

James Weimer

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ACADEMIC APPOINTMENTS

Research Assistant Professor

Aug. 2016 - present

Department of Computer and Information Science
School of Engineering and Applied Sciences
University of Pennsylvania, *Philadelphia, PA*

Postdoctoral Researcher

Nov. 2012 - Jul. 2016

Department of Computer and Information Science
School of Engineering and Applied Sciences
University of Pennsylvania, *Philadelphia, PA*
Mentor: Prof. Insup Lee

Postdoctoral Researcher

Nov. 2010 - Nov. 2012

Department of Automatic Control
School of Electrical Engineering
KTH Royal Institute of Technology, *Stockholm, Sweden*
Mentor: Prof. Karl Henrik Johansson

EDUCATION

Ph.D. in Electrical and Computer Engineering

2010

Carnegie Mellon University, *Philadelphia, PA*
Dissertation: "Large-Scale Multi-Source Detection Using Wireless Sensor Networks"
Co-advisors: Prof. Bruce H. Krogh and Prof. Bruno Sinopoli

M.S. in Electrical and Computer Engineering

2007

Carnegie Mellon University, *Philadelphia, PA*
Thesis: "Modeling and Implementation of Mode Switching with Application to Failure Analysis in Steer-by-Wire Systems"
Advisor: Prof. Bruce H. Krogh

B.S. in Electrical Engineering

2005

Purdue University, *West Lafayette, IN*

RESEARCH INTERESTS

Cyber-Physical Systems; Medical Cyber-Physical Systems; Security of Cyber-Physical Control Systems; Fault-Detection and Diagnostics; High-confidence Control Systems; Embedded and Distributed/Networked Control; Real-time Signal Processing.

JOURNAL PUBLICATIONS

1. Sanjian Chen, Oleg Sokolsky, James Weimer, and Insup Lee. "Data-driven Adaptive Safety Monitoring using Virtual Subjects in Medical Cyber-Physical Systems: A Glucose Control Case Study." *Journal of Computing Science and Engineering*, (to appear).
2. Miroslav Pajic, James Weimer, Nicola Bezzo, Oleg Sokolsky, George J. Pappas, and Insup Lee. "Design and Implementation of Attack-Resilient Cyber Physical Systems." *IEEE Control Systems Magazine*, (to appear).
3. Sanjian Chen, James Weimer, Michael R. Rickels, Amy Peleckis, and Insup Lee. "Physiology-Invariant Meal Detection for Type I Diabetes." *Diabetes Technology and Therapeutics*, (to appear).
4. Radoslav Ivanov, James Weimer, Allan Simpao, Mohamed Rehman, and Insup Lee. "Prediction of Critical Pulmonary Shunts in Infants." *IEEE Transactions on Control Systems Technology*, (to appear).
5. James Weimer, Radoslav Ivanov, Alexander Roederer, Sanjian Chen, and Insup Lee. "Parameter Invariant Design of Medical Alarms." *IEEE Design and Test*, 2015.
6. James Weimer, Bruce H. Krogh, Mitchell Small, and Bruno Sinopoli. "An Approach to Leak Detection Using Wireless Sensor Networks at Carbon Sequestration Sites." *International Journal of Greenhouse Gas Control*, 2012.

BOOK CHAPTERS

1. James Weimer, Jose Araujo, Mani Amoozadeh, Seyed Alireza Ahmadi, Henrik Sandberg, and Karl Henrik Johansson. "Parameter-Invariant Actuator Fault Diagnostics in Cyber-Physical Systems with Application to Building Automation." *Lecture Notes in Control and Information Sciences: Control of Cyber Physical Systems*, vol. 449, pp. 179-196, 2013.
2. James Weimer, Nicola Bezzo, Miroslav Pajic, George J. Pappas, Oleg Sokolsky, and Insup Lee. "Resilient Parameter-Invariant Control with Application to Vehicular Cruise Control." *Lecture Notes in Control and Information Sciences: Control of Cyber Physical Systems* vol. 449, pp. 197-216, 2013.

