

Preface

As Artificial Intelligence (AI) research becomes more intertwined with other research domains, the evaluation of systems designed for human-machine interaction becomes more critical. The design of experiments that meet the standards for acceptance in multiple fields can become incredibly challenging. For example, a human-robot interaction experiment may involve elements from allied fields such as psychology or anthropology. The design for such an experiment needs to meet the requirements of these different, and sometimes conflicting, disciplines.

This symposium was designed to provide a forum for researchers from many disciplines to discuss experimental design and the evaluation of AI-based systems. Researchers from human-machine interaction and allied fields, such as psychology, anthropology, design, human-computer interaction, human-robot interaction, rehabilitation and clinical care, were invited to share ideas about experiment design. Application domains included assistive technology, urban search and rescue, and remote scientific exploration.

The symposium included a wide variety of topics that address the challenges of experiment design for AI applications including: (1) the design of system evaluations; (2) the successes and failures in system evaluations; (3) a survey of designs for user studies; (4) the understanding the role technology plays in society; (5) the uses of quantitative and qualitative data, (6) the utility of formative and summative end user evaluations, and other related topics.

Katherine Tsui (University of Massachusetts Lowell, USA), Chair
David Feil-Seifer (University of Southern California, USA)
Heidy Maldonado (Stanford University, USA)
Bilge Mutlu (Carnegie Mellon University, USA)
Kristen Stubbs (University of Massachusetts Lowell, USA)
Leila Takayama (Stanford University, USA)

Invited Speaker Biographies

Keynote Speakers

Julie A. Adams is an Assistant Professor of Computer Science and Computer Engineering in the Electrical Engineering and Computer Science Department at Vanderbilt University, where she directs the Human-Machine Teaming Laboratory. Her research focuses on distributed artificially intelligent algorithms for autonomous multiple robot coalition formation and the development of complex human-machine systems for large human and robotic teams. She has published on topics in autonomous robotic coalition formation, human-robot interaction, cognitive task analysis for robotic systems, and human factors. She worked in Human Factors for Honeywell, Inc. and the Eastman Kodak Company from 1995 to 2000. She was an Assistant Professor of Computer Science at Rochester Institute of Technology from 2000 until 2003. She is an appointed member of the National Research Council's Army Research Laboratory Technical Assessment Review Panel on Solider Systems and is the recipient of the NSF CAREER Award. She received her Bachelor of Science in Computer Science and her Bachelors of Business Administration in Accounting from Siena College. She received her M.S.E. (1993) and her Ph.D. (1995) in Computer and Information Sciences from the University of Pennsylvania.



Marjorie Skubic received her Ph.D. in Computer Science from Texas A&M University, where she specialized in distributed telerobotics and robot programming by demonstration. She is currently an Associate Professor in the Electrical and Computer Engineering Department at the University of Missouri, Columbia with a joint appointment in Computer Science. She has over 100 publications and has received funding by the National Science Foundation, the Naval Research Lab, the U.S. Army, and the Administration on Aging. In addition to her academic experience, she has spent 14 years working in industry on real-time applications such as data acquisition and automation. Her current research interests include sensory perception, computational intelligence, spatial referencing interfaces, human-robot interaction, and sensor networks for eldercare. She has recently established the Center for Eldercare and Rehabilitation Technology at the University of Missouri and serves as the Center Director for this interdisciplinary team.



Trey Smith is a Systems Scientist at Carnegie Mellon University Silicon Valley/NASA Ames Research Center in the Intelligent Robotics Group directed by Terry Fong. His research interests include robot decision-making in complex, uncertain environments, with an emphasis on probabilistic reasoning, fielded robot systems, and applications in astrobiology and planetary science. Specific interests include planning under partial observability, rover science autonomy (i.e. onboard science data understanding and response), rough-terrain navigation, and multi-agent task allocation. He received his PhD Field Robotics Center of the The Robotics Institute at Carnegie Mellon University in 2007.



Greg Trafton is a cognitive scientist at the Naval Research Laboratory. He has degrees in both computer science and cognitive science; his Ph.D came from Princeton University. He is interested in building and applying theories in complex, real-world situations, including human-robot interaction, error recovery, interruptions and resumptions, and scientific reasoning. He has collected data in both naturalistic settings and laboratory environments to build computational and mathematical theories.



Panel Session: Usable real-world AI: Working with the real end users

End-users must be involved in the development of usable AI systems. But when? And how? In this panel, we focus on human inspired real-world AI systems and human-machine AI systems. Our panelists will discuss their experiences in consulting end-users prior to creating real-world AI systems and then evaluating AI systems in an iterative fashion.

Julie Fitzgerald is somewhat of a fish out of water in the research world. Trained as a philosopher, she's spent the past ten years participating in and evaluating artificial intelligence research programs for DARPA (the Defense Advanced Research Programs Agency). She currently works for Scitor, providing program support to program managers within DARPA/ IPTO (Information Processing Techniques Office). Evaluation has been and remains a focus of her career – few things are more satisfying (and frustrating!) to her than designing a test that really exercises a system and allows us to characterize its performance. And she is drawn to old-school AI problems, such as teaching systems to learn for and from themselves. Julie can be reached at julie.fitzgerald.ctr@darpa.mil.



Aaron Spaulding is a Computer Scientist and Interaction Designer at SRI's Artificial Intelligence Center. His interests focus on the intersection of design, human-computer interaction, and artificial intelligence, with a focus on developing useable interfaces for intelligent systems that meet actual user needs. At SRI, Aaron leads the usability efforts on a variety of projects, including end user programming, and effective creation of knowledge bases by novices, that focus on moving intelligent technologies out of the lab and into the hands of real users. He has a Masters degree in Human-Computer Interaction from Carnegie Mellon University.



Holly Yanco is an Associate Professor in the Computer Science Department at UMass Lowell, where she heads the Robotics Lab (<http://robotics.cs.uml.edu>). Her research interests include human-robot interaction (HRI), interface design, robot autonomy, computer vision, and evaluation methods in the application domains of urban search and rescue and assistive technology. She is one of twelve elected members of the Association for the Advancement of Artificial Intelligence's Executive Council for the term of 2006 to 2009 and served as the AAAI Symposium Committee Chair from 2002 to 2005. Yanco has a PhD and MS from MIT and a BA from Wellesley College, all in Computer Science.



Exploring Ethnographic Observation

Ethnographic observation is a powerful tool for understanding how and why people utilize human-machine systems in the ways that they do. Working with qualitative data can be challenging, yet it offers significant benefits for understanding real-world systems. In this activity, we will discuss how to design and execute an ethnographic study, including a rigorous methodology for conducting and analyzing ethnographic observations. Participants will have the opportunity to examine previously collected data and to practice collecting ethnographic data of their own. By the end of the activity, participants will have a better understanding of when and how to apply ethnographic methods to study human-machine systems.

Kristen Stubbs is a Postdoctoral Research Associate in the Computer Science Department at UMass Lowell. She received her MS and PhD degrees in Robotics from the Robotics Institute at Carnegie Mellon University. Stubbs's research areas include human-robot interaction for remote robots and educational robotics. She has also worked to develop educational robotics curricula and evaluation methodologies for Robot Diaries, an outreach program targeted towards middle-school girls. Stubbs has over 300 hours of experience conducting ethnographic observations of remote exploration robotics; she utilizes both qualitative and quantitative methods to examine HRI systems.

