

2023 GOMACTech Keynote and Plenary Speakers

Tuesday, March 21, 2023

Keynote Address I

8:45 – 9:30 am

“3DHI and the Coming Inflection Point in Microelectronics Manufacture”



Dr. Mark Rosker

Director

Microsystems Technology Office (MTO)

DARPA

Two kinds of scaling, geometric and economic, are both driving microelectronics to a critical inflection point. The future of microelectronics manufacture, critical for defense and commercial applications, will depend on the emerging technology of three-dimensional heterogeneous integration (3DHI). This talk will highlight DARPA’s strategy, within the Electronics Resurgence Initiative 2.0 (ERI 2.0), to create a national capability for fabricating and prototyping next-generation 3DHI microsystems. Other key challenges within ERI 2.0 will also be presented.

Dr. Mark Rosker became director of DARPA’s Microsystems Technology Office (MTO) in April 2019. Previously, he was deputy director of DARPA’s Defense Sciences Office (DSO) from April 2018 to April 2019. Prior to his most recent DARPA appointment, Rosker was a principal engineering fellow at Raytheon Space and Airborne Systems. He received his Bachelor of Science in physics from the California Institute of Technology in 1981, and his Master of Science (1983) and doctorate (1987) in applied and engineering physics from Cornell University. Dr. Rosker is a Fellow of the IEEE for “his leadership in microwave and millimeter-wave phased arrays, gallium nitride semiconductors, and terahertz electronics.”

Keynote Address II

9:30 – 10:15 am

“Aligning Defense Microelectronics Technologies with Industry Needs: Fueling US Success”



Ezra Hall

Senior Director

Global Aerospace and Defense Business

GlobalFoundries

Microelectronics are pervasive in society, transforming the way we work and live, and are used across countless industrial, consumer, and defense applications. As the underpinning technologies have advanced to meet these growing and diverse application needs, today's business models must account for the design, development, and manufacturing of semiconductors to ensure a reliable and sustainable supply. With the nation's increased focus on domestic semiconductor production to address economic and national security, the need to align the needs of the US government and industry with dual-use technology roadmaps could not be more critical. In this talk, Hall will discuss the business and technical factors required to keep the US moving forward in this critical sector.

Ezra Hall is the senior director of Global Aerospace and Defense Business at GlobalFoundries, one of the world's leading semiconductor manufacturers and the only one with a truly global footprint. In this role, he devises novel and strategic solutions to technical, legal, security, and business challenges in support of governments and A&D markets, addressing national security and critical infrastructure sector needs. With nearly 39 years of experience across technical and business roles, Hall is a known leader in microelectronics supply chain security. Recognized as a master inventor, he holds 21 US patents with additional pending, has published award-winning papers, and co-founded and now co-chairs the National Defense Industry Association Electronics Division in the US.

Jack S. Kilby Lecture Series

10:30 am – 12:00 pm

“Analog Hardware Security: What We Don't Know *Will* Hurt Us”



Dr. Waleed Khalil

Professor

Electrical and Computer Engineering

Ohio State University and the ElectroScience Lab

Advances in microelectronics have had a tremendous positive impact on society, providing users with more features, more automation, and more connectivity. However, these advancements come at a cost, as increasing complexities in designs and increased reliance on offshoring lead to growing threats and vulnerabilities. While there has been some research into hardware security in response to these vulnerabilities, most work has focused on the digital domain, as it is easier to see the circuit world that is abstracted into 1s and 0s. However, this abstraction leaves largely unaddressed the area of analog hardware security. This talk will provide some of the initial strides that the analog community has taken to augment its digital counterpart, building toward more secure and resilient hardware.

Dr. Waleed Khalil is a professor of electrical and computer engineering at Ohio State University. He founded the Circuit Laboratory for Advanced Sensors and Systems (CLASS) in 2009, following a 16-year career at Intel. His research is focused on integrated circuits and systems, with applications in the areas of hardware security, wireless and wireline communications, heterogeneous chip integration, and image sensors. Khalil co-leads an AFOSR Center of Excellence, the Center for Enabling Cyber Defense in Analog and Mixed-Signal Domain (CYAN), which is focused on multidisciplinary research in the area of

hardware-enabled cybersecurity through innovation and development of new AMS domain security, and co-directs MEST, the National Microelectronics Security Training Center.

