

Bio-inspired Signature Management: A Workshop

Committee

Andrew G. Alleyne

Co-Chair

Andrew Alleyne (co-chair) is Ralph M. and Catherine V. Fisher Professor at University of Illinois, Urbana-Champaign and the director for the NSF Engineering Research Center on Power Optimization for Electro-Thermal Systems (POETS). Dr. Alleyne received his mechanical and aerospace engineering B.S.E. from Princeton University in 1989. He received his M.S. and Ph.D. degrees in mechanical engineering in 1992 and 1994, respectively, from UC Berkeley. He is an Institute of Electrical Engineers Fellow and American Society of Engineers Fellow. He has received the Gustus Larson Award, the Charles Stark Draper Award for Innovative Practice, The Yasundo Takahashi Education Award, and the Henry Paynter Outstanding Investigator Award from ASME. His record of campus service includes the associate dean for research in the College of Engineering and the associate head for undergraduate programs in Mechanical Science and Engineering. In addition to research and service, he has a keen interest in education and has earned the UIUC College of Engineering Teaching Excellence Award, the UIUC Campus Award for Excellence in Undergraduate Education, and the UIUC Campus Award for Excellence in Graduate Student Mentoring.

Michael Bear

Co-Chair

Michael J. Bear (co-chair) is a technical director in BAE Systems' Electronics System Sector with over 30 years of experience migrating advanced technologies to national air and space systems. He is currently a member of the Air Force Scientific Advisory Board and led, or played major roles, in studies on mitigating cyber vulnerabilities in air and space embedded systems, data analytics for operational decision making, and improving the cyber hardness and reliability of the upcoming nuclear modernization platforms. He has co-authored a national space development standard for mission-critical electronics, and guidelines addressing cyber and physical threats to microelectronics throughout the supply chain. In addition to BAE Systems, Dr. Bear has worked at IBM, Loral, and Lockheed Martin addressing all elements of microelectronics and electronic development from the underlying Physics of Failure to System-on-Chip (SoC) development through payload design, manufacturing, and qualification. Additionally, Dr. Bear has taught seminars on the secure methods to develop microelectronics for mission-critical applications. He has led the development of many complex SoCs, including a multi-core Digital Signal Processor for space applications. He has been instrumental in creating programs to bring advanced analytics and machine learning to C4ISR platforms. Dr. Bear has worked on multiple DARPA programs, including thermal imaging and microelectronic reliability. He has authored multi-scale physical simulations to explore material processing techniques needed to produce advanced electronics and sensors. Dr. Bear is a standing member in the American Association for the Advancement of Science (AAAS), American Physical Society, and IEEE, where he is a member of the IEEE Cyber-Physical Systems and Human-Systems Integration Technical Committees. He is a leader in the reliability and resilience of complex systems through cyber hardening and systems engineering with a range of publications and patents. He is an active member of National Academy of Science, Engineering, and Medicine's Intelligence Science & Technology Expert Group (ISTEG). He received two BAE Systems Chairman's Awards for work in microelectronics and systems development. Dr. Bear received his Ph.D. in computational physics and M.S in applied physics from George Mason University and a B.S. in applied physics from Purdue University, where he became a member of Phi Beta Kappa.

Pamela Abshire

Member

Pamela Abshire is an associate professor in the Department of Electrical and Computer Engineering and the Institute for Systems Research at the University of Maryland, College Park. Her areas of specialty are in the fields of VLSI circuit design and bioengineering. Dr. Abshire's research focuses on better understanding the tradeoffs between performance and resources in natural and engineered systems. Prior to her arrival at the University of Maryland in November, 2001, she was a graduate student in the Sensory Communications and Microsystems Lab in the Department of Electrical and Computer Engineering at The Johns Hopkins University. Her advisor was Andreas G. Andreou, and her dissertation topic was Sensory Information Processing Under Physical Constraints. Her research interests include information theory for physical systems; noise theory for electronic, photonic, and biological systems; analysis and design of sensory information processing systems and algorithm; VLSI circuit and microsystem design, especially for low power applications. She received her B.S. degree in physics with honors in 1992 from the California Institute of Technology in Pasadena, CA. Between 1992 and 1995 she worked as a research engineer in the Bradycardia Research Department of Medtronic, Inc. in Minneapolis, MN. In 1995 she began her graduate education in the Department of Electrical and Computer Engineering at The Johns Hopkins University. She received her M.S. degree in electrical and computer engineering in 1997 and completed her Ph.D. degree in electrical and computer engineering in October 2001.

