JUN CHEN, PH.D.

CONTACT jchenisu2015@gmail.com U.S. Permanent Resident

EDUCATION

Ph.D. in Electrical Engineering (minor in CS), Iowa State University, Ames IA, 4.0/4.0 12/2014
B. S. in Automation, Zhejiang University, Hangzhou China, 3.72/4.0 06/2009

RESEARCH INTERESTS

Systems and Control: Model predictive control, stochastic processes, automatic tuning, extremum seeking
Optimization: Quadratic programming, convex optimization, stochastic optimization, implicit constraints
Automotive Systems: Vehicle dynamics, propulsion control, model based control, active thermal management
Power and Energy: Hybrid energy systems, renewable integration, electricity market, economic analysis
Data Mining: Reduced order modeling, time series, statistical verification, risk analysis, scenario generation
Discrete event and hybrid systems: failure diagnosis & prognosis, stochastic systems, verification
Formal Methods: Model-based verification and design, statistical verification, linear-time temporal logic

EMPLOYMENT

Control Systems Engineer in *Vehicle and Propulsion Control*, General Motors, MI, USA 01/2017–present
R&D Scientist in *Power and Energy Systems*, Idaho National Laboratory, ID, USA 11/2014–12/2016
Summer Intern in *Software V&V*, General Motors R&D, MI, USA 04/2014–07/2014
Research Assistant in *Stochastic Hybrid Systems*, Iowa State University, IA, USA 01/2011–10/2014

HONORS AND RECOGNITIONS

Design for Six Sigma (DFSS) Black Belt Certification, General Motors 2018
Best Paper Award, IEEE Transactions on Automation Science and Engineering 2016
Associate Editor, Energy Systems 2016–present
Associate Editor, Journal of Control and Decision 2016–2019
Associate Editor, Chinese Control & Decision Conference 2013–2019
INL Peer Recognition Award for Publication Achievement, Idaho National Laboratory 2016
INL Exceptional Contributions Program Award, Idaho National Laboratory 2015, 2016
Outstanding Reviewer for Energy, Elsevier 2016, 2018
Outstanding Reviewer for Applied Energy, Elsevier 2016
Accomplishment Certificate for Machine Learning, Coursera 2014
Research Excellence Award, Iowa State University 2014
Student Travel Award, American Control Conference 2014
Professional Development Grants (PAG), Iowa State University 2014
Provost Graduate Fellowship, University of Central Florida 2009–2010
Third Class Scholarship for Undergraduate Student, Zhejiang University 2008
Outstanding Student, Zhejiang University 2008

TEACHING

Teaching Assistant, Iowa State University, Ames, IA 50011, USA
- EE 576: Digital Feedback Control Systems (Grader: Spring 2012, Spring 2013)
- EE 324: Signals and Systems II (Grader & Lab instructor: Fall 2011)
- EE 442: Introduction to Circuits and Instruments (Grader: Spring 2011)

EXPERIENCE

Control Systems Engineer in *Vehicle and Propulsion Control*, General Motors, MI, USA 01/2017–present
- Next gen vehicle motion and powertrain control.

R&D Scientist in *Power and Energy Systems*, Idaho National Laboratory, ID, USA 11/2014–12/2016
- Led proposals development in renewable energy integration, power grid modenization, and nuclear energy;
- Modeling, control, optimization, and technical & economic analysis in hybrid energy systems;
- Developed stochastic optimization algorithm with implicit constraints handling based on SPSA (simultaneous perturbation stochastic approximation);
- Data driven synthetic scenario generation using ARMA (auto-regressive moving average) and ANN (artificial neural network) for stochastic optimization and bootstrapping analysis;
- Implemented time-dependent data mining algorithms in RAVEN (Risk Analysis Virtual ENvironment) using Python;
- *Received Directorate awards for excellent contributions and significant publication achievements*;

- Tools used: Matlab/Simulink, Python, Modelica/Dymola, FMI (for co-simulation), git.

Summer Intern in *Software V&V*, General Motors R&D, MI, USA 04/2014–07/2014
- Validation of diagnostic software requirement using model-based (automata) and data-based techniques.
- Tools used: Matlab, NuSMV.

