News

New ELLIIT infrastructure initiatives

ELLIIT has decided to go on with a number of larger infrastructure initiatives. All in all approximately 10 MSEK annually will be spent on infrastructure to enable world class research from our ELLIIT researchers. Among the initiatives supported can be mentioned an edge computing testbed with local 5G connectivity, a joint autonomous systems lab with new heavy autonomous ground vehicles and new arm for the already existing SPOT robotic dog, a 6G testbed with large intelligent surfaces, a research platform for 6G, sub-THz radar, and beyond. The infrastructure support will cover both equipment and research engineers supporting the initiatives. The steering group and program management group will continue working on additional initiatives during the fall.

ELLIIT: 10 years of successful collaborations

ELLIIT released a collection of success stories from its first 10 years of operation, *Strategic Research for Society and Industry*. The document can be downloaded from the new ELLIIT web by following this link: https://elliit.se/about/documents/

Launch of ELLIIT Focus Periods

The ELLIIT Research Program is now launching ELLIIT Focus periods, an ambitious new guest and exchange program for international top-level researchers. The focus periods, organized twice a year at one of the four ELLIIT universities, aim to create optimal circumstances for innovating research and new collaborations.

Researchers from participating universities will be invited to work with other internationally established scientists on a dedicated cross-disciplinary research topic. During the 5-week focus period, the organizing university will host visiting scholars in addition to the regular ELLIIT faculty, postdocs and PhD students. [Read more about ELLIIT Focus Periods here](#).

RQ20: Lund University's Research Quality Evaluation Project 2020

Lund University has concluded its research quality evaluation RQ20. Among all, the departments and strategic research areas were evaluated by external researchers. In general, both the ELLIIT departments as well as ELLIIT itself came out well in the evaluation, ELLIIT was especially recognized as a world leading strategic research area with strong international and national visibility. The report and presentations can be downloaded at https://rq20.blogg.lu.se/

Research Highlights

OpenModelica 1.17.0 and 1.18.0 beta1 were released
Adrian Pop (LiU/IDA)

The OpenModelica Julia prototype can now target the Julia `ModelingToolkit.jl` (a modeling framework for high-performance symbolic-numeric computation in scientific computing and scientific machine learning) with good simulation performance compared with the original OpenModelica generated code (see figure below). The new prototype also has support for handling nonlinear loops via surrogate functions with ~160+ times speedup in simulation time and ~26+ times less memory usage.
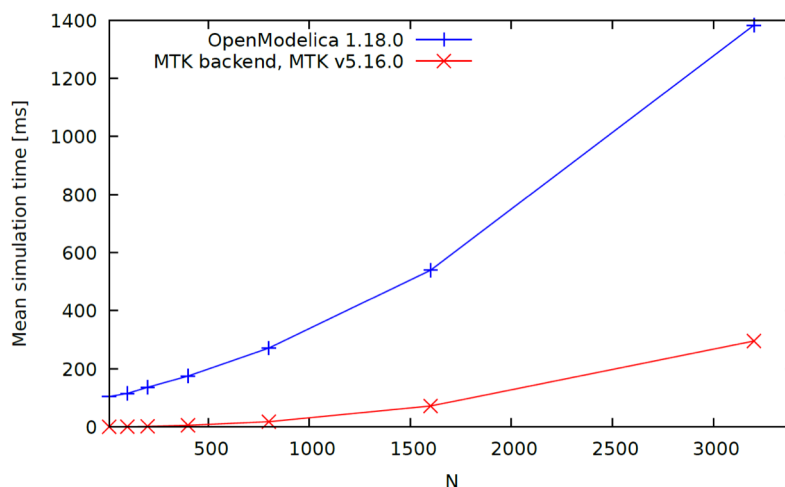

Figure: OpenModelica 1.18.0 vs OM-Julia-MKT prototype, simulation time vs number of equations in a model.

Radiation measurements using UAV-carried sensor

Anders Robertsson (LU/Automatic Control)

In beginning of June 2021, Marcus Greiff, Emil Rofors, Rikard Tyllström and Rohith Yadav made field tests on UAV-based radiation measurements in an area around Gävle, which is the region in Sweden that was most polluted after the Chernobyl accident in 1986. The measurements were performed in the same area that was studied by Finck & Edvarson in 1987, shortly after the accident.
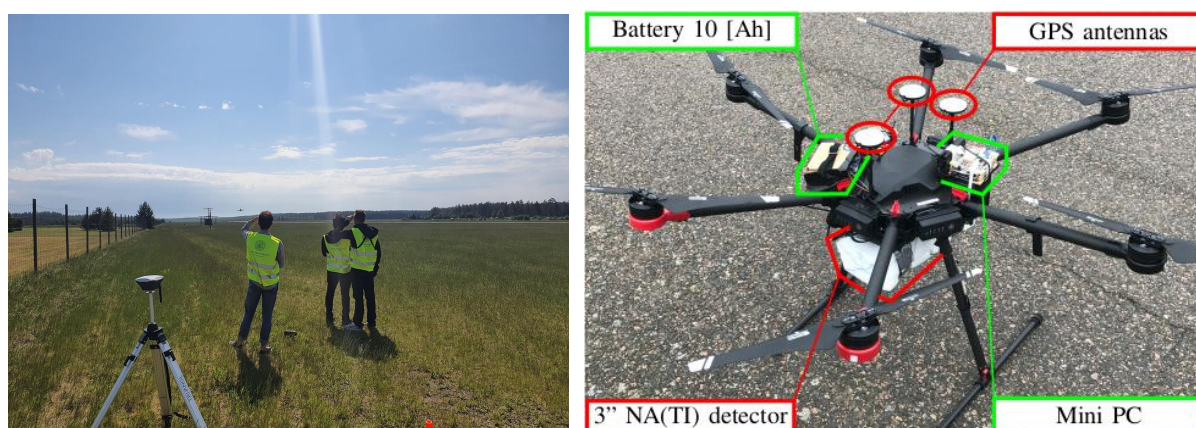

Figure: Field tests on UAV-based radiation measurements (left) and the Matrice 600 pro UVA with added components labeled (right).

