

ELLIIT Annual Workshop

15–16 October 2019

Blekinge Institute of Technology, Karlskrona

Program

Tuesday, Oct 15

10:30 Registration & coffee

Location: Multisalén (J-huset, BTH)

11:00 Opening

Location: Multisalén (J-huset, BTH)

Session chair: Erik G Larsson (LiU)

11:15 Project highlights

Location: Multisalén (J-huset, BTH)

Session chair: Inger Erlander Klein (LiU)

- Kalle Åström (LTH, P8): Advances in Mapping and Positioning
- Therese Forsberg (LTH/Ericsson, P1/WP4): An analog frequency generation circuit for 5G mm-wave communication
- Michael Felsberg (LiU, P7): Deep Vision: Object Tracking goes Segmentation

12:30 Lunch

Location: Bistro J (J-huset, BTH)

13:30 Keynote 1: Anna Scaglione (Arizona State University, USA): Opinion dynamics under attack: polarization and the influence of zealots

Abstract: Opinion dynamics models aim at capturing the phenomenon of social learning through public discourse. While a functioning society should converge towards common answers, the reality often is characterized by divisions and polarization. This talk reviews the key models that capture social learning and its vulnerabilities. In particular, we review models that explain the effect of bounded confidence and social pressure from zealots (i.e. fake news sources) and show how very simple models can explain the trends observed when social learning is subject to these phenomena. We also introduce mechanisms to achieve robust consensus, or detect the presence of sociopaths, and how their influence exposes trust different agents place on each other.

Bio: Anna Scaglione (M.Sc.'95, Ph.D. '99) is currently a professor in electrical and computer engineering at Arizona State University. She was Professor of Electrical Engineering previously at the at UC Davis (2010-2014). Her expertise is in the broad area of statistical signal processing for communication, electric power systems and networks. Her current research focuses on studying and enabling decentralized learning and signal processing in networks of sensors.

Dr. Scaglione was elected an IEEE fellow in 2011. She served as Associate Editor for the IEEE Transactions on Wireless Communications and on Signal Processing, as EiC of the IEEE Signal Processing letters. She was member of the Signal Processing Society Board of Governors from 2011 to 2014. She received the 2000 IEEE Signal Processing Transactions Best Paper Award and more recently was honored for the 2013, IEEE Donald G. Fink Prize Paper Award for the best review paper in that year in the IEEE publications. Her work with her student Lin Li earned the 2013 IEEE Signal Processing Society Young Author Best Paper Award.

Location: Multisalén (J-huset, BTH)

Session chair: Fredrik Tufvesson (LTH)

14:30 Poster session & coffee

Location: J1360 + outside J16xx rooms (J-huset, BTH)

Session chair: Jürgen Börstler & Nauman bin Ali (BTH)

15:45 Parallel tracks

	Systems modeling	Security & testing	Machine learning
Location	J16xx	J16xx	J16xx
Chair	Görel Hedin (LTH, P5)	Emelie Engström (LTH, P4)	Nauman bin Ali (BTH, P4)
Talks	<ol style="list-style-type: none"> Johan Thunberg (HH, P5): Modeling and Rigorous Simulation of Cyber-Physical Systems Anton Cervin (LTH, P2): Modeling and analysis of deadline violations in embedded control systems Peter Fritzson (LiU, P5): Integrated FMI Simulation/Co-simulation and Composite Models with OpenModelica OMSimulator 	<ol style="list-style-type: none"> Marco A.M. Marinho (HH, P1/WP6): Performance Assessment for Distributed Broadband Radio Localization Ulf Kargén (LiU, P1/ WP5): Security testing using fuzzing Alexey Vinel (HH, P1/ WP6): Vehicle-to-Vehicle Communications for Platooning: Safety Analysis 	<ol style="list-style-type: none"> Ebo Bennin (BTH, P4): The Significant Effects of Data Sampling Approaches on Software Defect Prioritization and Classification Emil Björnson (LiU, P1/ WP1): The role of deep learning in wireless communications Gabriel Eilertsen (LiU, P9): Dissecting the weight space of neural networks

16:45 End of technical program day 1

18:00 Visit of Marine museum (optional)

Location: Marine museum, submarines exhibition hall

18:45 Conference dinner

Location: Marine museum

Wednesday, Oct 16

09:00 Keynote 2: Paris Avgeriou (University of Groningen, The Netherlands): Technical Debt: Risk or Opportunity?

