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What is Automation?
An interview with Ken Goldberg, EiC IEEE T-ASE

Eugenio Guglielmelli (RAM EiC), What was the rationale behind the genesis of the T-ASE journal?

Ken Goldberg (T-ASE EiC), As you know the IEEE Robotics and Automation Society was created 30 years ago with the marriage of two subfields. Twenty years later, recognizing a significant potential for research in these areas to evolve, the Society decided to bifurcate its journal into two publications, the Transactions on Robotics (T-RO) and the Transactions on Automation Science and Engineering (T-ASE). This year will be the 10th anniversary for T-ASE. Automation has expanded beyond its roots in Manufacturing to include applications in Healthcare, Security, Transportation, Agriculture, Construction, and Energy. There's also been a surge of interest in Home Automation, e.g. Google's purchase of Nest.

In 2013, T-ASE received over 700 submissions, almost double the number from two years ago. We published papers by leading researchers such as Pieter Abbeel, Russ Tedrake, and Sebastian Thrun and included a Guest Editorial by Raff D'Andrea on Grand Challenges after Amazon's purchase of Kiva Systems. T-ASE is widely read in China, where over 100 universities have established Automation departments.

EG. So what is the difference between Robotics and Automation, in your opinion?

Let's admit: Robotics is sexier. Automation has always been viewed as the workhorse, focused on manufacturing; less glamorous but with a much larger impact on the world economy.
Both Robotics and Automation explore the frontiers of automated and semi-automated machines. Both fields are increasingly concerned with the role of humans and human interfaces, and with the potential of the Internet. Looking at the RAS Field of Interest Statement:

"Robotics focuses on systems incorporating sensors and actuators that operate autonomously or semi-autonomously in cooperation with humans. Robotics research emphasizes intelligence and adaptability to cope with unstructured environments. Automation research emphasizes efficiency, productivity, quality, and reliability, focusing on systems that operate autonomously, often in structured environments over extended periods, and on the explicit structuring of such environments."

Note that Automation emphasizes sustained performance: efficiency, productivity, and reliability. Sustained performance requires new theory, analysis, models, performance guarantees, and results on robustness, stability, productivity, efficiency, completeness, optimality, convergence, time complexity, sensitivity, verification, and reliability. It's vital to emphasize the rigorous theoretical foundations of Automation.

EG. Consequently, what typical topic do you expect to be covered in an Automation paper to be submitted to T-ASE rather than to T-RO?

KG. Robotics and Automation are not disjoint; it's important todispel the myth of the excluded middle. The distinction between Robotics and Automation is a sigmoid, not a step function. Many papers include aspects of both subfields, but emphasize one or the other. Both publications

emphasize “research” over “development.” Of course an Automation paper may present a feasibility study for an entirely novel mechanism, model, or theory for applications that involve repetitive operations, for example, in manufacturing or healthcare. But an Automation paper could also focus on making robots walk, drive, fly, or perform a surgical subtask more efficiently, more reliably, or more cost effectively.

There is much more information on the scope of T-ASE, a list of published paper titles, and a list of our ten primary Methodologies and ten primary Applications on the T-ASE website: http://www.ieee-ras.org/publications/t-ase

EG. Are you making changes to the format of T-ASE?

KG. Yes. As you know, reproducibility is the hallmark of good science. Everyone benefits when researchers compare their new results alongside data or reproduced experiments from previously published methods. To facilitate this, T-ASE is encouraging authors to publish data, code, CAD models, and other media with their papers, as well as details on experimental methods, so that others can repeat and extend published results. To increase access and impact, we also encourage authors to include presentation materials and illustrative videos.

EG. How can RAS support the development of Automation within the Society?

KG. The IEEE Robotics and Automation Society is a successful marriage that is growing stronger over time. At the last CASE conference (where Larry Ho presented an inspiring career overview), attendees greatly appreciated that the past, present, and future RAS Presidents participated actively. The RAS leadership has been a steadfast supporter of Automation and I’m very fortunate to work with a terrific Editorial Board.

It’s vital to continue to evolve how we think about Automation. I’m confident that RAS will benefit by emphasizing both Robotics and Automation in the years ahead.