Human-Systems Integration Research Topics for the 711th Human Performance Wing of the Air Force Research Laboratory

Committee

Mica R. Endsley

Chair

Mica Endsley (Chair) is President of SA Technologies and is the former Chief Scientist for the US Air Force. She has also held the positions of Visiting Associate Professor at MIT in the Department of Aeronautics and Astronautics and Associate Professor of Industrial Engineering at Texas Tech University. She was formerly an Engineering Specialist at the Northrop Corporation. Dr. Endsley is a Fellow and Past-President of the Human Factors and Ergonomics Society. She received a Ph.D. in Industrial and Systems Engineering from the University of Southern California in 1990. Dr. Endsley is a recognized world leader in the design, development and evaluation of systems to support human situation awareness (SA) and decision-making, and the integration of humans and automation. She has published extensively on the effects of automation and AI on human performance and situation awareness. She has authored over 200 scientific articles and is the co-author of Analysis and Measurement of Situation Awareness and Designing for Situation Awareness. Dr. Endsley received the Human Factors and Ergonomics Society Jack Kraft Innovator Award and the Aerospace Medical Association Kent Gillingham Awards for her work in situation awareness. Dr. Endsley is currently a member of the Board of Human System Integration (BOHSI) of the NAS, and has previously served on the NAS Aeronautics and Space Engineering Board (2008 – 2013), as well as the Army Research Laboratory Technical Assessment Board Panel on Soldier Systems (1998 – 2000) and Panel on Human Factors in the Design of Tactical Display Systems for the Individual Soldier (1994 – 1996).

Barrett S. Caldwell

Member

Barrett S. Caldwell is Professor of Industrial Engineering (and Aeronautics & Astronautics, by courtesy) at Purdue. His PhD (Univ. of California, Davis, 1990) is in Social Psychology, and BS degrees in Aeronautics and Astronautics and Humanities (MIT, 1985). His research team examines and improves how people get, share, and use information well in settings including aviation, critical incident response, healthcare, and spaceflight operations. He was named in 2008 as a Fellow of the Human Factors and Ergonomics Society (HFES). Prof. Caldwell has served on multiple panels, and in a variety of projects, associated with the National Academies of Science, Engineering and Medicine (NASEM). He co-organized the National Academy of Engineering US Frontiers of Engineering (FOE) 2008 session on Cognitive Ergonomics, and participated in 2003 US FOE, 2006 German-American FOE and 2016 Japan-U.S. FOE. NASEM committee service has included panels on Human Factors Science at the Army Research Laboratory; Information Technology Automation and the U.S. Workforce; and Systems Engineering to Improve Traumatic Brain Injury Care in the Military Health System. During 2016-17, Prof. Caldwell was a Jefferson Science Fellow at the U.S. Department of State, assigned to environment, science, technology and health policy in the Office of Japanese Affairs.

Erin K. Chiou

Member

Erin K. Chiou is an assistant professor of human systems engineering at Arizona State University (ASU), and directs the Automation Design Advancing People and Technology (ADAPT) Laboratory. The ADAPT lab studies human-agent teaming in complex work environments, with a focus on social factors such as trust and accountability with automation. Recent projects have been supported by the U.S. Department of Homeland Security, Department of Defense, the National Science Foundation, and include applications in security, manufacturing, and healthcare. Dr. Chiou received her Ph.D. (2016) and M.S. (2011) in industrial and systems engineering from the University of Wisconsin-Madison, concentrating in human factors and ergonomics, with a minor in health systems. Her B.S. (2008) was completed at the University of Illinois at Urbana-Champaign where she majored in Psychology and Philosophy. Chiou has served as a panelist on the National Academies of Sciences, Engineering, and Medicine panel on human factors science at the Army Research Laboratory (2019), and as an invited expert for workshops hosted by the Office of the Director of National Intelligence (2018), the UN Institute for Disarmament Research (2019), Trusted Autonomous Systems Defence CRC (2019), and the Computing Community Consortium (2020). She is also the co-editor of a recent volume titled, “Advancing Diversity, Inclusion, and Social Justice through Human Systems Engineering” (2019) published by CRC Press.

