

IEEE SSCS DL Prof. Sudhakar P. Samarti Lectures at SEMINATEC 2019

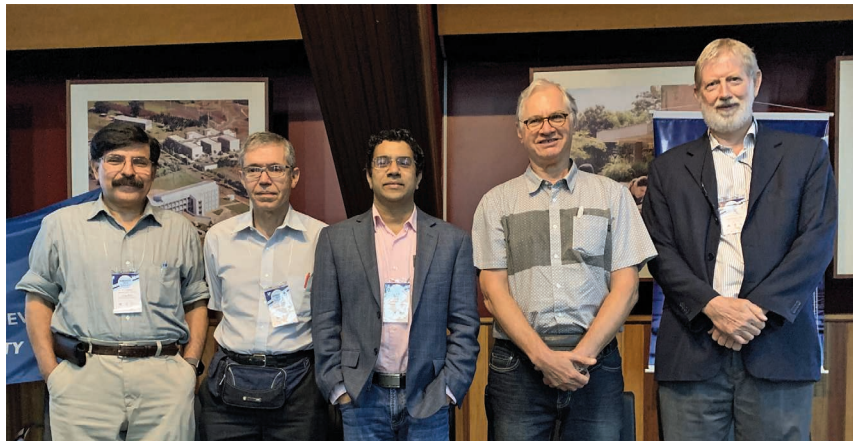
The 14th Workshop on Semiconductors and Micro & Nano Technology (SEMINATEC) 2019 was held on 11–12 April 2019 at the State University of Campinas (UNICAMP), Brazil.

SEMINATEC 2019 was a continuation of 13 previous workshops, all focused on technology trends in the areas of micro- and nanotechnology. This year's SEMINATEC included discussions on materials, processing, devices, IC design and testing, and associated electron design-automation tools. The goal was to promote interaction among industry, academics, R&D centers, government, and students, all looking for real opportunities toward improving education, research, and technology.

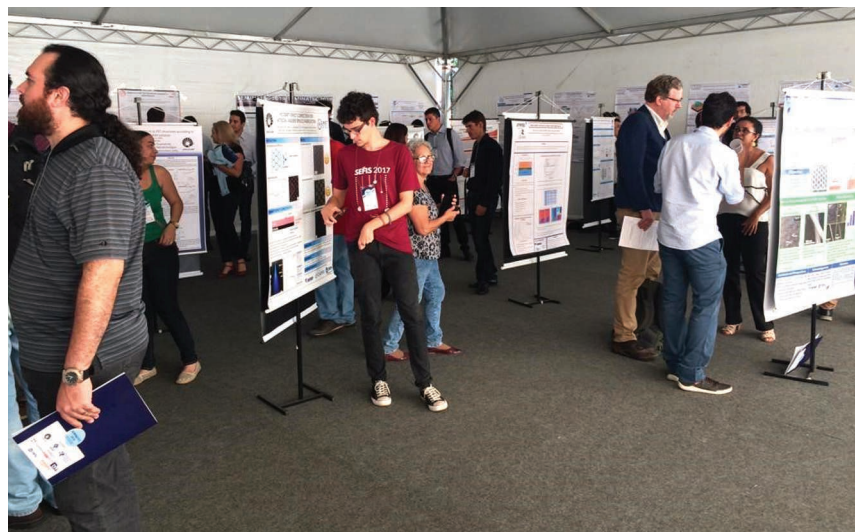
SEMINATEC 2019 was organized by the IEEE Electron Devices Society (EDS) Student Chapter at UNICAMP and supported and funded by the EDS and IEEE Solid-State Circuits Society (SSCS) South Brazil Chapters, the EDS Student Chapter at the Educational Foundation of Ignatius, and the SSCS Student Chapter at the University of São Paulo (USP), Brazil. The Chapters invited four Distinguished Lecturers (DLs) to deliver keynote talks.

More than 135 participants from academia, research institutes, and industry attended SEMINATEC 2019. Such high attendance reflects the enormous success of its organization and indicates substantial and continued interest over the years. This year, SEMINATEC's two-day intensive program centered on five overview lectures:

- “Low Power Clocking for Energy Conscious IoT Systems,” by SSCS DL Prof. Sudhakar Pamarti
- “Self-Heating in FinFETs and Its Impact on Logic Circuits,” by Prof. Durga Misra
- “A Review of DC Extraction Methods for MOSFET Series Resistance



Several SEMINATEC 2019 lecturers and organizing committee members. (From left): Durga Misra (New Jersey Institute of Technology, EDS), Adelmo Ortiz (Simón Bolívar University, EDS), Dr. Pamarti (University of California, Los Angeles, SSCS), Wilhelmus Van Noije (USP, SSCS Chapter chair), and Jacobus Swart (UNICAMP, SEMINATEC general chair).

