

# Introduction to the Special Issue on Human–Robot Interaction

**T**HIS SPECIAL issue is one of the products of the 2001 DARPA/NSF Study on Human–Robot Interaction. That study was commissioned by Jean Scholtz, then at the Defense Advanced Research Projects Agency (DARPA), and Vladimir Lumelsky, then at the National Science Foundation (NSF). The intent of the study and the details of the workshop that provided most of the source material are presented in the report by Burke, Murphy, Rogers, Scholtz, and Lumelsky, but the need for a survey of the state of the art of human–robot interaction should be clear. The past five years has seen an acceleration of the insertion of robots into the “everyday” world. Robots are no longer confined to the factory floor or Mars, but are serving as our museum guides, vacuuming our floors, searching for us in the aftermath of a disaster, and even acting as pets.

The collection is intended to be a sampling of research efforts focused on human–robot interaction (HRI). The articles show that HRI has moved beyond the shallow interpretation of “interaction,” meaning how to navigate around people in a room. HRI now embraces a richer perspective, including how to be able to directly aid a person with individual needs and preferences (see Hüttenrauch *et al.*), or how technology is inserted into complex tasks such as space exploration (Clancey), or existing organizations such as emergency response (see Murphy). Likewise human–robot interaction goes beyond multimodal user interfaces which create a mechanism by which a human can direct a robot and instead drills into what a robot and person need to say to each other to accomplish a task (see Skubic *et al.*), how the system can help a user configure and coordinate multiple robots (see Endo *et al.*), and what the flavor of such interactions might be (see the two articles by Breazeal and the one by Lisetti *et al.*).

Perhaps one lesson from the 2001 study is that HRI may be best thought of as a world view, a view much broader than even human-centered design. If we follow the taxonomy postulated in the article by Woods *et al.*, there are three views of a human–robot system: that of the roboticist, the cognitive engineer, and the problem holder. The roboticist is concerned

with making and programming robots. The cognitive engineer is interested in abstracting and applying lessons learned in how people adapt to technology. The problem holder is focused on how the technology solves the problem. HRI is a fusion of these three perspectives into a systems-oriented viewpoint. That said, perhaps the most telling indication of the state of the art of HRI is that almost each article in this issue takes a roboticist viewpoint. Even in the most human-centered article, the needs and constraints of the robot continue to dominate any discussion of the system. As HRI research matures and robots become more capable, it is expected that neither the human nor the robot will be “centric,” but rather the *system* will be the true focus.

This special issue finds that the field of human–robot interaction is off to a good start but now must broaden its perspective to fully engage cognitive science, human-computer interaction, usability engineering, and the requirements of specific domains in order to fulfill the promise of truly usable robotic systems. We trust that you will find these articles a useful foundation for your investigations into this emerging area of inquiry.

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