Mariane Alleyne

Member

Marianne Alleyne is a research scientist and lecturer at the University of Illinois at Urbana-Champaign (UIUC). She received her biology and entomology degrees from UC Berkeley, M.S. from UC Riverside, and her Ph.D. from University of Illinois Urbana Champaign. Her research covers many areas related to insect physiology, including: host-parasitoid interactions, arthropod sensors, bioinspired materials and robotics. Dr. Alleyne currently leads multi-disciplinary teams of faculty, graduate students, and undergraduate students across entomology and engineering. Dr. Alleyne teaches courses in Insect Physiology, Insect Pathology and Bioinspired Design. With an extensive experience in online teaching and learning, she serves as the graduate director for the online Master of Science Teaching Biology in the School of Integrative Biology at Illinois. Her additional interests include science communication, science policy and diversity in science.

Leila Daravi

Member

Leila Deravi is an assistant professor of chemistry and chemical biology at Northeastern University in Boston, MA. At Northeastern, she leads the Biomaterials Design Group – a multi-disciplinary team comprising chemists, mechanical engineers, marine biologists, and materials scientists - whose primary focus is to investigate fundamental mechanisms behind systems in biology and use this understanding to better inform the design new classes of biomaterials that may interface with or enhance the performance of humans and the environment. Before her appointment at Northeastern, Leila received her PhD in chemistry at Vanderbilt University in Nashville, Tennessee, and completed her postdoc at Harvard University in the School of Engineering and Applied Sciences.

Christina E. Davis

Member

Cristina E. Davis is professor and chair of the Department of Mechanical and Aerospace Engineering at the University of California, Davis. Her main research interests are in chemical and biological sensing applications, use of technology to speed biomarker discovery, novel bioMEMS devices, and bioinformatics interpretation of sensor output. She received her B.S. in mathematics and biology from Duke University, her Ph.D. in biomedical engineering from University of Virginia, and completed a postdoc in physiology and electrical engineering at John Hopkins University.

William A. Goddard, III

Member

William A. Goddard is the Charles and Mary Ferkel Professor of Chemistry, Materials Science, and Applied Physics at California Institute of Technology. He received his B.S. from the University of California Los Angeles and his Ph.D. from California Institute of Technology. He was inducted into the National Academy of Science in 1984. The long-term objective of Professor Goddard's research has been to describe the properties of chemical, biological, and materials systems directly from first principles (without the necessity of empirical data). To accomplish this the group has been developing new theory, new methods, and new software. The group's approach builds from Quantum Mechanics (QM) through a hierarchy of more approximate methods suitable for longer length and times scales as indicated in the figure including Molecular Dynamics (MD), mesoscale dynamics, and macroscopic dynamics. The couplings between the length scales provide the means of determining the parameters [e.g. Force Fields (FF)] essential in the coarser descriptions.

Roger T. Hanlon

Member

Roger T. Hanlon is a senior scientist at Marine Biological Laboratory in Woods Hole. He has performed more than 6,000 research dives and studies the sensory and motor aspects of rapid adaptive camouflage and signaling in cephalopods under all aspects of lighting in the natural environment. His research focuses on rapid adaptive coloration in cephalopods (squid, cuttlefish, octopus) and fishes. His laboratory research involves live-animal, hypothesis-driven experimentation on several key aspects of the adaptive camouflage and signaling systems. Recently his research has focused on a highly multidisciplinary effort to quantify animal camouflage, touching subjects as varied as visual perception, psychophysics, neuroscience, behavioral ecology, image analyses, computer vision, and art. He has over 240 peer-reviewed scientific papers on these and related subjects. His laboratory regularly works with material scientists and engineers to translate some of the operating principles in biological coloration to new classes of materials. He graduated with an M.S. in 1975, and Ph.D. in 1978, in marine sciences from the University of Miami, Rosenstiel School of Marine and Atmospheric Sciences. He then journeyed to the University of Cambridge, U.K. for a postdoc in ethology. For nearly 20 years he worked as tenured faculty at the Marine Biomedical Institute, University Texas Medical Branch. In 1995, he moved to the Marine Biological Laboratory where he was founding director of the Marine Resources Center until 2003. He has hosted and mentored nearly 40 graduate students and postdocs during his career and continues a vigorous research program both in the laboratory and the field

Jacquelyn K. Nagel

Member

Jacquelyn K. Nagel is assistant department head and associate professor in the Department of Engineering at James Madison University. Dr. Nagel is well known for her work in the areas of bio-inspired design process and pedagogy. Her research focuses on developing engineering design tools and methods to make biological inspiration accessible to engineering design problems, as well as instructional resources for teaching bio-inspired design. She has applied her research to the areas of sensors, manufacturing, and alternative energy systems. In 2012, Dr. Nagel was recognized by the National eWeek Foundation and IEEE-USA as one of the New Faces of Engineering for her pioneering work in bio-inspired design. She earned her Ph.D. in mechanical engineering from Oregon State University, and her M.S. and B.S. in manufacturing engineering and electrical engineering, respectively from Missouri.

William Millonig

Staff Officer