



WELCOME

to the September 24-25
2018 Lund Circuit Design Workshop

Ove Edfors

Director

Lund University Excellence Center for System Design on Silicon (SoS)



About the workshop



Two days of activities

150+ participants

30+ organizations

Workshop program with

Invited speakers

Senior researchers

Post docs

PhD students

International advisors

SoS board



Thematic sessions

- **Day 1** - Monday September 24
 - Session 1: Emerging Circuits and Systems
 - Session 2: Application Specific Processors
 - Session 3: Low-energy circuits

- **Day 2** - Tuesday September 25
 - Session 4: Computing and communication
 - New Competence Center for Connected Systems



Invited speakers

- **Lorenzo Ciampolini**, CEA LETI – LISAN, FR
Advanced memory solutions for emerging circuits and systems
- **Marcus Binning**, Cadence, UK
Close to the Edge – How Neural Network inferencing is migrating to specialised DSPs in State of the Art SoCs
- **Frédéric Hasbani & Michael Løngaa**, GN Hearing, DK
Technology and design considerations for Ultra-Low Power audio DSP
- **Nafiseh Mazloum**, Sony Mobile Communications, SE
Cellular IoT Devices
- **Jan Rabaey**, UC Berkeley, US
Adventures in High Dimensions



SoS Board

Sven Mattisson, Chairman
Ericsson



Andreia Cathelin
STM



Franz Dielacher
Infineon



Peter Karlsson
Sony



Anton Klotz
Cadence



Karl-Erik Årzén
LTH



Peter Olanders
Ericsson



Per Runeson
CS, LTH



SoS International Advisors

Mike Faulkner
Victoria University
Australia



Qiuting Huang
ETH
Switzerland



Jan Rabaey
UC Berkeley
California



Some logistics

- Day 1 activities at Grand Hotel, including lunch
- Day 1 workshop dinner at Hypoteket
Dinner starts at 19.00
- Day 2 activities in the E-building, Faculty of Engineering, LU
Coffee and posters at 09.00

