



ELLIIT Nyhetsblad 12 – December 2015

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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

The Future of ELLIIT

The budget proposition from September 2015 contained nothing explicit about the future of the strategic research areas, including ELLIIT. Instead this will be part of the research and innovation proposition of September 2016. In the meantime ELLIIT will continue at its present volume also during 2016.

In spite of this uncertainty a restructuring of ELLIIT's project portfolio has been performed for 2016. For the Linköping and Lund parts of ELLIIT instead of having a large number of, often quite small, projects, project funding will only be given either for full time positions (PhD students or postdocs) (600k/year) or half time positions (300k/year). The titles of the new ELLIIT projects are:

- 5G Wireless
- Co-Design of Robust and Secure Networked Embedded Control Systems
- Stream Computing Infrastructures
- Decision Support for Efficient and Effective Lean Testing
- Scalable Language Tools for Cyber-Physical Systems
- Collaborative Robotic Systems
- Deep Vision: Multiple Object Tracking
- Local Positioning Systems
- Visual Feature Based Data Reduction
- Scalable Optimization for Control Systems
- Online Optimization and Control towards Autonomous Vehicle Maneuvering

The 5G wireless project, which is the largest, has six subprojects: System design and propagation channels, Networking solutions, Baseband processing, Analog hardware, Trustworthy operation and management, and Vehicular communication.



The Wallenberg Autonomous System Program (WASP) starts

The Wallenberg Autonomous System Program, where several ELLIIT researchers are involved, has started. Six start projects have been approved and are under startup. The six projects are

- *Automatic transport systems* - Coordinated by Professor Bo Wahlberg, KTH Royal Institute of Technology.
- *Autonomous clouds* –coordinated by Professor Karl-Erik Årzén, Lund University.
- *Interaction and communication with autonomous agents* –coordinated by Anders Ynnerman, professor at LiU.
- *Data-driven development of autonomous systems of systems* – coordinated by Professor Jan Bosch, Chalmers.
- *Localization and scalability in autonomous systems* –coordinated by Professor Fredrik Gustafsson, Linköping University.
- *Interaction, perception, learning and verification in interactive autonomous systems* – coordinated by Danica Kragic, professor at KTH Royal Institute of Technology.

WASP is currently recruiting 26 PhD students and/or postdocs for these projects. Wasp has also a call for industrial PhD students which has attracted huge interest from industry. It received 52 applications for the 20 open positions. More information about WASP can be found on

<http://www.wasp-sweden.org>

Lund University Robotics Week, November 23-27 2015

During euRobotics week 2015, about 20 one-hour-long guided tours were arranged in Robot Lab at Lund University. The main audience were about 670 school children and students of all ages from 20 different school classes in the region who had booked a tour but also about 30 adults from the public (including some from within Lund University) during special sessions.

Demos included in the tours:

- Ball-catching robot using stereo vision
- Robot doing free-form hot-wire cutting in styrofoam
- Interaction and programming of a dual-arm robot by lead-through motions
- Parallel kinematic manipulators
- Simultaneous localization and mapping for mobile robots
- Tactile/haptic feedback for operator interface
- Overview of current and outlook of future robotics research including the EU-funded projects SMERobotics, SARFUN and Flexifab
- Natural-language programming of an industrial robot



Positioning using Massive MIMO

Location awareness in wireless networks may enable many applications such as emergency services, autonomous driving and geographic routing. Although there are many available positioning techniques, none of them is adapted to work with massive multiple-in-multiple-out (MIMO) systems, which represent a leading 5G technology candidate. A recent paper (V. Savic and E. G. Larsson, IEEE VTC-2015), from LIU/ISY discusses possible solutions for positioning of mobile stations using a vector of signals at the base station, equipped with many antennas distributed over deployment area. The main proposal is to use fingerprinting techniques based on a vector of received signal strengths. These kinds of methods are able to work in highly-cluttered multipath environments, and require just one base station, in contrast to standard range-based and angle-based techniques. It also provides a solution for fingerprinting-based positioning based on Gaussian process regression, and discusses main applications and challenges. <http://arxiv.org/pdf/1509.00202.pdf>

