

News

ELLIIT workshop

The workshop 2019 will take place at BTH October 15-16 2019, with local organizer Nauman bin Ali. The 2018 ELLIIT workshop was held in Linköping October 22-23. 111 registered attendants presented and listened to recent work and attended mini workshops in the different subject areas. The two keynotes were given by Prof. Slawomir Stanczak from TU Berlin and Prof. Joakim Jaldén from KTH. Prof. Stanczak presented work on machine learning for 5G, especially related to channel estimation and detection, while Prof. Jaldén talked about detecting cells in images and the endeavours related to collaborating with industry and commercialization.

Deep learning vulnerable to adversarial attacks

Deep learning (DL), despite its enormous success in many computer vision and language processing applications, is exceedingly vulnerable to adversarial attacks. We consider the use of DL for radio signal (modulation) classification tasks, and present practical methods for the crafting of white-box and universal black-box adversarial attacks in that application. We show that these attacks can considerably reduce the classification performance, with extremely small perturbations of the input. In particular, these attacks are significantly more powerful than classical jamming attacks, which raises significant security and robustness concerns in the use of DL-based algorithms for the wireless physical layer. (Authors: M. Sadeghi and E. G. Larsson), Read more: <https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8449065>

AIML@LU

ELLIIT researchers with Kalle Åström in the forefront have created an open network for artificial intelligence and machine learning. Research on artificial intelligence and machine learning is done at many departments at most faculties. The network for Artificial Intelligence and Machine Learning at Lund University (AIML@LU) is a faculty wide platform for research, education and innovation in the area. There will be many interesting seminars and symposia, see <http://aiml.lu.se/> for further information.

BTH ranked high in Software engineering

BTH is ranked sixth in the world and first in Europe regarding the number of publications in leading journals in Software Engineering. The article in the Journal of Systems and Software (Vol 147, Jan 2019) lists a total of about 120 researchers, of whom ten researchers are active in Sweden. Four of them work full-time at BTH, one works part-time at BTH, and two are former employees of BTH. Thus, in total, seven out of ten ranked researchers with Swedish affiliations have a connection to BTH. See https://www.bth.se/eng/dipt_eng-news/bth-top-ranked-in-software-engineering-research/ for the press release.

2019 Swedish Communication Technologies Workshop in Lund

The 2019 Swedish Communication Technologies Workshop (Swe-CTW 2019) will be held at Lund University June 10-12. The aim of this annual workshop is to bring together researchers and research students in the general area of communication technologies and related areas. It provides an opportunity for researchers and research students to gather in a largely informal setting to share ideas, make contacts, and foster new collaborative links for the future.

Marconi award for energy efficient communications

Increased data throughput has been the leading requirement for wireless communication systems for a long time period, but with the advent of 5G, the energy efficiency has become another important metric. Since 5G is supposed to increase the data rates by 100x, the energy consumption would increase by the same factor, unless the energy efficiency is radically improved. Associate Professor Emil Björnson, LiU, has received the 2018 IEEE Marconi Prize Paper Award in Wireless Communications for his journal article "Optimal Design of Energy-Efficient Multi-User MIMO Systems: Is Massive MIMO the Answer?" that initiated a new research direction where optimization theory is used to design energy efficient cellular networks. He has continued the research within the project SSF sponsored project "Holistic energy efficiency optimization in cellular networks". The number of antennas, number of users, transmit power, base station density, and selection of hardware components are some of the optimization variables considered in his research. For more information, see the interview in IEEE Spectrum <https://spectrum.ieee.org/energywise/telecom/wireless/will-increased-energy-consumption-be-the-achilles-heel-of-5g-networks> or the LiU news article: <https://liu.se/en/news-item/okningen-av-mobildata-kraver-energieffektivare-nat>

Invited Talks:

- Buon Kiong Lau presented Antennas and Propagation Society Distinguished Lectures in Malaysia (7 Jan. 2018), Singapore (8 Jan. 2018), China (Chengdu and Chongqing, 21-23 July 2018), and India (Kanpur, Kolkata, Chennai, 29 Oct. 2018-2 Nov. 2018)
- Fredrik Tufvesson had a key-note at IEEE Globecom 2018, workshop on Channel Models and Measurements for mmWave Bands, "High-resolution dynamic characterization of mm wave channels"
- Ove Edfors on "Massive MIMO for sub-6GHz Wireless Communications" at the 2019 IEEE International Solid-State Circuits Conference forum on Sub-6GHz 5G Radio Circuits and Systems: From Concepts to Silicon.

Awards and Appointments:

- N. Pappas appointed to the editorial board of the IEEE Transactions on Communications, April 2018.
- N. Pappas appointed to the editorial board of the IEEE/KICS Journal on Communications and Networks, April 2018.
- N. Pappas co-chair for the IEEE INFOCOM 2019 Workshop on "Ultra Low Latency in Wireless Networks".

