

Dragan Djurdjanovic

Department of Mechanical Engineering, University of Michigan
1031 Dow Bldg., 2350 Hayward Street
Ann Arbor, MI 48109-2125
Tel. (734) 763 9975; Fax: (734) 936 0363
E-mail: ddjurdja@umich.edu

EDUCATION

- Ph.D. (5/2002) Mechanical Engineering, University of Michigan, Ann Arbor, MI
- M.S. (5/2002) Electrical Engineering (Systems) University of Michigan, Ann Arbor, MI
- M.S. (8/1999) Mechanical Engineering, Nanyang Technological University, Singapore
- B.Sc. (9/1997) Applied Mathematics University of Nis, Nis, Yugoslavia
- B.Sc. (5/1997) Mechanical Engineering University of Nis, Nis, Yugoslavia

WORK EXPERIENCE

Assistant Research Scientist, University of Michigan

Dept. of Mechanical Engineering
Nov. 2003 – present

Adjunct Assistant Professor, University of Michigan

Dept. of Mechanical Engineering
Sep. 2004 – Dec. 2004

Adjunct Assistant Professor, University of Michigan

Dept. of Industrial and Operations Engineering
Sep. 2002-Dec. 2002

Postdoctoral Fellow, University of Michigan

Dept. of Mechanical Engineering
July 2002 – Nov. 2003

Graduate Student Research Assistant

University of Michigan Engineering Research Center, Ann Arbor, Michigan
Sep. 1999 – May 2002

HONORS AND AWARDS

- 2006 Branimir F. von Turkovich Outstanding Young Manufacturing Engineer Award from the Society of Manufacturing Engineers.
- Teaching Incentive Award from the Department of Mechanical Engineering, University of Michigan for the Winter 2005 semester.

- Best Paper Award in the Factory Operations section at the 8th Semiconductor Research Corporation (SRC) Technical Conference (TechCon) 2005.
- 2003 Distinguished Doctoral Thesis Nomination from the Department of Mechanical Engineering, University of Michigan
- 2002 Student of the Year in the Engineering Research Center for Reconfigurable Manufacturing Systems at the Univ. of Michigan.
- Best Paper Award at the 2001 SME North American Manufacturing Research Conference (NAMRC) in Gainesville, FL.
- Best student graduated from the Dept. of Mechanical Engineering, University of Nis, Yugoslavia in the first 40 years of its existence. Prize awarded in the year 2000.
- Municipal award “January 11th” from the City of Nis in 1998 for outstanding scholarly achievements.
- Best student graduated from the University of Nis, Yugoslavia, in 1997.
- Serbian National Scholarship for the period 1992 – 1997.

PUBLICATIONS

Journals and Transactions (published or accepted)

1. **D. Djurdjanovic**, W. J. Williams and C. K. H. Koh, “Discrete Implementation of Scale Transform,” Transactions of SPIE, Vol. 3807, pp. 522-533, 1999.
2. **D. Djurdjanovic**, S. E. Widmalm, W. J. Williams, C. K. H. Koh and K. P. Yang, “Computerized Classification of Temporomandibular Joint Sounds”, IEEE Transactions on Biomedical Engineering, Vol. 47, No. 8, pp. 977-984, 2000.
3. **D. Djurdjanovic** and J. Ni, “Linear State Space Modeling of Dimensional Machining Errors”, Trans. of NAMRI/SME, Vol. 29, pp. 541-548, 2001.
4. **D. Djurdjanovic** and J. Ni, “Dimensional Errors of Fixtures, Locating and Measurement Datum Features in the Stream of Variation Modeling in Machining,” Transactions of ASME, Journal of Manufacturing Science and Engineering, Vol. 125, pp. 716-730, 2003.
5. S. E. Widmalm, **D. Djurdjanovic** and D. C. McKay, “The dynamic range of TMJ Sounds”, Journal of Oral Rehabilitation, Vol. 30, pp. 495-500, 2003.
6. S. E. Widmalm, W. J. Williams, **D. Djurdjanovic** and D. C. McKay, “The frequency range of TMJ Sounds”, Journal of Oral Rehabilitation, Vol. 30, pp. 335-346, 2003.
7. **D. Djurdjanovic** and J. Ni, “Bayesian Approach to Measurement Scheme Analysis in Multi-Station Machining Systems,” Journal of Engineering Manufacture, Vol. 217, No. B8, pp.1117-1130, 2003.
8. N. Casoetto, **D. Djurdjanovic**, R. Mayor, J. Lee and J. Ni, “Multisensor Process Performance Assessment Through the Use of Autoregressive Modeling and Feature Maps,” SME Journal of Manufacturing Systems, Vol. 22, No. 1, pp. 64-72, 2003.
9. **D. Djurdjanovic**, J. Lee and J. Ni, “Watchdog Agent – An Infotronics Based Prognostics Approach for Product Performance Assessment and Prediction”, International Journal of Advanced Engineering Informatics, Special Issue on Intelligent Maintenance Systems, Vol. 17, No. 3 -4, pp. 109-125, 2003.
10. **D. Djurdjanovic** and J. Ni, “Measurement Scheme Synthesis in Multi-Station Machining Systems”, Transactions of ASME, Journal of Manufacturing Science and Engineering, Vol. 126, No. 1, pp.178-189, 2004.

