


## Chapter 26

# Augmented Technology for Safety and Maintenance in Industry 4.0

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### ABSTRACT

*The traditional manufacturing system is going through a rapid transformation and has brought a revolution in the industries. Industry 4.0 is considered to be a new era of the industrial revolution in which all the processes are integrated with a product to achieve higher efficiency. Digitization and automation have changed the nature of work resulting in an intelligent manufacturing system. The benefits of Industry 4.0 include higher productivity and increased flexibility. However, the implementation of the new processes and methods comes along with a lot of challenges. Industry 4.0. requires more skilled workers to handle the operations of the digitalized manufacturing system. The fourth industrial revolution or Industry 4.0 has become the absolute reality and will undoubtedly have an impact on safety and maintenance. Hence, to tackle the issues arising due to digitization is an area of concern and has to be dealt with using the innovative technologies in the manufacturing industries.*

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## **INTRODUCTION**

As also indicated by Reyes Garcia et al. (2019), the first industrial revolution started in the eighteenth-century by utilizing steam as the source of power. It brought significant changes in all the industries by and increased the performance of the industrial sectors to a large extent. The second industrial revolution took place when electric power was used to run the machines. In addition, the assembly lines were used in large industries for mass production. The third industrial revolution integrated information technology with the manufacturing process. There were several dynamic changes in the manufacturing system with the swift exchange of information. The fourth industrial revolution is the amalgamation of the manufacturing process with emerging technologies like the Internet of thing, big data and cloud-assisted processes (Muhuri, 2019). Industry 4.0 is the solution to the increasing demand for product variety existing in the market (Kuo et al., 2019). It includes the use of all cutting edge technology with the automation resulting in smart manufacturing that can adapt the hasty environment transformation (Galati & Bigliardi, 2019, Corallo et al., 2020).

As the advancement in technology is increasing day by day, the safety and maintenance of the entire system is a serious concern for all the industries (Scurati et al., 2018). The level of the issues pertaining to the quality of the product has increased manifold in the current industrial scenario. The intensity of the analysis and identification of safety measures is the key challenge in the industry 4.0. In addition, the standard policy of the governments prevailing in a country needs to be implemented in all the industries in order to avoid major accidents occurring in any workplace. Advancement in technology has also affected the environment and hence the environment protection is to be dealt with seriousness (Ceruti et al., 2019).

Safety and maintenance of the processes involved in the industry is the essential requirement for the growth of any manufacturing plant and new approaches are rising for taking into account not only technical but also societal needs (Martinetti et al., 2017; Martinetti et al. 2019). It includes the implementation of the safety measures and identification of the factors that can cause risk arising due to uncontrolled and unprotected data management (Kaczmarek & Gola, 2019). Despite several attempts towards the safety and maintenance adopted in the manufacturing industry in the past, there exist several cases reporting the breakdown of the network connecting the different processes. A similar scenario prevails with the maintenance of the various tools used in the manufacturing industries wherein highly skilled professionals are required to maintain the dynamic environment of the industry 4.0 as compared to the conventional manufacturing system (Sarmiento et al., 2020; Ivanov et al., 2018). The effective use of information technology in the manufacturing and processing industry needs special attention.

The chapter aims to highlight the processes used in industry 4.0 for the safety and maintenance and the related physical system with the cyber world. The work done to improve the safety and maintenance processes involved in industry 4.0 is discussed. The present chapter also focuses on the various challenges existing in the highly sophisticated and automated processes involved in Industry 4.0.

## **INDUSTRY 4.0: THEORETICAL BACKGROUND AND PROCESSES**

Industry 4.0 is a new industry era wherein all the process involved in the system is digitalized. There is an interconnection of the various steps involved in the process with is a corresponding virtual demonstration. The process flow is mapped with the cyber world in an incessant manner (Monostori, 2014). The

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