

**Jin Kocsis (Jin Wei)**


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Assistant Professor

Department of Electrical and Computer Engineering

Auburn Science and Engineering Center, Room 554

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**Research Interests**

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- Cyber-physical security.
  - Biologically inspired intelligent system design.
  - Renewable energy system integration and Smart Grid.
  - Real-time multi-target tracking.
  - Cooperative spectrum sensing in cognitive radio networks.

**Education**


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Ph.D.	Department of Electrical & Computer Engineering, University of Toronto
	Specialization: Cyber-Physical Security of Smart Power Grids
	Completion: April 2014
M.S.	Department of Electrical Engineering, University of Hawaii at Manoa
	Specialization: Signal Processing in Wireless Sensor Networks
	Completion: August 2008
B.E.	Department of Electronic Information Engineering, Beihang University
	Specialization: Electrical Engineering,
	Completion: July 2004

**Employment Experience**


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<u>Position Held</u>	<u>Institution/Company</u>	<u>Department</u>	<u>Period</u> (mm/yy)
Assistant Professor	University of Akron	Electrical & Computer Engineering	08/14 - present
Postdoctoral Research Fellow	National Renewable Energy Laboratory (NREL)	Energy Systems Integration Facility (ESIF)	04/14 – 07/14

**Professional Memberships**

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- IEEE (student member; Power & Energy and Communications Societies).

## **Selected Awards**

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- Best Paper Award Finalist (2012) at Canadian Conference on Electrical and Computer Engineering (CCECE) for paper entitled “On the Use of Cyber-Physical Hierarchy for Smart Grid Security and Efficient Control”.

## **Research Experience**

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Assistant Professor, University of Akron, August 2014 to present.

- Developing the Intelligent Cyber-Physical System-of-Systems Technology.
- Laying Out a Roadmap for Next-Generation Renewable Energy Systems.

Postdoctoral Research Fellow, National Renewable Energy Laboratory (NREL), April 2014 to July 2014.

- Development, Modeling and Design of Cyber-Physical Integrated Renewable Energy Systems:
  - Developing the theoretical foundations and archetypes for optimal planning and operations of cyber-physical integrated renewable energy systems.
  - Modeling and design of the Cyber-Physical integrated Transmission-Distribution-End-Use large-scale High Performance Computer (HPC)-based testbed.

Research Assistant, University of Toronto/Texas A&M University, August 2008 to April 2014.

- Modeling and Design of Real-Time Cyber-Physical Integrated Communication and Control Strategies for Intelligent Microgrids:
  - Development of bio-inspired real-time dynamic security maintenance for autonomous Microgrids in emergent situation.
  - Design of optimal game theoretic security strategy for Microgrids in emergency mode.
  - Analysis of intelligent integration of distributed energy storage sources and renewable energy sources into Microgrids for security purposes.
- Development of Hierarchical Dynamic Systems Paradigm for Cyber-Physical Integrated Communication and Control Framework in Wide-Area Smart Energy System:
  - Development of the cyber-physical integrated dynamical systems paradigm for smart energy systems.
  - Analysis and enhancement of cyber-physical security in wide-area smart energy systems under potential cyber and physical attacks, such as DoS attack and false data injection attack.
  - Design of a secure smart grid communication infrastructure.
- Development of Secure Compressive Spectrum Sensing Techniques for Wireless Cognitive Radio Networks:
  - Development of a hierarchical optimal-cooperation based secure distributed spectrum sensing technique for wireless cognitive radio networks.
  - Design of a spatial-spectral joint compressive spectrum sensing scheme for wireless cognitive radios.
- Development of Fault-Tolerant Distributed Information Processing Techniques in Wireless Visual Sensor Networks:
  - Development of a secure mobile multi-target tracking technique in wireless visual sensor networks.
  - Design of an adaptive control and reconfiguration scheme of mobile wireless visual sensor networks for

dynamic multi-target tracking.

Research Assistant, University of Hawaii at Manoa, July 2006 to August 2008.

- Development of Statistical Signal Processing Techniques in Wireless Sensor Networks:
  - Development of energy and bandwidth efficient multi-target tracking technique in a two-tier hierarchical wireless sensor network.
- Design of Commercial Aircrafts Health Management and Fault Diagnosis Systems:
  - Development of a feature-based data analysis scheme for condition-based diagnostics and prognostics.

