
Editorial: Robotic intelligence and automation

Under the joint efforts of the publisher and the editorial team, journal *Assembly Automation* has been renamed as *Robotic Intelligence and Automation* (RIA). RIA focuses on the interdisciplinary integration of robotics, artificial intelligence and automation and hardware and software.

Robots have grown tremendously in recent decades and are playing an increasingly important role in the industrial and service sectors. In anticipation of robots replacing humans in more general scenarios, and even becoming human friends, scientists have been conducting ongoing research to give robots human-like structure and intelligence. In 2000, ASIMO, a humanoid robot developed by Honda, received widespread attention for being able to perform actions such as walking, running and grasping both hard and soft objects in response to human commands (Sakagami *et al.*, 2002). In 2005, Boston Dynamics developed a four-legged robot, Big Dog (Raibert *et al.*, 2008), capable of traversing various outdoor terrains and recovering from disturbances. In 2013, Boston Dynamics unveiled its humanoid robot, Atlas (Kuindersma *et al.*, 2016). After several iterations, Atlas's advanced control system and hardware enabled highly complex and agile locomotion, such as running, dancing and backflipping. From 2012 to 2015, the Defense Advanced Research Projects Agency hosted the DARPA Robotics Challenge to promote technological innovation in semiautonomous robots for dangerous tasks such as disaster rescue in complex environments (Guizzo and Ackerman, 2015). HUBO, a robot from the Korean Institute for Science and Technology, won the competition (Oh *et al.*, 2017). In 2020, the University of Liverpool developed a mobile robotic chemist that can move freely around the lab and perform chemical experiments independently with its arms (Burger *et al.*, 2020). In 2022, a robot codenamed Optimus was unveiled by Tesla. The developers of Optimus Prime hope to mass-produce the robot in the future and use it to perform “dangerous, repetitive and boring” tasks, such as assisting in manufacturing[1]. In addition, to better imitate human structure, many musculoskeletal robots with human-inspired joints, muscles and actuation mechanisms have been designed and established by the University of Tokyo (Asano *et al.*, 2017) and Institute of Automation, Chinese Academy of Sciences (Qiao *et al.*, 2023).

However, compared with humans, the intelligence of existing robots is still limited especially in complex and unstructured environments, which restricts the ability of robots to interact naturally with humans, to make flexible decisions in complex unstructured environments and to achieve precise and dexterous manipulation.

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Therefore, it is crucial to further enhance the robotic intelligence. In recent years, artificial intelligence, including large language model, has developed rapidly and become deeply integrated into various application scenarios. In 2012, AlexNet (Krizhevsky *et al.*, 2017) significantly improved the performance of image recognition on ImageNet. In 2016, AlphaGo (Silver *et al.*, 2016) beat the world champion in the game Go. The victory is an important milestone for the field of artificial intelligence, proving that machine learning algorithms can master complex strategy games previously thought too difficult for computers. In 2021, AlphaFold (Jumper *et al.*, 2021) was developed by DeepMind as a protein structure prediction system and has achieved state-of-the-art performance in the CASP13 protein structure prediction challenge. From 2018, OpenAI continuously developed large language models GPT-1 (Radford *et al.*, 2018), GPT-2 (Radford *et al.*, 2019) and GPT-3 (Brown *et al.*, 2020), which received widespread attention for their impressive performance on a wide range of NLP tasks. GPT can produce highly coherent and reasonable text in a variety of styles and formats. In 2022, OpenAI released their novel chatbot ChatGPT as a web application, which has the fastest user growth rate of any APP in history. ChatGPT has the potential to revolutionize many industries with its powerful language understanding and generation capabilities. Bill Gates said that ChatGPT is as important as PC and internet, and it will change the world.

Although AI research has developed rapidly, it is more concerned with the performance of algorithms and software systems and still has limitations in improving the intelligence of robots and hardware systems. Therefore, the improvement of robot intelligence still requires the intersection of several disciplines such as artificial intelligence, neuroscience, control science and mathematics. Based on the judgment that robotic intelligence will be an important and promising direction in the information field, we decided to rename the journal to RIA to encourage and motivate the development of robotic intelligence.

RIA is a relatively new journal and focuses on theory and application of robotic intelligence and automation from multiple disciplines like artificial intelligence, control science, mechanical engineering, mathematics, neuroscience and material. It welcomes theories of robotic intelligence and automation on perception, cognition, decision-making, control, structure design and their applications to industry, service, surgery, agriculture, marine, space and other fields. Furthermore, integrated intelligence and biologically inspired intelligence of robots are especially encouraged. Welcome to submit your research.

The editorial team of RIA, including the editor-in-chief and associate editors, consists of 15 internationally renowned scholars from five countries in the fields of robotics, artificial intelligence, control, etc. It is a united and upward editorial team, and we hope to work together to make the journal better. More fresh blood and valuable suggestions for the journal are welcomed by the editorial team.

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Note

- 1 Optimus by Tesla [EB/OL]. <https://spectrum.ieee.org/tesla-optimus-robot>

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