Nancy J. Cooke

Member

Nancy Cooke is a professor of Human Systems Engineering at Arizona State University and directs ASU’s Center for Human, AI, and Robot Teaming. She received her PhD in Cognitive Psychology from New Mexico State University in 1987. Dr. Cooke is a past President of the Human Factors and Ergonomics and recently chaired a study panel for the National Academies on the Enhancing the Effectiveness of Team Science. Dr. Cooke was a member of the US Air Force Scientific Advisory board from 2008-2012. She currently serves on DARPA’s Information and Science Technology Study Group and is a member of the National Academies committee on Risk Analysis for Nuclear War and Nuclear Terrorism. Dr. Cooke’s research interests include the study of individual and team cognition and its application to the development of cognitive and knowledge engineering methodologies and human-AI-robot teaming in defense operations, urban search and rescue, and distributed space operations. Her work is funded primarily by DoD.

Mary L. Cummings

Member

Mary (Missy) Cummings received her B.S. in Mathematics from the US Naval Academy in 1988, her M.S. in Space Systems Engineering from the Naval Postgraduate School in 1994, and her Ph.D. in Systems Engineering from the University of Virginia in 2004. A naval officer and military pilot from 1988-1999, she was one of the U.S. Navy's first female fighter pilots. She is currently a Professor in the Duke University Electrical and Computer Engineering Department, and the Director of the Humans and Autonomy Laboratory. She is an American Institute of Aeronautics and Astronautics (AIAA) Fellow, and a member of several technology-focused national committees. Her research interests include human supervisory control, explainable artificial intelligence, human-autonomous system collaboration, human-robot interaction, human-systems engineering, and the ethical and social impact of technology.

Cleotilde Gonzalez

Member

Cleotilde Gonzalez is a Research Professor of Decision Sciences and the Founding Director of the Dynamic Decision Making Laboratory at Carnegie Mellon University. Her main affiliation is with the Social and Decision Sciences department and she has additional affiliations with many other departments and centers in the university. She is a lifetime Fellow of the Cognitive Science Society and the Human Factors and Ergonomics Society. She is also a member of the Governing Board of the Cognitive Science Society. She is Associate Editor of the Cognitive Science Journal and part of the Editorial Board of Decision, the Journal of Experimental Psychology-General, the Journal of Behavioral Decision Making, the Human Factors Journal, and the System Dynamics Review. She is widely published across many fields deriving from her contributions to Cognitive Science. Her work includes the development of a theory of decisions from experience called Instance-Based Learning Teory (IBLT), from which many computational models have emerged, including a run-up winner of a modeling competition focused on the prediction in repeated Market Entry Games. She has been Principal or Co-Investigator on a wide range of multi-million and multi-year collaborative efforts with government and industry, including current efforts on Collaborative Research Alliances and Multi-University Research Initiative grants from the Army Research Laboratories and Army Research Office. She has mentored more than 30 post-doctoral fellows and doctoral students, many of whom have pursued successful careers in academia, government, and industry.

John D. Lee

Member

John D. Lee is the Emerson Electric Professor at the University of Wisconsin-Madison. He investigates the issues of human-automation interaction, particularly trust in automation. John has investigated trust in domains that include UAVs, maritime operations, highly automated vehicles, and deep space exploration. His work also involves assessing interface and interaction methods to enhance trust calibration, as well as statistical approaches to assess trust and user state estimation. He helped to edit the Handbook of Cognitive Engineering, the APA Handbook of Human Systems Integration, Handbook of Human Factors for Automated, Connected, and Intelligent Vehicles, and is also a co-author of a popular textbook: Designing for People: An introduction to human factors engineering. Dr. Lee graduated with a PhD in Mechanical Engineering (1992) and MS in Industrial Engineering (1989) from the University of Illinois, and a BS in Mechanical Engineering (1988) and BA in Psychology (1987) from Lehigh University. Dr. Lee has served on several National Academies committees including: Committee on Human Factors; Committee on Reducing and Preventing Teen Motor Vehicle Crashes; and the Army Research Laboratory Technical Assessment Board.

