ELLIIT Nyhetsblad 1 – Oktober 2012

Redaktör: Karl-Erik Årzén

Målet med ELLIITs bi-monthly nyhetsblad är att sprida information om händelser och nyheter från ELLIIT. Nyhetsbladet är skrivet på en blandning av svenska och engelska. Första numret är uppdelat i tre huvudrubriker:

- Nyheter
- Rekryteringar
- Forskningsfinansiering

Nyheter

Ny ELLIIT hemsida:

ELLIITs nya hemsida släpps den 31 oktober även om den ännu inte är fullt komplett. Den nya adressen är http://www.liu.se/elliit . Ev kommer också den gamla adressen (http://www.elliit.liu.se) att fungera.

Scaling up MIMO:

Massive MIMO is an emerging technology, being developed in ELLIIT, which scales up MIMO by an order of magnitude compared to current state-of-the-art. We think of systems that use antenna arrays with a few hundred antennas that simultaneously serve many tens of terminals in the same time-frequency resource. Massive MIMO technology makes it possible to improve uplink spectral efficiency 10 times and simultaneously reduce energy consumption 100 times, using extremely simple signal processing (maximum ratio combining) and taking into account the costs of obtaining channel state information. If you want to know more about this new technology, an overview paper by ELLIIT researchers is appearing shortly in the IEEE Signal Processing Magazine:

F. Rusek, D. Persson, B.K. Lau, E.G. Larsson, T.L. Marzetta, O. Edfors, and F. Tufvesson. *Scaling up MIMO: Opportunities and Challenges with Very Large Arrays*, IEEE Signal Processing Magazine, Jan. 2013 (to appear). [Manuscript: http://arxiv.org/pdf/1201.3210v1.pdf]

For more information visit the very large MIMO **webpage**.

LCCC Workshops in Lund:

On Sept 19-21, the LCCC workshop System Design meets Equation-based Languages was held in Lund. The workshop is related to Project 4.2 in ELLIIT, and was initiated by researchers from this project. The Linneaus Center LCCC at Automatic Control at LTH hosted the workshop, which attracted 25 international invited speakers and over 50 participants in total. The aim of the workshop was to gather outstanding researchers and industrial practitioners from different communities with a common interest in modeling languages for systems design, including language design and extension, algorithms for systems design and verification, and industrial applications. The challenges in this area

are cross-disciplinary, and the workshop was very successful in stimulating exchange of ideas and inspiring new research directions.

On Oct 17-19, the LCCC workshop Information and Control In Networks was held in Lund. In control of complex networked systems, a central role is played by information. The system dynamics and the information flows evolve in an intertwined way. The aim of the workshop was to bring together leading researchers in control, information theory, computer science, and mathematics to create exciting cross-fertilization and new ideas. Also this workshop has around 25 international invited speakers and over 50 participants in total.

The next LCCC workshop is planned for April 17-19, 2013 and the topic will be **Formal Verification in Embedded Systems**.

LinkQuad quadrotor:
The LinkQuad quadrotor system is an integrated autonomous micro UAV system that has been developed for use in the research with cooperative UAV systems at the Artificial Intelligence and Integrated Computer Systems Division at the Department of Computer and Information Sciences at Linköping University. All design, material construction, avionics, hardware and software systems have been developed in-house into one integrated system. The LinkQuad system includes a suite of flight control modes, and an integrated ROS-based software architecture which integrate control modes with high-level autonomous functionality such as automated planning systems. The following video taken from an iPhone, demonstrates some of the flight modes that have been developed.

http://www.liu.se/mall11/flash/c.swf?path=http%3A%2F%2Fwww.youtube.com%2Fv%2FAqty4-cPg1o%26amp%3Bhl%3Dsv%26amp%3Bfs%3D1%26amp%3B

Photon Mapping using Historygrams:
Medical modalities such as CT scanners are generating increasingly large data. In just a few seconds thousands of 2D slices can be extracted and be put together to a volume of data representing the human body. Researchers in ELLIIT have developed new methods for ultra-realistic volume rendering of this data. The illumination of the data is based on tracing of virtual photons that are allowed to scatter in the participating volumetric media. This generates images with realistic light conditions such as shadows and gloss. The computational complexity of tracing photons is reduced by using novel data representations which take into account which photons that are affected by changes of visualization parameters and "remembers" the path of the photons. We have named these data structures "Historygrams" and for the first time we can achieve interactive interaction with ultra-realistic volume rendered images. The work has been presented at the IEEE Visualization conference in Seattle in October 2012.

