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Artificial Intelligence Driven Framework for Successful Introduction of Colloborating Robots in Supply Chain Management

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Abstract

Automation in industrial settings has been a driver for enhancing productivity, quality control, safety, efficiency, and reliability. This has increased worldwide interest in artificial intelligence-based solutions and robotic technologies. The recent COVID-19 crisis has further accelerated the momentum of interest in automation and robotic applications for handling unpredictable breakdown in supply chain, workforce, and occupational hazard which greatly impacted the business performance during such disruptions. In this study, we present an artificial intelligence driven framework that identifies the potential barriers in the adoption of robots in diverse industrial settings and examines the efficacy of collaborating robots for their successful adoption in supply chain management of various enterprises. The framework consists of artificial intelligence-based supply chain analytics and deep neural network-based method for human-aware robot grasping to provide enhanced human-robot interaction in a specific enterprise environment to improve the functionality, workability, and productivity. The real robot experiment was carried out to assess the efficacy of the developed method for improved human-robot interaction. The study reveals that the key determinants in adoption of robots in industrial settings include relative advantage, technological complexity, cost, occupational safety, trust, psychophysiological reaction, employee acceptance, competitive pressure, vendor support, and disruptive scales in supply chain. Results obtained reveal that the developed robust grasping method is well equipped with the knowledge and reasoning capabilities that allow more natural and socially aware collaboration between human and robot over the traditional robot centric method while performing a given task in shared environment.

Keywords: artificial intelligence, automation, covid-19, robot collaboration, supply chain