

## Automaatiopäivät23 15.-16.5.2019, Original Sokos Hotel Arina, Oulu

### Ohjelma

15.5.2019

8:30-09:00 Ilmoittautuminen ja kahvi

09.00-09.10 Avaus

9:10-9:55 **Keynote #1: Towards autonomous systems – promises and considerations for industry?**  
Heli Helaakoski, Senior Principal Scientist, VTT

9:55-10.10 Verkostoitumistauko & siirtyminen saleihin

10:10-11:30	Simulation and digital twins (Sali A)	Robotics (Sali B)	Control design (Sali C)
1 A-B-C	<p>12. Riku-Pekka Nikula, Marko Paavola, Mika Ruusunen and Joni Keski-Rahkonen: Towards online adaptation of digital twins</p> <p><i>keywords: adaptation, differential evolution, digital twin, optimisation, surrogate model</i></p> <p>25. Pekka Isto, Tapio Heikkilä, Aarne Mämmelä, Mikko Uitto, Tuomas Seppälä and Jari Ahola, 5G Based Machine Remote Operation Development Utilizing Digital Twin</p> <p><i>keywords: 5G, remote operation, models, control</i></p> <p>46. Amin Modabberian, Hoang Khac Nguyen and Kai Zenger, Mean value modelling of maritime diesel engines</p> <p><i>keywords: diesel engines, modelling, mean value modelling, control, emissions</i></p>	<p>16. Timo Malm, Timo Salmi, Ilari Marstio and Iina Aaltonen, Are collaborative robots safe?</p> <p><i>keywords: functional safety, collaborative robots, safety requirements, levels of collaboration</i></p> <p>2. Markku Suomalainen and Ville Kyrki, Learning compliant assembly skills from human demonstration</p> <p><i>keywords: industry, robotics, learning from demonstration, compliant assembly</i></p> <p>24. Tapio Heikkilä, Janne Saukkoriipi, Jari Ahola, Tuomas Seppälä and Pekka Isto, Programming and control for skill-based robots</p> <p><i>keywords: robot skill, programming, sensor, control</i></p>	<p>66. Mats Friman, Fault-Tolerant Valve Control</p> <p><i>keywords: valve, valve controller, fault-tolerant control</i></p> <p>19. Khoa Dang and Igor Trotskii, Architecture For Automation System Metrics Collection, Visualization and Data Engineering - HAMK Sheet Metal Center Building Automation Case Study</p> <p><i>keywords: building automation, IoT, anomaly detection, analytics</i></p> <p>30. Tomi Räsänen and Veli-Pekka Pyrhönen, State feedback design of a Rotary Inverted Pendulum</p> <p><i>keywords: LQR-control, pole-placement, inverted pendulum, balance control, reference tracking</i></p>

35. Jouni Aro, Lauri Saikko and Markus Johansson, Simulation Platform for Industrie 4.0 Components with OPC UA Machine learning in process industry

*keywords: industrie 4.0, smart manufacturing, OPC UA, administration shell, communication, information modelling, simulation*

28. Veli-Pekka Pyrhönen, Robust and Perfect Tracking Control of a DC Servo Motor

*keywords: robust and perfect tracking, servo control, control applications, linear systems, actuator saturation*

**11:30-12:30 Lounas**

**12:30-13:50**

**2 A-B-C**

**OPC-UA and IOT (A)**

9. Lauri Haapanen, Olli Luukkainen and Lauri Saurus, Advanced Process Control with Redundant DCS Communication using OPC UA

*keywords: OPC UA, digitalization, process control, automation, redundancy*

10. Tomi Lahti and Lauri Saurus, OPC UA with Publish/Subscribe is now ready to apply for IOT on the process industry

*keywords: OPC UA, IoT, Edge, publish/subscribe, PubSub*

**Automation in building and buildings (B)**

1. Jukka Koskinen, Timo Salmi, Pekka Kilpeläinen and Pertti Lahdenperä. Robottiikan mahdollisuudet rakentamisessa

*keywords: robotiikka, automatisointi, rakentaminen*

21. Dat Huynh and Sy Nguyen. Engaging building automation data visualization using Building Information Modelling and Progressive Web Application

