



EES-UETP

Electric Energy Systems - University Enterprise Training Partnership



EES UETP Course on
Co-Simulation of Energy and ICT Systems

Organized by
School of Electrical Engineering
KTH Royal Institute of Technology

Stockholm, Sweden

28th- 29th November 2013.



Course coordinators:

Professor Lars Nordström

Dr. Moustafa Chenine

Co-Simulation of Energy and ICT Systems

November 28th- 29th, 2013

at KTH Royal Institute of Technology, Stockholm, Sweden

Background

Co-Simulation based approaches are increasingly being utilized to develop, test and verify paradigms for next generation monitoring, control and operation of energy systems. The co-simulation approach usually involves the integration of two or more simulators to capture the cyber physical dependency of a process. The purpose of this course is to provide insight to the latest co-simulation methods and techniques as well as how they are being applied in various research fields in Energy systems.

Course Outline

Module 1: Introduction to Simulation and Co-Simulation (Day 1, 5.5 Hours)

9:00-10:30 Introduction to simulation and co-simulation processes and techniques (James Nutaro).

10:30-12:00 Introduction to distributed simulations and the High Level Architecture framework (Farshad Moradi).

12:00-12:45: Lunch

13:00-14:00 modeling of complex cyber-physical systems: concepts and methods (Peter Palensky).

15:30-17:00: Visit to ABB DC Grid Simulation Center in Västerås.

17:00-21:00 Social Program and Dinner

Module 2: Co-Simulation Methods and Technologies (Day 2, 6.5 Hours)

9:30-10:30 - ADEVS co-simulation platform (James Nutaro).

10:30-12:00 - i2Sim integration framework for multiple infrastructures co-simulation (Jose R. Marti).

12:00-12:45 – LUNCH

13:00-14:00 – ICT and Power System Co-simulation for the analysis of networked control strategies in distribution systems (Alberto Borghetti).

14:00-15:00 - Co-simulation for intelligent control systems – timing patterns (Kai Heussen)

15:00-15:30 – Break

15:30-16:30 Agent based control in smart grids using the Mosaik co-simulation framework (Sebastian Rohjans)

16:30-17:30 – The INSPIRE Co-Simulation: Using HLA for Co-Simulating Power System Dynamics, ICT and WAMPAC Systems (Sven C. Müller).

Target Participants

This course targets individuals in academia and industry that utilize co-simulation technologies as part of their research methodology or for building and evaluating robust industrial solutions in the power systems domain.

Course Instructors

James Nutaro is a member of the Modeling and Simulation Group in the Computational Sciences and Engineering Division at Oak Ridge National Laboratory. His research interests include discrete event and hybrid systems, parallel discrete event simulation, modeling methodologies, and event based numerical methods. This work covers a broad range of application domains, with particular emphasis on control systems operating over IP-based communication links, communication and control in electric power systems, simulating of large transportation systems, and modeling and simulation of wireless communication networks. James Nutaro has authored or coauthored over 25 papers in the open literature. He holds a B.S., M.S., and Ph.D. in computer engineering from the University of Arizona. Is a member of the IEEE and Society for Computer Simulation International, and serves as an associate editor for ACM TOMACS and SIMULATION.

Farshad Moradi is the program manager in the area of Modelling and Simulation at the Swedish Defense Research Agency (FOI). He has been working on modelling and simulation for more than 17 years. He holds a Master of Science in Computer Science and Engineering from Chalmers University of Technology, Gothenburg, Sweden, and a PhD in Distributed Simulations from the Royal Institute of Technology (KTH). His research interests are in the areas of Distributed Systems, Component-based Modelling and Simulation, Group Behavior Modelling, and Embedded Simulations Systems.

Peter Palensky is Principal Scientist at the AIT Austrian Institute of Technology / Energy Department. Before that he was Head of Business Unit "Sustainable Building Technologies" at the AIT, CTO of Envidatec Corp., Hamburg, Germany, Associate Professor at the University of Pretoria, South Africa, Department of Electrical, Electronic and Computer Engineering, University Assistant at the Vienna University of Technology, Austria, and researcher at the Lawrence Berkeley National Laboratory, California. He is active in international committees like ISO, IEEE and CEN. His main research fields are complex energy systems and intelligent buildings.

Jose R. Marti is a Professor in the Department of Electrical and Computer Engineering of the University of British Columbia, Canada. He is known for his work in real time simulation of large power system networks. He is a Fellow of the Institute of Electrical and Electronics Engineers, a Fellow of the Canadian Academy of Engineering and a registered Professional Engineer in the Province of British Columbia. He is the leader of UBC's Complex Systems Integration Laboratory developing real time simulation tools for optimization and decision support in multi-layered physical and human systems. Current work includes the development of a system of systems simulator i2Sim that integrates the interdependencies among multiple critical infrastructures (power, water, ICT, etc.). This work is currently being applied to disaster response coordination and operation and control of smart power distribution networks.

Alberto Borghetti received the electrical engineering degree (Hons.) from the University of Bologna, Bologna, Italy, in 1992. Since then, he has been with the Power System Group and the University of Bologna, initially as a Researcher and, since 2004, as an Associate Professor of electric power systems.