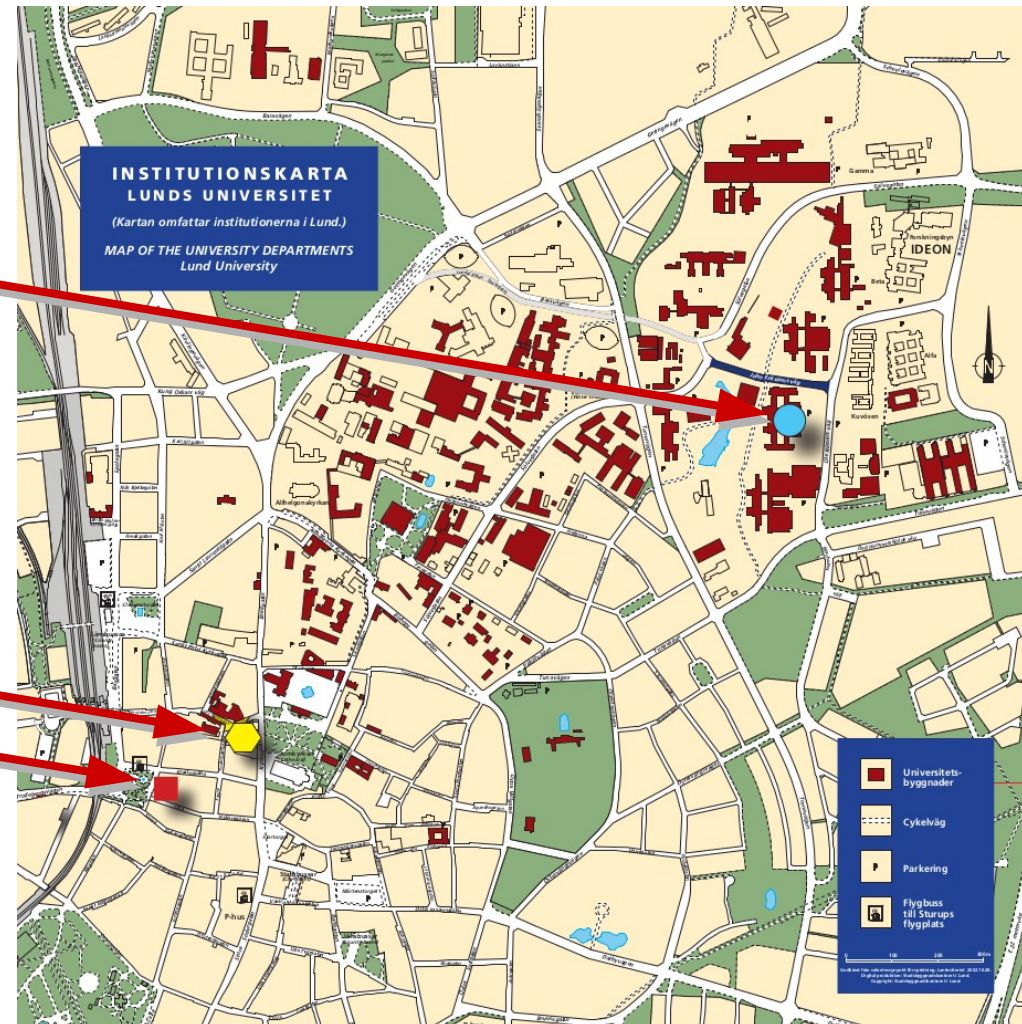
**ALL THREE LOCATIONS ON THE MAP AT THE END OF
THE PRINTED PROGRAM**



Lund map – The tree important locations

**E-huset
Faculty of
Engineering**

**Hypoteket
Grand Hotel**



Hypoteket



TONIGHT AT 19.00

**Across the street from
Lund cathedral**

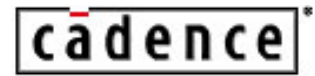
E-building, Faculty of Engineering



TOMORROW AT 09.00



Workshop hosts



Excellence
Center for



Digit@LTH



Excellence Center in System Design on Silicon



Director and co-director

- **Ove Edfors**

Director

Focus on higher level system design



- **Joachim Rodrigues**

Co-director

Focus on circuit design



Guest professor

- **Liesbet Van der Perre**, KU Leuven
Appointed part-time Lise Meitner
Guest Professor at Lund University
for a period of three years

*Holds a workshop on
IoT with a soft touch
directly after this workshop.*



... SoS associated people

Senior Researchers



PostDocs



PhD Students



A selection of SoS related projects active in 2017/2018



MaMi in new 5G frequency bands

2.1 MSEK over two years: August 2016 to July 2018

EIT: Liang Liu, Fredrik Tufvesson, Ove Edfors

Project Partner: Sony Mobile Communications

COMPLETED

SONY



High-Speed A/D Converters for 5G

3.5 MSEK over two years: Sept. 2017 to Aug. 2019

EIT: Pietro Andreani

Project Partner: Ericsson Research



mmWave Smart Beamforming MaMi

2.04 MSEK over two years: September 2018 to June 2020

EIT: MinKeun Chung, Liang Liu, Fredrik Tufvesson, Ove Edfors

Project Partner: Sony Mobile Communications

NEW

SONY



Extremely Wideband Digital Receivers

2.5 MSEK over two years: September 2018 to June 2020

EIT: Henrik Sjöland, Pietro Andreani

Project Partner: Ericsson, SAAB

NEW



Digital Predistortion PA for NB-IoT

2 MSEK over two years: September 2018 to June 2020

EIT: Henrik Sjöland, Joachim Rodrigues

Project Partners: ARM, Xenergetic

NEW

The ARM logo is displayed in a bold, blue, lowercase sans-serif font.

