

Chapter 1

AI and IIoT Enabling Smart Connectivity and Automation in Healthcare

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ABSTRACT

IIoT is revolutionizing industries through connectivity of things, devices, and even the machines in an industrial setting. AI, when integrated with IIoT, enhances the existing automation to sophisticated levels, real-time analysis, and allows the specu-

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lation methodologies to be implemented. This chapter emphasis on IIoT, in particular discussing how machine learning and edge computing and data analytics contribute to IIoT. In this context, the chapter presents selected cases of AI application in IIoT, including predictive and prescriptive maintenance, optimization of production processes, and intelligent manufacturing. The report systematically outlines how artificial intelligence can enhance the automation of various production processes, industrial operations, and decision making. In addition, other issues like security of data, the system's ability to grow with an organization, and integration of the system into an organization environment are discussed.

INTRODUCTION

Technological advancement in the 21st century can be described as revolution brought by the technology mainly the Industrial Internet of Things (IIoT) and Artificial Intelligence (AI). These technologies are going to define industries by optimizing them, automating and providing detailed information about the various processes and systems in the industries. In a nutshell, IIoT is defined as a system of interconnected machines, devices, instruments, sensors that are integrated with software, hardware, connectivity, and the capability to communicate and collect data (Bader et al., 2016; Alkattan et al., 2024; Dutta et al., 2023; Mensah et al., 2025). Unlike, for instance, Business Intelligence that is composed of analytical tools and methods allowing business leaders to uncover insights from data, and then make decisions and automate these insights, AI refers to a range of technologies including data analytics, cognitive systems, as well as machine learning that allows systems and machines to learn from data and optimise processes.

AI in collaboration with IIoT has the possibility to directly affect industries by increasing productivity by providing better data through the improved decision-making system, achieving better results in maintenance prediction, automating the existing processes, creating smart factories (Raza et al., 2020). The integration of AI in IIoT systems is crucial given that a holistic approach is required in the organization and analysis of the large data sets which originate from the IIoT systems (Gummadi & Damacharla, 2024; Al-Attar, 2023; Almaiah et al., 2025; Omotunde et al., 2023). Real-time data and decision making is a major area with the help of which many machine learning algorithms, particularly, are useful. They apply to enhancing production, recognizing equipment failure before they happen, enhancing supply chain, and decreasing energy use in operations.

Cyber physical systems have paved its way and become popular aspects of the modern industries since they make it possible for the machines, devices, and people to work together in an intelligent way. Thus, the systems of IIoT become no more

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