Bronze medal to JaCoP

The JaCoP constraint programming solver from LU/CS received the bronze medal (third place) in the MiniZinc solver challenge in the fix search category this year. JaCoP is a Java-based finite domain solver developed by two main developers, Krzysztof Kuchcinski and Radoslaw Szymanek. The MiniZinc challenge is organized by NICTA (National ICT Australia) and this year had 14 entrants. In the competition each solver was given 20 different problems, each having several sets of input data, all



together over 100 different instances to solve.

LiU-CVL's visual object tracking method SRDCF

LiU-CVL's visual object tracking method SRDCF, which won the OpenCV object tracking challenge 2015, has been submitted to OpenCV on their request. It has also performed best on the VOT-TIR2015 challenge and second best on the VOT2015 challenge. It will be presented at ICCV2015, Santiago de Chile.

Robot Gift Wrapper

In a collaboration between Department of Automatic Control LU, Department of Computer Science LU, Cognibotics, and MediaMarkt the ABB two-armed robot Yomi was used to wrap Christmas gift parcels. The robot has been on tour to MediaMarkt's stores in Sweden during December and has also been featured in [Ny Teknik](#) and [TV4](#).



Some Publications:

- Amir Aminifar, Paulo Tabuada, Petru Eles and Zebo Peng : Self-Triggered Controllers and Hard Real-Time Guarantees, Accepted for DATE 2016.



- V. Savic, E. G. Larsson, J. Ferrer-Coll and P. Stenumgaard, “Kernel methods for accurate UWB-based ranging with reduced complexity,” IEEE Transactions on Wireless Communications. To appear.
- S. K. Mohammed and E. G. Larsson, “Improving the performance of the zero-forcing multiuser MISO downlink precoder through user grouping,” IEEE Transactions on Wireless Communications. To appear.
- X. Gao, O. Edfors, F. Tufvesson and E. G. Larsson, “Massive MIMO in real propagation environments: Do all antennas contribute equally?,” IEEE Transactions on Communications. To appear.
- E. Karipidis, D. Yuan, Q. He and E. G. Larsson, “Max-min power control in wireless networks with successive interference cancellation,” IEEE Transactions on Wireless Communications. To appear.
- V. Savic and E. G. Larsson, “Fingerprinting-based positioning in distributed massive MIMO systems,” in Proc. of IEEE Vehicular Technology Conference (VTC), Sept. 2015.
- H. Q. Ngo, A. Ashikhmin, H. Yang, E. G. Larsson and T. L. Marzetta, “Cell-free massive MIMO: Uniformly great service for everyone,” in Proc. of IEEE Signal Processing Advances in Wireless Communications (SPAWC), June 2015.
- Jingya Li, Emil Björnson, Tommy Svensson, Thomas Eriksson, Mérouane Debbah, “Joint Precoding and Load Balancing Optimization for Energy-Efficient Heterogeneous Networks,” IEEE Transactions on Wireless Communications, vol. 14, no. 10, pp. 5810-5822, Oct. 2015.
- Xinlin Zhang, Michail Matthaiou, Emil Björnson, Mikael Coldrey, “Impact of residual transmit RF impairments on training-based MIMO systems,” IEEE Transactions on Communications, vol. 63, no. 8, pp. 2899-2911, August 2015.
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- Emil Björnson, Erik G. Larsson, “Three Practical Aspects of Massive MIMO: Intermittent User Activity, Pilot Synchronism, and Asymmetric Deployment,” Proceedings of IEEE Global Communications Conference (GLOBECOM), Workshop on Massive MIMO: From theory to practice, San Diego, California, USA, December 2015.
- Emma Söderberg, Görel Hedin. Declarative rewriting through circular nonterminal attributes. Computer Languages, Systems & Structures. Volume 44, Part A, Pages 3–23, Elsevier, December 2015.
- Niklas Fors, Gustav Cedersjö, Görel Hedin. JavaRAG: a Java library for reference attributes grammars. Proceedings of the 14th International Conference on Modularity, pages 55-67. ACM. 2015.
- Niklas Fors, Görel Hedin. A JastAdd implementation of Oberon-0. Science of Computer Programming. Volume 114, Pages 74–84. Elsevier. 2015.