“Secure Silicon Development Lifecycle: Pre and Post CHIPS”



Mark M. Tehranipoor

Intel Charles E. Young Preeminence Endowed Chair Professor
Chair of the Department of Electrical and Computer Engineering (ECE)
University of Florida

The CHIPS Act has brought much needed excitement for onshoring the front-end and back-end fabrication test and facility. However, much of the security concerns during the design of modern system on chips (SoCs) or system-in-package (SiPs) have little to do with onshoring. This talk will discuss challenges to securing silicon development lifecycle with CHIPS in place, offer solutions to engineers and practitioners, and present research opportunities for academics.

Mark M. Tehranipoor is currently the Intel Charles E. Young Preeminence Endowed Chair Professor and the chair of the Department of Electrical and Computer Engineering (ECE) at the University of Florida. His current research projects include: hardware security and trust, supply chain security, IoT security, VLSI design, test and reliability. He is a recipient of a dozen best paper awards and nominations, as well as the 2008 IEEE Computer Society (CS) Meritorious Service Award, the 2012 IEEE CS Outstanding Contribution, the 2009 NSF CAREER Award, and the 2014 AFOSR MURI award. He received the 2020 University of Florida Innovation of the year as well as teacher/scholar of the year awards. He co-founded the IEEE International Symposium on Hardware-Oriented Security and Trust (HOST), IEEE International Conference on Physical Assurance and Inspection of Electronics (PAINE). He serves on the program committee of more than a dozen leading conferences and workshops. He has also served as program and general chair of a number of IEEE and ACM sponsored conferences and workshops (HOST, ITC, DFT, D3T, DBT, NATW, and more). He is currently serving as a founding EIC for *Journal on Hardware and Systems Security (HaSS)* and served as associate editor for *TC*, *JETTA*, *JOLPE*, *TODAES*, *IEEE D&T*, *TVLSI*. He is currently serving as a founding director for the Florida Institute for Cybersecurity Research (FICS) and a number of other centers with focus on microelectronics security. Tehranipoor is a Fellow of the IEEE, a Fellow of the ACM, a Fellow of the National Academy of Inventors (NAI), a Golden Core Member of IEEE CS, and a Member of ACM SIGDA.

“James Webb Space Telescope Development and Latest Discoveries”



Krystal Puga

Lunar Mission Architect
Space Systems Sector
Northrop Grumman Corporation.

This lecture includes an overview of the James Webb Space Telescope Mission, incorporating key facts and a description of the development of the telescope, including assembly, integration, and test. The lecture will describe some of the technical challenges, breakthrough technologies, and logistics leading up to launch campaign. It will also address the science objectives and latest discoveries that have been published across many platforms.

Krystal Puga is a spacecraft systems engineer with Northrop Grumman Space Systems based in Los Angeles, CA. Currently she supports the Human Exploration Organization Advanced Concepts Group, developing proposals and strategies for future lunar habitation. Previously she was the hardware manager for the 178 release mechanisms that deployed the James Webb Space Telescope (JWST). Puga provided hundreds of tours of JWST, was critical in community outreach, was a key speaker for multiple conferences, and was showcased in the official NASA videos. Additionally, she is the program manager for the NG Space Sector SPARK Innovation Ecosystem. Puga holds a master of science degree in astronautical engineering from the University of Southern California and a bachelor of science degree in engineering physics from Embry Riddle Aeronautical University, Florida. She is currently pursuing a second graduate degree in human spaceflight from the University of North Dakota. Puga is passionate about space education and has founded numerous programs and engineering competitions to promote STEM to middle and high school students, including a 3D printed Cubesat educational kit to teach students about transient planet finding methods. She has also served as a Hispanic Hero for the Los Angeles Hispanic Youth Institute since 2009.