The research was made within the ELLIIT-project "Autonomous Radiation Mapping and Isotope Composition Identification by Mobile Gamma Spectroscopy".
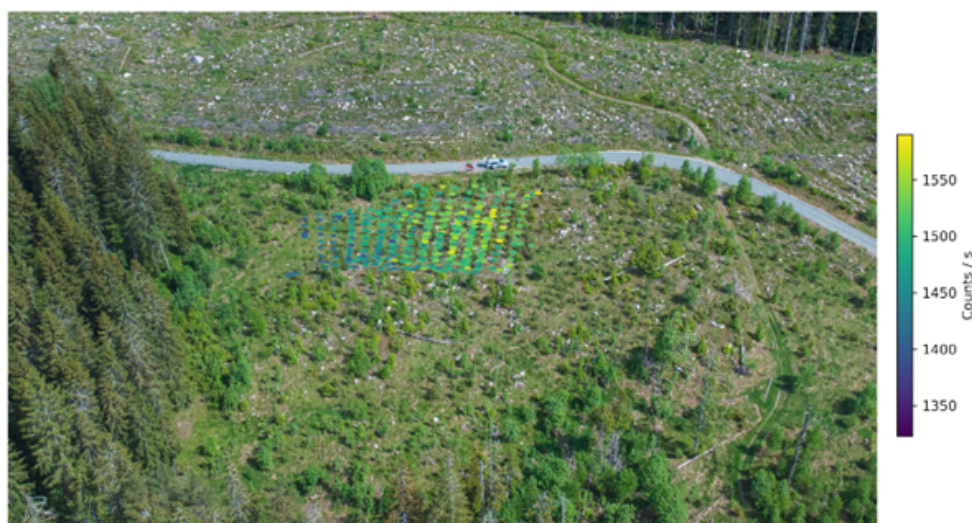

Figure: UAV-based intensity measurements from site 'Kalhygget', Söderhamn.

Similar measurements and algorithm development for estimation of background radiation have been performed around the European Spallation Source, Lund, and around the closed nuclear power plant at Barsebäck, where the UAV-carried sensor allows for measurement over both rougher terrain, buildings, and structures exposed to radiation.
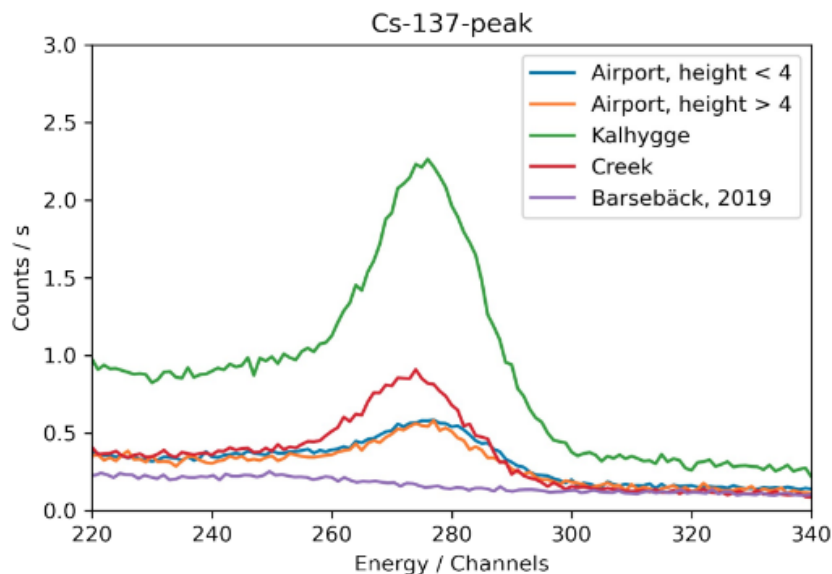
Figure: Comparison of measurements at different sites and heights.

The most recent results are reported in the [IROS-2021](#) paper "Gamma-Ray Imaging with Spatially Continuous Intensity Statistics" by M. Greiff, E. Rofors, A. Robertsson, R. Johansson, and R. Tyllström.

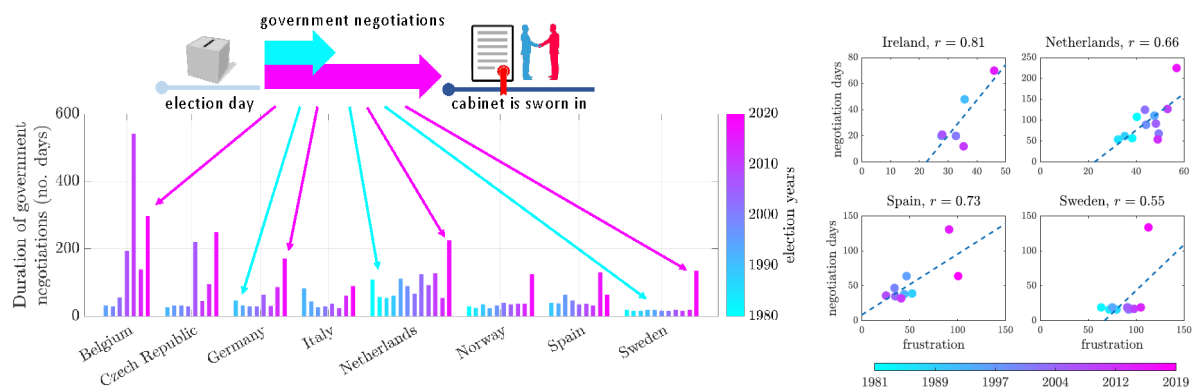## The Roadmap to 6G Security and Privacy
Andrei Gurtov (LiU/IDA)

