

# Jianguo Wu

Assistant Professor

Dept. of Industrial, Manufacturing and Systems Engineering,  
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## **EDUCATION**

<b>Ph.D.</b>	Industrial & Systems Engineering, UW-Madison Advisor: Shiyu Zhou	08/2015
<b>M.S.</b>	Statistics, University of Wisconsin-Madison	05/2014
<b>M.S.</b>	Mechanical Engineering, Purdue University Advisor: Ashlie Martini	05/2011
<b>B.S.</b>	Mechanical Engineering & Automation, Tsinghua University	07/ 2009

## **EMPLOYMENT**

<b>University of Texas at El Paso</b> Assistant Professor (tenure track), Dept. of Industrial, Manuf. and Systems Engineering (primary) Dept. of Electrical & Computer Engineering (affiliated) Computational Science Program	08/2015-present
<b>University of Wisconsin-Madison</b> , Industrial and Systems Engineering Graduate Research Assistant	09/2011-06/2015
<b>Purdue University</b> , School of Mechanical Engineering Graduate Research Assistant	09/2009-05/2011

## **RESEARCH INTERESTS**

My research interests focus on statistical modeling, monitoring and control of complex manufacturing (e.g., nanomanufacturing and 3D printing) and service systems/processes for system design, quality control and performance improvement through integrated applications of sensing technology, engineering domain knowledge and advanced data analytics.

- Data analytics for manufacturing system improvement: quality characterization and quantification; sensor/microscopic images data collection; nondestructive inspection and monitoring; physical process modeling and statistical calibration.
- Data driven system fault detection, diagnosis and prognostics: changes detection; root causes identification; integration of reliability theory, statistical modeling with engineering/domain knowledge for fault management in manufacturing, energy and service systems.
- Bayesian and stochastic filtering for engineering system control and improvement: spatial or temporal modeling of processes; Bayesian inference of state space models; sequential Monte Carlo method development.

## **HONORS AND AWARDS**

- University of Texas STARS Award, University of Texas System  
*Science and Technology Acquisition and Retention program, \$200,000* 08/2015
- NSF Travel Grant Award, ISERC, Nashville, TN 06/2015
- Best Student Paper Award Finalist 06/2015  
*Quality Control and Reliability Engineering (QCRE) Division of ISERC, Nashville, Tennessee*
- Richard S. and Harriet K. Fein Scholarship, UW-Madison 2014-2015
- E. Wayne Kay Graduate Scholarship, 2014-2015  
*Society of Manufacturing Engineers (SME)*
- NSF Travel Grant Award, ISERC, Montreal, Canada 06/ 2014
- Huang Yi-Cong Couple Scholarship, Tsinghua University 2007
- First Prize in the 23rd National University Students Physics Competition 2006  
*Society of Physics, Beijing*
- First Class Scholarship for Academic Excellence (rank 2/90) 2006  
*Department of Mechanical Engineering, Tsinghua University*
- First Prize in Mathematical Olympic Competition 2004  
*Hunan Province, China*

## **PUBLICATIONS**

### **Referred Journals and Transactions**

1. **Jianguo Wu\***, Yuan Yuan, Haijun Gong, Bill Tseng (2016), “Inferring 3D Porous Defects based on Cross-Sectional Images in Metal-based Additive Manufacturing”, *Technometrics* (submitted)
2. **Jianguo Wu**, Yuhang Liu, Shiyu Zhou\*(2016), “Bayesian Hierarchical Linear Modeling of Profile Data with Applications to Quality Control of Nanomanufacturing”, *IEEE Transactions on Automation Science and Engineering*
3. Yuxing Hou, **Jianguo Wu**, Yong Chen\* (2016), “Online Steady State Detection Based on Rao-Blackwellized Sequential Monte Carlo”, *Quality and Reliability Engineering International*
4. Nan Chen\*, Eunshin Byon, **Jianguo Wu** (2016), “A General Wiener Process Model for Heterogeneous Degradations based on Kriging”, *Journal of Quality Technology* (revision)
5. **Jianguo Wu**, Yong Chen, Shiyu Zhou\* (2015), “Online Detection of Steady-state Operation using a Multiple Change-point Model and Exact Bayesian Inference”, *IIE Transactions on Quality and Reliability Engineering*, v.48 no.7, pp. 599-613 (2015 ISERC QCRE Best Student Paper Competition Finalist)

