Temple University
College of Engineering

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Department of Electrical and Computer Engineering

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Video Available for Faculty, Please email han.wang.hw@temple.edu

Advancing Microelectronics Security in the Globalized Semiconductor Landscape

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Abstract: The globalization of the semiconductor supply chain brings rapid research and development (R&D) of chip fabrication and design, as well as swift adoption of the latest technology nodes. System-on-chip (SoC) has evolved in the past decades to combine different intellectual properties (IPs) into one design layout, and thus, a single die with multiple functions in one chip. However, the intensive computation workload in today's high-performance computers, data centers, cloud computing, and machine learning applications demands innovations beyond the current state-of-the-art SoC status quo. This presentation focuses on the comprehensive design, assessment, evaluation, and proposal of security assurance to ensure the trustworthiness and testability of devices. It includes a modular blockchain framework for building a tamper-resistant record for the chiplet/IC supply chain, self-referencing approaches for the detection and avoidance of counterfeit ICs, and the use of Boolean satisfiability for hardware security and VLSI testing. It also addresses the security implications and vulnerabilities for microelectronics, particularly 2.5D/3D ICs, in the coming decade, along with potential solutions.

Biography: Ujjwal Guin is currently an Associate Professor at the Department of Electrical and Computer Engineering at Auburn University. He received Bryghte D. and Patricia M. Godbold Associate Professorship for the highest research, teaching, and service achievements at Auburn University. He received his Ph.D. degree from the University of Connecticut in 2016. He is actively involved in projects in the fields of Hardware Security and Trust, Supply Chain Security, Cybersecurity, and VLSI Design and Test. He has developed several on-chip structures and techniques to improve the security, trustworthiness, and reliability of integrated circuits. He co-authored the book "Counterfeit Integrated Circuits: Detection and Avoidance". He also authored two book chapters, thirty journal articles, and more than forty refereed conference papers. He currently serves or has served several technical program committees in several reputed conferences, such as DAC, HOST, VTS, PAINE, VLSID, GLSVLSI, ISVLSI, and Blockchain