Although the fifth generation (5G) wireless networks are yet to be fully investigated, the visionaries of the 6th generation (6G) systems have already come into the discussion. Therefore, in order to consolidate and solidify the security and privacy in 6G networks, we survey how security may impact the envisioned 6G wireless systems, possible challenges with different 6G technologies, and the potential solutions. We provide our vision on 6G security and security key performance indicators (KPIs) with the tentative threat landscape based on the foreseen 6G network architecture.
[Here you can read our open-access paper "The Roadmap to 6G Security and Privacy"](#), published on *IEEE Open Journal of the Communications Society,* 2021. The paper was the most downloaded LiU publication on ResearchGate in May 2021.

Forming a government - how long? A multiagent perspective
Claudio Altafini (LiU/ISY)

In recent years, many general elections in Europe have given inconclusive results, with the consequence that the negotiations needed to form a government have been extremely long (think of Sweden in 2018). Is there a way to build a model that captures the complexity of the negotiation process and that anticipates when long negotiation times are expected (and perhaps even predict which coalition is more likely to win a confidence vote)? Researchers from ELLIIT, Angela Fontan and Claudio Altafini (LiU/ISY) have developed one such model, inspired by the field of multiagent systems and complex networks theory.

The outcome of the model is an index, called frustration, which correlates reasonably well (0.4 to 0.7 in a scale of 1) with the government negotiation times of around 30 European countries. The details are available in the paper "A signed network perspective on the government formation process in parliamentary democracies" published on Scientific Reports, 2021.

Industry-academia communication in a joint software engineering research project

Per Runeson (LU/CS)

Communication in industry-academia collaboration is the focus of a recently published paper in Journal of Software: Evolution and Process by Sergio Rico, Elizabeth Bjarnason, Emelie Engström, Martin Höst, and Per Runeson. Based on analysis of an industrial excellence center, the authors identify five key factors:

F1 Research relevance
F2 Practitioner's attitude towards research
F3 Active practitioner involvement
F4 Frequency of communication
F5 Long-term collaboration

These factors are linked to nine categories of outcomes, including new knowledge (O1), change in practice (O3), social networks (O5) and changes in teaching (O8). The paper is available open access https://onlinelibrary.wiley.com/doi/10.1002/smr.2372.

Efficient Business Prototyping for Startups

Elizabeth Bjarnason (LU/SERG)

Startups use prototyping to generate and validate innovative business ideas, and to communicate with external stakeholders and investors. But, what, when, and how should they prototype to maximise the value of the time and effort spent to avoid wasting scarce resources on unviable product ideas? Elizabeth Bjarnason (LU) has investigated current practices among startups and found that prototyping is implicitly required by investors, and that software engineering competence plays an important role in enabling startups to effectively apply prototyping practices. She has also developed a model of prototyping (PAM) that can be used to reflect on why, what, and how to use prototyping. Among other aspects, the PAM

model points to the importance of considering the environment (digital and physical) in which a prototype is used, and the realism of the data included in the prototype. The model and initial case study findings are accepted for presentation at RESET (an RE21 workshop) and the ESEM 2021 conference. The long-term aim of this ELLIIT pre-project is to provide empirically based guidelines that help startups to pinpoint viable business ideas through more effective prototyping.

Purpose of Prototyping
Exploration & learning
Communication & alignment
Incremental development
Quality improvement
Validation & Testing
Prototype Scope
Breadth and Depth of functionality
Refinement of Visual appearance, Interactive behaviour, Data realism
Prototype Use
Review method: Demo, Scenario testing, Free testing, Internal use
Usage environment
Exploration Strategy
Point-based exploration
Parallel exploration
Optimisation exploration
Flexible exploration

Figure: An overview of the Prototyping Aspects Model (PAM) presented at ESEM 2021.

Invited Talks

- Alexey Vinel, (Halmstad University), will hold an invited talk on "Cooperative Autonomous Vehicles: from Theoretical Models to Real World Labs and Back" at International Workshop on Beyond 5G Support for the Future Vehicular Networks in conjunction with IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC), September 2021.

- Emil Björnson (LiU) was a keynote speaker at the Connected Everything Summer School, July 2021.

- Emil Björnson (LiU/ISY) was a plenary speaker at the IEEE Communications Theory Workshop, June 2021.

- Emil Björnson (LiU) was a keynote speaker at the Disruptive Wireless Communication Paradigms: The Road towards 6G (DWCP-6G), ECE Department, IIIT Guwahati, February 2021.

- Fredrik Tufvesson (LU/EIT) had a key-note presentation at the 15th European Conference on Antennas and Propagation, EuCAP 2021, "Propagation and Channel modelling for automotive environments".