11. T. Gruget and **D. Djurdjanovic**, "Optimal Reduction of Measurements in an Existing Manufacturing System", *International Journal of Manufacturing Science and Production*, Vol. 6, No. 3, pp. 103-117, 2004.
12. J. Barhak, **D. Djurdjanovic**, P. Spicer and R. Katz, "Integration of Reconfigurable Inspection with Stream of Variations Methodology", *International Journal of Machine Tools and Manufacture*, Vol. 45, pp. 407-419, 2005.
13. **D. Djurdjanovic** and J. Ni, "Stream of Variation (SOV) Based Measurement Scheme Analysis in Multi-Station Machining Systems," accepted for publication in the *IEEE Transactions on Automation Science and Engineering*, Paper No. T-ASE-2004-205, 2005.
14. G. Yu, H. Qiu, **D. Djurdjanovic** and J. Lee, "Feature Signature Prediction of a Boring Process Using Neural Network Modeling with Confidence Bounds", accepted for publication in the *International Journal of Advanced Manufacturing Technology*, Paper No. 2946, 2005.
15. M. Zhang, **D. Djurdjanovic** and J. Ni, "Diagnosibility and Sensitivity Analysis for Multi-Station Machining Processes", accepted for publication in the *International Journal of Machine Tools and Manufacture*, 2005.
16. J. Lee, J. Ni, **D. Djurdjanovic**, H. Qiu and H. Liao, "Intelligent Prognostics Tools and E-Maintenance", accepted for publication in the *Computers in Industry*, special issue on e-Maintenance, 2005.
17. Z. Yang, Q. Chang, **D. Djurdjanovic**, J. Ni and J. Lee, "Maintenance Priority Assignment On-Line Production Information," accepted for publication in the *Transaction of ASME, Journal of Manufacturing Science and Engineering*, Paper no. MANU-05-1073, 2005.
18. Y. Lei, **D. Djurdjanovic**, J. Ni, J. Lee, G. Xiao and J. R. Mayor, "System Level Optimization of Predictive Maintenance in Industrial Automation Systems", to appear in *Trans. of NAMRI/SME*, Vol. 34, 2005.
19. S. E. Widmalm, H. E. K. Bae and **D. Djurdjanovic**, "Inaudible Temporomandibular Joint Vibrations", submitted to *Journal of Craniomandibular Practice*, Paper no. 1400, 2005.