Authors: Daniel Jönsson, Joel Kronander, Timo Ropinski, Anders Ynnerman
Paper Title: Historygrams - Enabling Interactive Global Illumination in Direct Volume Rendering using Photon Mapping

Computer vision research is shown in Apple keynote address:
Computer vision research is shown in the latest keynote address from Apple. See: Apple WWDC 2012 keynote address from June 11 2012 http://www.apple.com/apple-events/june-2012/
Study in particular the 3D reconstructions about 1 hour and 42 minutes into the presentation.

Martin Byröd finished his PhD thesis at the centre for Mathematical Sciences, Lund University, in 2010, cf. http://www.maths.lth.se/vision/publications/publications/view_paper.php?paper_id=453
Of particular interest for large-scale 3D reconstruction is Martins paper at ECCV 2010:
http://www.maths.lth.se/vision/publications/publications/view_paper.php?paper_id=490
After the PhD thesis Martin worked half-time as a postdoc at the centre, working with the ELLIIT project on navigation and map-making problems and half-time at C3 Technologies in Linköping. It has previously been rumored/reported in the newspapers that Apple bought C3 Technologies. In their latest keynote address Apple demonstrates their new Apple maps that are the result of research within computer vision, with Martin Byröd and in particular with the technology from C3.

- Contact person: Karl Åström
- More info: kalle@maths.lth.se

Cyber-Physical Systems:
October 3-4 Karl-Erik Årzén and Walid Taha from ELLIIT participated in the US National Science Foundation's Principal Investigator Meeting for the Cyber-Physical Systems programme, outside Washington DC. Taha participated in his role as PI and Årzén was invited to participate as an international guest.

Technology Visit på SAAB:
Representanter för ELLIIT besökte Saab den 18 oktober för ett Technology Visit.

Erik G. Larsson technical chair för Asilomar konferens:
Erik G. Larsson är technical chair för Asilomar Conference on Signals, Systems and Computers som går av stapeln den 4-7 november 2012 i Pacific Grove, CA, USA. Konferensen spänner kommunikationssystem, signalbehandling för ljud, bild, video och bio-tillämpningar, samt arkitekturer och implementering. Asilomar är en anrik konferens som i år arrangeras för 46e året i rad. (http://www.asilomarssc.org)

Patrick Doherty European AI President:
Patrick Doherty of IDA in Linköping has been elected president of the European Coordinating Committee on Artificial Intelligence (ECCAI). This is the largest umbrella organization in Europe for Artificial Intelligence. It includes 29 national AI societies, actively promotes AI research internationally and is responsible for the largest AI conference in Europe, ECAI, which takes place every two years.

Software testing at BTH and LU:
Software testing is the focus in a joint ELLITT project between BTH and Lund University. Thus, it is a pleasure to inform about a conference on software testing, where Brian Robinson from ABB will be the general chair and Claes Wohlin from BTH will be a program co-chair. The International Conference on Software Testing will take place in Cleveland in 2014. It should be noted that the conference will include a special industry track.

Software Language Engineering:
Görel Hedin from ELLIIT was co-chair of the 5th International Conference on Software Language Engineering, which was held in Dresden, Sept 26-28. The term "software language" refers to artificial languages used in software development including general-purpose programming languages, domain-specific languages, and modeling/meta-modeling languages. (http://planet-sl.org/sle2012)

TrueTime för Modelica:
Dept of Automatic Control, Lund University and Vanderbilt University have started a joint project with the aim to port the embedded systems simulator TrueTime developed in Lund, from Simulink to Modelica, through the use of the new Functional Mock-up Interface (FMI). The project is a part of the US DARPA project AVM (Adaptive Vehicle Make). TrueTime will be part of a model-based design tool chain for the design of automotive systems.

