The security and integrity of the data is guaranteed by using blockchain technology to store and exchange these insights securely. Additionally, blockchains decentralised structure offers resilience against single points of failure, enabling fault tolerance and guaranteeing continuity in industrial operations. However, there are obstacles to successfully integrating AI and blockchain into systems for industrial robotics. For robots with limited resources, the intricacy of AI algorithms and the resource-intensive nature of blockchain can provide computational difficulties. Scalable architectures, optimised algorithms, effective hardware and software design are required to meet these problems.

Real-time applications and their data uses the blockchain technology by making a chain like structure of secured data blocks that are used to store various information. In the present world, robotics is a multi-disciplinary domain that is thriving, and growing its roots deep into various fields of research, manufacturing industries, healthcare, cyber security and even in our day-to-day lives. It has the potential to revolutionize production processes by enhancing productivity, precision, and efficiency, industrial robots has attracted a lot of interest. There are also worries about data security, transparency, and trust as industrial robots become more linked and incorporated into intricate supply chain networks. Blockchain technology, which is renowned for being decentralised and unchangeable, has the ability to solve these problems and improve industrial robots performance. Robotics is made up of vast fields of studies which make it as the root to many challenges in the scenario of performance.

EMERGENCE OF BLOCKCHAIN TECHNOLOGY IN INDUSTRIAL ROBOTICS

Blockchain technology is examined to promote operational efficiency in industrial robots systems by facilitating transparent and auditable transactions, facilitating cooperation without relying on trust, and facilitating data integrity and security. The technology enables producers to check the quality and