*keywords: building lifecycle management (BLM), building information modelling (BIM), Progressive Web Application (PWA), visualization, simulation*

**Methods and applications 1 (C)**

39. Petri Kannisto, David Hästbacka, Kari Rainio, Matias Alarotu, Tiina Pajula, Jouni Savolainen and Matti Vilkkö, Plant-wide communication architecture enabling online life cycle assessment

*keywords: process control, information systems, systems integration, online life cycle assessment (LCA)*

31. Veli-Pekka Pyrhönen, Two Practical Improvements for the Composite Nonlinear Feedback Methodology

*keywords: control applications, constrained control, linear systems, nonlinear control, servo systems*

74. Jukka Pulkkinen, Igor Trotskii and Khoa Dang. Data Strategy in Service Development: Case Study for a facility management service company utilizing IoT

*keywords: digital servitization, service design, facility management services, data management, lean service development*

38. Henri Pettinen and Marko Elo, Utilizing CrossControl's multifunctional display computer in industrial IoT use cases

*keywords: industry 4.0, Internet of Things, IoT, Productive4.0, multifunctional display, Arrowhead framework, graphical user interface (GUI), CrossControl gateway, Software as a Service (SaaS), Service Oriented Architecture (SOA)*

14. Petri Hietaharju and Mika Ruusunen, Forecasting and optimization of the heat demand at city level

*keywords: district heating, modelling, prediction, demand side management, optimization*

13. Igor Trotskii and Jukka Pulkkinen. Unsupervised machine learning model for heat flow monitoring in a geothermal energy storage in a near-zero-energy building.

*keywords: condition Based Maintenance (CBM), principal component analysis (PCA), near-zero-energy buildings (nZEB), maintenance*

54. Hannu Rummukainen and Jukka K. Nurminen, Reinforcement learning for economic lot scheduling

*keywords: reinforcement learning, production control, stochastic optimization, stochastic economic lot scheduling*

56. Kurt-Erik Häggblom, Data-Based Experiment Design to Maximize Information for MIMO System Identification

*keywords: system identification, multivariable systems, ill-conditioned systems, experiment design, data-based design*

**13:50-14:10 Kahvi & posterit / näyttely**

**14:10-15:30 Education (A)**

3 **A-B-C** 52. Antti Liljaniemi and Heikki Paavilainen, Using Digital Twin Technology in Engineering Education – Course Concept to Explore Benefits and Barriers

*keywords: digital twin, digital shadow, Industry 4.0, engineering education, virtual learning environment*

**Energy solutions (B)**

5. Hans Aalto, Estimating the dynamic characteristics of natural gas transmission systems

*keywords: gas pipeline dynamics, time constant, dominating time constant*

**Environment (C)**

6. Ekaterina Nikolskaya, Mika Liukkonen and Yrjö Hiltunen, Real-time measurement system for determining metal concentrations in water-intensive processes.

*keywords: nuclear magnetic resonance (NMR), time domain, metal concentration, precipitation, mining water*



32. Jaakko Etto and Matti Paaso, Automaatioinsinöörin kompetenssit ja osaamisen oppiminen

*keywords: automaatio, kompetenssi, osaaminen*

33. Jaakko Etto and Matti Paaso, Automaation etälaboraatioiden ja etäopetuksen kehittäminen

*keywords: automaatio, etäopetus, etälaboraatio*

41. Tero Hietanen, Manne Tervaskanto and Timo Heikkinen, Verkottunut yhteistyö automaatiokoulutuksessa

*keywords: IoT, koulutus, digitalisaatio*

58. Yrjö Majanne, Tomas Björkqvist, Pertti Järventausta and Matti Vilkkö, Modeling and optimization of distributed energy resources microgrids

*keywords: industry, microgrid, modelling, optimization, distributed generation*

61. Petteri Lehtonen, Successful I&C renewal project of Loviisa NPP

*keywords: nuclear power, digital safety automation, project life cycle, systems engineering, licensing, simulators*

