Intelligent Machining Systems for Robotic End-Effectors: State-of-the-Art and Toward Future Directions

Abdul Nasir Abd. Ghafar, Devin Babu, Mohd Hanafi Muhammad Sidik, Muhammad Hisyam Rosle, and Nurul Najwa Ruzlan

Abstract This review paper delves into the advancements brought about by Industry 4.0 in the realm of intelligent machining systems for robotic end-effectors. Robotic end-effectors, which are the devices at the end of a robotic arm, have seen significant enhancements in their design, development, and application across various sectors, from manufacturing to healthcare. The integration of intelligent machining systems into these end-effectors has augmented their efficiency, precision, and flexibility. The paper also highlights the role of intelligent control systems in boosting the performance of these robotic systems. Despite the progress, challenges persist, such as improving machining accuracy, optimizing machining trajectories, and integrating machine learning techniques. The review concludes by identifying gaps in the current research and suggests potential areas for future exploration to further enhance the capabilities of robotic end-effectors.

Keywords Robotic end-effectors · Intelligent machining systems · Intelligent control systems · Compliance control · Machining trajectory optimization

A. N. Abd. Ghafar (✉) · D. Babu
Faculty of Electrical and Electronics Engineering Technology, Universiti Malaysia Pahang Al-Sultan Abdullah, 26600 Pekan, Pahang, Malaysia
e-mail: abdnasir@umpsa.edu.my

M. H. M. Sidik
Faculty of Mechanical and Automotive Engineering Technology, Universiti Malaysia Pahang Al-Sultan Abdullah, 26600 Pekan, Pahang, Malaysia

M. H. Rosle
Faculty of Electrical Engineering Technology, Universiti Malaysia Perlis, 02600 Perlis, Malaysia

N. N. Ruzlan
Faculty of Manufacturing and Mechatronic Engineering Technology, Universiti Malaysia Pahang Al-Sultan Abdullah, 26600 Pekan, Pahang, Malaysia

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