Abstract: The term Technical Debt has undeniably become part of the everyday vocabulary and

practices of software engineers. We know that it concerns compromises to the internal quality of a system; most of these compromises are inevitable, given the realities of software development in industry. But, it is associated with a clear risk especially for large and complex systems: if we do not manage Technical Debt, it threatens to “bankrupt” those systems. On the other hand, technical debt may be seen as an opportunity to invest resources wisely in anticipation of future changes; but also to act as a common language between engineers and management.

In this talk we revisit the state of the art and practice in managing Technical Debt, and identify the main challenges. We pay special attention to Architecture Technical Debt, which requires the most effort during maintenance and evolution but is often overlooked by tool vendors.

Bio: Dr. Paris Avgeriou is Professor of Software Engineering at the University of Groningen, the Netherlands where he has led the Software Engineering research group since September 2006. Before joining Groningen, he was a post-doctoral Fellow of the European Research Consortium for Informatics and Mathematics. He is the Editor in Chief of the Journal of Systems and Software, as well as an Associate Editor for IEEE Software. He also sits on the board of the Dutch National Association for Software Engineering (VERSEN) and the Dutch research school IPA. He has co-organized several international conferences such as ECSA, ICSSA, and Tech Debt and served on their steering committees. His research interests lie in the area of software architecture, with strong emphasis on architecture modeling, knowledge, evolution, analytics and technical debt. He champions the evidence-based paradigm in Software Engineering research and works towards closing the gap between industry and academia.

Location: Multisalén (J-huset, BTH)

Session chair: Claes Wohlin (BTH)

10:00 Coffee break

Location: Multisalén (J-huset, BTH)

10:30 Open mini workshops

	5G/6G Wireless	Visual data analytics for decision making	Cyber-physical systems	Software & systems: Open Source Tools in Industry-Academia Collaboration
Location	J16xx	J16xx	J16xx	J16xx
Coordinator/ chair	Di Yuan (LiU, P1/WP2)	Ingrid Hotz (LiU, P9) & Jonas Unger (LiU, P9)	Anders Robertsson (LTH, P11) & Anders Hansson (LiU, P10)	Per Runeson (LTH, P4)
Projects “covered”	P1, P2	P7, P8, P9	P6, P10, P11	P3, P4, P5

12:00 End of technical program day 2

12:15 Lunch

Location: Bistro J (BTH)

ELLIIT Board Meeting

Location: Villa Oscar

Programs for Mini-workshops

Mini-workshop 1: 5G/6G wireless

- **Short presentations** by the panel members (Emil Björnson, Nikolaos Pappas, Ove Edfors, Atila Alvandpour, Thomas Johansson, and Alexey Vinel)
- **Panel discussion:** How to prepare for 6G?
- **Short summary:** This mini-workshop brings together perspectives and visions of the work packages of 5G/6G Wireless of ELLIIT, in order to approach better understanding of key research challenges and opportunities for 6G. The topics featured by the mini-workshop range from hardware and signal processing, networking aspects, system design and trustworthy solutions, to specific application scenarios of 6G. The panel discussion is intended to identify interesting themes as well as to facilitate new research initiatives of ELLIIT for future evolution of mobile systems.

Mini-workshop 2: Visual data analytics for decision making

- **Format:** 3 short talks to introduce the topic followed by an open discussion.
- **Short summary:** Improved support for human decision making is of crucial importance in many areas of society and in a variety of contexts and environments. A fundamental challenge is the rapidly increasing amount and variety of data available, e.g. through sensors, simulation, databases, and from the Internet. Artificial Intelligence (AI) is simultaneously developing at unprecedented speed and has a predicted impact in essentially all aspects of modern society. Behind the recent successes of AI lies the data driven approach of neural networks, in particular what is known as deep learning based on layers of interconnected network. The data and systems hold and aggregate invaluable information describing complex situations needed for human experts to make fast assessments and take informed decisions. This workshop focuses on the data representations, analysis and visualization for decision support and machine learning and AI applications.