- Michael Felsberg has been invited speaker at the CVPR 2021 Workshop on Robust Video Scene Understanding. [Click here to watch Michael`s presentation](#).
- Per Runeson (LU/CS) gave an invited talk June 2, at FOSS-north/NOSAD conference on Open Source Software and Data as Digital Commons (in Swedish). [Click here to watch the talk "Källkod och data som digitala allmänningar"](#). NOSAD (https://nosad.se) is a knowledge sharing network, particularly for open source and data in the public sector.
- Peter Fritzson (LiU/IDA) was invited as keynote speaker at SIMULTECH 2021 (11th International Conference on Simulation and Modeling, Methodologies, Technologies, and Applications). He held a keynote talk on "[The OpenModelica Environment and its Use for Development of Sustainable Cyber-physical Systems and Digital Twins](#)".
- Simin Nadjm-Tehrani, Dept. of Computer and Information Science at Linköping University, held an invited talk on "Where AI meets safety and security" at the Digital Futures Forum in Stockholm in February 2021.
- Thomas Johansson, Dept of EIT, Lund University, held an invited talk on "Next generation crypto" at [Advenica Insight 2021](#) on May 11, 2021.
- Tom Ziemke (LiU/IDA) gave an invited talk at the 2nd International Workshop on Self-Supervised Learning (IWSSL) in August 2021.

Awards and Appointments:

- Alexey Vinel (HH) was awarded "Doctoral Visiting Professor" at the University of Lille, France in April 2021.
- Carina Geldhauser (LU, Mathematics LTH) received the annual prize of the Foundation Tönissteiner Kreis, which rewards excellent young talents with international experience.
- Emil Björnson (LiU) received the IEEE Pierre-Simon Laplace Early Career Technical Achievement Award "[for contributions to signal processing for communications and research reproducibility](#)".
- Emil Björnson (LiU) received the IEEE Communication Theory Technical Committee (CTTC) Early Achievement Award "[for contributions to MIMO communications and promoting wireless research through videos and social media](#)".
- Emil Björnson (LiU) received the 2021 IEEE ComSoc RCC Early Achievement Award "for contributions to radio communications".
- Erik G. Larsson (LiU/ISY) wins the "Gyllene Moroten" (golden carrot) best teacher award 2021 by LinTek, the Engineering College student union at LiU.
- Erik G. Larsson (LiU/ISY) is elected to the Royal Swedish Academy of Sciences (KVA).
- In June Fredrik Tufvesson (LU/EIT) together with co-authors got the IEEE Communications Society Best Tutorial Paper Award for the paper "[5G: A Tutorial Overview of Standards, Trials, Challenges, Deployment, and Practice](#)," by Mansoor Shafi, Andreas F. Molisch, Peter J. Smith, Thomas Haustein, Peiying Zhu, Prasan De Silva, Fredrik Tufvesson, Anass Benjebbour, and Gerhard Wunder, *IEEE Journal on Selected Areas in Communications,* Vol. 35, No. 6, pp. 1201-1221, June 2017.
  The paper is given to an outstanding tutorial paper published in any IEEE Communications Society magazine or journal in the previous five calendar years.

- In July a paper about 6G by, among all, the ELLIIT researchers Harsh Tataria, Henrik Sjöland and Fredrik Tufvesson was selected as a featured paper in IEEExplore. It was the most downloaded paper from IEEExplore in July 2021:

  H. Tataria, M. Shafi, A. F. Molisch, M. Dohler, H. Sjöland and F. Tufvesson, "[6G Wireless Systems: Vision, Requirements, Challenges, Insights, and Opportunities](#)", in *Proceedings of the IEEE*, vol. 109, no. 7, pp. 1166-1199, July 2021.

- According to a ranking published in the Journal of Systems and Software, Blekinge Institute of Technology (BTH) is ranked seventh worldwide and first in Europe for software engineering research based on the publications in selected venues during the years 2013-2020 and second worldwide. ELLIIT researchers Kai Petersen and Nauman bin Ali are among several researchers from BTH listed in various categories in the rankings. (Further details: https://doi.org/10.1016/j.jss.2021.111029)

- The paper " Normalized Convolution Upsampling for Refined Optical Flow Estimation" by Abdelrahman Eldesokey, and Michael Felsberg (LiU/ISY), won the Best Paper Award at the 16th International Conference on Computer Vision Theory and Applications (VISAPP 2021).

- Nils Vreman, Anton Cervin, and Martina Maggio received the Best Paper Award for the paper entitled "[Stability and Performance Analysis of Control Systems Subjects to Bursts of Deadline Misses](#)", presented at the 33rd Euromicro Conference on Real-Time Systems (ECRTS 2021).

- Together with Tom Froese (Okinawa Institute of Technology), Tom Ziemke (LiU/ IDA) received the "Outstanding Paper of the Decade 2006-2016" award from the International Society for Artificial Life (July 2021), for a paper on "Enactive AI", [published in the Artificial Intelligence journal in 2009](#).
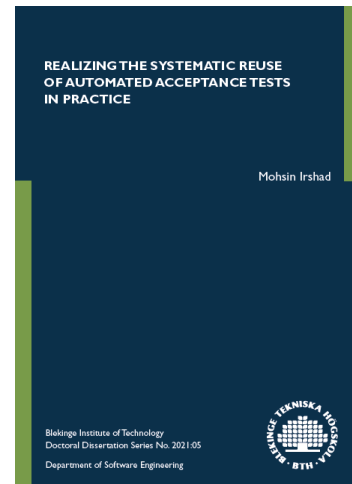
Program chairs and Editorships

