Computing Breakthroughs and Innovation Patterns

Committee

Eric Horvitz

Co-Chair

Eric Horvitz (NAE) serves as Microsoft’s Chief Scientific Officer. In this role, Dr. Horvitz provides leadership and perspectives on advances and trends on scientific matters, and on issues and opportunities rising at the intersection of technology, people, and society. He has pursued principles and applications of AI with contributions in machine learning, perception, natural language understanding, and decision making. His research centers on challenges with uses of AI amidst the complexities of the open world, including uses of probabilistic and decision-theoretic representations for reasoning and action, models of bounded rationality, and human-AI complementarity and coordination. His efforts and collaborations have led to fielded systems in healthcare, transportation, ecommerce, operating systems, and aerospace. He received the Feigenbaum Prize and the Allen Newell Prize for contributions to AI. He received the CHI Academy honor for his work at the intersection of AI and human-computer interaction. He has been elected fellow of the National Academy of Engineering (NAE), the Association of Computing Machinery (ACM), Association for the Advancement of AI (AAAI), the American Association for the Advancement of Science (AAAS), the American Academy of Arts and Sciences, and the American Philosophical Society. Dr. Horvitz currently serves on the President’s Council of Advisors on Science and Technology (PCAST) and is a member of the Computer Science and Telecommunications Board (CSTB) of the National Academies. He served as a commissioner for the National Security Commission on AI where he chaired the line of effort on ethical and responsible AI. He has served as president of the AAAI, and on advisory committees for the National Science Foundation, National Institutes of Health, DARPA, and the Allen Institute for AI.

James F. Kurose

Co-Chair

Jim Kurose (NAE) is a Distinguished University Professor in the College of Information and Computer Sciences at the University of Massachusetts Amherst. He has held a number of visiting scientist positions in the US and abroad, including IBM Research, INRIA, and Sorbonne University in France. From 2015 - 2019, Kurose served as Assistant Director at the US National Science Foundation, where he led the Directorate of Computer and Information Science and Engineering (CISE). With an annual budget of nearly $1B, CISE's mission is to uphold the nation's leadership in scientific discovery and engineering innovation through its support of fundamental research in computer and information science and engineering and transformative advances in cyberinfrastructure. Recently, Jim also served as the Assistant Director for Artificial Intelligence in the US White House Office of Science and Technology Policy (OSTP). Dr. Kurose received his BA in physics from Wesleyan University and his PhD in computer science from Columbia University.

Michael J. Franklin

Member

Michael J. Franklin is the Morton D. Hull Distinguished Service Professor for the Department of Computer Science. He held the inaugural title of Liew Family Chair of Computer Science until September 2023. He also serves as Senior Advisor to the Provost on Computation and Data Science and is Faculty Co-Director of the Data Science Institute. Previously, Franklin was on the faculty at the University of California, Berkeley, where he was Thomas M. Siebel Professor of Computer Science and served a term as Chair of the Computer Science Division. He was Director of the Algorithms, Machines and People Laboratory (AMPLab) and was Principal Investigator of the lab's National Science Foundation CISE "Expeditions in Computing" award. He is one of the original creators of Apache Spark, a leading open source platform for data analytics and machine learning that was developed at the lab. In addition to his academic work, Franklin founded and was chief technology officer of Truviso, a data analytics company acquired by Cisco Systems. He currently serves as a technical advisor to various data-driven technology companies and organizations, including AMPLab spin-out Databricks and Chicago-based Ocient. Franklin recently completed terms as a member of the NSF CISE Advisory Committee and a Board Member of the Computing Research Association and currently serves on the ACM Fellows Committee. He is a Fellow of the Association for Computing Machinery and a two-time recipient of the ACM SIGMOD (Special Interest Group on Management of Data) "Test of Time" award. He received the Ph.D. in Computer Science from the University of Wisconsin in 1993, a Master of Software Engineering from the Wang Institute of Graduate Studies in 1986, and the B.S. in Computer and Information Science from the University of Massachusetts in 1983.

Mark A. Horowitz

Member

Mark Horowitz is the Fortinet Founders Chair of the Department of Electrical Engineering, Yahoo! Founders Professor in the School of Engineering, and Professor of Computer Science at Stanford University. He is a co-founder of Rambus, Inc., and his distinguished career spans breakthroughs in high-performance digital system design, early RISC microprocessors, distributed shared-memory multiprocessors, and pioneering high-speed link technology developed by his Stanford research group and former Rambus colleagues. In the 2000s, he collaborated with Professor Marc Levoy on computational photography, contributing to the light-field imaging systems that enabled refocusable images (e.g. Lytro). His current research ranges from analog and digital VLSI agile hardware methodologies to applications of electrical engineering and computer science in neurobiology and molecular biology. He has been elected Fellow of both IEEE and ACM and is a member of the US National Academy of Engineering and American Academy of Arts & Sciences. He earned his BS and MS in Electrical Engineering from MIT in 1978 and his PhD in Electrical Engineering from Stanford University in 1984.