## **Publications**

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### Refereed Book Chapter

- [BC1] J. Wei and D. Kundur, "A Biologically Inspired Hierarchical Cyber-Physical Integrated Security Analysis Framework For Smart Grids," invited by, Cyber Physical Systems Approach to Smart Electric Power Grid, Springer-Verlag Inc., 2014.

### Refereed Journal Articles

- [J2] J. Wei, D. Kundur and K. Butler-Purpy, "A Novel Bio-Inspired Technique for Rapid Real-Time Generator Coherency Identification," to appear in, *IEEE Transactions on Smart Grid*, 2014.
- [J1] J. Wei, D. Kundur, T. Zourntos and K. Butler-Purpy, "A Flocking-Based Paradigm for Hierarchical Cyber-Physical Smart Grid Modeling and Distributed Control," to appear in, *IEEE Transactions in Smart Grid*, 2014.

### Refereed Conference Papers

- [C20] A.K. Farraj, E.M. Hammad, J. Wei, D. Kundur, and K.L. Butler-Purpy, "Performance of Flocking-Based Control Schemes in Smart Grid Applications," *GlobalSIP14*, Atlanta, Georgia, December 2014.
- [C19] A.K. Farraj, E.M. Hammad, J. Wei, D. Kundur, and K.L. Butler-Purpy, "Performance Evaluation of Flocking-Based Distributed Cyber-Physical Control for Smart Grid," *Proc. IEEE International Conference on Smart Grid Communications*, Venice, Italy, November 2014.
- [C18] J. Wei and D. Kundur, "A Multi-Flock Approach to Rapid Dynamic Generator Coherency Identification," *Proc. IEEE Power & Energy Society General Meeting*, Vancouver, Canada, July 2013.
- [C17] J. Wei and D. Kundur, "A Flocking-Based Model for DoS-Resilient Communication Routing in Smart Grid," *Proc. IEEE Global Communications Conference (GLOBECOM)*, Anaheim, CA, December 2012.
- [C16] J. Wei, D. Kundur, T. Zourntos, and K.L. Butler-Purpy, "Probing the Telltale Physics: Towards a Cyber-Physical Protocol to Mitigate Information Corruption in Smart Grid Systems," *Proc. IEEE*

- [C15] J. Wei and D. Kundur, "Two-Tier Hierarchical Cyber-Physical Security Analysis Framework for Smart Grid," *Proc. IEEE Power & Energy Society General Meeting*, San Diego, CA, July 2012.
- [C14] J. Wei, D. Kundur, T. Zourntos and K.L. Butler-Purry, "A Flocking-Based Dynamical Systems Paradigm for Smart Power System Analysis," *Proc. IEEE Power & Energy Society General Meeting*, San Diego, CA, July 2012.
- [C13] J. Wei, D. Kundur and T. Zourntos, "On the Use of Cyber-Physical Hierarchy for Smart Grid Security and Efficient Control," *Proc. IEEE Canadian Conference on Electrical & Computer Engineering (CCECE)*, Montreal, Canada, April-May 2012. **Best student paper award finalist.**
- [C12] J. Wei and X. Zhang, "Multiple Visual-Targets Tracking in Decentralized Wireless Camera Sensor Networks," *Proc. IEEE Military Communications Conference (MILCOM)*, San Jose, CA, October 2010.
- [C11] J. Wei and X. Zhang, "Distributed Secure Compressive Spectrum Sensing in Wireless Cognitive Radio Networks," *Proc. IEEE Military Communications Conference (MILCOM)*, San Jose, CA, October 2010.
- [C10] J. Wei and X. Zhang, "Decentralized Sensor-Coordination Optimization for Mobile Multi-Target Tracking in Wireless Sensor Networks," *Proc. IEEE Global Communications Conference (GLOBECOM)*, Miami, FL, December 2010.
- [C9] J. Wei and X. Zhang, "Energy-Efficient Distributed Spectrum Sensing for Wireless Cognitive Radio Networks," *Proc. IEEE INFOCOM Workshop on Cognitive Wireless Communications and Networking*, San Diego, CA, March 2010.
- [C8] J. Wei and X. Zhang, "Two-Tier Optimal-Cooperation Based Secure Distributed Spectrum Sensing for Wireless Cognitive Radio Networks," *Proc. IEEE INFOCOM Workshop on Cognitive Wireless Communications and Networking*, San Diego, CA, March 2010.
- [C7] J. Wei and X. Zhang, "Efficient Node Collaboration for Mobile Multi-Target Tracking Using Two-Tier Wireless Camera Sensor Networks," *Proc. IEEE International Conference on Communications (ICC)*, Cape Town, South Africa, May 2010.
- [C6] J. Wei and X. Zhang, "Decentralized-Detection Based Mobile Multi-Target Tracking in Wireless Sensor Networks," *Proc. IEEE International Conference on Communications (ICC)*, Cape Town, South Africa, May 2010.
- [C5] J. Wei and X. Zhang, "Sensor Self-Organization for Mobile Multi-Target Tracking in Decentralized Wireless Sensor Networks," *Proc. IEEE Wireless Communications and Networking Conference (WCNC)*, Sydney, Australia, April 2010.
- [C4] J. Wei and X. Zhang, "Dynamic Node Collaboration for Mobile Multi-Target Tracking in Two-Tier Wireless Camera Sensor Networks," *Proc. IEEE Military Communications Conference (MILCOM)*, Boston, MA, October 2009. **Student Travel Grant recipient.**
- [C3] J. Wei and X. Zhang, "Mobile Multi-Target Tracking in Two-Tier Hierarchical Wireless Sensor Networks," *Proc. IEEE Military Communications Conference (MILCOM)*, Boston, MA, October

