The School of Electrical, Computer and Energy Engineering

Semiconductor talent and innovation development in Indonesia
&
Analog in the Digital Age: Exploring Digitally-Assisted, Stochastic, and Neuromorphic Circuits

Seminar with Dr. Astria Nur Irfansyah
Associate Professor, Institut Teknologi Sepuluh Nopember (ITS) Surabaya, Indonesia
Presents July 10
Presentations begin at 9:00 AM in GWC 487

ABSTRACTS

Semiconductor talent and innovation development in Indonesia

Unlike its neighbouring countries, Indonesia has less semiconductor industry presence. However, to meet global or regional demand of skilled talents in the semiconductor field, and to grow a national semiconductor ecosystem to enable Indonesia to enter the semiconductor supply chain, collaborative efforts have been made by multiple Indonesian universities with the support from local industry and the government. This presentation discusses about the efforts from ICDEC (Indonesia Chip Design Collaborative Center) that is formed by 16 universities in Indonesia, as well as Institut Tecknologi Sepuluh Nopember (ITS), for talent development and enabling chip design and research in Indonesian universities, as well as its current projects, plans, and challenges.

Analog in the Digital Age: Exploring Digitally-Assisted, Stochastic, and Neuromorphic Circuits

Modern CMOS technology nodes are designed for digital circuits and may actually degrade analog circuit performance due to lower voltage supply, reduced transistor transconductance, higher noise, and larger device variability. This presentation introduces the research efforts conducted by ITS faculty and students in dealing with this matter. We will highlight research examples such as digitally-assisted analog circuits in a sigma delta modulation circuit, as well as stochastic circuits, and time-based circuits. Early exploration on neuromorphic circuits for power-efficient intelligent edge device will also be briefly covered.

BIOGRAPHY

Astria Nur Irfansyah is an associate professor at the Department of Electrical Engineering, Institut Teknologi Sepuluh Nopember (ITS) Surabaya, supervising students and undertaking research in the area of microelectronics and robotics. As a member of the Microelectronics and Embedded Systems Laboratory, his teaching portfolio at ITS includes courses on semiconductor devices, electronic circuits, embedded systems, and integrated circuit design. At ITS, he also serves as Deputy Director for International Partnership at ITS Global Engagement since 2020. Within the scope of electrical engineering professional community, Dr. Irfansyah previously served a voluntary role as Vice Secretary of the IEEE Indonesia Section in 2019, and currently Vice Chair of ICDEC (Indonesia Chip Design Collaborative Center). He received his Ph.D in Electrical Engineering from the University of New South Wales, Australia, in 2016, focusing on mixed-signal circuit design, with a dissertation titled “Sigma-Delta Modulation Circuits with Digital Assistance”. He is currently active in promoting IC design to students and supervising several student thesis on microelectronics and embedded systems. His current research interests include mixed-signal circuit design, neuromorphic circuits, and embedded system.

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Introduction to Microelectronics and Embedded System Laboratory
&
FPGA based RISC-V soft processor

Seminar with Dr. Totok Mujiono
Head of Microelectronic and Embedded System Laboratory (MESL),
Institut Teknologi Sepuluh Nopember (ITS) Surabaya, Indonesia
Presents July 10
Presentations begin at 9:00 AM in GWC 487

ABSTRACTS

Introduction to Microelectronics and Embedded System Laboratory. Microelectronics and Embedded System Laboratory (MESL) is one of the 16 laboratories belongs to Electrical Engineering Department, ITS Surabaya. The MESL with 5 members serve as teaching laboratory and research laboratory. As a teaching laboratory MESL serve 3 laboratory classes including Electric Circuit, Electronics, and Digital System laboratories. As a research laboratory MESL performing various research on semiconductore, biosensor, and assistive technology involving undergraduate and graduate students.

FPGA based RISC-V soft processor
In this lecture, we will discuss the implementation of a five-stage pipelined soft processor core. The core uses the RISC-V RV32I Base Integer Instruction Set Architecture. RISC-V is an open standard ISA that is freely available to use and modify. To implement the processor core, FPGA design methodology will be used. First, implement the design specification with the HDL. Then, simulate the design in the ModelSim simulation environment. Following the verification, the resource usage, critical path, and maximum frequency of the processor will be analyzed Finally, upload the processor core to an actual FPGA board.

BIOGRAPHY

Totok Mujiono is head of Microelectronic and Embedded System Laboratory (MESL) in Electrical Engineering Department, Institut of Teknologi Sepuluh Nopember (ITS) Surabaya, Indonesia. He finished his undergraduate degree in Electrical Engineering from ITS (1988), master degree in Computer Science from University of Indonesia (1990), and Doctor degree in physical Electronic from Tokyo Institute of Technology (2016). He is a lecturer in Electrical Engineering ITS since 1990 and teaching various courses such as Electrical Circuit, Electronics, Digital System, Microprocessor, FPGA Based Digital System Design, etc. His research interest is in Biosensor (especially optical biosensor) and Embedded System.

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