Anna Karlin

Member

Anna R. Karlin (NAS, NAE) is the Bill & Melinda Gates Chair and Professor of Computer Science and Engineering at the University of Washington. She received her Ph.D. in Computer Science from Stanford University in 1987. Before joining the University of Washington, she spent five years as a researcher at Digital Equipment Corporation's Systems Research Center. Her research centers on theoretical computer science, specifically the design and analysis of algorithms—including probabilistic, online, and algorithmic game theory. She is co-author of Game Theory, Alive (2017) with Yuval Peres, and a Fellow of the ACM and a member of the American Academy of Arts & Sciences.

Margaret R. Martonosi

Member

Margaret Martonosi (NAE) is the William M. Addy '82 University Professor at Princeton University, where she has been on the faculty since 1994. Martonosi's research interests are in computer architecture and mobile computing. Her work has included the widely-used Wattch power modeling tool and the Princeton ZebraNet mobile sensor network project for the design and real-world deployment of zebra tracking collars in Kenya. Her current research focuses on computer architecture and hardware-software interface issues in both classical and quantum computing systems. From 2020 to 2024 she was Assistant Director of the Computer & Information Science & Engineering Directorate at the National Science Foundation. She was previously Director of the Princeton's Keller Center for Innovation in Engineering Education, and an A. D. White Visiting Professor-at-Large at Cornell University. From 2015-2017 Martonosi was a Jefferson Science Fellow at the U.S. Department of State. Martonosi is a Fellow of IEEE and ACM, and a member of the American Academy of Arts and Science and the National Academy of Engineering. Her papers have received numerous long-term impact awards including: 2015 ISCA Long-Term Influential Paper Award, 2017 ACM SIGMOBILE Test-of-Time Award, 2017 ACM SenSys Test-of-Time Paper award, and the 2018 (Inaugural) HPCA Test-of-Time Paper award. Other notable awards include the 2018 IEEE Computer Society Technical Achievement Award, 2010 Princeton University Graduate Mentoring Award, the 2013 NCWIT Undergraduate Research Mentoring Award, the 2013 Anita Borg Institute Technical Leadership Award, and the 2015 Marie Pistilli Women in EDA Achievement Award. In addition to many archival publications, Martonosi is an inventor on seven granted US patents, and has co-authored two technical reference books on power-aware computer architecture. Martonosi completed her Ph.D. at Stanford University.

Elizabeth Mynatt

Member

Elizabeth D. Mynatt is the Dean of the Khoury College of Computer Sciences at Northeastern University. She joined Northeastern in 2022 after a 23-year career at Georgia Tech, where she served as Regents’ and Distinguished Professor and Executive Director of the Institute for People and Technology. A leading researcher in human-centered computing, ubiquitous computing, and assistive technologies, Mynatt’s work has advanced technologies supporting health, aging, and independent living. She previously directed the Everyday Computing Lab and was a key investigator in the Aware Home Research Initiative. She has held leadership roles with the NSF CISE Advisory Committee, the Computing Community Consortium, and currently serves on the National Academies’ Computer Science and Telecommunications Board. She earned her BS in Computer Science from North Carolina State University and her MS and PhD in Computer Science from Georgia Tech.

Stefan Savage

Member

Stefan Savage is the Irwin and Joan Jacobs professor of Information and Computer Science at the University of California, San Diego. He currently serves as the co-director for UCSD's Center for Network Systems (CNS) and as a founding member of the school’s Center for Healthcare Cybersecurity. Savage is known for his work on network security and reliability, on cybercrime economics and defense, and on the empirical measurement of cybersecurity and cyberinfrastructure. He is a member of the National Academy of Engineering and the American Academy of Arts and Sciences, a MacArthur Fellow, an ACM Fellow, and is the recipient of ACM's Prize in Computing and AAAS' Golden Goose award. He received his Ph.D. in Computer Science and Engineering from the University of Washington and a B.S. in Applied History from Carnegie Mellon University.

William L. Scherlis

Member

William L. Scherlis is a Professor of Computer Science at Carnegie Mellon University and Special Advisor to the Software Engineering Institute, a DoD FFRDC at CMU. He recently served as director of DARPA's Information Innovation Office (I2O) leading program managers in the development of programs in cybersecurity, artificial intelligence, secure software, and information operations. At Carnegie Mellon (CMU) he served for more than a decade as head of the Software and Societal Systems Department, which hosts research and educational programs related to software development, security and privacy, IoT and mobility, AI engineering, social network analysis, and related topics. He founded the CMU PhD program in Software Engineering and led it for its first decade. His research relates to software assurance, cybersecurity, software analysis, and assured safe concurrency. He has led several large research projects including the CMU National Security Agency Science of Security Lablet and the CMU/NASA High Dependability Computing Project. He served as program chair for technical conferences including ACM Foundations of Software Engineering (FSE) and ACM Partial Evaluation and Program Manipulation (PEPM). Scherlis has led multiple national studies including the National Academies study that in 2010 produced the report Critical Code: Software Producibility for Defense. He has testified before Congress on the federal AI workforce, on federal software sustainment, on computing technology and innovation, and on roles for a Federal CIO. He is a Life Fellow of the IEEE and a Lifetime National Associate of the National Academy of Sciences. Dr. Scherlis received an AB magna cum laude from Harvard University in applied mathematics and a PhD in computer science from Stanford University, with an intervening year in the Department of Artificial Intelligence at the University of Edinburgh as a John Knox Fellow.