- Adrian Pop (LiU/IDA) is organizing the [14th International Modelica Conference 2021](#).
- Alexey Vinel (HH) is appointed as Associate Editor for the *[IEEE Transactions on Information Forensics and Security](#)* in July 2021.
- Claudio Altafini (LiU/ISY) is serving as a Guest Editor for the journal *IEEE Transactions on Control of Networked Systems* for a Special Issue on "[Dynamics and Behaviors in Social Networks](#)", 2021.
- Emma Söderberg is serving as Artifact Evaluation Co-chair at the [13th ACM/SPEC International Conference on Performance Engineering (ICPE) 2022](#).
- Håkan Grahn (BTH/CS) served as guest editor of the journal *Big Data Research* (together with Lars Lundberg, BTH, Valeria Cardellini, University of Rome Tor Vergata, Italy, Andreas Polze, Hasso Plattner Institute, Germany, and Sogand Shirinbab, Ericsson AB) for a special issue on "[Big Data in Industrial and Commercial Applications](#)".
- Luke Church (LU/CS) was general chair for the [<Programming> 21](#) conference in March 2021.
- Martina Maggio (LU/Control) will be program co-chair for [17th Symposium on Software Engineering for Adaptive and Self-Managing Systems](#) (SEAMS 2022).
- Michael Felsberg (LiU/ISY) has been appointed AC for BMVC 2021 and CVPR 2022.

- Mikael Asplund and Simin Nadjm-Tehrani edited [the refereed proceedings of the 25th Nordic Conference on Secure IT Systems, NordSec 2020](). Virtual Event, November 23-24, 2020, Lecture Notes in Computer Science 12556, Springer 2021, ISBN 978-3-030-70851-1.

- Nauman bin Ali (Blekinge Institute of Technology) served as a program committee member for the Experimental Software Engineering track of the XXIV Ibero-American Conference on Software Engineering (CIbSE-ESELAW) Costa Rica, 2021.

- Nikolaos Pappas (LiU/ITN) was appointed as Expert Editor for Invited Papers at the IEEE Communications Letters.

- Nikolaos Pappas (LiU/ITN) served as guest editor for the following special issues:
  -- IEEE Internet of Things Journal, Special Issue on ''Age of Information and Data Semantics for Sensing, Communication and Control Co-Design in IoT'',
  -- Frontiers in Communications and Networks, Special Issue on ''Age of Information'',
  -- EURASIP Journal on Wireless Communications and Networking, Special Issue on ''Future of Wireless Access for Industrial IoT (FutureIIOT): Enabling Industry 4.0 revolution''.

- Nikolaos Pappas (LiU/ITN) is serving as Associate Editor for the following journals:
  -- IEEE Transactions on Communications,
  -- IEEE/KICS Journal of Communications and Networks,
  -- IEEE Open Journal of Communications Society.

- Nikolaos Pappas (LiU/ITN) co-chaired the [4th Age of Information Workshop]() (AoI'21) in conjunction with IEEE INFOCOM 2021 in May 2021.

- Nikolaos Pappas (LiU/ITN) served as publicity chair for the 19th International Symposium on Modeling and Optimization in Mobile, Ad hoc, and Wireless Networks (WiOpt) 2021.

- Nikolaos Pappas (LiU/ITN) is among the founding members and currently co-chairing the IEEE Special Interest Group – IoT in Tactile Internet.

- Per Runeson (LU/CS) is promoted to the Advisory board of [Empirical Software Engineering]() (Springer Verlag, JCR impact factor 3.156) after serving 17 years on the Editorial board. He and co-author Martin Höst (LU/CS) still have the most cited paper ever in the journal history: "[Guidelines for conducting and reporting case study research in software engineering]()", 2009.

- Per Runeson (LU/CS) is appointed Associate editor for IEEE Transactions on Software Engineering (JCR Impact Factor, 6.112).

- Simin Nadjm-Tehrani (LiU/IDA) serves as program chair for the 18th European Dependable Computing Conference (EDCC), to be held in Saragoza, Spain, in September 2022.

- Thomas Johansson, Dept of EIT, Lund University, serves as editor for *[Cryptography and Communications]()*.

- Tom Ziemke guest-edited a special issue on "Explainable Robot Behavior" for the journal ACM Transactions on Human-Robot Interaction, together with Maartje de Graaf (Utrecht University), Bertram Malle (Brown University) and Anca Dragan (UC Berkeley) (appeared July 2021).

- Dr. Zheng Chen (LiU/ISY/Communication systems) will be co-chair of [2021 IEEE Globecom workshop on Wireless communications for distributed intelligence]().
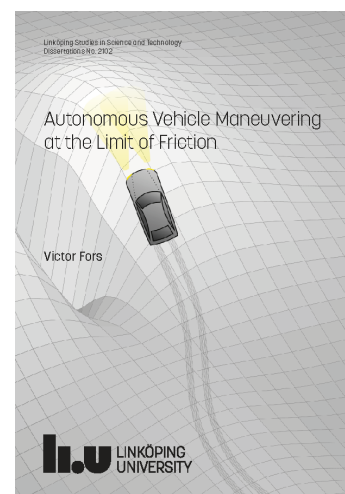
PhD theses

- Alfred Åkesson (LU/CS) defended his Ph.D. thesis with the title "ComPOS - a Domain-Specific Language for Composing Internet-of-Things Systems" in June 2021. Görel Hedin was supervisor.

- Amin Ghazanfari successfully defended his Ph.D. thesis "Multi-Cell Massive MIMO: Power Control and Channel Estimation". Advisor: Emil Björnson, LiU/ISY/Comm. Systems.