xenergetic



5G lab equipment

1.2 MSEK over 5 years (LTH)
200 kSEK (Crafoord)

Fredrik Tufvesson



The Crafoord Foundation
ESTABLISHED BY HOLGER CRAFOORD IN 1980

28 GHz MIMO Channel Sounder

Fredrik Tufvesson



SONY

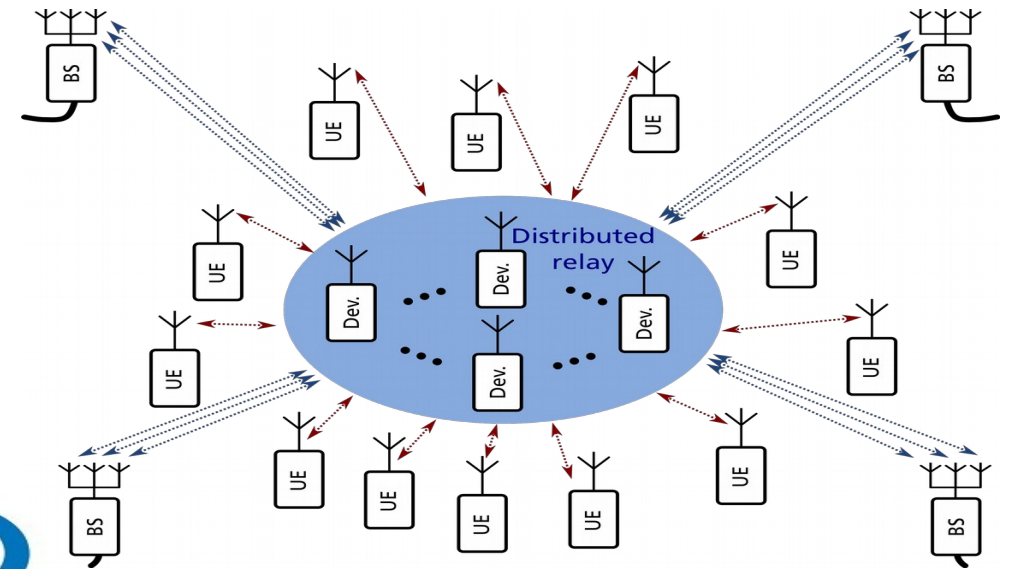


Distributed Dense MaMi Networks

375 kUSD over three years: May 2016 to Apr 2019

EIT: Liang Liu, Ove Edfors

Project Partner: SRC/Intel



3D-MUSE

3.8 MEUR over two years (400 kEUR to Lund)

Lund representative: Joachim Rodrigues

Horizon 2020

Leti



ideas
Integrated Detector Electronics AS



Ultra Low Voltage SRAM Architectures

3.2 MSEK over four years

PI: Joachim Rodrigues



Vetenskapsrådet

MaMi through tight device cooperation

3.2 MSEK over four years

PI: Ove Edfors



Vetenskapsrådet

EIT long term massive MIMO cooperation with Ericsson

Ericsson goes Massive with Lund University



Björn Ekelund

Mar 8, 2018

Today, Ericsson and Lund University are happy to announce a multi-year collaboration agreement regarding research and development in key technologies for mobile communication systems, mainly Massive MIMO technologies and applications.

NEW

A result of the successful research within SoS and the strategic research area ELLIIT.



Publication high-lights



IEEE Transactions on Circuits and Systems – I & II

IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS—I: REGULAR PAPERS

1

An Area-Efficient On-Chip Memory System for Massive MIMO Using Channel Data Compression

Yangxurui Liu¹, *Member, IEEE*, Liang Liu¹, *Member, IEEE*, Ove Edfors², *Senior Member, IEEE*, and Viktor Öwall, *Member, IEEE*

IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS—I: REGULAR PAPERS, VOL. 65, NO. 2, FEBRUARY 2018

531

On the Remarkable Performance of the Series-Resonance CMOS Oscillator

Federico Pepe, Andrea Bevilacqua, *Senior Member, IEEE*, and Pietro Andreani

432

IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS—I: REGULAR PAPERS, VOL. 64, NO. 2, FEBRUARY 2017

A General Theory of Phase Noise in Transconductor-Based Harmonic Oscillators

Federico Pepe and Pietro Andreani

1062

IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS—II: EXPRESS BRIEFS, VOL. 64, NO. 9, SEPTEMBER 2017

A 38 pJ/b Optimal Soft-MIMO Detector

M. Shabany, R. Doostnejad, M. Mahdavi, and P. Glenn Gulak

IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS—I: REGULAR PAPERS, VOL. 64, NO. 9, SEPTEMBER 2017

2495

Compressed Level Crossing Sampling for Ultra-Low Power IoT Devices

Jun Zhou, *Student Member, IEEE*, Amir Tofighi Zavareh, Robin Gupta, Liang Liu, Zhongfeng Wang, *Fellow, IEEE*, Brian M. Sadler, *Fellow, IEEE*, Jose Silva-Martinez, *Fellow, IEEE*, and Sebastian Hoyos, *Senior Member, IEEE*

IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS—I: REGULAR PAPERS, VOL. 65, NO. 4, APRIL 2018

1257

A 128 kb 7T SRAM Using a Single-Cycle Boosting Mechanism in 28-nm FD-SOI

Babak Mohammadi, *Member, IEEE*, Oskar Andersson, *Member, IEEE*, Joseph Nguyen, *Student Member, IEEE*, Lorenzo Ciampolini, *Member, IEEE*, Andreia Cathelin, *Senior Member, IEEE*, and Joachim Neves Rodrigues, *Senior Member, IEEE*

To appear:

M. Abdulaziz, E. Klumperink, B. Nauta, H. Sjöland, "Improving Receiver Close-in Blocker Tolerance by Base-band Gm-C Notch-Filtering", accepted to IEEE TCAS-I