CONFERENCE PUBLICATIONS

1. Minsu Jo, Junkil Park, Yungmi Baek, Radoslav Ivanov, James Weimer, Sanghyuk Son, and Insup Lee. "Adaptive Transient Fault Model for Sensor Attack Detection." *Cyber-Physical Systems, Networks, and Applications (CPSNA)*, 2016 (to appear).
2. Nicola Bezzo, James Weimer, Yanwei Du, Oleg Sokolsky, Sang H. Son, and Insup Lee. "A Stochastic Approach for Attack Resilient UAV Motion Planning." *American Control Conference (ACC)*, 2016.
3. Radoslav Ivanov, Nikolay Atanasov, James Weimer, Miroslav Pajic, Allan Simpao, Mohamed Rehman, George J. Pappas, and Insup Lee. "Estimation of Blood Oxygen Content Using Context-Aware Filtering." *ACM/IEEE International Conference of Cyber Physical Systems (ICCPS)*, 2016.
4. Sanjian Chen, Mathew O'Kelly, James Weimer, Oleg Sokolsky, and Insup Lee. "An Intraoperative Glucose Control Benchmark for Formal Verification." *5th IFAC Conference on Analysis and Design of Hybrid Systems (ADHS)*, 2015.
5. Alexander Roederer, James Weimer, Joseph Dimartino, Jacob Gutsche, and Insup Lee. "Robust Monitoring of Hypovolemia in Intensive Care Patients Using Photoplethysmogram Signals." *37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, 2015.
6. Sanjian Chen, James Weimer, Michael R. Rickels, Amy Peleckis, and Insup Lee. "Towards a Model-Based Meal Detector for Type I Diabetics." *6th Medical Cyber-Physical Systems Workshop (MedicalCPS)*, 2015.
7. Alexander Roederer, James Weimer, Joseph Dimartino, Jacob Gutsche, and Insup Lee. "Towards Non-Invasive Monitoring of Hypovolemia in Intensive Care Patients." *6th Medical Cyber-Physical Systems Workshop (MedicalCPS)*, 2015.
8. Radoslav Ivanov, James Weimer, Allan Simpao, Mohamed Rehman, and Insup Lee. "Early Detection of Critical Pulmonary Shunts in Infants." *ACM/IEEE International Conference of Cyber Physical Systems (ICCPS)*, 2015. (Best Paper Award Finalist)
9. Junkil Park, Radoslav Ivanov, James Weimer, Miroslav Pajic, and Insup Lee. "Sensor Attack Detection in the Presence of Transient Faults." *International Conference of Cyber Physical Systems (ICCPS)*, 2015.
10. Nicola Bezzo, James Weimer, Miroslav Pajic, Oleg Sokolsky, George J. Pappas, and Insup Lee. "Attack Resilient State Estimation for Autonomous Robotic Systems." *Intelligent Robots and Systems (IROS)*, 2014.
11. James Weimer, Oleg Sokolsky, Nicola Bezzo, and Insup Lee. "Towards Assurance Cases for Resilient Control Systems." *Cyber-Physical Systems, Networks, and Applications (CPSNA)*, 2014.
12. James Weimer, Nicola Bezzo, Miroslav Pajic, Oleg Sokolsky, and Insup Lee. "Attack-Resilient Minimum Mean-Squared Error Estimation." *American Control Conference (ACC)*, 2014.
13. Miroslav Pajic, James Weimer, Nicola Bezzo, Paulo Tabuada, Oleg Sokolsky, Insup Lee, and George J. Pappas. "Robustness of Attack-Resilient State Estimators." *ACM/IEEE International Conference of Cyber Physical Systems (ICCPS)*, 2014. (Best Paper Award)
14. Miroslav Pajic, Nicola Bezzo, James Weimer, Rajeev Alur, Rahul Mangharam, Nathan Michael, George J. Pappas, Oleg Sokolsky, Paulo Tabuada, Stephanie Weirich, and Insup Lee. "Towards

Synthesis of Platform-Aware Attack-Resilient Control Systems." *2nd ACM International Conference on High Confidence Networked Systems (HiCoNS)*, 2013.

