



## ELLIIT Nyhetsblad 13 - April 2016

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Målet med ELLIITs nyhetsblad är att sprida information om händelser och nyheter från ELLIIT. Nyhetsbladet är skrivet på en blandning av svenska och engelska.

### Nyheter

#### Grand Competitive Driving Challenge 2016

Halmstad University is taking part in this year's Grand Competitive Driving Challenge (GCDC, see <http://gcdc.net>) to be held in the Netherlands at the end of May 2016. GCDC is co-organised by TNO (Netherlands) and Victoria Institute (Sweden) research institutes with financing from EU.

This year is a second installment of the GCDC event, the first one took place in 2011, and Halmstad University team was proud to take the second place on that occasion. For the upcoming event, the Master students team from HH is preparing a Volvo S60 car to participate in two cooperative driving scenarios that involve (a) simultaneous, high density wireless communication with the other competing cars in an unreliable environment, (b) high precision longitudinal and lateral automated control of the car movement, and (c) cooperative decision making.

#### REFSQ conference

The 22nd International Working Conference on Requirements Engineering: Foundation for Software Quality (REFSQ) was organized in Gothenburg, March 14-17. Prof Björn Regnell at LU is the steering committee chair for REFSQ. Particularly, the RET (3rd International Workshop on Requirements Engineering and Testing) was co-organized by Elizabeth Bjarnason LU and Mikael Unterkalmsteiner BTH. The workshop originates from the EASE research program at LU and BTH.

#### 140 character publication

Per Runeson et al (CS/LU) published a tweet size paper (140 characters) in the fourth volume of Tiny Transactions of Computer Science ([tinytocs.org](http://tinytocs.org)). The full body text of the paper (P. Runeson, H.



Munir, and K. Wnuk. It is more blessed to give than to receive – open software tools enable open innovation. *Tiny Transactions on Computer Science (Tiny ToCS)*, 4, 2016) is: "Sharing software tools enables open innovation, brings faster upgrades and frees up resources, but demands investments in the open community". There is no space for any in depth analysis in the paper, but the 250 word abstract and three references point to the underlying papers. This is a new way in the attempt to reach a broader audience with research results.

### Lise Meitner guest professor

Prof. Margaret-Anne Storey from university of Victoria, Canada, is appointed LUs Lise Meitner guest professor 2016-2018 for underrepresented gender. She will collaborate with the associate senior lecturers at the Department of Computer Science (biträdande lektorer), Elizabeth Bjarnason and Emelie Engström.

### WASP starts up

The Wallenberg Autonomous Systems Program (WASP), where several ELLIIT researchers are members, is starting up. During late Fall 2015 and Spring 2016 WASP has hired in total 25 academic PhD students, one Post Doc, and 23 industrial PhD students at the five participating universities. Of these 13 have gone to Linköping University, including 7 industrial PhD students from Saab Dynamics (\*2), Sectra, Atlas Copco, Boliden, Ericsson, Saab Aerodynamics, and 9 have gone to Lund University including 3 industrial PhD students from Saab Kockums, Axis Communications, and Ericsson. The WASP Graduate School arranged a kick-off meeting at Linköping University April 7-8 with more than 90 attendees.





## Massive MIMO as Enabler for Communications with Drone Swarms

*P. Chandhar, D. Danev, E. G. Larsson (Proc. of International Conference on Unmanned Aircraft Systems (ICUAS), 2016)*

Massive multiple-input multiple-output (MIMO) is an emerging technology for mobile communications, where a large number of antennas at the base station simultaneously serve multiple single-antenna terminals with very high capacity. In this paper, we study the potentials and challenges of utilizing massive MIMO for unmanned aerial vehicles (UAVs) communication. We consider a scenario where multiple single-antenna UAVs simultaneously communicate with a ground station (GS) equipped with a large number of antennas. Specifically, we discuss the achievable uplink (UAV to GS) capacity performance in the case of line-of-sight (LoS) conditions. We also study the type of antenna polarization that should be used in order to maintain a reliable communication link between the GS and the UAVs. The results obtained using a realistic geometric model show that massive MIMO is a potential enabler for high-capacity UAV networks.