- Christoff Bürger. Reference attribute grammar controlled graph rewriting: motivation and overview. SLE 2015: Proceedings of the 2015 ACM SIGPLAN International Conference on Software Language Engineering, Pages 89-100, ACM, October 2015.
- A. K. M. Pillai and H. Johansson, "Efficient recovery of sub-Nyquist sampled sparse multi-band signals using reconfigurable multi-channel analysis and modulated synthesis filter banks," IEEE Trans. Signal Processing, vol. 63, no. 19, pp. 5238–5249, Oct. 1, 2015.
- H. Johansson and F. Harris, "Polyphase decomposition of digital fractional-delay filters," IEEE Signal Processing Lett., vol. 22, no. 8, pp. 1021–1025, Aug. 2015.
- Y. Wang, H. Johansson, H. Xu, and Z. Sun, "Joint blind calibration for mixed mismatches in two-channel time-interleaved ADCs," IEEE Trans. Circuits Syst. I - Regular Papers, vol. 62, no. 6, pp. 1508–1517, June 2015.
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- H. Johansson and O. Gustafsson, "Filter-bank based all-digital channelizers and aggregators for multi-standard video distribution," in Proc. IEEE Int. Conf. Digital Signal Processing, Singapore, July 21–24, 2015.
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- Dorrell, D., Vinel A., Cao D. Connected vehicles - Advancements in vehicular technologies and informatics IEEE Transactions on Industrial Electronics, 62(12), 2015, pp. 7824 - 7826
- H. Beohar, M. Varshosaz, M.R. Mousavi, Basic behavioral models for software product lines: Expressiveness and testing pre-orders, Science of Computer Programming, 2015. (Top 10 most downloaded paper of SCP in October-November 2015.)
- M. Konečný, W. Taha, F. A. Bartha, J. Duracz, Adam Duracz, Aaron D. Ames, Enclosing the Behavior of a Hybrid Automaton up to and Beyond a Zenon Point, Nonlinear Analysis: Hybrid Systems, 20:1--20, 2015.
- The book "Experimentation in Software Engineering" by C. Wohlin, P. Runeson, M. Höst, M. C. Ohlsson, B. Regnell and A. Wesslén, has been translated and published in Chinese by China Machine Press (in collaboration with Springer), ISBN 978-7-111-51856-3, 2015.
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- N. bin Ali, K. Petersen, and B. de França, "Evaluation of simulation-assisted value stream mapping for software product development: Two industrial cases", Information and Software Technology, Vol. 68, Feb 2015, 45-61.
- M. Khurum, S. Fricker, T. Gorschek, "The Contextual Nature of Innovation - An Empirical Investigation of Three Software Intensive Products", Information and Software Technology, Vol. 57, Jan 2015, 595-613.