15. James Weimer, Damiano Varagnolo, and Karl Henrik Johansson. "Distributed Model-Invariant Detection of Unknown Inputs in Networked Systems." *2nd ACM International Conference on High Confidence Networked Systems (HiCoNS)*, 2013.
16. James Weimer, Damiano Varagnolo, Miroslav Stankovic, and Karl Henrik Johansson. "Parameter-Invariant Detection of Unknown Inputs in Networked Systems." *52nd Annual Conference on Decision and Control (CDC)*, 2013.
17. James Weimer, Seyed Alireza Ahmadi, Jose Araujo, Francesca Madia Mele, Dario Papale, Iman Shames, Henrik Sandberg, and Karl Henrik Johansson. "Active Actuator Fault Detection and Diagnostics in HVAC Systems." *4th ACM Workshop on Embedded Sensing Systems for Energy-Efficiency in Buildings (BuildSys)*, 2012.
18. James Weimer, Yuzhe Xu, Carlos Fischione, Karl Henrik Johansson, Per Ljungberg, Craig Donovan, Ariana Sutor, and Lennart Fahlen. "A Virtual Laboratory for Micro-Grid Information and Communication Infrastructures." *3rd IEEE PES Innovative Smart Grid Technologies in Europe Conference (ISGT-Europe)*, 2012.
19. James Weimer, Jose Araujo, and Karl Henrik Johansson. "Distributed Event-Triggered Estimation in Networked Systems," *4th IFAC conference on Analysis and Design of Hybrid Systems (ADHS)*, 2012.
20. James Weimer, Soumya Kar, and Karl Henrik Johansson. "Distributed Detection and Isolation of Topology Attacks in Power Networks." *1st ACM International Conference on High Confidence Networked Systems (HiCoNS)*, 2012.
21. James Weimer, Jose Araujo, Aitor Hernandez, and Karl Henrik Johansson. "Periodic Constraint-Based Control Using Dynamic Wireless Sensor Scheduling." *IEEE Conference on Decision and Control (CDC)*, 2011.
22. Kin Cheong Sou, James Weimer, Henrik Sandberg, and Karl Henrik Johansson. "Scheduling Smart Home Appliances Using Mixed Integer Linear Programming." *IEEE Conference on Decision and Control (CDC)*, 2011.
23. James Weimer, Bruno Sinopoli, and Bruce H. Krogh. "Multiple Source Detection and Localization in Advection-Diffusion Processes Using Wireless Sensor Networks." *IEEE Real-Time Systems Symposium (RTSS)*, 2009.
24. James Weimer, Bruno Sinopoli, and Bruce H. Krogh. "A Relaxation Approach to Dynamic Sensor Selection in Large-Scale Wireless Networks." *IEEE International Conference on Distributed Computing Systems (ICDCS)*, 2008.
25. James Weimer and Bruce H. Krogh. "Hierarchical Modeling of Mode-Switching Systems." *Summer Computer Simulation Conference (SCSC)*, 2007.
26. Summit Jha, Bruce H. Krogh, James Weimer, and Edmund Clarke. "Reachability for Linear Hybrid Automata Using Iterative Relaxation Abstraction." *Hybrid Systems : Computation and Control (HSCC)*, 2007.

DEMONSTRATIONS AND TUTORIALS

1. James Weimer, Oleg Sokolsky, and Insup Lee. "Tutorial Abstract: Parameter-Invariant Monitor Design for Cyber-Physical Systems." *Cyber Physical Systems Week (CPSweek)*, 2016. (accepted)
2. James Weimer, Oleg Sokolsky, and Insup Lee. "Tutorial Abstract: Robust Medical Monitor Design." *International Conference on Health Care Informatics (ICHI)*, 2015.
3. James Weimer, Oleg Sokolsky, and Insup Lee. "Tutorial Abstract: Parameter-Invariant Monitor Design for Cyber-Physical Systems." *Embedded Systems Week (ESweek)*, 2015.
4. Miroslav Pajic, Nicola Bezzo, James Weimer, Oleg Sokolsky, George J. Pappas, Paulo Tabuada, and Insup Lee. "Demo Abstract: Synthesis of Platform-Aware Attack-Resilient Vehicular Systems." *International Conference of Cyber Physical Systems (ICCPS)*, 2013.