### Some Publications:

- Per Ganestam and Michael Doggett, "SAH guided spatial split partitioning for fast BVH construction", to appear in Computer Graphics Forum (Proceedings of Eurographics), Volume 35, Number 2, 2016.
- W. Sun, D. Yuan, E. G. Ström, and F. Brännström. Resource sharing and power allocation for D2D-based safety critical V2X communications. *IEEE Transactions on Wireless Communications*. (Accepted)
- V. Angelakis, A. Ioannis, N. Pappas, E. Fitzgerald, and D. Yuan. Allocation of heterogeneous resources of an IoT device to flexible services. *IEEE Internet of Things Journal*. (Accepted)
- Q. He, V. Angelakis, A. Ephremides, and D. Yuan. Polynomial complexity minimum-time scheduling in a class of wireless networks. *IEEE Transactions on Control of Network Systems*. (Accepted)
- Z. Miers and B. K. Lau, "Computational analysis and verifications of characteristic modes in real materials," *IEEE Trans. Antennas Propag.*, in press. (Special Issue on Theory and Applications of Characteristic Modes)
- I. Vasilev, J. Lindstrand, V. Plicanic, H. Sjöland, and B. K. Lau, "Experimental investigation of adaptive impedance matching for a MIMO terminal with CMOS SOI tuners," *IEEE Trans. Microw. Theory Tech.*, in press.
- I. Vasilev, V. Plicanic, and B. K. Lau, "Impact of antenna design on MIMO performance for compact terminals with adaptive impedance matching" *IEEE Trans. Antennas Propag.*, in press.



- Martin Danelljan et al., "Adaptive Decontamination of the Training Set: A Unified Formulation for Discriminative Visual Tracking", Accepted for CVPR 2016.
- Martin Danelljan et al. "A Probabilistic Framework for Color-Based Point Set Registration", Accepted for CVPR 2016
- Shao, Caixing, Leng, Supeng, Zhang, Yan, Vinel, Alexey, Jonsson, Magnus (2015). Performance Analysis of Connectivity Probability and Connectivity-aware MAC Protocol Design for Platoon-based VANETs. IEEE Transactions on Vehicular Technology, 64 (12), pp. 5596 - 5609.
- Vinel, Alexey, Ma, Xiaomin, Huang, Dijiang (2016). Guest Editors' Introduction : Special Issue on Reliable and Secure VANETs. IEEE Transactions on Dependable and Secure Computing, 13 (1), pp. 2 – 4
- Vinel, Alexey, Pettersson, Henrik, Lin, Lan, Altintas, Onur, Gusikhin, Oleg (2015). Vehicular networking for autonomous driving : [Guest Editorial]. IEEE Communications Magazine, 53 (12), pp. 62 - 63.
- M. Mohaqeqi and M.R. Mousavi. Sound Test-Suites for Cyber-Physical Systems. Proceedings of the 10th International Symposium on Theoretical Aspects of Software Engineering (TASE 2016), IEEE Computer Society, 2016.
- F. Ghassemi and M.R. Mousavi. Product Line Process Theory, Journal of Logic and Algebraic Methods in Programming, 85(1): 200--226, 2016.
- G. Amarasuriya, E. G. Larsson and H. V. Poor, "Wireless information and power transfer in multi-way massive MIMO relay networks," IEEE Transactions on Wireless Communications. To appear.
- S. Kashyap, E. Bjornson and E. G. Larsson, "On the feasibility of wireless energy transfer using massive antenna arrays," IEEE Transactions on Wireless Communications. To appear.
- E.G.Larsson and H.V.Poor, "Joint beamforming and broadcasting in massive MIMO", IEEE Transactions on Wireless Communications. To appear.
- M. Garrido, P. Källström, M. Kumm, and O. Gustafsson, "CORDIC II: A New Improved CORDIC Algorithm," *IEEE Transactions on Circuits and Systems II: Express Briefs*, vol. 63, no. 2, pp. 186-190, Feb. 2016.
- M. Garrido, R. Andersson, F. Qureshi, and O. Gustafsson, "Multiplierless Unity-Gain SDF FFTs," *IEEE Transaction VLSI Systems*, to appear.
- M. Garrido, S.-J. Huang, S.-G. Chen, and O. Gustafsson, "The Serial Commutator (SC) FFT," *IEEE Transactions on Circuits and Systems II: Express Briefs*, to appear.
- M. Garrido, "The Feedforward Short-Time Fourier Transform," *IEEE Transactions on Circuits and Systems II: Express Briefs*, Accepted for publication.
- E Bjarnason, K Smolander, E Engström, P Runeson, "A theory of distances in software engineering", Information and Software Technology 70, 204-219 1 2016
- MV Mäntylä, B Adams, F Khomh, E Engström, K Petersen , "On rapid releases and software testing: a case study and a semi-systematic literature review", Empirical Software Engineering 20 (5), 1384-1425 6 2015
- ED Ekelund, E Engstrom , "Efficient regression testing based on test history: An industrial evaluation", Software Maintenance and Evolution (ICSME), 2015 IEEE International conference on