IEEE Transactions on Very Large Scale Integration (VLSI) Systems

2976

IEEE TRANSACTIONS ON VERY LARGE SCALE INTEGRATION (VLSI) SYSTEMS, VOL. 25, NO. 10, OCTOBER 2017

Architecture Design of a Memory Subsystem for Massive MIMO Baseband Processing

Yangxurui Liu, Liang Liu, and Viktor Öwall



Elsevier Inregration: the VLSI journal

A 70 pJ/b configurable 64-QAM soft MIMO detector[☆]

Mahdi Shabany^{a,*}, Dimpesh Patel^b, Mario Milicevic^b, Mojtaba Mahdavi^c, P. Glenn Gulak^b

Clustered checkpointing: Maximizing the level of confidence for non-equidistant checkpointing[☆]

Dimitar Nikolov*, Erik Larsson

Department of Electrical and Information Technology, Lund University, Lund 22100, Sweden



IEEE Microwave and Wireless Components Letters

1010

IEEE MICROWAVE AND WIRELESS COMPONENTS LETTERS, VOL. 27, NO. 11, NOVEMBER 2017

A 2.8–3.8-GHz Low-Spur DTC-Based DPLL With a Class-D DCO in 65-nm CMOS

Ahmed Mahmoud, Pietro Andreani, and Federico Pepe

IEEE MICROWAVE AND WIRELESS COMPONENTS LETTERS, VOL. 27, NO. 5, MAY 2017

509

Two mm-Wave VCOs in 28-nm UTBB FD-SOI CMOS

Therese Forsberg, *Student Member, IEEE*, Johan Wernehag, *Member, IEEE*, Anders Nejdell, *Member, IEEE*, Henrik Sjöland, *Senior Member, IEEE*, and Markus Törmänen, *Senior Member, IEEE*




Springer Analog Integrated Circuits and Signal Processing

Analog Integr Circ Sig Process (2017) 90:333–349
DOI 10.1007/s10470-016-0902-2



System simulations of a 1.5 V SiGe 81–86 GHz E-band transmitter

Tobias Tired¹  · Per Sandrup² · Anders Nejdell¹ · Johan Wernehag¹ · Henrik Sjöland^{1,3}

To appear:

T. Ghanavati, E. Farshidi, H. Sjöland, A. Kosarian, "A high precision logarithmic-curvature compensated all CMOS voltage reference", accepted to Springer Analog Integrated Circuits and Signal Processing



IEEE Journal of Solid State Circuits

1988

IEEE JOURNAL OF SOLID-STATE CIRCUITS, VOL. 53, NO. 7, JULY 2018

A 28-nm FD-SOI 115-fs Jitter PLL-Based LO System for 24–30-GHz Sliding-IF 5G Transceivers

Staffan Ek, Tony Pålsson[✉], Christian Elgaard[✉], Anders Carlsson[✉], *Member, IEEE*, Andreas Axholt,
Anna-Karin Stenman[✉], *Member, IEEE*, Lars Sundström[✉], *Member, IEEE*,
and Henrik Sjöland[✉], *Senior Member, IEEE*



IEEE International Solid State Circuits Conference

ISSCC 2018 / SESSION 13 / MACHINE LEARNING AND SIGNAL PROCESSING / 13.6

**13.6 A 1.8Gb/s 70.6pJ/b 128×16 Link-Adaptive
Near-Optimal Massive MIMO Detector in 28nm
UTBB-FDSOI**

Wei Tang¹, Hemanth Prabhu², Liang Liu², Viktor Öwall², Zhengya Zhang¹



IEEE Transactions on Computers

IEEE TRANSACTIONS ON COMPUTERS

1




Test of Reconfigurable Modules in Scan Networks

Riccardo Cantoro, *Member, IEEE*, Farrokh Ghani Zadegan, *Member, IEEE*, Marco Palena, *Member, IEEE*, Paolo Pasini, *Member, IEEE*, Erik Larsson, *Senior Member, IEEE*, and Matteo Sonza Reorda, *Fellow, IEEE*

IEEE TRANSACTIONS ON COMPUTERS, VOL. 67, NO. 2, FEBRUARY 2018

237

On-Chip Fault Monitoring Using Self-Reconfiguring IEEE 1687 Networks

Farrokh Ghani Zadegan , *Student Member, IEEE*, Dimitar Nikolov , *Member, IEEE*, and Erik Larsson , *Senior Member, IEEE*




Springer Journal of Electronic Testing

J Electron Test (2017) 33:7–23
DOI 10.1007/s10836-016-5638-5



Test Planning for Core-based Integrated Circuits Under Power Constraints

Breeta SenGupta¹  · **Dimitar Nikolov¹** · **Urban Ingelsson²** · **Erik Larsson¹**