Research Assistant in *Stochastic Hybrid Systems*, Iowa State University, IA, USA 01/2011–10/2014
- Diagnosis, prognosis, secrecy, and resiliency analysis in stochastic discrete-event and hybrid systems;
- Model-based property verification concerning fault diagnosability & prognosability, secrecy, and resilliency;
- Online fault detection and parameter synthesis with guaranteed error bounds;
- Hybrid state estimation based on Bayesian filter for temporal logic (LTL) requirement violation monitoring;
- Feature extraction (pattern mining) for predicting critical events from sequential symbolic sensor data;
- Metrics development for behavioral confidentiality and resiliency of (electric) cyber-physical systems.
- Tools used: Matlab/Simulink, NuSMV, CVX, Spin.

Publications and Talks

Patent

[1] **Jun Chen**, Ruixing Long and Yiran Hu, "Method for Increasing Control Performance of Model Predictive Control Cost Functions," US Patent pending.

[2] **Jun Chen**, David Edwards, Yiran Hu, Min Sun, Adam Heinzen and Michael Smith, "Method and System for Determing Thermal State," US Patent pending.

Open Source Software

[1] "Risk Analys Virtual ENvironment (RAVEN)," Idaho National Laboratory, ID, USA
- URL: https://raven.inl.gov/SitePages/Overview.aspx
- GitHub: https://github.com/idaholab/raven
- Contribution: time dependent data mining, stochastic optimization, and synthetic data generation.

Book Chapter

[1] Mariam Ibrahim, **Jun Chen** and Ratnesh Kumar, "Quantification of Centralized/Distributed Secrecy in Stochastic Discrete Event Systems," in *Recent Advances in Systems Safety and Security*, Editors: Emil Pricop and Grigore Stamatescu, Springer, May 2016, ISBN: 978-3-319-32523-1.

Journal Articles

[1] Xiang Yin, **Jun Chen**, Zhaojian Li and Shaoyuan Li, "Robust Fault Diagnosis of Stochastic Discrete Event Systems," *IEEE Transactions on Automatic Control*, (To appear).

[2] **Jun Chen**, Qin Wang, Jianming Lian and Wanning Li, "Guest Editorial: Advances in Control and Decision for Power and Energy Systems," *Journal of Control and Decision*, volume 5, number 2, pages 115–116, February 2018.

[3] **Jun Chen**, Christoforos Keroglou, Christoforos N. Hadjicostis and Ratnesh Kumar, "Revised Test for Stochastic Diagnosability of Discrete-Event Systems," *IEEE Transactions on Automation Science and Engineering*, volume 15, number 1, pages 404–408, January 2018.

[4] **Jun Chen**, Peter Molnar and Aman Behal, "Identification of a Stochastic Resonate-and-Fire Neuronal Model via Nonlinear Least Squares and Maximum Likelihood Estimation," *International Journal of Modeling, Identification and Control*, volume 28, number 3, pages 221–231, October 2017.

[5] **Jun Chen** and Cristian Rabiti, "Synthetic Wind Speed Scenarios Generation for Probabilistic Analysis of Hybrid Energy Systems," *Energy*, volume 120, pages 507-517, February 2017.

[6] **Jun Chen**, Mariam Ibrahim and Ratnesh Kumar, "Quantification of Secrecy in Partially Observed Stochastic Discrete Event Systems," *IEEE Transactions on Automation Science and Engineering*, volume 14, number 1, pages 185–195, January 2017.

[7] Jong S. Kim, **Jun Chen** and Humberto E. Garcia, "Modeling, Control, and Dynamic Performance Analysis of a Reverse Osmosis Desalination Plant Integrated within Hybrid Energy Systems," *Energy*, volume 112, pages 52–66, October 2016.

[8] **Jun Chen** and Humberto E. Garcia, "Economic Optimization of Operations for Hybrid Energy Systems under Variable Markets," *Applied Energy*, volume 177, pages 11–24, September 2016.

[9] **Jun Chen**, Humberto E. Garcia, Jong S. Kim and Shannon M. Bragg-Sitton, "Operations Optimization of Nuclear Hybrid Energy Systems," *Nuclear Technology*, volume 195, number 2, pages 143–156, August 2016.

[10] Humberto E. Garcia, **Jun Chen**, Jong S. Kim, Richard B. Villim, William R. Binder, Shannon M. Bragg-Sitton, Richard D. Boardman, Michael G. McKellar and Christiaan J. J. Paredis, "Dynamic Performance Analysis of Two Regional Nuclear Hybrid Energy Systems," *Energy*, volume 107, pages 234–258, July 2016.

