Microelectronics: Critical Enabler for Innovation in Commercial and Military Systems

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Semiconductors underpin virtually every product and system that commercial industry and the U.S. military use. Next-generation microelectronics technologies create asymmetric capabilities for the warfighter. Commercial industry's microelectronics enable system-level product opportunities in numerous market verticals. Most military systems are unique, demand bespoke microelectronics capabilities for operation in harsh environments and adequate security of the chips and systems they are embedded in. It is also critically important to maintain sustained access to a high mix, low volume onshore semiconductor ecosystem that encompasses leading-edge electronics, state-of-practice, and legacy technologies.

The U.S. Chips and Science Act is enabling access to a rich onshore ecosystem for microelectronics across the cycle of design, manufacturing, advanced packaging, test, and assembly. As Principal Director for Microelectronics at the Pentagon during the last four years, I had the honor and unique opportunity to create and manage the CHIPS-funded Microelectronics Commons (ME Commons) program to accelerate Lab to Fab prototyping of microelectronics hardware for myriad technologies including AI Hardware, Quantum, 5G/6G, Secure IoT, and Electronic Warfare. ME Commos is lowering the barriers to innovation, democratizing access to semiconductor design tools and hardware prototyping, and bolstering the domestic workforce.

In this keynote, I plan to provide my perspectives on challenges and opportunities in the broad area of U.S. microelectronics and the role that materials, components, devices, and systems play in enabling next-generation capabilities for the U.S. military and the commercial sector.

INSTRUCTOR BIO

Dr. Dev Shenoy is currently serving as a Strategic Advisor to IBM Semiconductors within IBM Research. Dr. Shenoy recently served as the Principal Director for Microelectronics in the Office of the Under Secretary of War for Research and Engineering, OUSW(R&E). In this role, Dr. Shenoy was responsible for leading the Department of War's research and engineering efforts in microelectronics to ensure the DoW and the Warfighter have access to the most advanced semiconductor-based capabilities in the world.

At OUSW R&E, Dr. Shenoy conceptualized and created the Microelectronics Commons (ME Commons) program. The CHIPS and Science Act-funded initiative is addressing a critical gap in the U.S. semiconductor ecosystem for Lab-to-Fab prototyping and helping strengthen innovation and the manufacturing base onshore. The ME Commons program is fostering semiconductor workforce development, protecting Intellectual Property (IP) in the U.S. by onshoring critical capabilities for a robust semiconductor ecosystem and ensuring the DoW has access to transformative, leading-edge microelectronics-based weapons systems and platforms to create asymmetric capabilities for the U.S. warfighter. To strengthen the ME Commons network and leverage investments in semiconductor prototyping, Dr. Shenoy initiated and established strong Interagency CHIPS collaborations with the National Science Foundation and the Department of Commerce.

In his role as Principal Director for microelectronics, Dr. Shenoy provided oversight and management of complex and critical programs such as the Trusted and Assured Microelectronics Program (T&AM), served as the Director of the Defense Microelectronics Cross-Functional Team (DMCFT), and co-led the Strategic Radiation Hardened Electronics Council (SRHEC). Dr. Shenoy created an overarching strategy for the Department's microelectronics, leveraging the best commercial capabilities, addressing gaps in DoW's microelectronics portfolio of investments by initiating Power Electronics projects that are critical for Critical Technology Areas such as Hypersonics, Directed Energy, and AI and Autonomy.

In prior roles, Dr. Shenoy served as the Director of Microelectronics Innovation and as Director of Advanced Technologies at the University of Southern California's Information Sciences Institute (USC/ISI); as Chief Engineer in the Advanced Manufacturing Office at the Department of Energy (DoE); as a Senior Advisor within the Manufacturing and Industrial Base Policy (MIBP) Office in the Office of the Secretary of Defense; as a Program Manager at the Defense Advanced Research Projects Agency (DARPA) where he developed and managed cutting-edge technology programs in microelectronics and photonics for defense and commercial applications. In these various roles, he demonstrated deep experience in myriad technologies, in creating and managing cutting-edge programs, in establishing public-private partnerships such as the Manufacturing Innovation Institute (MII), AIM Photonics, and exemplified his visionary leadership and strong management skills.