

# Towards Intelligent Manufacturing Systems for Industrial Revolution 4.0: An Overview

**Syahrul N. Junaini**

Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia.

**Mohd Saleh Abbas**

INTI International University, Nilai, Negeri Sembilan, Malaysia

**Zakaria Amir**

Azman Hashim International Business School, Universiti Teknologi Malaysia

**Sarina Mail**

Universiti Teknologi Malaysia, Malaysia

**Farah Zeehan**

Department of academic Excellence, Teacher Education Institute Temenggong Ibrahim Campus, Johor, Malaysia

**Muhaimin Haziq Mihat**

Institute of Nano Optoelectronics Research and Technology (INOR), Universiti Sains Malaysia, Pulau Pinang, Malaysia

*Abstract* - Throughout the previous decade, the fourth industrial revolution has created many chances to enhance manufacturing and production processes. These innovations aim to bridge the divide between physical and digital technology in order to create a more intelligent and efficient manufacturing system. To completely grasp the relationship between intelligent manufacturing and IR4.0, first, we begin with reviewing eight advantages of intelligent manufacturing in relation to IR 4.0. Second, while deploying an intelligent manufacturing system inspired by AI has several benefits, it also introduces several complications. Finally, we see Cyber Physical Systems (CPS) as an innovative option for researching and developing intelligent manufacturing processes.

*Index Terms* - Industrial Research, Intelligent Manufacturing, Internet of Things, Manufacture

## INTRODUCTION

Over the last few years, the fourth industrial revolution, (referred to as Industry 4.0) has created various enhancements to manufacturing and production processes. These innovations aim to combine physical and digital technology to create a more intelligent manufacturing system that is more efficient [1]. The aim of this paper is to provide an overview of the literature on intelligent manufacturing systems, with a focus on the industrial revolution 4.0.

This paper is organized as follows: Next, we present benefits of implementing intelligent manufacturing for IR4.0. After that, we discuss challenges in AI-inspired intelligent manufacturing systems (IMS). After that, we present a brief idea of how Cyber Physical Systems (CPS) could be an innovative option for and developing intelligent manufacturing processes.

## BENEFITS OF IMPLEMENTING INTELLIGENT MANUFACTURING FOR IR 4.0

The first benefit is that intelligent manufacturing exploits developments in wireless networking, the Internet of things, and big data [2]. These technologies are convergent in the sense that they help organizations to boost their efficiency and minimize their expenses. The purpose of an intelligent manufacturing system is to enable a corporation to minimize costs and boost efficiency [3]. By building a platform for innovation support capacity it promotes collaboration across departments and production lines [4].

Second, as conventionally, the typical manufacturing process is sequential—on the other hand, intelligent manufacturing permits the use of many machines to do the same task at various locations, controlled by computers. For instance, by utilizing intelligent manufacturing techniques, a machine may produce more and more components concurrently. We refer these operations to as concurrent engineering. Intelligent manufacturing systems accomplish these goals through the use of several technologies, including sophisticated analytics tools [5].

Third, intelligent manufacturing technologies boost the machinery capability and return on investment, while also shortening the time required and increasing efficiency. This is true with the advent of machine learning. It is a branch of artificial intelligence that focuses on computers' ability to learn from, understand, and forecast data. In the smart factory setting, they used it for predictive maintenance [6]. They may also use it with imaging and sensor technologies to monitor the functioning of systems [7].