


Chapter 1

AI and Blockchain Fundamental: Their Convergence in the Realm of Industrial Robotics


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ABSTRACT

This chapter explores the intersection of artificial intelligence (AI) and blockchain technologies in the realm of industrial robotics. The integration of AI and blockchain has the potential to revolutionize various aspects of the manufacturing sector, from enhancing robotic capabilities to optimizing supply chain management. This chapter delves into the key applications, benefits, challenges, and future prospects of combining AI and blockchain in industrial robotics. Both blockchain and artificial intelligence have generated a lot of excitement in the technology industry for a number of years. AI and blockchain applications for robotics applications thus provides productive, energy-efficient outcome and thus ease the process of automation and maintenance.

1. INTRODUCTION

Industrial robotics has undergone significant advancements in recent years, transforming manufacturing processes across various industries. The integration of Artificial Intelligence (AI) and Block chain technologies into industrial robotics has further revolutionized the field. AI offers the ability to enhance robot perception, decision-making, and adaptability, while Block chain ensures secure and transparent

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data management. Understanding the background and potential of these technologies is crucial to appreciate their applications in industrial robotics.

The motivation behind exploring the applications of AI and Block chain in industrial robotics stems from several factors.

Enhanced Efficiency: AI can optimize robot operations, improving productivity and reducing errors.

Safety Improvements: AI can make robots safer to work alongside humans by enabling them to react to changing environments.

Data Security: Block chain can safeguard sensitive data and prevent tampering, critical in manufacturing settings.

Supply Chain Transparency: Block chain can provide transparency in the supply chain, ensuring quality control and traceability.

Industry 4.0 Adoption: As Industry 4.0 becomes more prevalent, the synergy of AI, Block chain, and robotics becomes imperative.

Objective: The primary objective of this study is to explore the applications of AI and Block chain in industrial robotics with a focus on achieving the following goals:

Assess the impact of AI on industrial robots in terms of automation, adaptive learning, and predictive maintenance.

Evaluate how Block chain technology can enhance data security, traceability, and trust in robotic applications.

Identify real-world use cases where AI and Block chain have been successfully integrated into industrial robotics.

Analyze the potential challenges and limitations of implementing these technologies in industrial settings.

Provide insights into the future trends and innovations in AI and Blockchain within the field of industrial robotics.

Scope: The scope of this study encompasses a broad range of topics related to the applications of AI and Block chain in industrial robotics, including but not limited to:

AI in Industrial Robotics:

Machine learning for robot perception and object recognition, AI-driven decision-making and autonomous robotic systems, Predictive maintenance and failure detection using AI,

Human-robot collaboration and safety improvements through AI, Blockchain in Industrial Robotics: Securing robot control systems and data using Blockchain .Supply chain management and provenance tracking through Blockchain, Ensuring the integrity of robotic process data, Decentralized control and coordination of robotic networks using Blockchain.

Thus, the integration of AI and Blockchain in industrial robotics holds immense promise for transforming manufacturing and related industries (Turjman F.,2021). This study aims to provide a comprehensive understanding of their applications, benefits, and challenges, paving the way for more informed decisions in adopting these technologies for improved industrial automation and efficiency.

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