63. Tomi Roinila, Tuomas Messo and Jussi Sihvo, Taajuusvastemenetelmät osana älykkäitä akkujärjestelmiä

*keywords: litium-ioni akku, akun impedanssi, älykkäät akkujärjestelmät, kuntotila, varaustila*

57. Heli Karaila, Lasse Järvinen and Ari Oksanen, Mass flow-based controls with solids measurements reduce sludge handling costs

*keywords: wastewater, solids, realtime measurement, model predictive control (MPC), optimizer*

27. Kai Zenger and Hoang Nguyen Khac, Optimal control maps for fuel efficiency and emissions reduction in maritime diesel engines

*keywords: diesel engine, NOx emissions, fuel efficiency, control map, optimization, optimal design*

42. Arto Visala, Panu Harmo, Jorma Selkäinaho, Mirja Salkinoja-Salonen and Janne Luukkaa, IoT based measurements to recognise pollutants in indoor air

*keywords: internet connected microcontrollers, cloud services, indoor air*

**16:00- 18:30 Vierailu: Nokia's Radio Technology Center Site, yleisesittely ja tuotantokierros**

**19:30-22:30 Illallinen, Radisson Blu Hotel**

**16.5.2019**

**08:30-09:00 Kahvi & posterit / esittely**

**9:00-9:45 Keynote #2: Kyberturvallisuus älykkään pilven ja älykkään reunan maailmassa  
Teknologiajohtaja Mikko Viitaila, Microsoft Finland**

**9:45-10:00 Verkostoitumistauko & siirtyminen saleihin**

**10:00-11:20 Machine learning (A)**

**Minerals processing and steel (B)**

**Methods and applications 2 (C)**

**4 A-B-C**

8. Samuli Bergman, Alexandre Boriouchkine, Tomi Lahti and Toni Oleander, Artificial Intelligence and Machine Learning in Process Industry

*keywords: machine learning, process optimization, OPC UA, industrial application*

50. Jukka K. Nurminen, Kari Rainio, Jukka-Pekka Numminen, Timo Syrjänen, Niklas Paganus and Karri Honkoila, Machine learning for object detection in legacy P&I diagrams

*keywords: object detection, machine learning, legacy data, P&I diagrams*

7. Pasi Ojala, Machine Learning for Intelligent Maintenance

*keywords: preventive maintenance, machine learning, predictive analytics*

44. Mika Kosonen, Eemeli Ruhanen, Sakari Kauvosaari and Chris Meintjes, Performance optimization of paste thickening at the Yara Siilinjärvi plant

*keywords: tailings, paste, thickening, optimization, model predictive control (MPC)*

43. Sakari Kauvosaari, Jani Kaartinen and Markus Torvinen, Performance optimization of copper flotation at the Boliden Kylylahti plant

*keywords: flotation, grade, recovery, process control, model predictive control (MPC)*

47. Anna-Mari Warttinen, Markus Harju, Satu Tamminen, Leena Määttä and Juha Röning, A tool for finding inclusion clusters in steel SEM specimens

*keywords: Data-driven manufacturing, automated decision support, steel cleanliness, inclusion cluster analysis*

15. Jari Ruuska, Riku-Pekka Nikula, Eemeli Ruhanen and Mika Kosonen, Data-analysis of paste thickener

*keywords: paste thickener, data-analysis, linear regression*

3. Mika Liukkonen, Philip O'Leary and Yrjö Hiltunen, Quality control of silicon wafers by spatial analysis of wafer maps

*keywords: quality control, wafer map, independent component analysis, spatial analysis, silicon wafer*

64. Francisco José Gómez, Matias Alarotu, Gerardo Santillán and Tommi Karhela, Online Life Cycle Assessment – Case Vinyl Acetate Monomer Process.