Journals and Transactions (Submitted)

20. Z. Yang, **D. Djurdjanovic**, R. Mayor, J. Ni and J. Lee, "Maintenance Scheduling in Production Systems Based on Predicted Machine Degradation," submitted to *IEEE Transactions on Automation Science and Engineering*, Paper no. V2004-067, paper in revision, 2005.
21. J. Liu, **D. Djurdjanovic**, K. A. Marko and J. Ni, "A Novel Method for Anomaly Detection, Localization and Fault Isolation for Dynamic Control Systems", submitted to *IEEE Transactions on Control Systems Technology*, Paper no. 2005-114, 2005.
22. **D. Djurdjanovic** and J. Ni, "On-Line Stochastic Control of Dimensional Quality in Multi-Station Manufacturing Systems", submitted to *Journal of Engineering Manufacture*, Paper no. JEM458, 2005.
23. Z. Yang, **D. Djurdjanovic** and J. Ni, "Maintenance Scheduling for a Manufacturing System of Machines with Adjustable Throughput", submitted to *IIE Transactions on Quality and Reliability Engineering*, Paper no. UIIE-0447, 2005.
24. J. Zhou, **D. Djurdjanovic**, J. Simmons-Ivy and J. Ni, "Integration of Maintenance and Reconfiguration Operations for Cost-Effective Maintenance in Reconfigurable Manufacturing Systems", submitted to *IIE Transactions on Quality and Reliability Engineering*, Paper no. UIIE-0467, 2005.
25. **D. Djurdjanovic**, J. Ni, J. Liu, P. Sun and K. Marko, "Building and Engineering Immune System: A New Paradigm for Design of Automotive Diagnostic Systems",

- submitted to the International Journal of Advanced Engineering Informatics, Paper no. ADVEI-D-06-00018, 2006.
26. J. Liu, **D. Djurdjanovic**, J. Ni, N. Casoetto and J. Lee, "Similarity Based Method for Manufacturing Process Performance Prediction and Diagnosis", submitted to Computers in Industry, 2006.
 27. **D. Djurdjanovic**, R. Kegg, J. Lee and J. Ni, "Time-Frequency Based Method for Multi-Sensor Assessment of Performance of Manufacturing Processes", submitted to Mechanical Systems and Signal Processing, 2006.

Selected conference papers:

28. J. Liu, **D. Djurdjanovic**, K. A. Marko and J. Ni, "Growing Structure Multiple Model System for Anomaly Detection and Fault Diagnosis", submitted for publication in Proc. of the 2006 International Symposium on Flexible Automation (ISFA), Osaka, Japan, 2006, Paper No. 0101-a.
29. Y. Liu, P. Kumar, J. Zhang, **D. Djurdjanovic** and J. Ni, "Predictive Modeling and Intelligent Maintenance Tools for High Yield Next Generation Fab", in Proc. of 8th Semiconductor Research Corporation (SRC) Technical Conference (TechCon), 2005. The paper was awarded *Best Paper Award* in the Factory Operations section.
30. **D. Djurdjanovic** and J. Zhu, "Stream of Variation Model Based Compensation of Dimensional Errors in Multistage Manufacturing", in Proc. of the 2005 ASME IMECE, Paper No. IMECE2005-81550, 2005.
31. J. Lee, J. Ni, G. Seliger, **D. Djurdjanovic**, D. Odry, H. Qiu and D. Guido, "Preventive Maintenance of Railroad Bogies in Freight Train Applications", Invited Paper at the 2004 Railcon – Scientific Expert Conference on Railways, Nis, Serbia, Oct. 22-23, 2004, pp. XIX – XXVI.
32. J. Ni, J. Lee and **D. Djurdjanovic**, "Watchdog Information Technology for Proactive Product Maintenance and its Implications to Ecological Product Re-Use", in Proceedings of the Colloquium e-ecological Manufacturing, pp. 101-110, Berlin, 2003.
33. **D. Djurdjanovic**, J. Lee and J. Ni, "Advances on Infotronics Based Prognostics", invited talk at the 14th International Workshop on Principles of Diagnostics DX-03, Washington, DC, pp. 31-35, 2003.
34. **D. Djurdjanovic**, J. Yang, H. Qiu, J. Lee and J. Ni, "Web-enabled Remote Spindle Monitoring and Prognostics," Proc. of 2nd International CIRP Conference on Reconfigurable Systems, Paper No. D20, 2003
35. **D. Djurdjanovic** and J. Ni, "Measurement Scheme Analysis in Multi-Station Machining Systems", in Proc. International Conference on Frontiers of Design and Manufacturing, Dalian, P.R. China, Vol. 1, pp.372-383, 2002.
36. **D. Djurdjanovic**, J. Ni and J. Lee, "Time-Frequency Based Sensor Fusion in the Assessment and Monitoring of Machine Performance Degradation", Proc. of 2002 ASME International Mechanical Engineering Congress and Exposition (IMECE), New Orleans, LA, Paper No. IMECE2002-32032, 2002.
37. **D. Djurdjanovic** and J. Ni, "Stream of Variation Based Analysis and Synthesis of Measurement Schemes in Multi-Station Machining Systems, in Proc. of the 2001 International Mechanical Engineering Congress and Exposition (IMECE), New York City, NY, 2001.
38. **D. Djurdjanovic**, C. K. H. Koh, W. J. Williams, S. E. Widmalm and K. P. Yang, "Automatic Recognition of the Source of Temporomandibular Joint Sounds," Proc. of the Rocky Mountains Biomedical Symposium, **35**, pp. 187-192, 1999.
39. K. P. Yang, K. H. Koh, W. J. Williams, S. E. Widmalm and **D. Djurdjanovic**, "Bilateral Sound Propagation Characteristics In Electronic TMJ Sound Recording," Proc. of the Rocky Mountains Biomedical Symposium, **35**, pp. 181-186, 1999.