Cross-Correlation of Large-Scale Parameters in Multi-Link Systems: Analysis Using the Box-Cox Transformation

GHASSAN DAHMAN¹, JOSE FLODELIS², FREDRIK TUFVESSON²

Spatial Separation of Closely-Located Users in Measured Massive MIMO Channels

JOSE FLODELIS¹, (Student Member, IEEE), FREDRIK RUSEK¹, (Member, IEEE),
XIANG GAO², GHASSAN DAHMAN³, (Member, IEEE),
OVE EDFORS¹, (Senior Member, IEEE), AND
FREDRIK TUFVESSON¹, (Fellow, IEEE)

When Are Low Resolution ADCs Energy Efficient in Massive MIMO?

MURIS SARAJLIĆ, (Student Member, IEEE), LIANG LIU, (Member, IEEE),
AND OVE EDFORS, (Senior Member, IEEE)

Department of Electrical and Information Technology, Lund University, 223 63 Lund, Sweden

A Simulation Framework for Multiple-Antenna Terminals in 5G Massive MIMO Systems

ERIK L. BENGTTSSON^{1,2}, FREDRIK RUSEK², STEFFEN MALKOWSKY²,
FREDRIK TUFVESSON², (Fellow, IEEE), PETER C. KARLSSON¹, AND OVE EDFORS²

Compact Full Duplex MIMO Radios in D2D Underlaid Cellular Networks: From System Design to Prototype Results

MINKEUN CHUNG¹, (Member, IEEE), MIN SOO SIM², (Student Member, IEEE),
DONG KU KIM³, (Senior Member, IEEE), AND CHAN-BYOUNG CHAE², (Senior Member, IEEE)

Communications and Wireless Communications

IEEE Transactions on Wireless Communications IEEE Journal on Selected Areas in Communications

IEEE TRANSACTIONS ON WIRELESS COMMUNICATIONS, VOL. 17, NO. 4, APRIL 2018 2247

Massive MIMO Performance—TDD Versus FDD: What Do Measurements Say?

Jose Flordelis[✉], *Student Member, IEEE*, Fredrik Rusek, *Member, IEEE*, Fredrik Tufvesson, *Fellow, IEEE*, Erik G. Larsson, *Fellow, IEEE*, and Ove Edfors, *Senior Member, IEEE*

3870 IEEE TRANSACTIONS ON WIRELESS COMMUNICATIONS, VOL. 16, NO. 6, JUNE 2017

Influence of Duty-Cycled Wake-Up Receiver Characteristics on Energy Consumption in Single-Hop Networks

Nafiseh Seyed Mazloun, *Member, IEEE* and Ove Edfors, *Senior Member, IEEE*

3042 IEEE TRANSACTIONS ON WIRELESS COMMUNICATIONS, VOL. 16, NO. 5, MAY 2017

Reciprocity Calibration for Massive MIMO: Proposal, Modeling, and Validation

Joao Vieira, Fredrik Rusek, Ove Edfors, *Member, IEEE*, Steffen Malkowsky, *Student Member, IEEE*, Liang Liu, *Member, IEEE*, and Fredrik Tufvesson, *Fellow, IEEE*

IEEE Transactions on Communications

2568 IEEE TRANSACTIONS ON COMMUNICATIONS, VOL. 65, NO. 6, JUNE 2017

Optimal Channel Shortener Design for Reduced-State Soft-Output Viterbi Equalizer in Single-Carrier Systems

Sha Hu, Harald Kröll, Qiuting Huang, *Fellow, IEEE*, and Fredrik Rusek

IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS, VOL. 35, NO. 6, JUNE 2017 1201

5G: A Tutorial Overview of Standards, Trials, Challenges, Deployment, and Practice

Mansoor Shafi, *Life Fellow, IEEE*, Andreas F. Molisch, *Fellow, IEEE*, Peter J. Smith, *Fellow, IEEE*, Thomas Haustein, *Member, IEEE*, Peiyong Zhu, *Senior Member, IEEE*, Prasan De Silva, *Member, IEEE*, Fredrik Tufvesson, *Fellow, IEEE*, Anass Benjebbour, *Senior Member, IEEE*, and Gerhard Wunder, *Senior Member, IEEE*

1244 IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS, VOL. 35, NO. 6, JUNE 2017

Performance Characterization of a Real-Time Massive MIMO System With LOS Mobile Channels

Paul Harris, *Student Member, IEEE*, Steffen Malkowsky, *Student Member, IEEE*, Joao Vieira, Erik Bengtsson, Fredrik Tufvesson, *Fellow, IEEE*, Wael Boukley Hasan, *Student Member, IEEE*, Liang Liu, *Member, IEEE*, Mark Beach, *Member, IEEE*, Simon Armour, and Ove Edfors, *Member, IEEE*