- N. B Ali, K. Petersen, K. Schneider, “FLOW-assisted value stream mapping in the early phases of large-scale software development”, *Journal of Systems and Software* 111:213-227, January 2016.
- J. Börstler, T.B. Hilburn, “Team Projects in Computing Education II” (2<sup>nd</sup> editorial), *ACM Transactions on Computing Education*, Vol. 16, No. 2, January 2016.
- R. Jabangwe, C. Wohlin, K. Petersen, D. Smite, J. Börstler, “A Method for Investigating the Quality of Evolving Object-Oriented Software Using Defects in Global Software Development Projects”, *Journal of Software: Evolution and Process*, to be published.
- J. Börstler, B. Paech, “The Role of Method Chains and Comments in Software Readability and Comprehension—An Experiment”, *Transactions on Software Engineering*, to be published.
- S. Poulding, K. Petersen, R. Feldt, V. Garousi, “Using Citation Behavior to Rethink Academic Impact in Software Engineering”, *Proceedings of the International Symposium on Empirical Software Engineering and Measurement*, October 2015.
- D. Badampudi, C. Wohlin, K. Petersen, “Experiences from using snowballing and database searches in systematic literature studies”, *Proceedings of the International Symposium on Empirical Software Engineering and Measurement*, October 2015.
- C. Wohlin, K. Wnuk, D. Smite, U. Franke, D. Badampudi and A. Cicchetti, “Supporting Strategic Decision-making for Selection of Software Assets”, accepted for publication in *Proceedings of the 7th International Conference on Software Business (ICSOB 2016)*, Ljubljana, Slovenia, June 2016.
- R. Britto, E. Mendes and C. Wohlin, “A Specialized Global Software Engineering Taxonomy for Effort Estimation”, accepted for publication in *Proceedings of the 11th International Conference on Global Software Engineering*, Orange County, CA, USA, August 2016.
- Petri Ihanola, Arto Vihavainen, Alireza Ahadi, Matthew Butler, Jürgen Börstler, Stephen H Edwards, Essi Isohanni, Ari Korhonen, Andrew Petersen, Kelly Rivers, Miguel Ángel Rubio, Judy Sheard, Bronius Skupas, Jaime Spacco, Claudia Szabo, Daniel Toll, “Educational Data Mining and Learning Analytics in Programming: Literature Review and Case Studies”, *Proceedings of the 2015 ITiCSE on Working Group Reports*, December 2015.
- A. Papadopoulos, A. Ali-Eldin, K.-E. Årzén, J. Tordsson, E. Elmroth “PEAS: A Performance Evaluation Framework for Auto-Scaling Strategies in Cloud Applications”, *ACM Transactions on Modeling and Performance Evaluation of Computing Systems (TOMPECS)*, 2016. Accepted for publication.
- A. Papadopoulos, C. Klein, M. Maggio, J. Dürango, M. Dellkrantz, F. Hernández-Rodríguez, E. Elmroth, K.-E. Årzén, “Control-Based Load-Balancing Techniques: Analysis and Performance Evaluation via a Randomized Optimization Approach”, *Control Engineering Practice*, 2016. Accepted for publication.