[11] **Jun Chen** and Ratnesh Kumar, "Fault Detection of Discrete-Time Stochastic Systems Subject to Temporal Logic Correctness Requirements," *IEEE Transactions on Automation Science and Engineering*, volume 12, number 4, pages 1369–1379, October 2015. (**Best Paper Award**)

[12] **Jun Chen** and Ratnesh Kumar, "Stochastic Failure Prognosability of Discrete Event Systems," *IEEE Transactions on Automatic Control*, volume 60, number 6, pages 1570–1581, June 2015.

[13] **Jun Chen** and Ratnesh Kumar, "Failure Detection Framework for Stochastic Discrete Event Systems with Guaranteed Error Bounds," *IEEE Transactions on Automatic Control*, volume 60, number 6, pages 1542–1553, June 2015.

[14] **Jun Chen** and Ratnesh Kumar, "Polynomial Test for Stochastic Diagnosability of Discrete Event Systems," *IEEE Transactions on Automation Science and Engineering*, volume 10, number 4, pages 969–979, October 2013.

[15] Lingfei Zhi, **Jun Chen**, Peter Molnar and Aman Behal, "Weighted Least-Squares Approach for Identification of a Reduced-Order Adaptive Neuronal Model," *IEEE Transactions on Neural Networks and Learning Systems*, volume 23, number 5, pages 834–840, May 2012.

Conference Articles

[1] Aaron S. Epiney, Andrea Alfonsi, Cristian Rabiti and **Jun Chen**, "Economic Assessment of Nuclear Hybrid Energy Systems: Optimization using RAVEN," *2017 ANS Annual Meeting*, San Francisco, CA, June 11–15, 2017.

[2] **Jun Chen**, Jong S. Kim and Cristian Rabiti, "Probabilistic Analysis of Hybrid Energy Systems Using Synthetic Renewable and Load Data," *2017 American Control Conference*, Seattle, WA, May 24–26, 2017.

[3] **Jun Chen** and Humberto E. Garcia, "Operations Optimization of Hybrid Energy Systems under Variable Markets," *2016 American Control Conference*, Boston, MA, July 6–8, 2016.

[4] Mariam Ibrahim, **Jun Chen** and Ratnesh Kumar, "A Resiliency Measure for Electrical Power Systems," *2016 IFAC/IEEE International Workshop on Discrete Event Systems*, Xi'an, China, May 30 – June 1, 2016.

[5] Mariam Ibrahim, **Jun Chen** and Ratnesh Kumar, "Quantification of Distributed Secrecy Loss in Stochastic Discrete Event Systems under Bounded-Delay Communications," *2016 IFAC/IEEE International Workshop on Discrete Event Systems*, Xi'an, China, May 30 – June 1, 2016.

[6] Mariam Ibrahim, **Jun Chen** and Ratnesh Kumar, "An Information Theoretic Measure for Secrecy Loss in Stochastic Discrete Event Systems," *2015 International Conference on Electronics, Computers and Artificial Intelligence – International Workshop on Systems, Safety and Security*, Bucharest, Romania, June 25–27, 2015.

[7] **Jun Chen** and Ratnesh Kumar, "Failure Prognosability of Stochastic Discrete Event Systems," *2014 American Control Conference*, Portland, OR, June 4–6, 2014.

[8] **Jun Chen** and Ratnesh Kumar, "Pattern Mining for Predicting Critical Events from Sequential Event Data Log," *2014 IFAC/IEEE International Workshop on Discrete Event Systems*, Paris-Cachan, France, May 14–16, 2014.

[9] Mariam Ibrahim, **Jun Chen** and Ratnesh Kumar, "Secrecy in Stochastic Discrete Event Systems," *2014 IEEE International Conference on Networking, Sensing and Control*, Miami, FL, April 7–9, 2014.

[10] **Jun Chen** and Ratnesh Kumar, "Failure Diagnosis of Discrete-Time Stochastic Systems Subject to Temporal Logic Correctness Requirements," *2014 IEEE International Conference on Networking, Sensing and Control*, Miami, FL, April 7–9, 2014.

[11] **Jun Chen** and Ratnesh Kumar, "Online Failure Diagnosis of Stochastic Discrete Event Systems," *2013 IEEE Multi-Conference on Systems and Control – IEEE Conference on Computer Aided Control System Design*, Hyderabad, India, August 28–30, 2013.

[12] **Jun Chen** and Ratnesh Kumar, "Decentralized Failure Diagnosis of Stochastic Discrete Event Systems," *2013 IEEE Conference on Automation Science and Engineering*, Madison, WI, August 17–21, 2013.