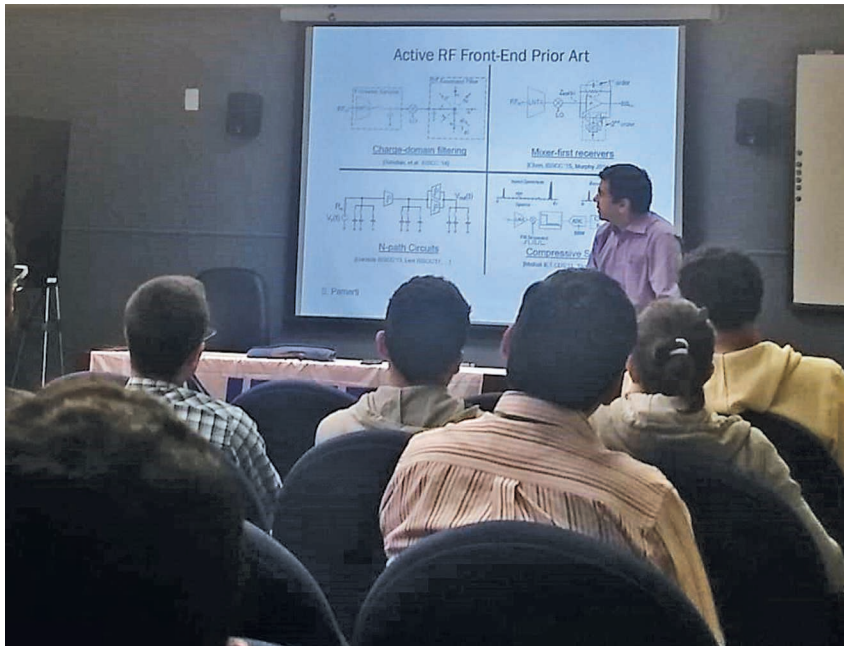


The poster session at SEMINATEC 2019.

- and Mobility Degradation Model Parameters,” by Prof. Adelmo Ortiz-Conde
- “Fully Printable and Autonomously Powered Electronic Nodes for the Internet of Everything,” by Prof. Paul Berger
- “High-Performance Interface IP: When Big Data Meets High Compute: Advanced EDA Tools and IPs,” by Dr. Rishi Chugh.

These talks covered new state-of-the-art devices, models, and circuit

design and applications, making the event of interest to members of the EDS and SSCS communities. In addition, company leaders and government officers delivered presentations about local activities and challenges in the field of micro- and nanoelectronics. These companies included the Center for Semiconductor Components and Nanotechnologies; the National Center for Advanced Electronic Technology; Chipus; the Center for Information Technology Renato



Prof. Pamarti presenting his talk “Time-Varying Filtering Techniques for RF Front Ends” at USP.

Archer; the Eldorado Institute; Idea! Sistemas Eletronicos; the Inter-university MicroElectronics Center; the Integrated System Laboratory/ USP; the Minister of Science, Technology, Innovations and Communications; and Smart Modular Technologies.

Pamarti gave two seminars. On 10 April 2019, the day before SEMINATEC kicked off, he presented “Time-Varying Filtering Techniques for RF Front Ends.” During this seminar, Pamarti provided an overview

of the basics of sharp, programmable, linear, and integrated filters, which are enabling components for software-defined and cognitive radio applications. He explained that they are difficult to realize, although some implementation techniques exist, such as surface acoustic wave and microelectromechanical system-based filters. These are sharp and linear but not very programmable, while active filters can be sharp

and programmable but are not very linear. Sampled charge domain filtering is sharp and programmable, but the burden of the linearity is on the front-end voltage-current converter. Pamarti explained that his group has developed a unique alternative that purposefully employs periodically time-varying circuit components to realize very sharp, linear, and programmable filters for use in RF front ends. He then presented the techniques and circuits for implementing such filters.

Pamarti’s second talk was scheduled during SEMINATEC, on 12 April 2019. He talked about low-power clocking for energy-conscious Internet of Things (IoT) systems and covered important aspects concerning the power consumption of IoT devices. He explained that many IoT devices, especially those with very stringent energy constraints, operate in an intermittent manner. The

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device wakes up infrequently, performs a burst of activity, and goes back to a sleep/inactive mode. Clocking serves multiple functions in such devices. Therefore, overall energy consumption will remain high unless the clocks themselves consume very little energy. To address this challenge, he explained that his group has developed two complementary approaches: one that enables starting up high-quality crystal oscillators very rapidly and another that enables the subnanowatt operation of such oscillators. During his talk, he presented and discussed the techniques and how they enable low-power clocking.

A poster session was organized during SEMINATEC to attract more students and promote discussions about possible collaborations at the undergraduate, master’s, and Ph.D. degree levels. More than 40 selected technical papers were presented and discussed during this time. The four invited DLs helped review the posters to select one for a best paper award. During the SEMINATEC closing session, the best paper award winner was announced. The selected best paper was “Magneto-electrical Transport Improvements of Postgrowth Annealed Iron-Cobalt Nanocomposites: A Route for Future Room-Temperature Spintronics,” presented by M.V. Puydinger dos Santos (UNICAMP). A second paper, “Back Enhanced SOI pMOSFET Light Sensor,” was presented by J.A. Padovese (USP) and received an honorable mention.

For more details about SEMINATEC 2019, please visit: <https://www.ccs.unicamp.br/seminatec/>.

—Wilhelmus A. M. V. Noije
Chapter Chair

—Roberto R. Silva
Student Chapter Chair