Chapter 3
Recent and Emerging Technologies in Industrial IoT

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ABSTRACT

The industrial internet of things (IIoT) is evolving through remote monitoring, cognitive analytics, and industrial process control. Through product customization, intelligent monitoring applications for production floor shops and machine health, and predictive and preventive maintenance of industrial equipment, the primary goal of IIoT is to achieve high operational efficiency, increased productivity, and better management of industrial assets and processes. But because the industrial sector is only now beginning to implement full-stack development solutions with IIoT, there is a need to deal with the problems that are emerging. The IIoT keeps industrial equipment, machines, and cloud-based applications connected. The authors emphasize the advantages of IIoT, which is one of the chapter's three key themes, which include emerging IIoT hardware and software technologies followed by the challenges of IIoT. Further, this chapter focuses on recent trends and technologies in industrial IoT and challenges in IIoT.

INTRODUCTION

In the industrial sector, disruptive technologies are creating enormous waves by enabling enterprises to drastically enhance their access to data to help connect people, organizations, and technologies. Organizations can now easily access factory, production, and industrial equipment data from a distance thanks to these revolutionary technologies Behrendt (2019). The Internet of Things (IoT) is the technology that has caused the most disruption in recent years. Two of the key breakthroughs in the digitizing trend are the

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Internet of Things (IoT) and the Industrial Internet of Things (IIoT). IoT and IIoT can assist businesses in functioning optimally, making better decisions, and opening up new funding sources by linking multiple devices and items of equipment through the Internet Khajenasiri et al. (2017).

Functioning of Internet of Things (IoT)

A network of connected devices known as the Internet of Things (IoT) allows users to access data and exchange messages. IoT devices often feature sensors that allow them to collect data and connect to the Internet. The IoT consists of a wide variety of gadgets Riahi Sfar et al. (2018). With more connected devices being added daily, it can include anything from factory equipment to electrical substations to buildings and infrastructure. The IoT is used by a range of different types of enterprises, including manufacturers, energy providers, local governments, and others.

With the use of IoT technology, you can gather data automatically from many different tasks, such as how much energy a building's lighting uses or how much water is passing through a sewage treatment facility. The data that IoT systems and devices collect can be sent to a centralized system over the Internet Karmakar et al. (2019). In order to make decisions, managers can use this data. It is possible to go further into the data using data analysis techniques in order to make predictions about the future and gain deeper insights.

Functioning of Industrial Internet of Things (IoT)

The development and implementation of the internet of things (IoT) throughout industrial applications and sectors is referred to as the "industrial internet of things" (IIoT). The IIoT helps businesses and industries to operate more efficiently and reliably thanks to its strong emphasis on machine-to-machine (M2M) connectivity, big data, and machine learning Meyer et al. (2018). The IIoT includes software-defined production processes, robotics, and medical advancements.

Beyond the standard networking of physical gadgets and consumer electronics related to the IoT, the IIoT encompasses a wider range of technologies. It differs due to the point at which operational technology (OT) and information technology (IT) converge. Supervisory control, Industrial control systems (ICSs), such as programmable logic controllers, distributed control systems (DCSs), and data acquisition (SCADA) systems, and human machine interfaces (HMIs), are referred to as operational processes when they are networked (PLCs).

A subtype of IoT is IIoT. IoT technology utilized in industrial settings, namely in manufacturing plants, is what the phrase alludes to. Industry 4.0, the subsequent phase of the industrial revolution, heavily relies on the IIoT. Smart technology, data, automation, interconnection, artificial intelligence, and other technologies and capabilities are highlighted by Industry 4.0 Zhu et al. (2018). The management of factories and industrial organizations is being revolutionized by these technologies.

Many of the same applications and advantages as IoT are possible with IIoT. Manufacturing equipment, energy systems, and infrastructure like pipelines and wiring can all use smart sensors. These sensors can assist industrial businesses in increasing their efficiency, production, employee safety, and other factors through the data they collect and the cutting-edge capabilities they provide.

Plant managers receive data from the IIoT that improves machine-to-machine connectivity and gives them a better understanding of how their facility is running. Industrial businesses can keep a better eye on how much energy, water, and other resources they're using, as well as when and how much they're