HONORS & AWARDS

Best Paper Award Finalist 2015
6th ACM/IEEE International Conference on Cyber-Physical Systems (**ICCPS'15**) for the paper "*Early Detection of Critical Pulmonary Shunts in Infants*"

Best Paper Award 2014
5th ACM/IEEE International Conference on Cyber-Physical Systems (**ICCPS'14**) for the paper "*Robustness of Attack-Resilient State Estimators*"

TEACHING EXPERIENCE

- Instructor, KTH Royal Institute of Technology, *Stockholm, SE* Summer 2011, Summer 2012
EIT ICT Smart Energy Summer School
Co-designed curriculum, co-organized event, judged final project competition.
- Teaching Assistant, Carnegie Mellon University, *Pittsburgh, PA* Spring 2006, Spring 2007
ECE 18-474 - Embedded Control Systems
Co-developed laboratory curriculum employing haptic feedback devices, MPC555 micro-controllers, and auto-code generation from Matlab/Simulink ; assisted in preparing and grading exams.
- Instructor, Purdue University, *West Lafayette, IN* Fall 2004, Spring 2005
ECE 308 - Systems Simulation and Control Laboratory
Co-Instructed laboratory-based controls course featuring the Comdyna GP-6 analog computer.
- Teaching Assistant, Purdue University, *West Lafayette, IN* Fall 2003, Spring 2004
ECE 264 - Advanced C Programming
Graded homework and exams.

PROFESSIONAL EXPERIENCE

- **Research Assistant** June 2007 - May 2010
ECE Department, Carnegie Mellon University, *Pittsburgh, PA*.
Research on large-scale multi-source detection using wireless sensor networks.
- **Research Assistant** August 2005 - May 2007
ECE Department, Carnegie Mellon University, *Pittsburgh, PA*.
Research on modeling and implementation of mode switching with application to failure analysis in steer-by-wire systems.
- **Electrical Engineer** June 2005 - August 2005
Delphi Electronics and Safety, Delphi Automotive, *Kokomo, IN*.
System monitoring – designed a multi-channel SPI-bus monitoring tool.
- **Electrical Engineer** June 2004 - August 2004
Delphi Electronics and Safety, Delphi Automotive, *Kokomo, IN*.
System validation – designed and verified component models.

PROFESSIONAL SERVICE

Technical Program Committees

- ACM/IEEE International Conference on Cyber Physical Systems, (**ICCPs 2016**)
- International Symposium on Signal Processing Applications in Buildings, (**GlobalSIP 2015**)
- EIT ICT Labs Workshop on Smart Grid Security, (**SmartGridSec 2012**)

Journal Reviewer

- ACM Transaction on Cyber-Physical Systems
- IEEE Transactions on Automatic Control
- Automatica
- IEEE Transactions on Control Systems Technology
- IEEE Transactions on Neural Networks and Learning Systems

Conference Reviewer

ACM/IEEE International Conference on Cyber-Physical Systems (**ICCPs 2014-2016**); IEEE Conference on Decision and Control (**CDC 2009 - 2015**); American Control Conference (**ACC 2009 - 2015**); ACM International Conference on Hybrid Systems: Computation and Control (**HSCC 2016**); International Conference on Runtime Verification (**RV 2013, 2014**); Conference on High Confidence Networked Systems (**HiCoNS 2012 - 2014**);

Panelist and Session Chair

- American Control Conference, *Portland, Oregon*, 2014. session on Estimation.

Government Activities

- NSF Panelist: CPS 2015

FUNDING

Current:

- *Frontier: Collaborative Research: Rigorous Design and Development of Closed-Loop Medical CPS*
National Science Foundation, CPS program
co-PI: James Weimer
(under review)

Past:

- Smart Energy Systems — Virtual Smart Grid Lab
European Institute of Technology (EIT) Information and Communication Technology (ICT) Lab
co-PI: James Weimer
70k €; 2011 - 2012
- Smart Energy Systems — Business Value and Business Modeling
European Institute of Technology (EIT) Information and Communication Technology (ICT) Lab
co-PI: James Weimer
21k €; 2011 - 2012
- Smart Energy Systems — Networked Smart Energy Systems Security
European Institute of Technology (EIT) Information and Communication Technology (ICT) Lab
co-PI: James Weimer
23k €; 2012

CITIZENSHIP AND IMMIGRATION STATUS

US citizen