



Bios and abstracts Day 2 - 28th of September:

Sanjit A. Seshia, Berkeley University – Towards Verified Artificial Intelligence

Abstract: The deployment of artificial intelligence (AI), particularly of systems that learn from data and experience, is rapidly expanding in our society. Verified artificial intelligence (AI) is the goal of designing AI-based systems that have strong, verified assurances of correctness with respect to mathematically-specified requirements. In this talk, I will consider Verified AI from a formal methods perspective. I will describe five challenges for achieving Verified AI, and five corresponding principles for addressing these challenges. I will illustrate these challenges and principles with examples and sample results from the domain of intelligent cyber-physical systems, with a particular focus on autonomous vehicles.

Biography: Sanjit A. Seshia is a Professor in the Department of Electrical Engineering and Computer Sciences at the University of California, Berkeley. He received an M.S. and Ph.D. in Computer Science from Carnegie Mellon University, and a B.Tech. in Computer Science and Engineering from the Indian Institute of Technology, Bombay. His research interests are in formal methods for dependable and secure computing, with a current focus on the areas of cyber-physical systems, computer security, and robotics. He has made pioneering contributions to the areas of satisfiability modulo theories (SMT), SMT-based verification, and inductive program synthesis. He is co-author of a widely-used textbook on embedded, cyber-physical systems and has led the development of technologies for cyber-physical systems education based on formal methods. His awards and honors include a Presidential Early Career Award for Scientists and Engineers (PECASE), an Alfred P. Sloan Research Fellowship, and the Frederick Emmons Terman Award for contributions to electrical engineering and computer science education. He is a Fellow of the IEEE.

Karl Meinke, KTH - 10 years in 1 day: Software Testing in the Age of Machine Learning

Abstract: Machine Learning (ML) has the potential to revolutionize the current way that we write, debug and assess software products. The combination of cheap concurrent hardware and highly parallelized ML algorithms offers enormous computational leverage combined with self-optimizing processes brought about by large data sets. In this talk, I will present some results of academic-industrial collaboration over several years to apply ML to software reliability problems such as testing and requirements analysis. I will discuss some lessons learned, some future directions and some potential bottlenecks to this bright future!

Biography: Prof. Dr. Karl Meinke is Head of the Department of Theoretical Computer Science in the School of Electrical Engineering and Computer Science. In the last ten years Meinke and his group have pioneered new applications of machine learning (ML) in software engineering (SE). The group has applied ML to develop tools that can automatically reverse engineer software artifacts such as system models, software requirements and test suites. These tools are now being evaluated in industry by major Swedish multinational companies such as: Ericsson, SAAB, Scania and Volvo. A major focus has been safety aspects of cooperating cyber-physical systems such as wireless linked vehicle platoons. Meinke is currently active in two EU projects SafeCOP and Testomat where these topics are studied. He is also involved in technology transfer of ML for SE through a new KTH incubation project RoboTest.

Markku Hämäläinen, Kontigo Care - Digital biomarkers and predictive e-Health systems

Abstract:

Kontigo Care has developed an IoT based eHealth-system for real-time monitoring of addictive diseases: PreVict® Alcohol and PreVict® Gambling. The sobriety, mood and therapy compliance of the patient is monitored and supported using a mobile phone application. The caregiver uses the web-portal to design questionnaires and tasks (e.g. CB-therapy) which are published to the app. Results from Breathalyzer test, reported cravings and answers to questionnaires are stored in a MS Azure cloud database. Analysis of these data resulted in the discovery of a set of digital biomarkers which gives a unique possibility to monitor the recovery process. The digital biomarkers are used as Y (and X) in AI-modelling of the disease process and for ultra-early prediction of increased risk of a relapse.

Biography:

Markku Hämäläinen, has a bachelor degree in organic chemistry, PhD in chemometrics and has published more than 40 scientific papers and patents. Markku worked previously >20 years as senior scientist and black-belt at the R&D-department of GE Healthcare Life Sciences. He is fluent in industrial data analysis and optimizations and was instrumental in the development of new biosensor systems for drug discovery. Today he works as chief scientific officer at Kontigo Care, a rapidly growing eHealth-company focusing on the development of new tools for successful addiction care. He recently published the discovery of a first digital biomarker for alcohol use disorder – Addiction Monitoring Index (AMI) - based on clinical data collected with eHealth system PreVict® Alcohol. AMI is the main engine in company's AI-informatics platform used for monitoring the recovery process and for ultra-early identification and prevention of a relapse.

Patric Jensfelt, KTH - Autonomous systems challenges and promises

Abstract: Autonomous cars are in the spotlight of media right now. These systems draw from a long history of research in robotics and other fields but they represent only one example of autonomous systems. The possibilities and promises of the technology are huge but so are the challenges. In this talk I will discuss some of the challenges that comes with mobile autonomous systems and how these are addressed today.

Biography: Prof. Patric Jensfelt is a professor of computer science specialised in robotics at the department of Robotics, Perception and Learning at the School of Electrical Engineering and Computer Science (EECS) and the Centre for Autonomous Systems (CAS), both at KTH. His main research interests center around autonomy for mobile robots, in particular aspects connected to navigation, localization and mapping.