- The paper “Karatsuba with rectangular multipliers for FPGAs” by Martin Kumm, Oscar Gustafsson, Florent de Dinechin, Johannes Kappauf, and Peter Zipf received the best paper award at the 2018 IEEE Symposium on Computer Arithmetic.
- The CVL-team from LiU achieved a second rank on 2018ies visual object tracking challenge sequestered test and against more than 70 competitors.
- Emil Björnson and Daniel Verenzuela co-authored the paper “Network Deployment for Maximal Energy Efficiency in Uplink with Multislope Path Loss,” that received the 2018 Young Author Best Paper (YABP) Award from the IEEE ComSoc/VTS Italy Chapter. The prize awarded to the first author, Andrea Pizzo, and Luca Sanguinetti is another author fo the paper.
- Erik G. Larsson Ove Edfors, Fredrik. Tufvesson and Tom Marzetta got the 2018 IEEE ComSoc Best Tutorial Paper Award for “Massive MIMO for next generation wireless systems”, published in EEE Communications Magazine, 2014
- Emil Björnson got the 2018 IEEE Marconi Prize Paper Award in Wireless Communications (shared with L. Sanguinetti, J. Hoydis and M. Debbah)
- Former Ph.D. student Hien Ngo got the 2018 EURASIP Best Ph.D. Award for his dissertation "Massive MIMO: Fundamentals and System Designs" (advisor: E.G. Larsson)
- Erik G. Larsson named "highly cited researcher" according to Clarivate Analytics, <https://hcr.clarivate.com/#freeText%3Dlarsson>
- Telecommunications research at Linköping University ranks #23 in the world according to the Shanghai academic ranking of world universities,
- Lund University is ranked 17 in the world in the area of Electrical & Electronic Engineering Shanghai academic ranking of world universities
- At the conference IEEE Edge in July 2018 the paper "Towards Mission-Critical Control at the Edge and Over 5G" got the Best Paper Award. Auhors: Per Skarin, William Tärneberg, Karl-Erik Årzén and Maria Kihl.
- Priset till Göran Linds minne från Kungliga Fysiografiska Sällskapet, 2018, går till Fredrik Rusek, institutionen för elektro- och informationsteknik
- During the LTH exam ceremony 30 May João Vieira was received an award from Sparbanksstiftelsen Färs och Frosta of 100.000 SEK for his Phd thesis Algorithms and Proofs of Concept for Massive MIMO Systems.

Program chairs and Editorships:

- Mario Garrido served as lead guest editor for special section on Fast Fourier Transform (FFT) Hardware Implementations in Journal of Signal Processing Systems
- Oscar Gustafsson served as one of the guest associate editors for the special issue of ISCAS 2018 in IEEE Transactions on Circuits and Systems II

PhD theses:

- Christopher Mollen (LiU/ISY/Communication systems) successfully defended his Ph.D. thesis "High-End Performance with Low-End Hardware: Analysis of Massive MIMO Base Station Transceivers", Jan. 2018
- Saeedeh Moloudi, Spatially Coupled Turbo-Like Codes, 2018, Lund
- Erik Bylow, Optimization Methods for 3D Reconstruction: Depth Sensors, Distance Functions and Low-Rank Models, 2018, Lund
- Dennis Medved, Deep Learning Applications for Biomedical Data and Natural Language Processing, 2018, Lund
- Viktor Larsson, Computational Methods for Computer Vision: Minimal Solvers and Convex Relaxations, 2018, Lund
- Mikael Nilsson, Verification of wireless communication performance and robustness for automotive applications, 2018, Lund
- Hussan Munir, An Empirically Based Theory for Open Software Engineering Tools, 2018, Lund
- Håkan Jonsson, From signal to social. Steps Towards Pervasive Social Context, 2018, Lund
- Martin Danelljan, "Learning Convolution Operators for Visual Tracking", Linköping Studies in Science and Technology. Dissertations, No. 1926, 2018.
- Marcus Karlsson successfully defended his Ph.D. thesis "Blind Massive MIMO Base Stations: Downlink Transmission and Jamming". LiU/ISY/Communication systems.
- Hei Victor Cheng successfully defended his Ph.D. thesis "Optimizing Massive MIMO: Precoder design and power allocation." LiU/ISY/Communication systems.
- Efficient mm-Wave Transmitter Design in CMOS Technology, Therese Forsberg, 2018 Nov 18, Lund: The Department of Electrical and Information Technology.
- Verification of wireless communication performance and robustness for automotive applications, Mikael Nilsson, 2018 May 15, Elektro- och informationsteknik.
- Physical Layer Techniques for High Frequency Wireline Broadband Systems
- Efficient Processing and Storage for Massive MIMO Digital Baseband, Liu, Y., 2018, Department of Electrical and Information Technology, Lund University.
- Muhammad Usman (BTH/SERL): Improving Expert Estimation of Software Development Effort in Agile Contexts, March 2018.
- Indira Nurdiani Jabangwe (BTH/SERL): Introduction of Agile Practices: Strategies and Impacts, Karlskrona, June 2018.