6. Yuhang Liu, **Jianguo Wu**, Shiyu Zhou\*(2015), Xiaochun Li, “Microstructure Modeling and Ultrasonic Wave Propagation Simulation of A206-Al<sub>2</sub>O<sub>3</sub> Metal Matrix Nanocomposites for Quality Inspection”, *ASME Journal of Manufact. Science and Engineering* 138.3: 031008, 2016
7. **Jianguo Wu**, Yong Chen, Shiyu Zhou\*, Xiaochun Li, “On-line Steady State Detection for Process Control Using Multiple Change-point Models and Particle Filters”, *IEEE Transactions on Automation Science and Engineering*, vol. 13, no. 2, pp. 688-700, 2016
8. **Jianguo Wu**, Shiyu Zhou\*, Xiaochun Li, “Ultrasonic Attenuation Based Inspection Method for Scale-up Production of A206-Al<sub>2</sub>O<sub>3</sub> Metal Matrix Nanocomposites”, *ASME Journal of Manufacturing Science and Engineering* 137.1(2015):011013
9. **Jianguo Wu**, Shiyu Zhou\*, Xiaochun Li, “Acoustic Emission Monitoring for Ultrasonic Cavitation Based Dispersion Process”, *ASME Journal of Manufacturing Science and Engineering* 135(3), 031015, 2013
10. Yalin Dong, Qunyang Li, **Jianguo Wu**, Ashlie Martini, "Friction, Slip and Structural Inhomogeneity of the Buried Interface," *Modeling and Simulation in Materials Science and Engineering* 19 065003

#### **Working Papers**

11. **Jianguo Wu\***, “On-line Change-point Detection of Bayesian Logistic Regression with Application to Risk-adjusted Outcome Monitoring in Healthcare”
12. Yuxin Wen, **Jianguo Wu\***, Nan Chen, “Degradation Signal based Condition Monitoring and Remaining Useful Life Prediction Using Multiple Change-point Models”
13. Zhonghua Hu, **Jianguo Wu\***, Bill Tseng, Yirong Lin, “Automatic Segmentation and Inference of Nanofibers from Microscopic Images in the Fiber-reinforced Nanocomposites Manufacturing”

#### **Conference Paper and Others**

1. Zhonghua Hu, Bill Tseng, Yirong Lin, **Jianguo Wu\***, “Hough Transform based Automatic Segmentation of Nanofibers from SEM images”, *The Southwest Emerging Technology Symposium*, 2016
2. **Jianguo Wu\***, Yirong Lin, Bill Tseng, “Numerical Simulation of Ultrasonic Wave Propagation in Fiber-enhanced Dielectric Nanocomposites for Quality Inspection”, *The Southwest Emerging Technology Symposium*, 2016
3. **Jianguo Wu**, Ashlie Martini, "Atomic Stick-Slip", DOI: 10254/nanohub-r7771.1, 2009( online software used by over 200 research scientists)

#### **PROPOSAL WRITING and GRANTS**

- “Real-time Defects Detection, Mitigation, and Ultrasonic based Quality Inspection for Porosity Reduction in Metal-based Additive Manufacturing”, submitted to NSF MME program, PI: Dr. Jianguo Wu, Co-PI: Dr. Ryan Wicker. Total amount requested: \$266,540