[13] **Jun Chen** and Ratnesh Kumar, "Polynomial Test for Stochastic Diagnosability of Discrete Event Systems," *2012 IEEE Conference on Automation Science and Engineering*, Seoul, Korea, August 20–24, 2012.

[14] **Jun Chen**, Jose Suarez, Peter Molnar and Aman Behal, "Maximum Likelihood Parameter Estimation in a Stochastic Resonate-and-Fire Neuronal Model," *2011 IEEE International Conference on Computational Advances in Bio and medical Sciences (ICCABS)*, Orlando, FL, February 3–5, 2011.

Technical Reports

[1] Cristian Rabiti, Andrea Alfonsi, Joshua Cogliati, Diego Mandelli, Robert Kinoshita, Sonat Sen, Congjian Wang, **Jun Chen**, "RAVEN User Manual," INL/EXT-15-34123 Version 5, Idaho Falls, ID: Idaho National Laboratory, March 2017.

[2] Joshua Cogliati, **Jun Chen**, Japan Patel, Diego Mandelli, Daniel Maljovec, Andrea Alfonsi, Cristian Rabiti and Congjian Wang, "Time Dependent Data Mining in RAVEN," INL/EXT-16-39860, Idaho Falls, ID: Idaho National Laboratory, September 2016.

[3] Aaron Epiney, **Jun Chen** and Cristian Rabiti, "Status on the Development of a Modeling and Simulation Framework for the Economic Assessment of Nuclear Hybrid Energy Systems (FY 16)," INL/EXT-16-39832, Idaho Falls, ID: Idaho National Laboratory, September 2016.

[4] Shannon M. Bragg-Sitton, Richard D. Boardman, Cristian Rabiti, Jong S. Kim, Michael G. McKellar, Piyush Sabharwall, **Jun Chen**, M. Sacit Cetiner, T. Jay Harrison and A. Lou Qualls, "Nuclear-Renewable Hybrid Energy Systems: 2016 Technology Development Program Plan," INL/MIS-16-38165, Idaho Falls, ID: Idaho National Laboratory, March 2016.

[5] Shannon M. Bragg-Sitton, Richard D. Boardman, Cristian Rabiti, Jong S. Kim, Michael G. McKellar, Piyush Sabharwall, **Jun Chen**, Mark Ruth, M. Sacit Cetiner, T. Jay Harrison and A. Lou Qualls, "Nuclear-Renewable Hybrid Energy Systems 2016 Technology Development Roadmap (DRAFT)," INL/EXT-15-37446, Idaho Falls, ID: Idaho National Laboratory, December 2015.

[6] Humberto E. Garcia, **Jun Chen**, Jong S. Kim, Michael G. McKellar, Wesley R. Deason, Richard B. Vilim, Shannon M. Bragg-Sitton and Richard D. Boardman, "Nuclear Hybrid Energy Systems – Regional Studies: West Texas & Northeastern Arizona," INL/EXT-15-34503, Idaho Falls, ID: Idaho National Laboratory, April 2015.

[7] **Jun Chen** and Ramesh S, "Model-based Validation of Diagnostic Specification," Electrical & Controls Systems Lab, General Motors Research & Development Center, Warren, MI, July 2014.

Thesis and Dissertation

[1] **Jun Chen**, "Failure Diagnosis and Prognosis in Stochastic Discrete-Event and Cyber-Physical Systems," Ph.D. Dissertation, Department of Electrical and Computer Engineering, Iowa State University, Ames, IA, USA, August 2014.

[2] **Jun Chen**, "On the Reliability of MVB Communication Network," Bachelor's Thesis, College of Electrical Engineering, Zhejiang University, China, June 2009.

Talks and Contributing Posters

[1] "Extremum Seeking for Combustion Set Point Calibration," *Department of Aerospace Engineering, University of Michigan*, Ann Arbor, MI, August 11, 2017.

[2] "Diagnosis, Prognosis, and Secrecy Analysis in Stochastic Discrete Event and Hybrid Systems," *Intelligent Fusion Technology, Inc*, Germantown, MD, April 8, 2016.

[3] "Operations Optimization of Nuclear Hybrid Energy Systems," *2015 INL Early Career Research Symposium*, Idaho Falls, ID, July 30–31, 2015.

[4] "An Information Theoretic Measure for Secrecy Loss in Stochastic Discrete Event Systems," *The 4th Midwest Workshop on Control and Game Theory*, Ames, IA, April 25–26, 2015.