Conferences and workshops:

- The industrial excellence center EASE (Embedded Applications Software Engineering) concluded its ten years of operation with a workshop, Oct 15. Highlights were presented from ten years of research, and industry panelists discussed visions of industry-academia research collaboration. Panelist were Johan Paulsson, CTO, Axis, Johan Svenér, V.P. Research & Incubation, Sony, Stefan Johansson, CEO Softhouse Invest, and Linda Persson, Head of Site & Product Development Baseband, Ericsson. <http://ease.cs.lth.se/oct15/>

- Swedsoft's annual Software Technology and Engineering Workshop (STEW) was held in Malmö, October 17-18. Under the themes of "Let us do it together: Open source in software development" and "Let the machine do the job; AI and ML in software development", several ELLIIT researchers contributed: Dr. Christoph Reichenbach, Dr. Hussan Munir, PhD student Rasmus Ros. The chair of LTHs board of directors, Dr. H.C. Charlotta Falvin gave an inspiring opening speech on "Experiences from managing software business".
<https://www.swedsoft.se/event/stew-2018/>
- Michael Felsberg is co-organizing the SCIA 2019 in Norrköping.

Personell

- New Ph.D. students Ziya Gulgun, LiU/ISY/Communication systems
- Harsh Tataria has started as a Post doctoral researcher in mm wave channel modeling at LU/EIT
- dira Nurdiani Jabangwe left BTH for a postdoc at DTU, Denmark.

Research Grants

- Per Runeson got prestudy funding from Vinnova for a project on "Open Collaborative Data as an Innovation Platform for Machine Learning Applications" together with RISE and Mobile Heights in the call for "Groundbreaking ideas in industrial development". The project aims at exploring and defining Open Collaborative Data (OCD) to innovate, share costs and ensure quality of data for training of machine learning applications, similar to Open Source Software (OSS).
- N. Pappas, "Low Latency Communications for Wireless Networks: Exploiting Traffic Characteristics", funded by the LiU Center for Industrial Information Technology (CENIIT), 440kSEK for 2019.
- European Union H2020 MSCA Individual Fellowships (IF) project COMPRESS NETS starts 1 January 2019. The fellowship is awarded to Marian Codreanu, with Di Yuan (LiU/ITN) as the supervisor.
- Michael Felsberg has received a new VR grant 2018-04673 - Algebraiskt begränsade fältningsnätverk för gles bilddata.
- Anders Hansson has together with Bo Wahlberg at KTH received a WASP Expedition Project on Autonomous Optimization that will fund two postdoc for two years.
- Buon Kiong Lau obtained a Vetenskapsrådet Project Grant for the topic "Optimal MIMO Terminal Antennas for 5G and Beyond" (dnr. 2018-04717), 4 years, 4 million SEK, 2019-2022.
- Emil Björnson (LiU) and Pontus Giselsson (LU) are the two PIs of the WASP-AI Expedition Project "ICARUS—Intelligent Cell-free Access for wiReless Ubiquitous Services".
- Nauman bin Ali (BTH/SERL): VITS – Visualization of Test Data for Decision Support, Funded by The Knowledge Foundation, Duration: April 1, 2019 – March 31, 2021. Total budget: 3.8 MSEK.
- Martin Hell and Martin Höst, LTH. HATCH: Handling Vulnerabilities in the Value Chain, funded by Vinnova, duration Nov 2018 – Nov 2021. Total Vinnova funding is 4MSEK.

