

# Robotics and Automation

By Seth Hutchinson

In the name “IEEE Robotics and Automation Society” (RAS), the “and” doesn’t get nearly enough respect. These days, one could easily read, publish, and attend conferences in either discipline without noticing that the other exists. Or, worse, one might feel a lack of collegiality, perhaps to the point of disrespect, from folks in the other discipline. Over the last few years,

**As a Society, it now seems the right time to ask how we arrived at this point and what we can do to bring our two communities of robotics and automation back together in meaningful ways.**

in 1984. In those days, manufacturing was the driving application for much of the research in both robotics and automation. The so-called big iron robotics companies—Fanuc, ASEA (later ABB), KUKA, Unimation, and others—were mainly in the business of manufacturing. If you were doing robotics research, you were likely using one of these man-

ufacturing robots. Integrating these robots into manufacturing systems was a key component of automation research. Robotics was essential to automation, and automation was the primary application

for robotics. Jagger and Richards, De Beauvoir and Sartre, Kurosawa and Mifune, Robotics and Automation.

Over the years, what began as the subdisciplines of robotics and automation grew in scope, until each could legitimately claim to be a discipline in its own right. Robotics moved from the factory to less constrained environments characterized by uncertain and dynamic conditions that require sophisticated real-time sensing and reasoning capabilities along with advanced control methods to ensure safe physical interaction with humans in shared spaces. Automation found application in transportation, agriculture, health care, pharmaceuticals, construction, and more, while developing rich theoretical foundations in formal methods, optimization, discrete-event systems, operations research, and more.

By the turn of the 21st century, our Society had outgrown much of its original structure. During this time, *IEEE Transactions on Robotics and Automation* (T-RA) struggled to keep pace with the growing number of submissions, and the International Conference on Robotics and Automation (ICRA), our Society’s flagship conference, failed to provide an adequate venue for the now burgeoning field of automation. From 2004 to 2005, innovative leaders responded by creating *IEEE Transac-*



*tions on Automation Science and Engineering* and the new IEEE International Conference on Automation Science and Engineering. At the same time, T-RA was renamed *IEEE Transactions on Robotics*. These

new venues significantly increased the opportunities for publishing in both communities, while enhancing the overall stature of the Society as a whole. At the same time, they represented a bifurcation in our research community, exposing an existing sense of competition between the two disciplines.

In subsequent years, we have worked to clarify the differences between the two disciplines, in part to inform authors of the most appropriate venues for publication or presentation of their research. This focus on distinguishing characteristics has, to some extent, led to a disconnect between the communities. At this point, one might even suggest that neither is essential for the other’s survival. While automation often involves machines performing repetitive operations, these machines need not conform to our idealization of robots. For robotics, most new applications are concerned with novel circumstances, dynamic environments, and unpredictable and uncertain interactions (for example, with humans). Researchers from robotics and automation alike could rightly claim that their discipline would survive, even thrive, without the other.

And, yet, doing so would lead to a less rich body of research, neglecting many interdisciplinary problems that are of critical societal importance. Self-driving

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robot with sophisticated sensing and control capabilities. Nevertheless, these capabilities are no match for the capricious and idiosyncratic aspects of real-world driving, and society's will-

cars provide a ready example—an application that requires a deep integration of research from both the robotics and automation communities. The vehicle itself is often conceptualized as a large mobile

ingness to tolerate failure has not yet been tested. But these are exactly the problems for which automation is best suited: ensuring quality, efficiency, and reliability is the hallmark of modern automation research. There are numerous domains for which this same rationale applies.

In 2021, our Society will begin a more formal conversation about the synergistic relationship that exists between the robotics and automation communities. I have appointed an ad hoc committee to explore synergies in automation and robotics, chaired by Ken Goldberg of the University of California, Berkeley. Ken has a long history in both the robotics and automation communities. His articles and editorials

have played a key role in shaping how our Society views the interaction between our two disciplines (not to mention the ideas in this column). This committee has been charged with finding new ways to enhance the interaction between the two disciplines. In addition, the plenary panel "Synergies Between Automation and Robotics" will be held during ICRA 2021. The panel will include a dozen researchers, all of whom will present their views on the issue, followed by a discussion among panelists and a question-and-answer period with attendees. It is my hope that these activities will initiate a renaissance in integrated, interdisciplinary research in robotics *and* automation.

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