

2022 Nordic Circuits and Systems Conference (NorCAS)

Hotel Scandic Helsfyr, Oslo, Norway 25.-26.10.2022

Tutorial at the University of Oslo 24.10.2022

Tutorial

Monday October 24

13:00 – 17:00 **Tutorial on "Low-Power IPs and Complex SoC Design for Industrial Use"**

with a coffee break at ~15:00

Instructors: Waqar Hussain, Omer Qadir, Berend Dekens / Nordic Semiconductor, Norway

Tutorial location:

University of Oslo, Ole-Johan Dahls Hus, Gaustadalleén 23 B, room 5462 "Informatikksalen".

Conference days in Scandic Helsfyr, Innspurten 7, Oslo

Tuesday October 25

9:00 – 9:20 Opening (Jari Nurmi, Tampere University; Dag T. Wisland, University of Oslo)

9:20 – 10:20 Keynote 1: Chair: Dag T. Wisland, University of Oslo

Philipp Häglifer, University of Oslo: High Density 3D CMOS Mixed-Signal Opportunities

10:20 – 11:00 Plenary 1: Chair: Dag T. Wisland, University of Oslo

(Best Paper Award Candidates)

10:20 An 88% fractional bandwidth reconfigurable power amplifier for NB-IoT and LTE-M in 22 nm CMOS FDSOI

Baktash Behmanesh, Joachim Rodrigues, Henrik Sjolund

Department of Electrical and Information Technology (EIT), Lund University, Sweden

10:40 Optimal switching time to minimize store energy in MTJ-based flip-flops under process and temperature variations

Kimiyoshi Usami¹, Daiki Yokoyama¹, Aika Kamei², Hideharu Amano²

1) Shibaura Institute of Technology, Japan; 2) Keio University, Japan

11:00 – 11:40 Coffee break

11:40 – 12:40 Biomedical Applications: Chair: Kristian Kjølgaard, University of Oslo

11:40 A Dynamic Range Extension Technique for Pseudo-Resistive Transimpedance Amplifiers Based on Two-Step Conversion

Maryam Rafati, Seyed Ruhallah Qasemi, Atila Alvandpour

Linköping University, Sweden

12:00 Design and In-Vivo Test of Battery-Free Implantable Temperature Sensor Based on Magnetic Resonant Wireless Power Transfer

Qirui Hua¹, Laura Rytøft², Ben Krøyer¹, Ole Rahbek², Søren Kold², Ming Shen¹

1) Department of Electronic Systems, Aalborg University, Denmark

2) Department of Clinical Medicine, Aalborg University Hospital, Denmark

12:20 A Single Battery Supply Power Concept for a Neuro Recording and Flexible Processing Chain in 22 nm

Franz Marcus Schüffny, Stefan Hänzsche, Marc Berthel, Seyed Mohammad Ali Zeinolabedin, Stefan Scholze, Sebastian Höppner, Richard Miru George, Christian Mayr; TU Dresden, Germany

11:40 – 12:40 Digital Signal Processing Circuits: Chair: Snorre Aunet, NTNU

11:40 Waveform Memory for Real-Time FPGA Test of Fiber-Optic Receiver DSPs

Rafael Romón Sagredo, Erik Börjeson, Ali Mirani, Magnus Karlsson, Per Larsson-Edefors; Chalmers University of Technology, Sweden

12:00 Reconfigurable Signal Processing and DSP Hardware Generator for 5G Transmitters

Agnimesh Ghosh¹, Andrei Spelman¹, Tze Hin Cheung¹, Dhanashree Boopathy¹, Vishnu Unnikrishnan², Vesa Lampu², Guixian Xu², Lauri Anttila², Kari Stadius¹, Marko Kosunen¹, Jussi Ryyänen¹

1) Department of Electronics and Nanoengineering, Aalto University, Finland

2) Department of Electrical Engineering, Tampere University, Finland

12:20 Dataflow Optimizations in a Sub-uW Data-Driven TCN Accelerator for Continuous ECG Monitoring; Johnson Loh, Tobias Gemmeke; RWTH Aachen, Germany

12:40 – 14:00 Lunch

14:00 – 15:00 Keynote 2: Chair: Peeter Ellervee, Tallinn University of Technology

Elena Dubrova, KTH: Breaking cryptographic algorithms using power and EM side-channels

15:00 – 15:40 Coffee break

15:40 – 16:40 High-Frequency Circuits: Chair: Kristian Kjelgaard, University of Oslo

15:40 A Study on the Effects Limiting the Responsivity of A Broadband Terahertz Power Detector with On-chip Antenna in 0.13 μ m SiGe HBT Technology

Negar Shabanzadeh, Mostafa Jafari Nokandi, Kimmo Rasilainen, Jiangcheng Chen, Sumit Pratap Singh, Aarno Pärssinen, Timo Rahkonen; University of Oulu, Finland

16:00 RF PA Predistortion using Non-Linear RF-DACs

Victor Åberg, Han Zhou, Christian Fager, Lars Svensson
Chalmers University of Technology, Sweden

16:20 High-level Comparison of Control-Bounded A/D Converters and Continuous-Time Sigma-Delta Modulators

Fredrik Esp Feyling¹, Hampus Malmberg², Carsten Wulff¹, Hans-Andrea Loeliger², Trond Ytterdal¹

1) Department of Electronic Systems, Norwegian University of Science and

Technology, Trondheim, Norway; 2) Department of Information Technology and Electrical Engineering, ETH Zürich, 8092 Zürich, Switzerland

15:40 – 16:40 Neural Networks on FPGA: Chair: Peeter Ellervee, Tallinn University of Technology