Mini-workshop 3: Cyber-physical systems

- Niklas Fors: *Bloqqi - a modular automation language* (Niklas Fors and Görel Hedin)
- Victor Fors: *Control Design for Autonomous Ground-Vehicle Maneuvers at-the-limit of Tire-Road Friction* (Victor Fors, Björn Olofsson, and Lars Nielsen)
- Olof Andersson: *Real-Time Robotic Search using Structural Spatial Point Processes* (based on collaboration between O. Andersson, P. Siden, J. Dahlin, P. Doherty, and M. Villani).
- Hamed Haghshenas: *Time-Optimal Cooperative Path Tracking: A Convex Optimization Approach* (Hamed Haghshenas, Mikael Norrlöf, and Anders Hansson)
- Zhiyong Sun: *Feasible coordination of multiple homogeneous or heterogeneous mobile vehicles with various constraints* (Zhiyong Sun, Marcus Greiff, and Anders Robertsson)

Mini-workshop 4: Software & systems: Open Source Tools in Industry-Academia Collaboration

- Talks: TBD
- **Panel discussion:** What can universities do to support open source tools as a means for knowledge sharing with industry?
- **Short summary:** This mini-workshops intends to give an overview of experiences of developing and using open source tools on and for research. Examples of tools used/developed in ELLIIT as well as in industry are presented, particularly in relation to open source aspects, such as licences, communities, and technical infrastructure. An interactive part of the mini-workshop aims at discussing what universities can do to support open source tools as a means

for knowledge sharing with industry.

Posters

P1/WP1: 5G wireless/ System design and propagation channels

Title: Sum Spectral Efficiency Maximization in Massive MIMO Systems: Benefits from Deep Learning

Presenter: Trinh Van Chien

E-mail: trinh.van.chien@liu.se

Title: Improving Short-Length LDPC Codes with a CRC and Iterative Ordered Statistic Decoding

Author: Wei Zhou and Michael Lentmaier

E-mail: wei.zhou@eit.lth.se

Title: A New Look at the Millimeter-Wave Propagation Channel

Presenter: Harsh Tataria, Erik Bengtsson, Peter Karlsson, Ove Edfors, Fredrik Tufvesson

E-mail: Fredrik.Tufvesson@eit.lth.se

P1/WP2: 5G wireless/ Networking solutions

Title: Modeling DRX for D2D communication

Presenter(s): Farnaz Moradi

E-mail: Farnaz.Moradi@eit.lth.se

Title: Utilizing traffic properties to improve reliability and latency for 5G and beyond

Name of presenters: Nikolaos Pappas, Marian Codreanu

E-mail: nikolaos.pappas@liu.se

Title: Anticipation techniques in 5G and beyond wireless networks

Presenter: Cristian Tatino, Emmanouil Fountoulakis

E-mail: nikolaos.pappas@liu.se

P1/WP3: 5G wireless/ Baseband processing

Title: Distributed architecture for Massive MIMO

Presenter: Jesus Rodriguez

E-mail: Jesus.Rodriguez@eit.lth.se

Title: Passive Intelligent Surface Assisted MISO Wireless Energy Transfer

Presenter: Deepak Mishra and Håkan Johansson

E-mail: hakan.johansson@liu.se

Title: Angular-domain massive MIMO detection: algorithm, architecture, and complexity trade-off

Presenter: Mojtaba Mahdavi

E-mail: Mojtaba.Mahdavi@eit.lth.se

P1/WP4: 5G wireless/ Analog hardware

Title: A 24-30 GHz Receiver with LO-based Phase-Shifting

Presenter(s): Rikard Gannedahl, Henrik Sjöland

E-mail: Rikard Gannedahl

Title: High-Speed Energy-Efficient DACs for 5G and beyond

Presenter(s): Oscar Morales, Jacob Wikner, Atila Alvandpour
E-mail: Oscar Morales, oscar.morales@liu.se

Title: Low power Circuits and Systems for Smart Sensors
Presenter(s): Atila Alvandpour
E-mail: Atila.Alvandpour@liu.se

P1/WP5: 5G wireless/ Trustworthy operation and management

Title: SNOW V: A Possible Cryptographic Algorithm for 5G
Presenter: Jing Yang
E-mail: jing.yang@eit.lth.se

Title: Machine Learning for Mobile Malware Analysis
Presenter: Alireza Mohammadinodooshan
E-mail: alireza.mohammadinodooshan@liu.se

P1/WP6: 5G wireless/ Vehicular communication

Title: Vehicle-to-Vehicle Communications for Platooning: Safety Analysis
Presenter: Johan Thunberg, Nikita Lyamin, Katrin Sjöberg, Alexey Vinel
E-mail: alexey.vinel@hh.se