*keywords: life cycle assessment (LCA), online LCA, functional mock-up interface (FMI), vinyl acetate monomer, key performance indicator (KPI), control system*

55. Hannu Rummukainen, Jukka K. Nurminen, Timo Syrjänen and Jukka-Pekka Numminen, Optimization of Facility Layout on the Basis of Example Solutions

*keywords: optimization, facility layout problem, machine learning, constraint programming*

60. Esko Juuso, Expertise and uncertainty with fuzzy systems processing in automation

*keywords: fuzzy set systems, fuzzy arithmetics, domain expertise, uncertainty*

**12:20-14:00 Paneelikeskustelu: Tekoälyä pilvessä – tässäkö automaation tulevaisuus?**

**14:00-14:20 Kahvi & posterit / näyttely**

**14:20-15:40 Cloud and edge computing (A)**

**Steel and forest industry (B)**

**Safety (C)**

**5 A-B-C**

48. Mika Karaila, Automaation tulevaisuus – Tekoälyn ja ihmisen vuorovaikutuksia

*keywords: tekoäly, pilvipalvelut, koneoppiminen, paperikone, katkoherkkyys*

20. Timo Juhani Mantere, Janne Koljonen and Mingzhang Wu, Addressing Resource Allocation Issues in Cloud Computing Environment with Ant Colony Optimization

*keywords: ant colony optimization, cloud computing, cost-performance trade-off problem, resource allocation, Cloudsim*

51. Timo Korvola, Jari Lappalainen and Jukka K. Nurminen, Simulation-based optimization in the cloud

*keywords: simulation, optimization, cloud, evolutionary algorithms*

49. Jukka Koskinen, Petri Tikka and Hannu Tanner, Industrial IoT applications

53. Henna Tiensuu, Satu Tamminen, Olli Haapala and Juha Röning, Intelligent methods for root cause analysis behind the centerline deviation of the steel strip.

*keywords: smart decision support, data driven manufacturing, machine learning, steel strip rolling, gradient boosting methods (GBM)*

36. Art Valta, Mika Ruusunen and Kauko Leiviskä, Identification of flowability properties in saw dust derived from Pinus Sylvestris and Picea Abies – towards quality control of material flow in modern biorefineries

*keywords: biorefinery, powder flow, moisture, estimation, cold climate*

4. Mika Liukkonen, Jukka Silvennoinen and Yrjö Hiltunen, Machine learning tools for analyzing the quality of fiber-based corrugated medium

*keywords: fluting, corrugated medium, modelling, self-organizing map*

37. Heikki Hyyti, Juha Mäkelä, Antero Kukko and Harri Kaartinen, An integrated positioning and mapping sensor for forest machinery

23. Risto Tiusanen, Timo Malm and Ari Ronkainen, An overview of the safety requirements for autonomous machines

*keywords: autonomous work machine, safety requirements, safety concepts, risk assessment, standardization, systems engineering*

22. Eetu Heikkilä and Janne Sarsama, Reliability modeling in reliability-critical system development: case wave power

*keywords: industrial, reliability modeling, wave power, reliability block diagram*

69. Matti Huotari, Kari Määttä and Juha Röning, Photoplethysmography signal analysis to assess sauna exposure, arterial elasticity, and recovery

*keywords: arterial elasticity, photoplethysmography, pulse wave analysis, sauna exposure*

40. Janne Peltonen, Differences of nuclear qualified automation equipment in comparison to industrial safety automation equipment

*keywords: edge and fog computing, robotics,  
intralogistics, smart water management,  
Fiware*

*keywords: rotating multi-beam lidar (RMBL),  
inertial measurements, sensor fusion,  
calibration, point cloud, forestry*

*keywords: nuclear qualification, automation  
equipment, functional safety*

**15:50-16:10 Lopetuspuheenvuoro**

Oikeus muutoksiin pidetään. Esitysten laajennetut abstraktit (Extended Abstracts) löytyvät osoitteesta: [www.automaatioseura.fi/automaatiopaivat23/extendedabstracts](http://www.automaatioseura.fi/automaatiopaivat23/extendedabstracts)  
(Verkkosivulla toimivat haut esitelmän otsikon, kirjoittajan tai keywordsin mukaan.)

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