## Keynotes and Invited Talks:

- Interview in *Elektroniktidningen* with E. G. Larsson (ISY/LiU) and F. Tufvesson (EIT/LU) : <http://etn.se/images/pdf/2016-02-Low.pdf>
- Claes Wohlin (BTH) is an invited keynote speaker at the 10th International Symposium on Empirical Software Engineering and Measurement in Ciudad Real, Spain in September 2016. The title of the keynote will be: “Is there a Future for Empirical Software Engineering?”



## Awards and Appointments:

- Michelle Chong (AC/LU) co-authored the paper "*SMT-based observer design for cyber-physical systems under sensor attacks*", winner of Best Paper Award at [ICCPS 2016](#). (part of CPSWEEK 2016)
- The Ph.D. thesis "*Multiantenna Cellular Communications: Channel Estimation, Feedback, and Resource Allocation*" of Dr. Emil Björnson (LiU/ISY/Communication systems) has been selected as one of the two winners of the 2016 EURASIP Best Ph.D. Award.

## Program chairs and Editorships:

- Buon Kiong Lau, (LU/EIT), chairs the physical layer (PHY) track with two colleagues in the Technical Program Committee of the 2016 IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC'2016), Valencia, Spain, September 4-7, 2016.
- Alexey Vinel, Associate Editor for IEEE Transactions on Dependable and Secure Computing (2016-).
- Kai Petersen (BTH) was the poster co-chair at the 23rd International Working Conference for Requirements Engineering: Foundations for Software Quality, held in Gothenburg, March 2016.

## Some new dissertations:

- PhD thesis: Per Ganestam, LU/CS, "*Faster data structures and graphics hardware techniques for high performance rendering*", More information here : <http://www.lu.se/lup/publication/8593599>
- PhD thesis: Lei Lei, (LiU/ITN), May 2016, "*From Orthogonal to Non-orthogonal Multiple Access: Energy- and Spectrum-Efficient Resource Allocation*" Advisor; Di Yuan.
- PhD thesis by Syed Asad Alam, LiU/ISY/DA, Feb. 23, "*Techniques for Efficient Implementation of FIR and Particle Filtering*", Advisor: Oscar Gustafsson
- Alma Orucevic Alagic (CS/LU): "*Understanding Software Development in an Open Source Context: Network Analysis of Source Code Repositories*", April 11
- Anders Mannesson (AC/LU): "*Joint Positioning and Multipath Radio Channel Estimation and Prediction*", May 2

## Personalförändringar

- Buon Kiong Lau was promoted in March 2016 to Professor in Applied Electromagnetic Wave Propagation at the Department of Electrical and Information Technology, Lund University.



- Dr. Mahdiah Sadabadi is starting a postdoc at Linköping University on May 1. She has a PhD from EPFL in Lausanne and will work on applications of optimization to modelling and control of power grids.
- Dr. Carsten Fritsche is employed 50% by Linköping University and 50% by NIRA Dynamics, Munich office. Since first of January 1 2016, he is funded by ELLIIT. He is working on fundamental filtering bounds and applications in filtering of the EM algorithm. He is also supervising students in the EU ITN project TRAX, who are working on indoor localisation algorithms. Indoor localisation is also the ELLIIT area where Carsten will contribute.

## Forskningsfinansiering

- DRIWS: Digital Runway Incursion Warning System (2016) funded by Trafikverket and led by Victoria Swedish ICT (Alexey Vinel is a participant from HH).
- Oscar Gustafsson, LiU/ISY/DA, has received a Korea-Sweden Research Cooperation grant from STINT with the project “Design of Core Algorithms and IPs of Communication Signal Processing for Portable Medical Device Systems” in collaboration with Ajou University.
- Fredrik Kahl, Anders Robertsson, Cristian Sminchisescu and Kalle Åström (LU/MIG/AC) have received a SSF grant in the call 'Smart Systems' for the project 'Semantic mapping and visual navigation for smart robots'. The awarded amount is 31.1 MSEK.
- Patrick Doherty (IDA/LiU) has received a SSF grant in the call “Smart Systems” for the project “Robot-assisterade hastigt bildade kunskapsnätverk”. The awarded amount is 27 MSEK.