[5] "Failure Diagnosis in Stochastic Discrete Event and Hybrid Systems," *Idaho National Laboratory*, Idaho Falls, ID, August 4, 2014.

[6] "Model-based Validation of Diagnostic Specification," *Electrical & Controls Systems Lab, General Motors Research & Development Center*, Warren, MI, July 22, 2014.

[7] "Failure Prognosability of Stochastic Discrete Event Systems," *2014 American Control Conference*, Portland, OR, June 5, 2014.

[8] "Metrics for Secrecy and Resiliency for Cyber-Physical Systems," *9th Showcase Meeting, NSF Security and Software Engineering Research Center*, Washington D.C., May 20, 2014.

[9] "Model-based Embedded Software Testing/Monitoring," *2014 ECpE Graduate Poster Session, Iowa State University*, Ames, IA, April 18, 2014.

[10] "Failure Diagnosis of Discrete-Time Stochastic Systems Subject to Temporal Logic Correctness Requirements," *2014 IEEE International Conference on Networking, Sensing and Control*, Miami, FL, April 7, 2014.

[11] "Detection of Requirement-Violation in Cyber-Physical Systems," *GPSS Graduate and Professional Student Research Conference, Iowa State University*, Ames, IA, April 4, 2014.

[12] "Failure Diagnosis in Stochastic Discrete-Event and Cyber-Physical Systems," *Graduate Seminar, Department of Electrical and Computer Engineering, Iowa State University*, Ames, IA, February 5, 2014.

[13] "Decentralized Failure Diagnosis of Stochastic Discrete Event Systems," *2013 IEEE Conference on Automation Science and Engineering*, Madison, WI, August 20, 2013.

Academic Services

Editorial Services

- **Associate Editor**, *Energy Systems*, 2016–present
- **Associate Editor**, *Journal of Control and Decision*, 2016–2019
- Guest Editor, *Journal of Control and Decision*, 2016–2017, for Special Issue on "Advances in Control and Decision for Power and Energy Systems".
- **Associate Editor**, *Chinese Control and Decision Conference*, 2013–2019

Session Chair/Organizor

- Session Chair, *American Control Conference*, 2014, for Regular Session "Discrete Event Systems".
- Session Organizer and Co-Chair, *IEEE International Conference on Networking, Sensing and Control*, 2014, for Invited Session on "Model-Based Developments for Embedded and Cyberphysical System".

Journal/Publisher Reviewer

- Applied Energy
- Automatica
- Asian Journal of Control
- Discrete Event Dynamic Systems: Theory and Applications
- Energy
- Energy Systems
- IEEE Transactions on Automatic Control
- IEEE Transactions on Automation Science and Engineering
- IEEE Transactions on Control of Network Systems
- IEEE Transactions on Control Systems Technology
- IEEE Transactions on Cybernetics
- IEEE Transactions on Fuzzy Systems
- IEEE Transactions on Neural Networks and Learning Systems
- IEEE Transactions on Smart Grid
- IEEE Transactions on Systems, Man, and Cybernetics: Systems
- IEEE Transactions on Systems, Man, and Cybernetics, Part B: Cybernetics
- International Journal of Computational Science and Engineering
- International Journal of Electronics and Communications
- International Journal of Embedded Systems

- International Journal of Modelling, Identification and Control
- John Wiley & Sons, Inc.
- Journal of Control and Decision
- Journal of Risk and Reliability
- Nuclear Technology
- Soft Computing
- Systems & Control Letters

Conference Reviewer
- American Control Conference
- Asian Control Conference
- Australian Control Conference
- Chinese Control Conference
- Chinese Control and Decision Conference
- European Control Conference
- IEEE Conference on Automation Science and Engineering
- IEEE Conference on Decision and Control
- IEEE International Conference on Advanced Intelligent Mechatronics
- IEEE International Conference on Control and Automation
- IEEE International Conference on Robotics and Automation
- IEEE International Conference on Robotics and Biomimetics
- IEEE International Symposium on Assembly and Manufacturing
- IFAC Symposium on Fault Detection, Supervision and Safety of Technical Processes (SafeProcess)
- IFAC Symposium on Information Control Problems in Manufacturing
- IFAC World Congress
- IFAC Workshop on Discrete Event Systems
- Indian Control Conference
- International Conference on Artificial Intelligence and Pattern Recognition
- International Conference on Connected Vehicles and Expo
- International Conference on Control, Automation, Robotics and Vision
- International Conference on Intelligent Computing
- Mediterranean Conference on Control and Automation

Last updated on June 28, 2019