Chapter 4
Next-Generation Industrial Robotics:
An Overview

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ABSTRACT

The Covid-19 pandemic resulted in a disruption across all industries; market data suggests that the demand for industrial robotics has steadily increased despite the pandemic, and possibly due to the impact of the pandemic. Particularly in industries that were not historically robotic markets, such as hospitals and distribution industries. In addition to that, non-traditional markets such as electronics and pharmaceuticals have become the dominant markets for industrial robots, taking over that position that has always been held by the automotive industry. The main challenge that faces increased artificial-intelligence (AI)-based technologies in next-generation collaborative robotics is the need for established preventive and corrective maintenance protocols on the AI-based technologies, as well as the need for established technician training programs on the new technologies and the wide availability of trained technicians. Another challenge that faces deploying mobile collaborative robotics in industry is the lack of safety standards for that technology.

INTRODUCTION

In the year 2020, a breakthrough was marked in the history of industrial robotics, with the Electronics industry, for the first time, becoming the biggest market of industrial robots (International Federation of Robotics, 2021), a position that has always been firmly held by the automotive industry (Tantawi, Fidan, & Tantawy, 2019) (See **Figure 1** below). In addition to that, the industrial robotics market witnessed a historical growth in the metal and machinery, Chemicals, and the food industries.

Figure 1. Market size of industrial robotics from 2017 to 2020
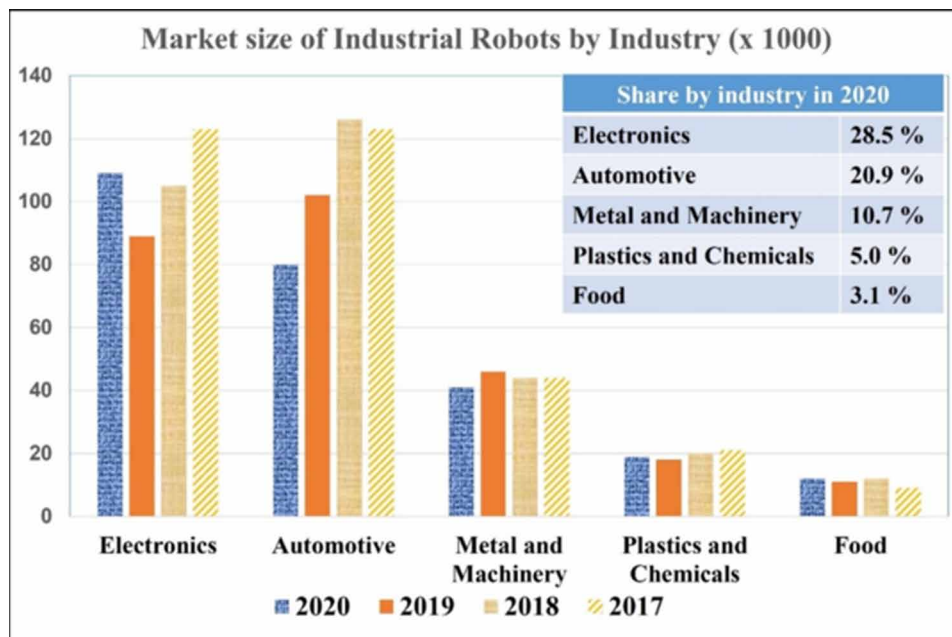
The data in the figure also show that a slight shrink in the world industrial robotics market took place in 2018 and 2019, due to a slowdown in the world economy and the ongoing trade conflict that involves the U.S., Europe, and China.

Another point that can be seen in the figure is that the automotive sector witnessed the strongest impact from the CoVid-19 pandemic. This is attributed to the switch to work-from-home in many industry sectors that continues until today, while the demand for computers and high-tech equipment at homes resulted in a sharp increase in the electronics sector.

The taking over of the largest robotics market share by the electronics sector was expected regardless of the state of the pandemic, as was evident in the year 2016, when the electronics industry exceeded the automotive industry in demand for industrial robotics in China, Japan, and Korea. Worldwide, the electronics sector's share of the robotics market rose steadily to 32% in 2017, almost equal to the automotive sector (33%). The rapid growth in the electronics and metal industries is resulting in a change in dominance of the robotics market. One important point that can be concluded from this change, is that new industry markets are emerging and overshadowing the historical automotive market. This means that

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