Robotics Technology Permeates Manufacturing and Other Industrial Contexts:
Human–Robot Interaction (HRI)

Aswini J. P.
St. Joseph College of Engineering, India

M. Navaneethakrishnan
St. Joseph College of Engineering, India

Beneta Mary A.
http://orcid.org/0009-0005-9084-1579
St. Joseph College of Engineering, India

S. Cloudin
http://orcid.org/0009-0002-7633-8377
Easwari Engineering College, India

Paul T. Jaba
http://orcid.org/0009-0003-1527-5330
St. Joseph College of Engineering, India

Robinson Joel M.
http://orcid.org/0000-0002-3030-8431
KCG College of Technology, India

ABSTRACT

As robot technology becomes more widely used in manufacturing and other industrial settings, the area of human-robot interaction (HRI) in industrial settings is becoming more and more essential. In industrial settings where people and robots collaborate, safety is of utmost importance. To avoid mishaps and injuries, safety precautions such as risk assessments, safety sensors, and physical barriers (such as fences or cages) are crucial. Collaborative robots are Cobots, as opposed to conventional industrial robots, which are made to work side by side with people in a shared workspace. Cobots are frequently outfitted with sophisticated sensors and software that enable them to recognise and respond to human presence, guaranteeing safe contact. Careful task design is necessary for human-robot collaboration to be effective in utilising the capabilities of both parties. Robots are usually more suitable for jobs that require repetitive motion or physical exertion, whereas humans are better at activities that call for dexterity, flexibility, and judgement.

INTRODUCTION

An era of efficiency and automation has been ushered in by the transformation of traditional production processes through the integration of robotics technology into manufacturing and other industrial contexts.

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Human-Robot Interaction (HRI) (Sheridan, & Thomas B, 2016) becomes a crucial field of study as robots become more commonplace in these environments. Human-Robot Interaction (HRI) is the study and creation of systems that facilitate human-robot collaboration and communication in shared workspaces.

Ensuring safety is crucial in industrial settings where humans and robots collaborate together. To stop accidents and injuries, a number of safety precautions are put in place, including as risk assessments, safety sensors, and physical barriers like fences or cages. The capacity to work safely with humans sets collaborative robots, or cobots (Castillo et al., 2021) apart from traditional industrial robots. Cobots, which are outfitted with sophisticated sensors and software, are able to recognize and react to human presence, enabling secure communication and engagement. The key to successful human-robot cooperation is thoughtful task design that makes use of each party's special talents. Robots are great at jobs requiring manual labor or repetitive motion, while humans are better at complicated tasks because of their dexterity, adaptability, and judgment. For smooth communication between humans and robots, intuitive user interfaces such as voice commands, touchscreen panels, graphical interfaces, and gesture detection systems are essential.

Adequate training is necessary for both human employees and robot operators to promote a safe and productive working relationship. Workers must learn how to interact with robots properly, and operators must be proficient in programming and troubleshooting robotic systems. Humans and robots must communicate clearly and unambiguously, with robots giving input on their objectives, status, and any possible problems.

Tasks in dynamic industrial settings may change over time, requiring robots to adjust to new conditions and work well with people in a variety of contexts. Robotic systems require routine monitoring and maintenance in order to operate at peak efficiency and reduce unscheduled downtime. By seeing possible problems before they become more serious, predictive maintenance systems that make use of sensors and data analytics can increase efficiency even further. The ethical and social implications of human-robot interaction must be taken into account as robotics technology continues to dominate industrial settings. It is imperative to take proactive measures to address concerns about job displacement, privacy issues, and the impact on the workforce. A thorough strategy that takes into account socioeconomic factors, usability, safety, and flexibility is necessary for the successful integration of robots technology into industrial settings. The future of manufacturing and industrial processes is greatly influenced by the field of human-robot interaction (HRI), which is opening the door to safer, more effective, and ethically sound human-robot cooperation.

Human-Robot Interaction (HRI) is a field of study dedicated to under- standing, designing, and evaluating robotic systems for use by or with humans. Interaction, by definition, requires communication between robots and humans. Communication between a human and a robot may take several forms, but these forms are largely influenced by whether the human and the robot are in close proximity to each other or not. Thus, communication and, therefore, interaction can be separated into two general categories Robotics technology has revolutionized old processes and increased productivity, becoming firmly ingrained in manufacturing and other industrial environments. Human-Robot Interaction (HRI) becomes increasingly important as automation progresses, especially when it comes to enabling remote human-robot interaction. Remote maintenance, teleoperated robots, remote sensing, telecommunication, remote user interfaces, remote feedback, remote supervision, and remote training are some examples of remote collaboration.