Title: High-Accuracy Signals-of-Opportunity Based Positioning for Vehicles
Presenter: Russ Whiton, Junshi Chen, Fredrik Tufvesson
E-mail: Fredrik.Tufvesson@eit.lth.se

Title: SIVERT - SIMulation and VERification of vehicular communication Technologies
Presenter: Aleksei Fedorov, Nikita Lyamin, Fredrik Tufvesson
E-mail: Fredrik.Tufvesson@eit.lth.se

P2: Co-Design of Robust and Secure Networked Embedded Control Systems

Title: Fundamental Limitations and Schedule Analysis
Authors: Nils Vreman, Martina Maggio, Richard Pates
E-mail: nils.vreman@control.lth.se

Title: Butterfly Attack: Adversarial Manipulation of Temporal Properties of Cyber-Physical Systems
Authors: Rouhollah Mahfouzi, Amir Aminifar, Soheil Samii, Mathias Payer, Petru Eles, Zebo Peng
E-mail: rouhollah.mahfouzi@liu.se

Title: JitterTime – A Tool for Analyzing Transient Performance in Cyber-Physical Systems
Authors: Anton Cervin, Paolo Pazzaglia, Mohammadreza Barzegaran, Rouhollah Mahfouzi
E-mail: anton@control.lth.se

P3: Stream Computing Infrastructures

Title: Tool Support for Stream Computing
Presenter(s): Hazem Ali, Jörn W. Janneck
E-mail: hazem.ali@hh.se

Title: Future Research Directions for Stream Computing Infrastructures
Presenter(s): Hazem Ali, Jörn W. Janneck
E-mail: jwj@cs.lth.se

P4: Decision Support for Efficient and Effective Lean Testing

Title: Test-case quality – understanding practitioners' perspectives

Name of the presenter (s): Vi Tran

E-mail of the poster contact: vtr@bth.se

Title: The Significant Effects of Data Sampling Approaches on Software Defect Prioritization and Classification

Name of the presenter (s): Ebo Bennin

E-mail of the poster contact: ebo@bth.se

Title: Initiatives for boosting the industry-academia communication in Software Engineering

Name of the presenter (s): Sergio Rico

E-mail of the poster contact: sergio.rico@cs.lth.se

P5: Scalable Language Tools for Cyber-Physical Systems

Title: Introducing Just-in-time Compilation in a Modelica Compiler

Authors: John Tinnerholm, Martin Sjölund, Adrian Pop

E-mail: peter.fritzson@liu.se

Title: Bloqqi – a modular automation language

Presenters: Niklas Fors and Görel Hedin

E-mail: niklas.fors@cs.lth.se

P6: Collaborative Robotics

Title: Real-Time Robotic Search using Structural Spatial Point Processes

Presenter(s): O. Andersson, P. Siden, J. Dahlin, P. Doherty, M. Villani

E-mail: patrick.doherty@liu.se

Title: Feasible coordination of multiple homogeneous or heterogeneous mobile vehicles with various constraints

Presenter(s): Z. Sun, Marcus Greiff, Anders Robertsson, and Rolf Johansson

E-mail: zhiyong.sun@control.lth.se

P7: Deep Vision: Multiple Object Tracking

P8: Local Positioning Systems

P9: Visual Feature Based Data Reduction

P10: Scalable Optimization for Control Systems

Title: Time-Optimal Path Tracking Problem for Cooperative Manipulators

Presenter(s): Hamed Haghshenas

E-mail: hamed.haghshenas@liu.se

Title: Motion Replanning for Collaborative Robots

Presenter(s): Martin Karlsson, A. Robertsson, Rolf Johansson

E-mail: anders.robertsson@control.lth.se

P11 Online Optimization and Control towards Autonomous Vehicle Maneuvering

Title: Yaw-moment control at-the-limit of friction using individual front-wheel steering and four-wheel braking

Presenter(s): V. Fors, B. Olofsson, L. Nielsen

E-mail: victor.fors@liu.se

Title: Real-time minimum-time lane change using the modified Hamiltonian algorithm

Presenters: V. Fors, Y. Gao, B. Olofsson, T. J. Gordon, L. Nielsen

E-mail: victor.fors@liu.se