- Andreas Robinsson (supervisor Michael Felsberg) defended his thesis "Discriminative correlation filters in robot vision" on June 14.

- Cristian Tatino (LiU/ ITN) successfully defended his PhD in February 2021, with the title "Analysis and Optimization for Robust Millimeter-Wave Communications".

- Erik Mårtensson (LU/EIT) defended his PhD thesis (supervisor Thomas Johansson) with the title "Some Notes on Post-Quantum Cryptanalysis" on January 22, 2021.

- Farnaz Moradi (LU/EIT) disputerade den 17/6 i ämnet elektroteknik med titeln "Improving DRX Performance For Emerging Use Cases in 5G". Björn Landfeldt (LU/EIT) var huvudhandledare.

- Gautham Nayak Seetanadi (LU/Control) defended his PhD thesis (supervisor Martina Maggio) with title "Improving Performance of Feedback-Based Real-Time Networks using Model Checking and Reinforcement Learning" on February 5, 2021.

- Georgios Smpokos (LiU/ITN) successfully defended his Licentiate in April 2021, with title "Performance Analysis in Wireless HetNets: Traffic, Energy, and Secrecy Considerations".

- Marcus Greiff (LU/Control), will defend his PhD thesis "Nonlinear Control of Unmanned Aerial Vehicles: Systems With an Attitude" in Lund on November 12, 2021.

- Marcus Valtonen Örnhag (LU), defended his PhD thesis (supervisor Anders Heyden) with title "Robust Estimation of Motion Parameters and Scene Geometry: Minimal Solvers and Convexification of Regularisers for Low-Rank Approximation" on May 14.

- Den 23 september 2021 försvarar Mohsin Irshad (BTH/DIPT) sin doktorsavhandling i programvaruteknik med titeln "Realizing the systematic reuse of automated acceptance tests in practice" Opponent är Professor Andy Zaidman, Delft University of Technology, The Netherlands.
  Permanent länk till avhandlingen är http://urn.kb.se/resolve?urn=urn:nbn:se:bth-21999
  Spikblad med sammanfattning finns här.

En kort sammanfattning: Automated acceptance tests are closely tied to software requirements and provide a mechanism for continuous validation of requirements. This thesis investigates the systematic reuse of automated acceptance tests by providing approaches to search, identity, adapt and maintain reusable test cases while analyzing the costs of reuse. A cost-aware systematic reuse process was constructed to support the reuse of automated acceptance tests. The evaluation of the solution shows that the results are helpful for the software industry.

- Sergio Rico (LU) defended his Licentiate thesis "Approaches to improve researcher-practitioner communication in joint software engineering research", Lund University, January 22, 2021.

- Victor Fors (LiU) defended his Ph.D. Thesis "Autonomous Vehicle Maneuvering at the Limit of Friction" on December 10, 2020.

The thesis begins by analyzing safety-critical vehicle maneuvers using optimal control. The insights gained are then used to develop controllers capable of operating at the limit of friction. These controllers are based on computing an acceleration-vector reference for the vehicle's center of mass, then given this reference, determine appropriate steering and braking commands. The controllers developed in this thesis show great promise with low computational cost and performance not far from that obtained offline by using numerical optimization when evaluated in high-fidelity simulation. The thesis was performed within the ELLIIT project "Online Optimization and Control towards Autonomous Vehicle Maneuvering" running from 2015-2020.

Organized conferences and workshops

- Adrian Pop (LiU/IDA) has organized the following meetings:
  -- 15th MODPROD Workshop on Model-Based Cyber-Physical Product Development, February 3-4, 2021
  -- 13th OpenModelica Annual Workshop, February 2, 2021
  -- 14th International Modelica Conference 2021, 20-24 September, 2021

- Alexey Vinel (HH) is co-organizing the IEEE ICAV 2021 Workshop on Intelligent Connected and Autonomous Vehicles in conjunction with The 29th IEEE International Conference on Network Protocols (IEEE ICNP) in November 2021.

- On June 4-5, as part of IEEE CSS Workshop on Control for Societal-Scale Challenges, Anders Rantzer (LU/RT) and Li Na (Harvard University) were leading a panel on

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

Decision-Making with Real-Time and Distributed Data. [Slides and discussions are available from the website here](#). Digital Futures at KTH will be hosting a follow-up meeting in Stockholm next summer.

- Deepika Badampudi (Blekinge Institute of Technology) co-organized the [2nd Workshop on Ethics in Software Engineering Research](#) and Practice, held virtually in June 2021.
- Michael Felsberg (LiU/ISY) is co-organizing the [VOT (Visual Object Tracker)](#) workshop at ICCV 2021.
- Nikolaos Pappas (LiU/ITN) is serving as symposium chair for the following conferences:
  -- [IEEE International Conference on Communications (ICC) 2022](#)
  -- [IEEE Wireless Communications and Networking Conference (WCNC) 2022](#)
- Nikolaos Pappas organized the following:
  -- IEEE SPAWC 2021 [Special session on Information Freshness in Real-Time Communication Networks](#)
  -- 17th International Symposium on Wireless Communication Systems (ISWCS) 2021 - [Special Session on Age of Information](#)

