Chapter 10
Industrial Internet of Things:
Benefit, Applications, and Challenges

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ABSTRACT

This chapter focused on the importance and influence of industrial internet of things (IIoT) and the way industries operate around the world and the value added for society by the internet-connected technologies. Industry 4.0 and internet of things (IoT)-enabled systems where communication between products, systems, and machinery are used to improve manufacturing efficiency. Human operators' intervention and interaction is significantly reduced by connecting machines and creating intelligent networks along the entire value chain that can communicate and control each other autonomously. The difference between IoT and IIoT is that where consumer IoT often focuses on convenience for individual consumers, industrial IoT is strongly focused on improving the efficiency, safety, and productivity of operations with a focus on return on investment. The possibilities with IIoT is unlimited, for example, smarter and more efficient factories, greener energy generation, self-regulating buildings that optimize energy consumption, smart cities that can adjust traffic patterns to respond to congestion.

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INTRODUCTION

The idea of a world where systems with local processing, sensors and controllers are interconnected with each other and to the larger network and cloud to share data and information is captivating within every single industry. These systems will be connected at a global level with each other and its end users to help entities and users make better-informed decisions based on the data retrieved from these systems. This idea has been given many labels so far, but ubiquitous is the Internet of Things (IoT). The IoT includes everything from smart cities to smart homes, everyday smart appliances, and connected toys to the Industrial Internet of Things (IIoT) with smart agriculture, smart factories, and the smart grid.

The Industrial Internet of Things (IIoT) is often presented as a revolution that is changing the face of the industry in an innovative and rapid manner. However, as it may take a bit of time for global standards to be generalised, the full benefits of IIoT is still a few years away. End users though will still be able to take advantage of the available new IIoT technologies and leverage their existing investment in technologies and people. Introducing IIoT solutions using "Wrap & Re-use'' approach, rather than a "Rip & Replace" approach will enable greater business control. In addition, this measured approach will drive the evolution towards a smart manufacturing enterprise that is more efficient, safer, and sustainable.

The IIoT vision for the world is one where smart connected machinery and equipment operate as part of a much bigger system that make up the smart manufacturing enterprise. The machinery and equipment, or the "things" will posses' different levels of intelligent functionality, ranging from sensory functions, control mechanisms, optimisation, and full autonomous operations.

The smart manufacturing plant comprises of smart equipment, machinery, and operations, all of which have high levels of intelligence embedded at the core. The automated and linked systems use various internet and cloud technologies that ensure secure access to devices and information. New and advanced analytics tools allow for Big Data to be processed efficiently to deliver greater business value.

Think of industrial machineries or systems that can sense their own environments and health and make appropriate adjustments. Instead of working until breakdown, the machines schedule their own regular maintenance or adjust control algorithms dynamically to compensate for the troubled part and the communicate this shortcoming to other machines in the system as well as users of these machines. IIoT can solve problems that were previously thought impossible. However, as the saying goes, "if it was any easier, everyone would be doing it". As IIoT, innovation grows so does the complexity, which makes the IIoT a very large challenge that no company alone can meet. In a recent report on Forbes (), it is estimated that the Industrial Internet of Things could create a total value of up to $11.1 trillion on an annual basis by 2025 and about 70% of this would be captured by business-to-business solutions-leaving the value of the consumer Internet at about $3.5 trillion. In other words, the Industrial Internet will be worth more than twice the consumer Internet will as illustrated in Figure 1 below.

LITERATURE REVIEW

According to Khan, et al. (2020), "the adoption of emerging technological trends and applications of the Internet of Things (IoT) in the industrial systems is leading towards the development of Industrial IoT (IIoT). IIoT serves as a new vision of IoT in the industrial sector by automating smart objects for sensing, collecting, processing, and communicating the real-time events in industrial systems. The major objective of IIoT is to achieve high operational efficiency, increased productivity, and better management