- C. Thümmeler, A. Keow Lim, I. Holanec, S. Fricker, “A Methodology to Assess Social Technological Alignment in the Health Domain”, *Journal of Innovation and Research in Biomedical Engineering*, accepted for publication.
- C. Wohlin, D. Smite, N.B. Moe, “A General Theory of Software Engineering: Balancing Human, Social and Organizational Capitals”, *Journal of Systems and Software*, Vol. 109, No. 11, 229-242. Open access - DOI: <http://dx.doi.org/10.1016/j.jss.2015.08.009>
- P. Chatzipetrou, L. Angelis, S. Barney, C. Wohlin, “An Experience-based Framework for Evaluating Alignment of Software Quality Goals”, *Software Quality Journal*, Vol. 23, No. 4, 567-594.
- C. Wohlin and A. Aurum, “Towards a Decision-making Structure for Selecting a Research Design in Empirical Software Engineering”, *Empirical Software Engineering: An International Journal*, Vol. 20. No. 6, 1427-1455.
- Oliinyk O., Petersen K., Schoelzke, M., Becker, M., Schneickert, S.; “Structuring Automotive Product-Lines and Feature Models: An Exploratory Study at Opel”, *Requirements Engineering Journal*, accepted for publication.
- Solinski A., Petersen K.; “Prioritizing Agile Benefits and Limitations in Relation to Practice Usage”, *Software Quality Journal*, accepted for publication.
- J. Börstler, T.B. Hilburn, “Team Projects in Computing Education” (editorial), *ACM Transactions on Computing Education*, Vol. 15, No. 4, 5 pp.
- S. Fricker, K. Schneider, F. Fotrousi, C. Thümmeler, “Workshop Videos for Requirements Communication”, *Requirements Engineering*, DOI: 10.1007/s00766-015-0231-5.
- Oliinyk O., Petersen K., Schoelzke, M., Becker, M., Schneickert, S.; “Metrics for the Evaluation of Feature Models in an Industrial Context”; In: *Proceedings of the 21st International Working Conference on Requirements Engineering: Foundations for Software Quality (REFSQ 2015)*; Essen, Germany; Springer; 2015.
- Alessandro Vittorio Papadopoulos, Martina Maggio, Alberto Leva and Enrico Bini. “Hard real-time guarantees in feedback-based resource reservations”; *Real-Time Systems 2015*.
- Antonio Filieri, Martina Maggio, Konstantinos Angelopoulos, Nicolas D'Ippolito, Ilias Gerostathopoulos, Andreas Berndt Hempel, Henry Hoffmann, Pooyan Jamshidi, Evangelia Kalyvianaki, Cristian Klein, Filip Krikava, Sasa Misailovic, Alessandro Vittorio Papadopoulos, Suprio Ray, Amir M. Sharifloo, Stepan Shevtsov, Mateusz Ujma, and Thomas Vogel. “Software Engineering Meets Control Theory”. *SEAMS 2015, Symposium on Software Engineering for Adaptive and Self-Managing Systems*.
- Antonio Filieri, Henry Hoffmann, and Martina Maggio. “Automated Multi-Objective Control for Self-Adaptive Software Design”. **ESEC/FSE 2015**, European Software Engineering Conference and ACM SIGSOFT International Symposium on Foundations of Software Engineering.
- Georgios Chasparis, Martina Maggio, Enrico Bini, Karl-Erik Årzén: “Design and implementation of distributed resource management for time-sensitive applications”, *Automatica*, Volume 64, February 2016, Pages 44-53
- Yang Xu, Karl-Erik Årzén, Anton Cervin, Enrico Bini, Bogdan Tanasa: “Exploiting Job Response-Time Information in the Co-Design of Real-Time Control Systems”, In *21th IEEE International*



Conference on Embedded and Real-Time Computing Systems and Applications, Hong Kong, China, August 2015.

- Federico Terraneo, Alberto Leva, Silvano Seva, Martina Maggio, Alessandro Vittorio Papadopoulos: "Reverse Flooding: exploiting radio interference for efficient propagation delay compensation in WSN clock synchronization", In 36th IEEE Real-Time Systems Symposium (RTSS), San Antonio, TX, USA, December 2015
- Alessandro Vittorio Papadopoulos, Martina Maggio: "Virtual Machine Migration in Cloud Infrastructures: Problem Formalization and Policies Proposal", In 54th IEEE Conference on Decision and Control, Osaka, Japan, December 2015
- Anders Rantzer: "On the Kalman-Yakubovich-Popov Lemma for Positive Systems", IEEE Transactions on Automatic Control, Accepted for publication
- Georgios C. Chasparis, Jeff S. Shamma, Anders Rantzer: "Nonconvergence to saddle boundary points under perturbed reinforcement learning", International Journal of Game Theory, 44:3, pp. 667–699, 2015.