Personnel

- Researchers at the School of Information Technology (HH) are getting ready to start the new project "[Baseband Processing for Beyond 5G Wireless](#)". They have recently welcomed Ali Nada, the new PhD student that will be working on the project.
- Two PhD students have joined the ELLIIT project "[Cloud Tooling for Large-Scale Cyber-Physical System Model-Based Development](#)": Anton Risberg Alaküla started at LU/CS in August 2021 (under the supervision of Görel Hedin) and Abdelazim Hussien, will start from September 1 at LiU/IDA (under the supervision of Adrian Pop).
- Two PhD students have joined ELLIIT project "[Developing core–technologies for tree-based models](#)": Bayu Beta Brahmantio, started 16 VIII 2021 at IDA, Linköping University under the supervision of Krzysztof Bartoszek and Etka Yapar who will most probably start 1 XII 2021 at the Department of Biology, Lund University under the supervision of Niklas Wahlberg.
- Ahmet Kaplan, Daniel Perez Herrera, Deijany Rodriguez Linarez and Jianan Bai are new PhD students at LiU/ISY/Communication systems.
- Boris Godoy is joining LU/Control within the ELLIIT project "[Autonomous Radiation Mapping and Isotope Composition Identification by Mobile Gamma Spectroscopy](#)" during fall 2021.
- Christian Jernberg (VTI) has joined Tom Ziemke's Cognition & Interaction Lab at LiU as a new PhD student in cognitive science, with a focus on human operators' remote driving of partially automated vehicles.
- Erik Mårtensson (LU/EIT) left the ELLIIT environment in February 2021 to work as postdoc in the University of Bergen, Norway.
- Felipe Valle joined Halmstad University as a new ELLIIT PhD-student in the area of V2X communications (main supervisor - Alexey Vinel). Felipe will work with H&E Solutions under the VINNOVA EPIC project.

- Two new PhD students started at the Computer Vision Laboratory (LiU/ISY): Johan Edstedt (Michael Felsberg, Mårten Wadenbäck) and Zhanyu Tuo (Per-Erik Forssén).
- Jörn Janneck`s (LU/CS) research group has hired Michail Boulasikis to work on the Lund part of the ELLIIT project on "General-purpose AI". Michael joins the group from Greece, after receiving his MSc in Electrical and Computer Engineering from the University of Patras. His academic interests include computational and applied mathematics, AI and machine learning, embedded systems, as well as hardware and algorithm Design for domain specific computations.
- Harsh Tataria left Lund University and joined Ericsson in April.
- Students Hedda Klintskog and Olivia Mattsson started as research assistants within the ELLIIT project Gazing at Code Reviews under the supervision of Emma Söderberg.
- Dr. Krishna Chaitanya Patchava joined as a postdoc at LiU/ISY in July 2021 in the ELLIIT project on coherent optical communication headed by Oscar Gustafsson.
- Marco Marinho (HH) left the ELLIIT environment for Bosch (Lund).
- Masoumeh Taromirad (LU/CS) has started as a post-doc researcher in the ELLIIT-project "Software Regression Testing with Near Failure Assertions". The project aims to more efficiently assert failures in software testing by exploring variation around the output. Masoumeh has a PhD from University of York, UK and has previously worked at Halmstad University and Sharif University of Technology in Iran.
- Mr Mehrdad Salimnejad, currently at the Research Center of Sharif University of Technology, Tehran, Iran, will start during the fall as a PhD student at LiU/ITN within an ELLIIT Project Call B, headed by Associate Professor Nikolaos Pappas.
- Dr. Mohd Tasleem Khan joined as a postdoc at LiU/ISY in June 2021 to work with Oscar Gustafsson.
- Muhammad Laiq started at BTH in January 2021 as a PhD student in the ELLIIT project "Quality assurance in continuous software engineering", to work on software development analytics.
- Oscar Molina joined Halmstad University as a postdoc, V2X communications (supervisor - Alexey Vinel). Oscar will work with AstaZero under KKS SafeSmart project.
- Peng Kuang started as PhD student at LU/CS in April 2021 under the supervision of Emma Söderberg.
- Sarvendranath Rimalapudi started as a postdoc at LiU/ISY/Communication systems.
- Senyang Huang started at Dept of EIT, Lund University, as a postdoc in April 2021. Senyang will work with implementation weaknesses for cryptographic algorithms.
- Simon Kristoffersson Lind started as a PhD student at LU/CS to work in the project Situation Aware Perception for Safe Autonomous Robotics Systems (Volker Krueger).
- Taqua Khairy Saeed started at Halmstad University as a new ELLIIT postdoc (supervisor - Alexey Vinel) in the area of V2X communications.
- Xuesong Cai, a postdoc from Aalborg University in Denmark joined Lund University as a postdoc to work on the ELLIIT project on wireless Terahertz communication.
- Zhanyu Tuo started at LiU/ISY in August 2021 as an ELLIIT PhD student. He will work on state representation for adaptive robot perception.
- Zheng Jia will start as ELLIIT-funded PhD student at LU/Control in August 2021 within the ELLIIT project "Autonomous Force-Aware Swift Motion Control".

Research Grants

- Carina Geldhauser (LU, Mathematics LTH) received a Crafoord Foundation 2 year grant (1,2 Mio SEK) for her project "Stochastic Models of Turbulence".
- New EU project H2020-REINDEER (REsilient INteractive applications through hyper Diversity in Energy Efficient RadioWeaves technology) starting up in January 2021, partners include LU (contact: Ove Edfors and Fredrik Tufvesson) and LiU (contact: Erik G. Larsson).