Panagiotis "Panos" Papadimitratos, KTH - Cyber-security when everything is connected

Abstract:

Our environments and processes are becoming increasingly "smart": vehicular communication (VC) systems making transportation safer and more efficient; location based services (LBS) providing precise data most relevant to the user whereabouts; participatory sensing (PS) systems providing measurements practically from everywhere without dedicated sensor deployment; wearable devices monitoring health; home installations controlling our living environments; operation of sophisticated machinery being automated. Exciting technologies, leveraging Versatile wireless networking and mobile or embedded computing platforms, offering knowledge about our physical world and the ability to control and make everything more efficient, more comfortable, and safer. The flip-side: they can be vulnerable, even offer novel ways for perpetrators, be it the hacker next door, or an industrial spy, a radical, or a criminal across the globe, to disrupt our everyday lives and business.

To reap the benefits of smart environments, it is paramount to secure their operation and protect the privacy of their users. Security is necessary, for example, to control the access to PS tasks, or to ensure the authenticity of VC messages, or to thwart LBS or PS data pollution. At the same time, contributed sensed data, frequent transmissions of vehicle mobility, or location-based queries, they all reveal location and other sensitive user information. In this seminar, we discuss how to address these concerns, especially because both security and privacy protection are necessary; in fact, they can be prerequisites towards broad acceptance and deployment. We consider the threat landscape for such emerging systems, in the broad context of the Internet of Things. We discuss concrete solutions for security and privacy protection based on a gamut of recent results on multiple fronts.

Biography:

Panagiotis (Panos) Papadimitratos earned his Ph.D. degree from Cornell University, Ithaca, NY, in 2005. He then held positions at Virginia Tech, EPFL and Politecnico of Torino. Panos is currently a Professor at KTH, Stockholm, Sweden, where he leads the Networked Systems Security group.

His research agenda includes a gamut of security and privacy problems, with emphasis on wireless networks. At KTH, he is affiliated with the ACCESS center, leading its Security, Privacy, and Trust thematic area, as well as the ICES center, leading its Industrial Competence Group on Security.

Panos is a Knut and Alice Wallenberg Academy Fellow and he received a Swedish Science Foundation Young Researcher Award. He has delivered numerous invited talks, keynotes, and panel addresses, as well as tutorials in flagship conferences. Panos currently serves as an Associate Editor of the IEEE Transactions on Mobile Computing and the ACM/IEEE Transactions on Networking and as a member of the Privacy Enhancing Technologies Advisory Board. He has served in numerous program committees, with leading roles in numerous occasions; as the program chair for the ACM WiSec (2016), TRUST (2016), and Cryptology and Network Security (2018) conferences. He is also serving as the general chair of the ACM WiSec (2018), PETS (2019), and IEEE EuroS&P (2019) conferences. Panos is a member of the Young Academy of Europe. His group webpage is: www.ee.kth.se/nss.

Diarmuid Corcoran, Ericsson – Challenges in building Intelligent Software Architectures in 5G Radio Access Networks

Abstract: Currently there is a significant trend towards the use of AI technology as an enabler for automating both repetitive and complex tasks. The current trend in machine learning promises to drastically simplify certain types of algorithm design. To achieve a level of weak or domain specific intelligence, for example, autonomous resource management in a 5G mobile network, there needs to be an integrated system of concepts to support building and using knowledge. In this talk I discuss the general limitations of current self-management approach in mobile systems. I also propose a new agent orient architecture, with built in simulation capabilities, for accelerated learning of resource management policies.

Biography:Diarmuid has worked at Ericsson for 25 years in many different development, research and technical leader roles and holds the position of Expert, Software Architecture. He has extensive experience building large-scale, fault-tolerant, software systems and has worked on software architectures and platforms for 2G, 3G, 4G and more recently 5G, mobile systems making new contributions to software applications, platforms and ways-of-working. Currently Diarmuid works within the networks system and technology division with specific focus on AI based software technologies to support the next generation of Radio Access Systems.

Lars Eklöf, Atlas Copco President Motor Vehicle Division - Smart connected assembly

Abstract: In Europe, it's Industry 4.0, in China Industry 2025, and in the USA the Industrial Internet of Things. But basically, they all refer to the same technological advances. In today's car plant, all tools used for safety critical applications are connected to a network storing data and to ensure the product quality. With the Smart Connected Assembly concept, Atlas Copco has created a set of solutions for Industry 4.0 / Smart Factory in assembly operations with a complete product offer consisting of tools, software and data driven service products. Smart Connected Assembly focuses on how to create customer value by connecting equipment and services.

Biography: Lars Eklöf is President of the Atlas Copco Motor Vehicle Industry division responsible for global sales and product development. The division has development sites in Sweden, Germany and Italy and application centers developing customer specific solutions in USA, Brazil, Germany, India and China. Lars has a Master of Science in Mechanical Engineering from KTH Sweden and a Bachelor of Engineering from Dartmouth College USA. He is also member of the board of directors for Beijer Electronics group.