IEEE Wireless Communications Letters

594 IEEE WIRELESS COMMUNICATIONS LETTERS, VOL. 7, NO. 4, AUGUST 2018

Achievable Rates and Training Overheads for a Measured LOS Massive MIMO Channel

Paul Harris[✉], Wael Boukley Hasan, Liang Liu, Steffen Malkowsky, Mark Beach, Simon Armour, Fredrik Tufvesson, and Ove Edfors



Antennas and Propagation

IEEE Transactions on Antennas and Propagation

1570 IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION, VOL. 66, NO. 3, MARCH 2018

Communication

Radiative MRI Coil Design Using Parasitic Scatterers: MRI Yagi

Juan D. Sánchez-Heredia[✉], Johan Avendal, Adnan Bibic, and Buon Kiong Lau

IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION, VOL. 65, NO. 9, SEPTEMBER 2017 4891

Communication

Design of Closely Packed Pattern Reconfigurable Antenna Array for MIMO Terminals

Hui Li, Buon Kiong Lau, and Sailing He

1522 IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION, VOL. 65, NO. 3, MARCH 2017

Communication

Analysis and Estimation of MIMO-SAR for Multi-antenna Mobile Handsets

Hui Li, Apostolos Tsiaras, and Buon Kiong Lau

IEEE Antennas and Wireless Propagation Letters

IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS, VOL. 17, NO. 5, MAY 2018 903

Dynamic Channel Model With Overhead Line Poles for High-Speed Railway Communications

Lai Zhou[✉], Zhi Yang[✉], Fengyu Luan, Andreas F. Molisch, *Fellow, IEEE*, Fredrik Tufvesson[✉], *Fellow, IEEE*, and Shidong Zhou, *Member, IEEE*

IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS, VOL. 16, 2017 1427

Measurement-Based Multiple-Scattering Model of Small-Scale Fading in High-Speed Railway Cutting Scenarios

Bei Zhang, *Student Member, IEEE*, Zhangdui Zhong, *Senior Member, IEEE*, Ruisi He, *Member, IEEE*, Fredrik Tufvesson, *Fellow, IEEE*, and Bo Ai, *Senior Member, IEEE*

1820 IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS, VOL. 16, 2017

On Characteristic Eigenvalues of Complex Media in Surface Integral Formulations

Zachary Miers, *Member, IEEE*, and Buon Kiong Lau, *Senior Member, IEEE*

Signal processing

IEEE Transactions on Signal Processing

IEEE TRANSACTIONS ON SIGNAL PROCESSING, VOL. 66, NO. 18, SEPTEMBER 15, 2018

4717




Efficient DSP and Circuit Architectures for Massive MIMO: State of the Art and Future Directions

Liesbet Van der Perre , Liang Liu , and Erik G. Larsson , *Fellow, IEEE*

2746

IEEE TRANSACTIONS ON SIGNAL PROCESSING, VOL. 66, NO. 10, MAY 15, 2018




Beyond Massive MIMO: The Potential of Data Transmission With Large Intelligent Surfaces

Sha Hu , *Member, IEEE*, Fredrik Rusek , *Member, IEEE*, and Ove Edfors , *Senior Member, IEEE*

IEEE TRANSACTIONS ON SIGNAL PROCESSING, VOL. 66, NO. 7, APRIL 1, 2018

1761

Beyond Massive MIMO: The Potential of Positioning With Large Intelligent Surfaces

Sha Hu , Fredrik Rusek , and Ove Edfors 

1622

IEEE TRANSACTIONS ON SIGNAL PROCESSING, VOL. 65, NO. 6, MARCH 15, 2017

A Soft-Output MIMO Detector With Achievable Information Rate based Partial Marginalization






Sha Hu and Fredrik Rusek

IEEE Journal of Selected Topics in Signal Processing

IEEE JOURNAL OF SELECTED TOPICS IN SIGNAL PROCESSING, VOL. 12, NO. 3, JUNE 2018

445

Digital Predistortion for Hybrid MIMO Transmitters

Mahmoud Abdelaziz , *Member, IEEE*, Lauri Anttila , *Member, IEEE*, Alberto Brihuega , *Student Member, IEEE*, Fredrik Tufvesson , *Fellow, IEEE*, and Mikko Valkama , *Senior Member, IEEE*



Vehicular Communication Channels

IEEE Transactions on Vehicular Technology

IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY, VOL. 66, NO. 9, SEPTEMBER 2017