  The REINDEER project will develop a new smart connect-compute platform with a capacity that is scalable to quasi-infinite, and that offers perceived zero latency and interaction with an extremely high number of embedded devices. It will thereto develop "RadioWeaves" technology, a new wireless access infrastructure consisting of a fabric of distributed radio, computing, and storage resources. https://reindeer-project.eu
- In the same area, Ove Edfors, ELLIIT researcher in Lund, has recently got a large SSF grant, 32 MSEK, for realizing and demonstrating the technology. In the project, Large Intelligent Surfaces – Architecture and Hardware, researchers are participating both from Lund University and Linköping university.
- Marco Kuhlmann (LiU/IDA) was granted funding from WASP for a joint project with Frank Drewes (Umeå University). The aim of the project is to develop a practical theory of computation for modern neural network architectures by combining methods from theoretical computer science with empirical validation in natural language processing (NLP). The project will recruit two PhD students and will run in the period 2022–2026.
- LU Mathematics student Sara Rousta won a prestigious Philippa Fawcett scholarship at Cambridge University to conduct their research for her degree project.
- The project "Sårbarheter och hot analys från sidokanaler med maskininlärning i fokus", co-PI Thomas Johansson, Dept of EIT, Lund University (PI Elena Dubrova, KTH), has received a 5-years grant of 10 MSEK från MSB. The project investigates side-channel attacks.
- Dr. Zheng Chen, LiU/ISY/Communication systems, wins CENIIT research grant on Wireless Network Design for Decentralized Machine Learning.

Courses, outreach

During spring 2021, a Ph.D. course on "Advanced Motion Planning and Control" was arranged within the ELLIIT projects "Autonomous Force-Aware Swift Motion Control" and "Safety and Resilience in Multi-Vehicle Behavioral Control for Autonomous Ground Vehicles". Participating Ph.D. students were from Dept. Electrical Engineering, LiU, Dept. Automatic Control, LU, and Dept. Computer Science, LU. The course was held online in Zoom with Björn Olofsson (LiU/FS) as main organizer and Erik Frisk (LiU/FS) as co-organizer. The course was concluded with an interesting project seminar, where the

participants presented and discussed projects that investigated different aspects of the course in depth in simulation or experiments on hardware platforms.
Course homepage: https://www.fs.isy.liu.se/en/Edu/Courses/MotionPlanning/

Blekinge Institute of Technology has developed a new master's program in software engineering (delivery on distance) for professionals. The program focuses on a rigorous and data-driven approach to software engineering. Several ELLIIT researchers from BTH have been involved in the design of the program and related courses.

Luke Church and Emma Söderberg (LU/CS) will give the PhD course "Programmer eXperience Centric Methods for Designing Languages and Tools (EDA075F)" during the Autumn of 2021.

The Natural Language Processing Group at LiU has developed a new, flexible online course entitled 'AI for Natural Language' (https://ai-for-naturligt-sprak.ida.liu.se). The course aims to provide an understanding of how far we have come towards the goal of building machines that understand and produce human language. Students learn about current methods in natural language processing, about what resources are required to build language technology systems, and about how one can assess the quality of these methods and systems. The first instalment of the course attracted more than 200 registered students from all over Sweden. Marco Kuhlmann (LiU/IDA) is responsible for the course.

Nikolaos Pappas (LiU/ITN) was invited to present the ELLIIT Project "Information Handling in Industrial IoT" at the IEEE Tactile Internet Technical Committee at ICC 2021 meeting in July 2021.
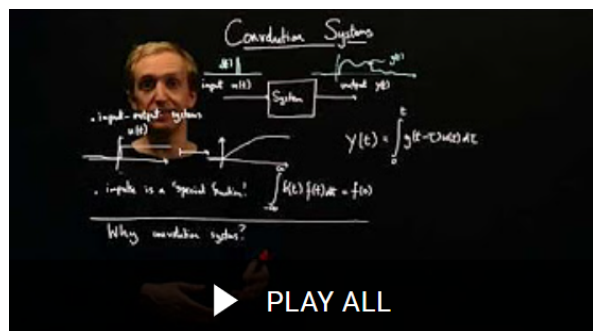
Nikolaos Pappas (LiU/ITN) will give a tutorial in IEEE SPAWC 2021 regarding "Semantics-empowered goal-oriented communications" in September 2021.

Carina Geldhauser and Sara Maad Sasane, from Lund University/Mathematics, organized a series of women's career talks. In order to inform female students about the many opportunities with a degree in mathematics or engineering mathematics, and to give them the opportunity to ask their questions in a protected environment, they launched a series of career talks, which were complemented by a women's career fika. Here you can read more about these events.

Erik G. Larsson and Emil Björnson (LiU/ISY) launched the podcast Wireless Future and released 18 episodes in the first season. It is available on YouTube, Apple Podcasts, Spotify, and Google Podcasts. The podcast is described as follows: "We are approaching a wireless future, where everything around us becomes connected and increasingly intelligent. Access to wireless connectivity is becoming as essential to our lives as access to electricity and water. In this podcast, two renowned Swedish academics discuss current and future wireless technologies, as well as their impact on society."

Richard Pates (LU/ Automatic Control) has taught the course "FRTF15: Control Theory". This course is designed as a complement to a basic course in control, and goes through some of the mathematics that underpins classical frequency domain and state-space methods. The course is available online.

The summer of math exposition: This summer Grant Sanderson has been running a competition to encourage more people to put out explainers of math online. Richard Pates (LU/Automatic Control) has submitted an entry explaining the use of Lyapunov functions, and their relation to some curious results from combinatorics and topology. Watch here the video "Lyapunov Stability via Sperner's Lemma".
Here you can find more about the Grant Sanderson's competition.