Keynotes and Invited Talks:

- E. G. Larsson, LIU/ISY, gave a keynote entitled "Massive MIMO: myths and realities" at WCSP in Nanjing, China in October 2015. Estimated audience ~300.
- E. G. Larsson, LIU/ISY, gave a keynote entitled "Massive MIMO: myths and realities" at ICWCS in Brussels, Belgium in August 2015. Estimated audience ~150.
- Erik G. Larsson, LIU/ ISY, gave a keynote presentation on the theme "Massive MIMO: The Road Ahead" at Globecom San Diego, USA, Dec 2015
- Boris Magnusson, LU/CS: "Supporting care in the home - experience from itACiH", Ubi-Health Tech 2015, May 28-30th, 2015, Beijing. P.R.China.
- Jesper Öqvist (LU/CS), Görel Hedin (LU/CS) and Emma Söderberg (Google) presented the tutorial "Analyze your Java Source Code with ExtendJ" at the ACM SIGPLAN conference on Systems, Programming, Languages and Applications: Software for Humanity (SPLASH), Pittsburgh, Oct 2015. <http://2015.splashcon.org/event/splash2015-tutorials-analyze-your-java-source-code-with-extendj>
- Mohammad Mousavi, HH, was the invited speaker at the 26th Conference on Concurrency Theory in Madrid, Spain.
- Mohammad Mousavi, HH, was the keynote speaker at the 21st Dutch Testing Day in Eindhoven, The Netherlands.
- Walid Taha, HH, was the keynote speaker at the 2015 Workshop on Embedded and Cyber-Physical Systems Education (WESE) in Amsterdam, Netherlands.

Awards and Appointments:



- Dr. Buon Kiong Lau received commendation from the Editor-in-Chief of IEEE Transactions on Antennas and Propagation for Exceptional Performance as an Associate Editor of the journal during 2014-2015 (one of three awards out of 46 associate editors).
- Giacomo Como, LU/CS, received the George S. Axelby Outstanding Paper Award 2015 from the IEEE CSS Society.
- Johan Karedal, Nicolai Czink, Alexander Paier, Fredrik Tufvesson, and Andreas F. Molisch recently got the Neal Shepherd Memorial Best Propagation Paper Award for the best propagation paper published in IEEE Transactions on Vehicular Technology for the paper "Path Loss Modeling for Vehicle-to-Vehicle Communications", IEEE Transactions on Vehicular Technology, Vol. 60, Issue 1, pp. 323-328, January 2011
- Erik G. Larsson, LIU/ISY, was recently appointed IEEE fellow for contributions to the technology of multi-antenna wireless communications

Program chairs and Editorships:

- Dr. Buon Kiong Lau was appointed as one of two Senior Associate Editors of the IEEE Transactions on Antennas and Propagation in Sep. 2015.
- Giacomo Como, LU/AC, has been appointed Associate Editor of the IEEE Transactions on Network Science and Engineering.
- LiU-CVL (Michael Felsberg et al) will, together with the Mathematical Imaging Group at LU, organize the International Conference on Computer Analysis of Images and Patterns - CAIP2017 - in Ystad 22-24 August 2017.
- Görel Hedin (LU/CS) has been on the steering committee of The International Conference on Software Language Engineering (SLE), since its start in 2008. In 2015, SLE has been accepted as an ACM SIGPLAN sponsored conference. <http://www.sigplan.org/Conferences/>
- 9th International Workshop on Communication Technologies for Vehicles: Nets4Cars-2015-Fall, 5-7 October, Munich, Germany (Alexey Vinel, HH, Co-Chair)
- On behalf of CERES, ELLIIT and IEEE VTS, HH organized a Workshop on Wireless Vehicular Communications at Halmstad University, Sweden on November 11, 2015 with around 40 participants. The workshop featured an invited speaker, Dr. Joachim Sachs from Ericsson Research, Sweden, funded by the IEEE VTS as well as presentations by researchers from Volvo Cars, Volvo Group Trucks Technology, Chalmers, Lund and Halmstad Universities. Participants came from KTH Royal Institute of Technology, Lund, Chalmers, Halmstad, and Beijing Jiaotong Universities as well as SP Technical Research Institute of Sweden, Viktoria Swedish ICT, Volvo Group Trucks Technology, Volvo Cars, Ericsson Research, Scania and Kapsch TrafficCom AB.
<http://www.hh.se/english/schoolofinformationtechnology/eventsandseminars/wwvc2015.65444248.html>
- 5th Workshop on Design, Modeling and Evaluation of Cyber Physical Systems (CyPhy'15), Held in conjunction with ESWEEK 2015 on October 8 2015, Amsterdam, The Netherlands. (Mohammad Mousavi, HH, Co-Chair).