- “Scalable Synthesis of 2D Layered Nanomaterials & Their Heterostructures Enabled by Additive Manufacturing Techniques”, submitted to NSF Scalable Nanomanufacturing, PI: Dr. Anupama Kaul, Co-PI: Dr. Jianguo Wu. Total amount requested: \$1,461,977
- “Acquisition of Nondestructive Evaluation Equipment to Enable Quality Assurance on 3D printed Products”, submitted to NSF, PI: Dr. Bill Tseng, Co-PI: Jianguo Wu. Total amount requested: \$760,917
- “Ultrasonic Nondestructive Evaluation based Quality Inspection for Porosity Reduction in Metal-based Additive Manufacturing”, University Research Institute Grant, University of Texas Systems. Total amount funded: \$5,000
- University of Texas Systems STARS award. Total amount funded: \$200,000
- Wrote part of the awarded proposal “Smart Asthma Management: Statistical Modeling, Prognostics, and Intervention Decision Making”, NSF SCH-1343969, PI: Dr. Shiyu Zhou, Co-PI, Dr. Patti Brennan, Amount:\$ 475,000, 2014-2016
- Contributed to the awarded proposal “Progressive Fault Identification and Prognosis in Aircraft Structure Based on Dynamic Data Driven Adaptive Sensing and Simulation”, PI: Shiyu Zhou, Co-PI: Jiong Tang, Yong Chen, Amount: \$ 650,000, 2014-2017
- Contributed to the submitted proposal “Enabling Metallic Nanocomposite Manufacturing Through Novel Nanostructure Design and Ultrasonic-based Inspection”, PI: Shiyu Zhou, Co-PI: Xiaochun Li

## **TEACHING**

- **IE/SE/MFG 5314, “Robotics and Flexible Automation”,** Fall 2016  
**Level:** graduate  
**Description:** This is a newly developed capstone course for graduate students in the IMSE department. It has three modules in modern manufacturing enterprises: (1) the modern manufacturing processes; (2) the industrial robotics technology, robotic programming, programmable logic controllers and PLC programming; (3) nondestructive evaluation techniques for quality control.
- **MFG 5359, “Computer-Aided Manufacturing”,** Spring 2016  
**Level:** graduate  
**Teaching evaluation summary:** course rating 4.3/5.0, instructor rating 4.4/5.0  
**Description:** This is a newly developed core course for graduate students in the manufacturing program. Topics include computer aided design system, geometric modeling, coordinates transform, numerical control and NC programming, process engineering, production planning and control, material requirement planning, production scheduling, FeatureCAM, NX software etc.
- **IE/MFG 5395, “Introduction to Industrial Data Analytics”,** Fall 2015  
**Level:** senior undergraduate/graduate  
**Teaching evaluation summary:** course rating 4.6/5.0, instructor rating 4.7/5.0  
**Description:** This is a newly developed course for graduate and senior undergraduate students. It focuses on various data analytics techniques for both manufacturing and service enterprises. Topics include data preprocessing, principle component analysis, linear/logistic regression,

clustering, classification, anomaly detection, model selection and validation, R programming, etc.

- Teaching Assistant/Grader/Guest Lecturer, ISyE691, “Industrial Data Analytics”, ISyE Dept., UW-Madison, Fall 2014, graduate level, textbook: “*An Introduction to Statistical Learning*” and “*Introduction to Data Mining*”
- Mentor for undergraduates, BUGS Program, UW-Madison, 2014-2015
- Grader, ISyE 512, “Inspection, Quality Control, and Reliability”, ISyE Dept., UW-Madison, Fall 2012, Fall 2013, graduate/undergraduate level

### **MENTOR/ADVISOR**

- Current Ph.D. Students
  - Honglun Xu (August 2016 – present)
  - Yuxin Wen (February 2016 – present )
  - Zhonghua Hu (co-advisor: Dr. Bill Tseng) (September 2015 – present)
- Current Undergraduate Student
  - Mar Del Hierro Manuel (Mechanical Engineering)
- Completed MS Students
  - Victor Loya