Some Publications

- I. Dimitriou, N. Pappas, "Stable Throughput and Delay Analysis of a Random Access Network With Queue-Aware Transmission", IEEE Transactions on Wireless Communications, vol. 17, no. 5, May 2018.
- P. Mohapatra, N. Pappas, J. Lee, T. Q. S. Quek, V. Angelakis, "Secure Communications for the Two-user Broadcast Channel with Random Traffic", IEEE Transactions on Information Forensics and Security, vol. 13, no. 9, pp. 2294-2309, Sept. 2018.
- Z. Chen, N. Pappas, M. Kountouris, V. Angelakis, "Throughput with Delay Constraints in a Shared Access Network with Priorities", IEEE Transactions on Wireless Communications, vol. 17, no. 9, Sept. 2018.
- N. Pappas, M. Kountouris, A. Ephremides, V. Angelakis, "Stable Throughput Region of the Two-User Broadcast Channel", IEEE Transactions on Communications, Vol. 66, no. 10, Oct. 2018.
- L. You, Q. Liao, N Pappas, D. Yuan, "Resource Optimization with Flexible Numerology and Frame Structure for Heterogeneous Services", IEEE Communications Letters, vol. 22, no. 12, Dec. 2018.
- N. Pappas, M. Kountouris, "Stable Throughput Region of the Two-User Interference Channel", Ad Hoc Networks, Vol. 85, Mar. 2019.
- B. Chen, L. You, D. Yuan, N. Pappas, J. Zhang, "Resource Optimization for Joint LWA and LTE-U in Load-coupled and Multi-cell Networks", Accepted, to appear, IEEE Communications Letters, Nov. 2018.
- O. Holland, E. Steinbach, V. Prasad, Q. Liu, Z. Dawy, A. Aijaz, N. Pappas, K. Chandra, V. Rao, S. Oteafy, M. Eid, M. Luden, A. Bhardwaj, X. Liu, J. Sachs, J. Araujo, "The IEEE 1918.1 "Tactile Internet" Standards Working Group and its Standards", Accepted, to appear, Proceedings of the IEEE, Nov. 2018.
- I. Dimitriou, N. Pappas, "Performance Analysis of a Cooperative Wireless Network with Adaptive Relays", Accepted, to appear, Ad Hoc Networks, Dec. 2018.
- Carl Ingemarsson, Oscar Gustafsson, "SFF—The Single-Stream FPGA-Optimized Feedforward FFT Hardware Architecture", Journal of Signal Processing Systems, 90(11): 1583-1592, 2018.
- Martin Kumm, Oscar Gustafsson, Mario Garrido Gálvez, Peter Zipf, "Optimal Single Constant Multiplication Using Ternary Adders", IEEE Transactions on Circuits and Systems - II - Express Briefs, 65(7): 928-932, 2018.
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- Jeong Keun Jang, Ho Keun Kim, Myung Hoon Sunwoo, Oscar Gustafsson, "Area-efficient scheduling scheme based FFT processor for various OFDM systems", Asia Pacific Conference on Circuits and Systems, 2018.
- Narges Mohammadi Sarband, Oscar Gustafsson, Mario Garrido, "Obtaining Minimum Depth Sum of Products from Multiple Constant Multiplication", IEEE Workshop on Signal Processing Systems, Cape Town, South Africa, 21-24 October, 2018, 2018.
- Martin Kumm, Oscar Gustafsson, Florent de Dinechin, Johannes Kappauf, Peter Zipf, "Karatsuba with Rectangular Multipliers for FPGAs", IEEE Symposium on Computer Arithmetic, Amherst, MA, USA, June 25-27, 2018, 2018.
- Erik Bertilsson, Oscar Gustafsson, and Erik G. Larsson, "A Modular Base Station Architecture for Massive MIMO with Antenna and User Scalability per Processing Node", Asilomar Conference on Signals, Systems and Computers, 2018.
- Madhur Gokhale, Cheolyong Bae, Oscar Gustafsson, and Mario Garrido, "Improved Implementation Approaches for 512-tap 60 GSa/s Chromatic Dispersion FIR Filters", Asilomar Conference on Signals, Systems and Computers, 2018.
- Oscar Gustafsson and Lars Wanhammar, "Arithmetic", Handbook of Signal Processing Systems, pp. 381-426, Springer, 2019.
- Mario Garrido, Fahad Qureshi, Jarmo Takala, and Oscar Gustafsson, "Hardware architectures for the fast Fourier transform", Handbook of Signal Processing Systems, pp. 613-647, Springer, 2019.
- M. Garrido, K. Möller and M. Kumm, "World's Fastest FFT Architectures: Breaking the Barrier of 100 GS/s," IEEE Transactions on Circuits and Systems Part I: Regular Papers. Accepted for publication.
- M. Garrido, "Multiplexer and Memory-Efficient Circuits for Parallel Bit Reversal," in IEEE Transactions on Circuits and Systems II: Express Briefs. Accepted for publication.
- Mario Garrido, Nanda K. Unnikrishnan and Keshab K. Parhi, "A Serial Commutator Fast Fourier Transform Architecture for Real-Valued Signals", IEEE Transactions on Circuits and Systems Part II: Express Briefs, Vol. 65, No. 11, pp 1693-1697, Nov. 2018.
- Konrad Möller, Martin Kumm, Mario Garrido and Peter Zipf, "Optimal Shift Reassignment in Reconfigurable Constant Multiplication Circuits", Transactions on Computer-Aided Design of Integrated Circuits and Systems, Vol. 37, No. 3, pp. 710-714, Mar. 2018.
- Mario Garrido, Shen-Jui Huang and Sau-Gee Chen, "Feedforward FFT Hardware Architectures based on Rotator Allocation", IEEE Transactions on Circuits and Systems I: Regular Papers, Vol. 65, No. 2, pp. 581-592, Feb. 2018.
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