His main research interests are power system analysis, with particular reference to voltage collapse, power system restoration after black-out, electromagnetic transients, optimal generation scheduling, and distribution system operation. Since 2010, he serves as an editor of the IEEE Transactions on Smart Grid.

Kai Heussen is Assistant Professor in Automation and Power Systems at the Department of Electrical Engineering at the Technical University of Denmark (DTU). He received his Dipl.Ing. in Engineering Cybernetics from the University of Stuttgart in 2007 and graduated with a PhD degree from DTU in 2011. He is currently engaged in teaching Intelligent Systems and several research projects on demand side management, modeling and control structure design. He also leads the Danish project RTLabOS aiming at identifying architectural patterns for the next generation of integrated smart grid lab testing and simulation infrastructure.

Sebastian Rohjans is a senior scientist at OFFIS – Institute for Information Technology focusing on interoperability aspects for automation systems in distribution grids. Further focal topics of his work are simulation frameworks, data modeling, and ICT-architecture development for future energy systems. The application of ICT-standards such as the Common Information Model (CIM), IEC 61850, and the OPC Unified Architecture is a cross-cutting key point of his overall work. In 2012 he received the PhD degree from the University of Oldenburg for his research dealing with “Semantic Service Integration for Smart Grids”. Since 2013, Dr. Rohjans is manager of the R&D group “Simulation and Automation of Complex Energy Systems”.

Sven C. Müller is a Research Associate at the Institute of Energy Systems, Energy Efficiency and Energy Economics (ie³) at TU Dortmund University. Currently he is the project leader of research unit FOR1511 “Protection and Control Systems for Reliable and Secure Operation of Electrical Transmission Systems” of the German Research Foundation (DFG). His focus of research is set on modeling and simulation of power systems, wide-area monitoring, protection and control systems and electricity markets. He received a diploma degree in industrial engineering and management at TU Dortmund University, Germany, and a Master of Science in Industrial Engineering at the Georgia Institute of Technology, Atlanta, USA.

Registration

Cost

250 Euro for attendees coming from EES-UETP partner institutions.

500 Euro for attendees coming from EES-UETP partner institutions with reduced fee.

600 Euro for attendees coming from non-member universities of the EES-UETP.

1000 Euro for attendees coming from non-member industries of the EES-UETP.

The course fees will include lectures, documentation, coffee breaks and lunches.

Registration and Payment procedure

Your registration is sent as an email to Annica Johannesson at KTH at Annica.Johannesson@ics.kth.se by November 10th 2013. After we have received your registration we will send you an invoice that should be paid before November 22nd. If you have any specific requirements regarding the information on the invoice, please make a note of this on your application.

There is a limit of **26 places** for the course. A first-come-first-served principle will be used.

Cancellation policy

Notifications should be sent in writing to the course coordinator. Cancellations received later than one week before the course will not be refunded.

Location and Travel Information

The course will take place at the:

Department for Industrial Information and Control Systems (ICS),
School of Electrical Engineering, KTH
Osquldas väg 10-12, 7th floor.
SE 100 44 Stockholm

For further details see <http://www.kth.se/ees/omskolan/organisation/avdelningar/ics/contact> and map below that shows the location of Osquldas väg 10 on the KTH Campus



You can get to KTH from Arlanda Airport directly with a taxi. It will take around 30 minutes and cost about 500 SEK.

Alternatively, via Stockholm Central Station from Arlanda:

By Airport coach (40 minutes): <http://www.flygbussarna.se/>

By Express train: (20 minutes): www.arlandaexpress.se

At the Central station switch to the Subway (Tunnelbana). If travelling by subway, go to the station Tekniska Högskolan Station (red line towards Mörby Centrum from T-Centralen). Exit the subway towards Östra Station and walk up Drottning Kristinas väg for approximately five minutes.

Accommodation

We generally recommend following hotels for participants:

Elite Hotel Arcadia (very close to KTH campus, 5 minute walk)

Körsbärsvägen1

114 23 STOCKHOLM

Phone: 0046 771-78 87 89

Web: www.elite.se/sv/hotell/stockholm/arcadia

Scandic Hotel Park (Close to KTH campus and city)

Karlavägen 43

114 31 STOCKHOLM

Phone: 0046 851- 75 17 00

Web: www.scandic.se

3: Crystal Plaza Hotel (Central location in the city)

Birger Jarlsgatan 35

111 45 STOCKHOLM

Phone: 0046 840- 68 8 00

Web: www.crystalplazahotel.se

Registration Form for Participants

Please fill out and send the following form (or equivalent information) to the course secretariat :

Annica Johannesson

Email: annica.johannesson@ics.kth.se

Phone: 0046 8790 6930

Any queries regarding payment should also be sent to the above address.

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|-------------------------------|---|
| Participant Name | |
| Organization Name | |
| Organization Type | University: Company: |
| EES- UETP membership | Yes: No: |
| Participant Position | |
| Participant main job function | |
| Address | |
| Phone | |
| Fax | |
| Email | |
| Fees to be paid | |
| signature | |

Course Organizers, Secretariat and Contact Information

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