### **INVITED PRESENTATIONS**

1. “Automatic Segmentation and Inference of Nanofibers from Microscopic Images in the Fiber-reinforced Nanocomposites Manufacturing”, The Southwest Emerging Technology Symposium, April 9, 2016
2. “Numerical Simulation of Ultrasonic Wave Propagation in Fiber-enhanced Dielectric Nanocomposites for Quality Inspection”, The Southwest Emerging Technology Symposium, April 9, 2016
3. “Bayesian Hierarchical Linear Modeling of Profile Data with Applications to Quality Control of Nanomanufacturing”, INFORMS Annual Meeting, Philadelphia, Nov 03, 2015
4. “On-line Steady State Detection for Process Control using Multiple Change-point Model and Particle Filters”, TASE invited special session, INFORMS Annual Meeting, Philadelphia, Nov 01, 2015
5. “Online Steady-state Detection Using Multiple Change-point Models and Exact Bayesian Inference ”, IIE Annual Conference & Expo, ISERC, Nashville, TX, June 2015
6. “Ultrasonic Attenuation Based Inspection Method for Scale-up Production of A206-Al<sub>2</sub>O<sub>3</sub> Metal Matrix Nanocomposites”, INFORMS Annual Meeting, San Francisco, Nov 2014
7. “Process Monitoring, Control, and Quality Inspection in the Fabrication of Ultra-High Performance Lightweight Nanocomposites”, Chinese Academy of Sciences, July 2014
8. “On-line Steady-state Detection Using Multiple Change-point Models and Particle Filters”, IIE Annual Conference & Expo, ISERC, Montreal, Canada, June 2014

9. “On-line Steady-state Detection Using Multiple Change-point Models and Particle Filters”, INFORMS Annual Meeting, Minneapolis, Minnesota, October 2013
10. “Acoustic Emission Monitoring for ultrasonic Cavitation based Casting of Metal-matrix Nanocomposites”, NIST TIP Project Semi-Annual Meeting, Ohio, Nov 2012.
11. “Acoustic Emission Monitoring for Ultrasonic Cavitation Based Dispersion Process”, INFORMS Annual Meeting, Phoenix, Arizona, October 2012
12. “Atomic-scale Friction and the nanoHUB Stick-Slip Toolkit”, Purdue University, 2011
13. “Atomic Stick-Slip toolkit”, STLE Annual Meeting, Las Vegas, 2010

### **JOURNAL REFEREE**

- IEEE Transactions on Automation Science and Engineering
- IIE Transactions on Quality and Reliability Engineering
- International Journal of Production Research
- Journal of Manufacturing Systems
- Technometrics

### **PROFESIONAL SERVICE AND AFFILIATIONS**

- Session Chair, “Energy and Sustainability”, The Southwest Emerging Technology Symposium, April 2016.
- **President**, SME Student Chapter at UW-Madison      2014~2015
- Vice President, SME Student Chapter at UW-Madison      2013~2014
- Member, Society of Manufacturing Engineers (SME)
- Member, Institute of Industrial Engineers (IIE)
- Member, Institute for Operations Research and the Management Sciences (INFORMS)
- Member, Society of Tribologists and Lubrication Engineers (STLE)
- Member of Network for Computational Nanotechnology (NCN), Purdue University

### **REFERENCES**

- **Prof. Shiyu Zhou**, Professor, Department of Industrial & Systems Engineering, University of Wisconsin-Madison, Phone: 608-262-9534, Email: [szhou@engr.wisc.edu](mailto:szhou@engr.wisc.edu)
- **Prof. Xiaochun Li**, Professor, Raytheon Chair in Manufacturing Engineering, Mechanical and Aerospace Engineering, University of California, Los Angeles, Phone: 310-825-2383, Email: [xcli@seas.ucla.edu](mailto:xcli@seas.ucla.edu)
- **Prof. Yong Chen**, Associate Professor, Mechanical and Industrial Engineering, University of Iowa, Phone: 319-335-6106, Email: [yong-chen@uiowa.edu](mailto:yong-chen@uiowa.edu)

- **Prof. Jianjun (Jan) Shi**, Professor, Carolyn J. Stewart Chair, Stewart School of Industrial & Systems Engineering, Georgia Institute of Technology, Phone: 404-385-3488, Email: [jshi33@isye.gatech.edu](mailto:jshi33@isye.gatech.edu)