FORCES
FOUNDATIONS OF RESILIENT CYBER-PHYSICAL SYSTEMS

Annual Review
November 13-14, 2014
Westin Georgetown, Washington, D.C.

TIME	*TOPIC*
Thursday, November 13, 2014	
0730– 0830	**BREAKFAST**
0830 – 0915	Welcome and Overview *Shankar Sastry (Berkeley); Larry Rohrbough (Berkeley)*
Modeling for Resilience	
0915 – 0945	Resilience Modeling and Model-Based Design for CPS *Gabor Karsai (Vanderbilt)*
0945 – 1015	Network Neutrality and CPS *Galina Schwartz (Berkeley)*
1015 – 1030	**BREAK**
1030 – 1100	A Supervisory Control Approach to Dynamic Cyber-Security *Demos Teneketzis (Michigan)*
1100 – 1130	Progress Towards System-Security Co-Design *Janos Sztipanovits (Vanderbilt)*
1130 – 1230	**LUNCH**
Operating Through Attacks (Part 1)	
1230 – 1300	Resilient Monitoring and Control Algorithms for Distribution Networks *Saurabh Amin (MIT)*
1300 – 1330	Resilient Monitoring of CPS in the Presence of Faults and Adversarial Attacks *Xenofon Koutsoukos (Vanderbilt)*
FORCES Young Researcher Presentations	
1330 – 1445	"Speed" Poster Previews (5 minutes each)
1445 – 1500	**BREAK**
Defenses and Economic Incentives	
1500 – 1530	Attack Surface Analysis and Program Hardening of CPS Systems *Chao Zhang (Berkeley); Dawn Song (Berkeley)*
1530 – 1600	Risk-Limiting Dynamic Contracts for Direct and Indirect Load Control *Insoon Yang (Berkeley); Claire Tomlin (Berkeley)*
1600 – 1630	Effects of Risk on Privacy Contracts for Demand-Side Management *Lillian Ratliff (Berkeley)*
FORCES Education and Outreach	
1630 - 1730	*Aimée Tabor (Berkeley); Saurabh Amin (MIT)*
1730	**POSTER SESSION AND RECEPTION**

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TIME	*TOPIC*
Friday, November 14, 2014	
0800 - 0900	**BREAKFAST**
0900 – 1000	Smart Grid Demonstration Results and Emerging Challenges for the Grid *Matt Wakefield (EPRI)*
1000 - 1015	**BREAK**
Operating Through Attacks (Part 2)	
1015 – 1045	Modeling and Mitigating Disruptions in Networked, Multi-Agent CPS *Hamsa Balakrishnan (MIT)*
1045 – 1115	Robust Convergence of Distributed Routing with Heterogeneous Population Dynamics *Walid Krichene (Berkeley); Alex Bayen (Berkeley)*
1115 – 1200	Scientific Value of FORCES *Saurabh Amin (MIT)*
1200	**Wrap-Up / End of Meeting (Box Lunch Provided)**
1200 – 1230	NSF / Advisory Board Caucus
1230 – 1300	NSF / Advisory Board Outbrief

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"Smart Grid Demonstration Results and Emerging Challenges for the Grid"

Matt Wakefield
Director
Information, Communications and Cyber Security
Power Delivery and Utilization

Abstract
This presentation will include a summary of results from the EPRI Smart Grid Demonstration Initiative - a seven-year collaborative research effort (2007-2014) to design, deploy, and evaluate the integration of distributed energy resources (DER) into utility grid and market operations. The Initiative has leveraged multi-million dollar investments in the Smart Grid by the electric utility industry with the goal of sharing information and research results on a wide range of smart grid technologies and applications. This collaborative research provides individual utilities with insights on real-world performance of methodologies, tools, and proposed standards—and unbiased assessments of technologies for implementing new system-wide smart grid implementations. Twenty-four utilities from Australia, Canada, France, Ireland, Japan and the United States have collaborated in the EPRI Smart Grid Demonstration Initiative. The key takeaways are available in the Smart Grid Demonstration Initiative Final Update, which features briefs of 48 case studies produced in 2012-2014.

Biography


Matt Wakefield is Director of Information, Communication and Cyber Security (ICCS) research at the Electric Power Research Institute (EPRI). His responsibilities include furthering the development of a modernized grid with a strong focus on leveraging emerging information and communication technologies that can be applied to the electric grid infrastructure. The research focus is on enabling advanced applications through standards, communication technology, integration architectures, cost benefit analysis and addressing cyber threats to an interconnected system as well as practical demonstrations like the 7-year Smart Grid Demonstration initiative integrating DER, as well as demonstrations on Data Analytics, Field Area Network Communications, Automatic Demand Response and similar projects.

Wakefield started his career in 1986 in the United States Navy serving as a Nuclear Power Plant Reactor Operator and Engineering Supervisor in the Submarine Fleet and specializing in electronic instrumentation and controls. Wakefield then joined Wisconsin Public Service Corp. (WPS) at the Kewaunee Nuclear Plant before becoming Manager of the Applied Technology group at Integrys Energy Group, the holding company of WPS. At Integrys, he focused on developing and applying information and communication technologies related to low-cost, real-time energy-related information transfer between control centers, generators, markets, and consumers utilizing open-source software and low-cost embedded hardware while leveraging the Internet for the communication infrastructure.

Wakefield received his Bachelor of Science degree in technology management from the University of Maryland University College.

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FORCES All Hands Meeting

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Young Researchers Presentations

Maximilian Balandat (University of California, Berkeley)

- Frequency Regulations by Aggregations of Buildings

Sam Burden (University of California, Berkeley)

- Metrization, Simulation, and First–Order Approximation for Networked CPS

Roy Dong (University of California, Berkeley)

- Blind System Identification via Lifting

Aron Laszka (Vanderbilt University)

- Resilient CPS Monitoring

Devendra Shelar (MIT)

- Vulnerability Assessment of Electricity Distribution Networks

Lina Sela (MIT)

- Multidimensional Control of Water Networks: Geometric Programming Approach

Hamid Tavafoghi (Michigan)

- Multi-Dimensional Forward Contracts under Uncertainty for Electricity Markets