- 14th International Conference on ITS Telecommunications: ITST-2014, 2-4 December, Copenhagen, Denmark (Alexey Vinel, HH, Co-Chair, Steering Committee Member).
- Alexey Vinel, HH, was appointed Associate Editor for IEEE Wireless Communications Magazine (2015-).
- ELLIIT researchers Ove Edfors and Fredrik Rusek from LU/EIT organized a workshop at Globecom San Diego, USA, Dec 2015 "Massive MIMO: From theory to practice" The program can be found at <http://mamiws.eit.lth.se/>.
- C. Wohlin, BTH, will be Special Content Editor (special issues and special section) of the Journal of Information and Software Technology, published by Elsevier, from January 1, 2016.
- N. bin Ali and K. Petersen, both BTH, are Co-chairs for the Industry Track of the 21st International Conference on Evaluation and Assessment in Software Engineering.
- On December 1, 2015, the workshop of the Sweden chapter of IEEE Robotics and Automation Society was held in Lund. With 24 participants, it was organized by the Lund University (LU) Robotics Lab, and its members Rolf Johansson, Anders Robertsson och Elin A. Topp, who also chaired the workshop.
- On July 7-10 LU/AC organized the 27th Euromicro Conference on Real-Time Systems (ECRTS 2015) in Lund with Karl-Erik Årzén as General Chair. The conference attracted 152 participants.

Some new dissertations:

- PhD thesis by Anders Nejdell, LU/EIT, Nov 24, 2015, "Flexible Receivers in CMOS for Wireless Communication" Advisor Henrik Sjöland
- Licentiate thesis by William Tärneberg, LU/EIT, Dec 15, " Performance modelling and simulation of the Mobile Cloud Network", Advisor: Maria Kihl
- PhD thesis by Björn Olofsson, LU/AC, Sep 25, "Topics in Machining with Industrial Robot Manipulators and Optimal Motion Control", Advisor: Anders Robertsson
- PhD thesis by Andreas Stolt, LU/AC, Oct 23, "On Robotic Assembly using Contact Force Control and Estimation", Advisor: Rolf Johansson
- PhD thesis by Olof Sörnmo, LU/AC, Nov 13, "Adaptation and Learning for Manipulators and Machining", Advisor: Anders Robertsson

Personalförändringar

- Prabhu C., joined LiU/ISY/communication systems as postdoc, working with E. G. Larsson and colleagues.



Forskningsfinansiering

- Giacomo Como, LU/AC, received a VR Research Grant for 2016-2019 for the project “Resilient Control of Network Flows”.
- Emil Björnson, LIU/ISY, was awarded a VR Research Grant to perform research on "Optimized Design of Wireless Networks with Multiple Performance Metrics”.
- Görel Hedin, LU/CS, won a Google Faculty Research Award in August 2015 for the project proposal "Supporting concurrent analyses in interactive programming tools".
<http://googleresearch.blogspot.se/2015/08/google-faculty-research-awards-summer.html>
- Fredrik Tufvesson, LU/EIT, received a VR grant on phase-based positioning, "Fasbaserad positionering med hög noggrannhet"
- Thomas Johansson, LU/EIT, received a VR grant in Cryptography, "Framtida kryptografiska primitiver från LWE och relaterade problem"
- Hien Ngo, LiU/ISY/Comm. systems, has won a three-year international postdoc grant from VR