Nathan J. McNeese

Member

Nathan J. McNeese is an Assistant Professor and Director of the Team Research Analytics in Computational Environments (TRACE) Research Group within the division of Human-Centered Computing in the School of Computing at Clemson University. Dr. McNeese is also the Director of the university-wide Clemson University Data (Science) Lab. Dr. McNeese received a PhD in Information Sciences & Technology from The Pennsylvania State University in 2014. His research interests span across human-AI teaming, human-centered AI, and the development/design of human-centered collaborative tools and systems. He currently serves on multiple international/societal program and technical committees, in addition to multiple editorial boards including Human Factors. He is a previous Member of the National Academies of Science Panel on Human Factors Science, and previous member of the Army Research Lab HERD Technical Advisory Board. His research has received multiple best paper awards/nominations and has been published in top peer-reviewed HCI and HF venues over 90 times. In addition, he has acquired over $14M in research funding from agencies such as NSF, ONR, AFOSR, and AHRQ.

Christopher Miller

Member

Christopher Miller has degrees in Cognitive Psychology (with an emphasis on Linguistics and language acquisition and use) from the University of Chicago (Ph.D., 1991; MA, 1989) and from Pomona College (B.A., 1985) and he is now the Chief Scientist and a co-owner of Smart Information Flow Technologies, a small business doing Human-Systems Integration research and development for over 20 years. He is one of the co-creators of the Playbook® concept, has been involved in all phases of its development across multiple customers and applications. He has substantial project management experience, including leading more than 55 efforts in human-systems and human-automation interaction for DARPA, the U.S. Navy, Army and Air Force and NASA—both as prime and subcontractor—as well as in medical, industrial processing and commercial aviation domains. Prior to joining SIFT, Dr. Miller led a series of projects as the Human Factors Fellow at Honeywell Technology Center where he was PI for Honeywell's role in the U.S. Army's Rotorcraft Pilot's Associate ACTD program and for Honeywell's effort in automated learning for task and information requirements for the USAF and DARPA's Pilot's Associate program. Dr. Miller won Honeywell's highest technical achievement award for his work in designing the intermodule and human communications aspects of the Abnormal Event Guidance and Information System—an associate-like system for use in oil refineries. Dr. Miller has also provided consulting services to the U.K., Canada and Australia on various defense research projects, and to the European Science Foundation in prioritizing research for autonomy support for deep space missions. Dr. Miller is the author of over 140 publications in these fields and has served as chair of 17 conference sessions or symposia and has given invited addresses to NATO RTO advisory boards, the European Space Foundation and the National Academy of Sciences. He has previously served on multiple NAS activities including (most recently) helping organize the workshop on Human-Automation Interaction Considerations for Unmanned Aerial System Integration in 2018.

Emilie Roth

Member

Emilie M. Roth is owner and principal scientist of Roth Cognitive Engineering, a small company that conducts research and application in the areas of human factors and applied cognitive psychology (cognitive engineering). Her work involves analysis of human problem-solving and decision-making in real-world environments (e.g., military command and control; intelligence analysis; nuclear power plant emergencies; railroad operations; healthcare), and the impact of support systems (e.g., computerized procedures; alarm systems; advanced graphical displays; new forms of decision-support and automation) on cognitive performance. Dr. Roth has supported analysis and design of first of a kind systems including design and manning of envisioned Army Future Vertical Lift; design and evaluation of next-generation nuclear power plant control rooms; and design of computer-based support systems for flight planning and monitoring for USTRANSCOM and the Air Mobility Command. She is a fellow of the Human Factors and Ergonomics Society, is an Associate Editor of the Journal of Cognitive Engineering and Decision Making, and serves on the editorial board of the journal Human Factors. She participated in the National Research Council Committee on Human-System Design Support for Changing Technology (in 2006), the National Research Council Committee examining lessons learned from the Fukushima nuclear accident for improving safety and security of U.S. nuclear plants (2012-2016), and is currently a member of the Board on Human-Systems Integration at the National Academies. She received her PhD. from the University of Illinois, Urbana-Champaign, in Cognitive Psychology in 1980.

William B. Rouse

Member

William B. Rouse is Research Professor in the McCourt School of Public Policy at Georgetown University, as well as Senior Fellow in the office of the Senior Vice President for Research, and Professor Emeritus and former Chair of the School of Industrial and Systems Engineering at the Georgia Institute of Technology. His research focuses on understanding and managing complex public-private systems such as healthcare delivery, higher education, transportation, and national security, with emphasis on mathematical and computational modeling of these systems for the purpose of policy design and analysis. He was Chair of the Committee on Human Factors before it became BOHSI. He is a member of the DBASSE Advisory Committee. Over the past four decades, he has served as chair, co-chair, or member of roughly 40 Academy study committees, ad hoc committees and other initiatives.