7633


Estimating the Cross-Correlation Properties of Large-Scale Parameters in Multilink Distributed Antenna Systems: Synchronous Measurements Versus Repeated Measurements

Ghassan Dahman, *Member, IEEE*, Jose Flordelis, *Student Member, IEEE*, and Fredrik Tufvesson, *Fellow, IEEE*

8632

IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY, VOL. 66, NO. 10, OCTOBER 2017

A Measurement-Based Multilink Shadowing Model for V2V Network Simulations of Highway Scenarios

Mikael G. Nilsson , *Member, IEEE*, Carl Gustafson, *Member, IEEE*, Taimoor Abbas, *Member, IEEE*, and Fredrik Tufvesson, *Fellow, IEEE*

IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY, VOL. 66, NO. 6, JUNE 2017

4657

Measurement-Based Wideband Analysis of Dynamic Multipath Propagation in Vehicular Communication Scenarios

Kim Mahler, Wilhelm Keusgen, Fredrik Tufvesson, Thomas Zemen, *Senior Member, IEEE*, and Giuseppe Caire, *Fellow, IEEE*



Recent PhD graduates



Yangxurui Liu

Efficient Processing and Storage for Massive MIMO Digital Baseband

Yangxurui Liu



LUND UNIVERSITY

Doctoral Thesis
Electrical Engineering
Lund, March 2018



Exchange PhD student from China

Supervisor: Viktor Öwall

Mikael Nilsson

Verification of wireless communication
performance and robustness for
automotive applications

—
Mikael Nilsson

Lund 2018



Industrial PhD student

Supervisor: Fredrik Tufvesson

Babak Mohammadi

Ultra-low Power Design Approaches in
Memories and Assist Techniques

Babak Mohammadi



LUND INSTITUTE OF TECHNOLOGY
Lund University

Doctoral Dissertation
Lund, June 2017



EIT PhD student

Supervisor: Joachim Rodrigues

Hu Sha

Channel Shortening in Wireless Communication

Sha Hu



LUND
UNIVERSITY

Doctoral Thesis
Faculty of Electrical Engineering
Lund, December 2017



EIT PhD student

Supervisor: Fredrik Rusek

Joao Vieira

Algorithms and Proofs of Concept for
Massive MIMO Systems

João Vieira

Lund 2017



EIT PhD student

Supervisor: Fredrik Tufvesson

Elevations, rankings and awards



IEEE Fellow Grade Elevations



Fredrik Tufvesson

for contributions to measurement and modeling of wireless propagation channels























Pietro Andreani





















for contributions to CMOS integrated voltage-controlled oscillators

Electrical and Electronic Engineering

2017

World Rank	Institution*	Country/Region
1	University of California, Berkeley	
2	Stanford University	
3	Massachusetts Institute of Technology (MIT)	
4	University of Illinois at Urbana-Champaign	
5	Georgia Institute of Technology	
6	Nanyang Technological University	
7	Tsinghua University	
8	University of Michigan-Ann Arbor	
9	The University of Texas at Austin	
10	National University of Singapore	
11	Harvard University	
12	Purdue University - West Lafayette	
13	Rutgers, The State University of New Jersey - New Brunswick	
14	Princeton University	
15	University of California, Santa Barbara	
16	Swiss Federal Institute of Technology Zurich	
17	Carnegie Mellon University	
18	University of Maryland, College Park	
19	Zhejiang University	
20	Lund University	

2018

World Rank	Institution*	Country/Region
1	Massachusetts Institute of Technology (MIT)	
2	Stanford University	
3	University of California, Berkeley	
4	Georgia Institute of Technology	
5	University of Illinois at Urbana-Champaign	
6	Princeton University	
7	University of California, Santa Barbara	
8	Rutgers, The State University of New Jersey - New Brunswick	
9	Harvard University	
10	North Carolina State University - Raleigh	
11	Swiss Federal Institute of Technology Zurich	
12	Nanyang Technological University	
13	University of Michigan-Ann Arbor	
14	Aalborg University	
15	University of California, San Diego	
16	University of California, Los Angeles	
17	Lund University	
18	Texas A&M University	
19	Carnegie Mellon University	
20	The University of Texas at Austin	

Paper awards

2018 IEEE Edge conference Best Paper Award

Towards Mission-Critical Control at the Edge and Over 5G

Per Skarin*^{†‡}, William Tärneberg*[§], Karl-Erik Årzen[†], and Maria Kihl[§]

2018 IEEE Communications Society Best Tutorial Paper Award

**Massive MIMO for Next Generation
Wireless Systems**

Erik G. Larsson, ISY, Linköping University, Sweden

Ove Edfors and Fredrik Tufvesson, Lund University, Sweden

Thomas L. Marzetta, Bell Labs, Alcatel-Lucent, United States

in IEEE Communications Magazine, vol. 52, no. 2, pp. 186-195, February 2014.

