Chapter 2
Industrial Automation Using Internet of Things

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ABSTRACT

This chapter presents a comprehensive view of Industrial Automation using internet of things (IIoT). Advanced Industries are ushering in a new age of physical production backed by the information-based economy. The term Industrie 4.0 refers to the 4th paradigm shift in production, in which intelligent manufacturing technology is interconnected with physical machines. IIoT is basically a convergence of industrial systems with advanced, near-real-time computing and analytics, powered by low cost and low power sensing devices leveraging global internet connectivity. The key benefits of Industrial IoT systems are a) improved operational efficiency and productivity b) reduced maintenance costs c) improved asset utilization, monitoring and maintenance d) development of new business models e) product innovation and f) enhanced safety. Key parameters that impact Industrial Automation are a) Security b) Data Integrity c) Interoperability d) Latency e) Scalability, Reliability, and Availability f) Fault tolerance and Safety, and g) Maintainability, Serviceability, and Programmability.

DOI: 10.4018/978-1-7998-0373-7.ch002

BACKGROUND

Internet of Things

The term Internet of things (IoT) was coined in 1999 by Kevin Ashton of P&G (Procter & Gamble). IoT basically is an interconnection of objects such as appliances, devices, vehicles and other items, broadly termed as "things". It comprises of devices such as sensors and actuators, hardware and firmware electronics, system and application software, and finally the connectivity which "enables" objects to link together and interchange data. Each "thing" has an address to uniquely identify the object and an ability to connect and operate with existing internet infrastructure. As per the estimates, IoT will span approximately 30 billion objects by 2020. The global market value of IoT is estimated at $7.1 trillion growing at a healthy compounded annual growth rate. IoT is blurring the lines between the physical and digital world. This meshed world is popularly known as "phygital" world. IoT enables "things" to be sensed, configured, monitored and operated (controlled) remotely leveraging the existing internet infrastructure. The key benefits of IoT are improved operational efficiency and productivity through automation, energy conservation, better precision and accuracy, improved safety and security and economic benefits like increased revenue and reduced expenses with reduced human intervention. Further, IoT is slated to improve end-user experience, engagement and satisfaction.

Industrial Internet of Things

The term Industrial Internet of Things (IIoT) was defined by General Electric [GE] in 2012. Industrial Internet is basically embedding of devices such as sensors, actuators and other similar instrumentation in machines to create a world of Smart Machines. IIoT, in a true sense provides a platform to converge global industrial systems using low-cost/low-power sensing devices that generate "Big Data" [High volume, High Velocity and High Variety] by adopting advanced analytics and computing. The platform is an interconnected mesh comprising of Machine-to-Machine [M2M] and People-to-Machine [P2M] and Machine-to-People [M2P]. IIoT meshes the "Industrial" world with "Digital" world and has the potential to transform and automate global Industries. The paradigm shift being "industrial data" as the source of competitive advantage which can be processed "anywhere" in a "hyper-connected" world. IIoT provides capability to manufacturing organizations to collect, aggregate and analyze large amounts of sensitive machine data in near

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Oluwadara J. Odeyinka, Opeyemi A. Ajibola, Michael C. Ndinechi, Onyebuchi C. Nosiriand Nnaemeka Chiemezie Onuekwusi (2020). *International Journal of Smart Sensor Technologies and Applications (pp. 1-16).*
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