Data-flow and CAL in Lund:
In the embedded system group at Dept. of Computer Science, Lund University there is research carried out on the data-flow computation model and, in particular on the CAL language. The objective of this research is to develop efficient execution scenarios and code generation for both existing commercial and non-standard multi-processor architectures. They address both multi-core processors as well as new reconfigurable architectures consisting of arrays of processors. The application of the research is in first place to efficiently compute video, audio and telecom algorithms. The goal is to provide high performance computations while having low power consumption.

Jörn Janneck invited professor at EPFL:
Jörn Janneck from Department of Computer Science, LU has been awarded a professeur invité grant (invited visiting professor) from École Polytechnique Fédérale de Lausanne, to work at the Institute of Electrical Engineering. He is using this opportunity to continue and intensify his collaboration with EPFL's Multimedia Group (headed by Marco Mattavelli) on tools for analyzing and implementing stream programs on a variety of platforms, including multicore processors, programmable logic devices (FPGAs) and novel manycore architectures such as ST Micro's STHORM (formerly P2012) processor.

ELLIIT Workshop 2013:
The Fourth Annual ELLIIT Workshop will be held in Lund during the autumn 2013. Björn Landfeldt from EIT, LU will be the program chair.

Arrangerade konferenser:
ELLIIT har arrangerat Swedish Communication Technology Workshop (Swe-CTW). Den hölls 24-26 oktober i Lund med ca 80 deltagare. Swe-CTW har som syfte att i en informell miljö samla unga forskare och doktorander verksamma i och kring kommunikationsteknologi. Fokus ligger på utbyte av ideer, kontaktskapande och befrämjande av nya samarbeten. Utöver presentationer av deltagarna har Swe-CTWs tekniska program bestått av tre inbjudna anföranden och två halvdagskurser. Swe-CTW 2012 har sponsrats av såväl ELLIIT som andra organisationer och företag. För detaljer, se http://www2.ee.kth.se/conferences/swe-ctw-2012/Welcome.html.

Den 24 oktober hölls också den årliga LUCAS dagen I Lund. LUCAS är en paraplyorganisation för programvarurelaterad forskning på Lunds Universitet. Målsättningen med LUCAS dagen är att främja och utveckla samarbeten mellan industri och universitet inom tillämpad programvaruforskning.

EU grant on Cooperative UAVs:
Patrick Doherty and his research group at IDA-LiU is a member of the recently accepted EU FP7 Integrated Project (IP) **SHERPA - Smart collaboration between Humans and ground-aErial Robots for imProving rescuing activities in Alpine environments.** The project has an estimated budget of 9 million Euro and starts formally in February 2013.

Nya rekryteringar

Ett antal nya personer har anställts inom ELLIIT, antingen direkt via ELLIIT medel, eller med annan finansiering.

Michael Lentmaier has been appointed as a ELLIIT associate professor at the Department of EIT at Lund University from January 2013. He received the Dipl.-Ing. degree in electrical engineering from University of Ulm, Germany in 1998, and the Ph.D. degree in telecommunication theory from Lund University, Sweden in 2003. He then worked as a Post-Doctoral Research Associate at University of Notre Dame, Indiana and at University of Ulm. From 2005 to 2007 he was with the Institute of Communications and Navigation of the German Aerospace Center (DLR) in Oberpfaffenhofen, working on signal processing techniques in satellite navigation receivers. From 2008 to 2012 he worked as a senior researcher and lecturer at the Vodafone Chair Mobile Communications Systems at TU Dresden, where he was heading the Algorithms and Coding research group. His research interests include design and analysis of coding systems, graph based iterative algorithms and Bayesian methods applied to decoding, detection and estimation in communication systems.

Cristian Sminchisescu was appointed as ELLIIT professor at Lund University in October 2012. Cristian Sminchisescu has obtained a doctorate in Computer Science and Applied Mathematics with an emphasis on imagining, vision and robotics at INRIA, France, and has done postdoctoral research in the Artificial intelligence Laboratory at the University of Toronto. He also holds a Professor rank, status appointment at Toronto and a Professor equivalent title at the Romanian Academy. During 2004-07, he has been a faculty member at the Toyota Technological Institute, a philantropically endowed computer science institute located at the University of Chicago. His research goal is to train computers to see and interact with the world seamlessly, as humans do. His research interests are in the area of computer vision (articulated objects, 3d reconstruction, segmentation, and object and action recognition) and machine learning (optimization and sampling algorithms, structured prediction, sparse approximations and kernel methods). Recent work in the group has produced state-of-the art results in the monocular 3d human pose estimation benchmark (HumanEva) and was the winner of the PASCAL VOC object segmentation and labeling challenge, over the past four editions, 2009 - 2012.