15:40 FPGA-Based Acceleration of Convolutional Neural Network for Gesture Recognition Using mm-Wave FMCW Radar

Rizwan Tariq Syed¹, Yanhua Zhao¹, Markus Ulbricht¹, Vladica Sark¹, Milos Krstic^{1,2}

1) IHP, Germany; 2) University of Potsdam, Germany

16:00 DeepFlexiHLS: Deep Neural Network Flexible High-Level Synthesis Directive Generator
Mohammad Riazati, Masoud Daneshtalab, Mikael Sjödin, Björn Lisper

Mälardalen University, Sweden

16:20 Detecting Improvised Land-mines using Deep Neural Networks on GPR Image Dataset targeting FPGAs

Safdar Mahmood¹, Stefan Scharoba¹, Jonas Schorlemer², Christian Schulz², Michael Hübner¹, Marc Reichenbach¹

1) Chair of Computer Engineering, BTU Cottbus - Senftenberg, Germany

2) Faculty of Electrical Engineering and IT, Ruhr-University Bochum

18:30 – 21:00 Conference dinner at the conference hotel

Wednesday October 26

9:00 – 10:00 Keynote 3: Chair: Jari Nurmi, Tampere University

Danielle Griffith, Texas Instruments: Innovation at the Edge: Next Generation IoT

10:00 – 10:20 Plenary 2: Chair: Jari Nurmi, Tampere University

(Best Paper Award Candidate)

10:00 Multi-Function CIM Array for Genome Alignment Applications built with Fully Digital Flow; Christian Lanius, Tobias Gemmeke; RWTH Aachen University, Germany

10:20 – 11:00 Design Software: Chair: Peeter Ellervee, Tallinn University of Technology

10:20 Python API for Kactus2 IP-XACT tool

Esko Pekkarinen, Mikko Teuho, Timo Hämäläinen; Tampere University, Finland

10:40 GLS Tracing: Gem5-based Low-intrusive Software Tracing

Lars Nolte¹, Tim Twardzik¹, Camille Jalier², Zhigang Huang³, Jiyuan Shi², Thomas Wild¹, Andreas Herkersdorf¹

1) Technical University of Munich, Germany; 2) Huawei Technologies, Grenoble, France; 3) Huawei Technologies, Nanjing, China

10:20 – 11:00 Miscellaneous Technologies: Chair: Snorre Aunet, NTNU

10 :20 CRC-Oriented Error Detection Architectures of Post-quantum Cryptography
Niederreiter Key Generator on FPGA

Alvaro Cintas Canto¹, Mehran Mozaffari Kermani², Reza Azarderakhsh³

1) Marymount University; 2) University of South Florida; 3) Florida Atlantic University

10:40 VCSEL Integrated Circuit Drivers: A Review
Siavash Mowlavi, Stavros Giannakopoulos, Lars G. Svensson
Chalmers University of Technology, Sweden

11:00 – 11:40 Coffee break

11:40 – 12:40 Analog and Mixed-Signal Design: Chair: Dag T. Wisland, UiO

11:40 A 28-Gb/s 13.8-mW Half-Rate Bang-Bang Clock and Data Recovery Circuit Using Return-to-Zero-Based Symmetrical Bang-Bang Phase Detector
Xinyi Ge¹, Yong Chen¹, Lin Wang¹, Nan Qi², Pui-In Mak¹, Rui P. Martins¹
1) University of Macau, People's Republic of China
2) University of Chinese Academy of Sciences, People's Republic of China

12:00 Noise Analysis of Current-Feedback DC-Servo Loop in Current-Balancing Chopper Amplifiers; Yu-Kai Huang, Saul Rodriguez; KTH Royal Institute of Technology, Sweden

12:20 An Integrated Circuit to Reduce Phase Noise and Spurious Tones in Radar Systems
Thomas Mausolf, Frank Herzel, Gunter Fischer
IHP - Leibniz-Institut für innovative Mikroelektronik, Germany

11:40 – 12:40 SoC Applications and Design: Chair: Jari Nurmi, Tampere University

11:40 Design and Evaluation of Performance-efficient SoC-on-FPGA for Cloud based Healthcare Applications
Mayank Kabra, Prashant H C, Madhav Rao
International institute of information technology, Bangalore, India

12:00 Design and Exploration of an ARC-Coprocessor for LSTM Based Audio Applications
Sebastian Birke¹, Bjoern Hartmann², Dominik Auras³, Markus Wloka³, Gerd Ascheid¹, Rainer Leupers¹
1) Institute for Communication Technologies and Embedded Systems, RWTH Aachen University, Germany; 2) RWTH Aachen University, Germany; 3) Synopsys GmbH, Germany

12:20 Open-Source Chip Design in Academic Education
Syed Anas Alam¹, Jakob Furbo Enevoldsen¹, Andreas Alkjær Eriksen¹, Niels William Hartmann¹, Ulrik Helk¹, Jørgen Kragh Jakobsen², Christa Skytte Jensen¹, Nicolai Dyre Bülow Jespersen¹, Karl Herman Krause¹, Mads Rumle Nordstrøm¹, Tjark Petersen¹, Luca Pezzarossa¹, Simon Winther Rasmussen¹, Martin Schoeberl¹, Jonas Ingerslev Sørensen¹
1) Technical University of Denmark, Denmark
2) IC Works - Open Source Chip Design, Denmark

12:40 – 14:00 Lunch

14:00 – 15:00 Keynote 4: Chair: Snorre Aunet, NTNU

Gunnar Mæhlum, Integrated Detector Electronics: Microelectronics in space, challenges, and some examples from Integrated Detector Electronics AS

15:00 – 15:20 Awards and Closing: Chair: Jari Nurmi, Tampere University

15:20 Farewell coffee