## 2009. **Student Travel Grant recipient.**

- [C2] J. Wei, X. Wang, and V.L. Syrmos, "Multi-target Tracking in a Two-Tier Hierarchical Architecture," *Proc. IEEE International Conference on Information Fusion*, Cologne, Germany, June-July 2008.
- [C1] J. Wei, X. Wang, and V.L. Syrmos, "Efficient Multi-Target Tracking with a Two-Tier Hierarchical Wireless Sensor Network," *International Conference on Software Process (ICSP)*, Leipzig, Germany, May 2008.

### Poster Presentation

- [PP1] J. Wei and D. Kundur, "Towards a Consensus Framework for Cyber Attack Impact Analysis in the Smart Grid," *National Control Engineering Students Workshop*, College Park, Maryland, April-May 2012.

### Technical Talk and Conference Presentations

- [TT1] J. Wei and D. Kundur, "A Graph-Based Dynamical Systems Paradigm for Smart Energy System Analysis," Trustworthy Cyber Infrastructure for the Power Grid (*TCIPG*) summer school, St. Charles, IL, June 2011. **Student Travel Grant recipient.**
- [CP4] J. Wei and D. Kundur, "A Flocking-Based Model for DoS-Resilient Communication Routing in Smart Grid," *Proc. IEEE Global Communications Conference (GLOBECOM)*, Anaheim, CA, December 2012.
- [CP3] J. Wei, D. Kundur, T. Zourntos, and K.L. Butler-Purry, "Probing the Telltale Physics: Towards a Cyber-Physical Protocol to Mitigate Information Corruption in Smart Grid Systems," *Proc. IEEE International Conference on Smart Grid Communications*, Tainan, Taiwan, November 2012.
- [CP2] J. Wei and X. Zhang, "Dynamic Node Collaboration for Mobile Multi-Target Tracking in Two-Tier Wireless Camera Sensor Networks," *Proc. IEEE Military Communications Conference (MILCOM)*, Boston, MA, October 2009.
- [CP1] J. Wei and X. Zhang, "Mobile Multi-Target Tracking in Two-Tier Hierarchical Wireless Sensor Networks," *Proc. IEEE Military Communications Conference (MILCOM)*, Boston, MA, October 2009.

### **Teaching Experience**

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#### Instructor:

- 4450:330 Computer Systems, Fall 2014.

#### Supervision:

Supervise six undergraduate students in research for ECE 496 Design Projects on Smart Grid, Summer 2013.  
Supervise one undergraduate student in his thesis project on Microgrids, Fall 2013.

### **Selected Professional Activities**

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- Journal Reviewer:
  - IEEE Transactions on Information Forensics & Security.
  - IEEE Transactions on Smart Grid.
- Conference Reviewer: IEEE SmartGridComm 2014.
- Program Committee Member: IEEE GLOBECOM 2010.
- Program Committee Member, IEEE Global Telecommunications Conference (GLOBECOM 2010).
  - Participated in the presentation abstract and manuscript review processes.