Thesis award



Joao was awarded the Sparbanksstiftelsen Färs & Frosta 100 000 SEK prize for best doctoral thesis at the Faculty of Engineering, Lund University.

Göran Lind Prize



Liang Liu received the 40 000 SEK Göran Lind Prize from the Royal Physiographic Society of Lund for his contributions to massive MIMO.

Future of SoS



System Design on Silicon → Connected Systems

- The System Design on Silicon center will broaden its field of activities, covering many aspects from materials and devices to high-level system design and applications
- To reflect the new focus the name will be changed to Connected Systems
- In this process we are looking for new partner companies
- More information about this tomorrow at 11.15 – 11.45.



Next year's workshop

- The successful tradition of annual workshops will continue
- Next year's workshop will be held

Thursday-Friday September 19-20, 2019,

the days before the ESSCIRC/ESSDERC conference.



Let's return to this year's workshop



Session 1: Emerging Circuits and Systems

MONDAY

SESSION 1
EMERGING CIRCUITS
AND SYSTEMS

10.30-11.15

Invited Presentation: Advanced memory solutions for emerging circuits and systems

LORENZO CIAMPOLINI, CEA LETI – LISAN, FR

11.15-11.45

3D stackable circuits and memory

KARL-MAGNUS PERSSON, EIT, LUND UNIVERSITY

11:45-12:00

A 26GHz 22.2dBm Variable Gain Power Amplifier in 28nm FD-SOI CMOS for 5G Antenna Arrays

CHRISTIAN ELGAARD, ERICSSON + EIT, LUND UNIVERSITY

12.00-13.15

Lunch



Session 2: Application Specific Processors

SESSION 2
APPLICATION SPECIFIC
PROCESSORS

MONDAY

13.15-14.00

Invited Presentation: Close to the Edge – How Neural Network inferencing is migrating to specialised DSPs in State of the Art SoCs

MARCUS BINNING, CADENCE, UK

14.00-14.15

An ASIP for massive MIMO with full compiler support

STEFFEN MALKOWSKY, EIT, LUND UNIVERSITY

14.15-14.30

SoC implementation in ST 28nm FD-SOI for distributed MIMO systems

HEMANTH PRABHU, EIT, LUND UNIVERSITY (XENERGIC)

14.30-14.45

Tuesday-poster pitches

POSTER PRESENTERS, EIT, LUND UNIVERSITY

14.45-15.15

Coffee

Session 3: Low-energy Circuits

SESSION 3
LOW-ENERGY CIRCUITS

MONDAY

15.15-16.00

Invited Presentation: Technology and design considerations for Ultra-Low Power audio DSP

FRÉDÉRIC HASBANI & MICHAEL LØNGAA, GN HEARING, DK

16.00-16.15

Energy efficient analog front ends: Scaling laws and applications

MURIS SARAJLIC, EIT, LUND UNIVERSITY

16.15-16.30

Human Body IoT- Connected as needed

ALI ZAHER, EIT, LUND UNIVERSITY

16.30-17.00

Invited Presentation: Cellular IoT Devices

NAFISEH MAZLOUM, SONY MOBILE COMMUNICATIONS, LUND

19.00-

Dinner at Hypoteket



Session 4: Computing and Communication

SESSION 4
COMPUTING AND COMMUNICATION

TUESDAY

09.00-09.30

Coffee with Poster Session

09.30-10.15

Invited Presentation: Adventures in High Dimensions

JAN RABAEY, UC BERKELEY, US

10.15-10.30

Multi-antenna terminals in Massive MIMO

ERIK BENGTTSSON, SONY MOBILE COMMUNICATIONS + EIT, LUND UNIVERSITY

10.30-10.45

Mission Critical Control at the Edge and over 5G

PER SKARIN, ERICSSON + AUTOMATIC CONTROL, LUND UNIVERSITY

10.45-11.15

Coffee with Poster Session



New Directions and Closing

NEW DIRECTIONS AND CLOSING

TUESDAY

11.15-11.45

New Competence Center for Connected Systems

OVE EDFORS, EIT, LUND UNIVERSITY

11.45-12.00

Closing Remarks

SVEN MATTISSON, ERICSSON, CHAIRMAN OF THE SOS BOARD

12.00-13.30

Lunch and continued poster session





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