Emilia Mendes is a new Professor in Software Engineering at Blekinge Institute of Technology. She obtained her PhD in Computer Science from the University of Southampton (UK) in 1999, and then initiated her full time academic career in the Computer Science Department at the University of Auckland (NZ), where she worked for 12 years. After leaving NZ, she was Associate Professor at Zayed University (UAE) for a year. Her research is inter-disciplinary, i.e. encompassing different disciplines - Web & Software measurement metrics, Empirical Software & Web Engineering and Computer Science & Education. Her main research interest relates to cost and effort estimation in software development with a particular focus on agile development and web engineering. She worked in the ICT industry for ten years as software engineer and project manager prior to moving to the UK in the end of 1995 to initiate her PhD studies.

Jürgen Börstler is Professor in Software Engineering at Blekinge Institute of Technology since Juli 2011. He obtained a PhD in Computer Science from Aachen University of Technology (RWTH), Germany, in 1993 with a thesis on software design. In 1994 he moved to Umeå University, Sweden where he eventually became a Professor in Computer Science. In 2010, he joined the Software Engineering Research Lab at BTH. His main research interests are in software process improvement and measurement, specifically related to agile software development, requirements engineering, and object-orientation. He is also genuinely interested in computer science education.

Forskningsfinansiering

Under denna rubrik presenterar vi nyheter från forskningsvärlden, med speciellt fokus på forskningsfinanisering.

Forskningspropositionen:
Utbildningsminister Jan Björklund gjorde ett utspel på DN debatt I samband med att forskningspropositionen släpptes, se (http://www.dn.se/debatt/vi-behover-fler-forskare-som-tar-storre-risker). Bland annat säger Björklund att

”All svensk forskning skulle kunna granskas med fyra- eller femårsintervall, då det bedöms hur väl de olika ämnesområdena vid varje lärosäte står sig i konkurrensen. Resultatet ska sedan ligga till grund för resursfördelningen mellan lärosätena för att främja kvalitet.”

Detta utspel har initierat mycket debatt inom forskarvärlden, till exempel skriver Olle Häggström, en mycket välrenommerad professor i matematik på Chalmers, på sin blogg att ett liknande system har haft förödande effekter på produktiviteten i Storbritanniens universitetsvärld. (http://haggstrom.blogspot.se/2012/10/bakvant-bjorklund.html , där även fler länkar finns att följa).

VINNOVAs forsknings och innovationsagendor:
VINNOVA har under våren-sommaren utlyst ansökningar inom Strategiska forsknings- och innovationsagendor, se (http://www.vinnova.se/sv/Ansoka-och-rapportera/Utlysningar/Effekta/Strategiska-forsknings--och-innovationsagendor/). Meningen är att näringsliv och universitet gemensamt skall bestämma vilken typ av forskning som VINNOVA skall utlysa forskningsprogram för. Ett stort antal ansökningar har beviljats men det är bara en liten del av dessa som så småningom kommer att resultera i några forskningssatsningar. ELLIIT forskare är med i ett flertal av de beviljade ansökningarna, bl.a. ’Systemsimulering och simulatorer’, ’Strategisk forsknings- och innovationsagenda för mjukvaruutveckling’, ’Cyber-Physical Systems - Vision, mål,

behov och samarbetsformer' och 'Samhällssäkerhet'; i flera fall tillsammans med industrirådsföretagen.

Vetenskapsrådet:
Resultatet för Vetenskapsrådets årliga projekt och rambidragsutlysning inom bland annat Signaler och System och Datavetenskap kommer att annonseras den 1 november. Många av ELLIITs forskare inväntar med spänning resultatet.

EU:
ICT Call 10 inom EU FP7 (FP7-ICT-2013-10) har deadline den 15 januari 2013. Detta call omfattar bland annat software engineering, inbyggda system, trusted systems, robotik, reglerteknik, cloud computing, och data centers.