40. K. P. Yang, **D. Djurdjanovic**, K. H. Koh, W. J. Williams and S. E. Widmalm, "Automatic Classification of the Temporomandibular Joint Sounds Using Scale and Time-Shift Invariant Representations of Their Time-Frequency Distributions," Proc. IEEE Time-Frequency and Time-Scale Symposium, pp. 265-268, 1998.

Manuscripts in Preparation:

41. **D. Djurdjanovic** and J. Zhu, "Stream of Variation Model Based Compensation of Dimensional Errors in Multistage Manufacturing", in preparation (preliminary work presented in 2005 ASME IMECE, Paper No. IMECE2005-81550)
42. J. Liu, **D. Djurdjanovic**, K. Marko and J. Ni, "Growing Structure Local Linear Model for Anomaly Detection and Fault Diagnosis", in preparation.
43. M. Zhang, **D. Djurdjanovic** and J. Ni, "Functionality Prediction from Surface Inspection Using Dimension Reduction Methods in Manufacturing", in preparation.
44. M. Zhang, **D. Djurdjanovic** and J. Ni, "Non-Parametric Representation of Engineering Surfaces for Defective Classification", in preparation.

Patent:

- **D. Djurdjanovic**, J. Liu and W. Miller, "Method and Systems for Anomaly Detection", US Patent Serial Number 10/967-102, Oct. 2004 (pending).

GRANTS AND CONTRACTS

- **Project title:** "Immune System Engineering for Automotive Engine Systems"
Sponsor: National Science Foundation
PI: Dr. Dragan Djurdjanovic
Co-PI-s: Prof. Jun Ni and Dr. Kenneth A. Marko
Proj. Period: 07/01/2006 – 6/30/2008
Requested Award Amount: \$99,890
- **Project title:** "Discrete Event Systems Anomaly Detection and Immune Systems Engineering for Automotive Systems"
Sponsor: ETAS Inc.
PI: Dr. Dragan Djurdjanovic
Proj. Period: 01/01/2006 - 12/31/2006
Award Amount: \$127,737
- **Project title:** "Survey of Predictive Maintenance Research and Practices in Semiconductor Manufacturing"
Sponsor: Intel Corporation
PI: Dr. Dragan Djurdjanovic
Proj. Period: 01/01/2006 - 5/1/2006
Award Amount: \$4,537
- **Project title:** " Intelligent Maintenance of Complex Systems using and Integrated Cumulative Damage Model and Distributed Agent-Based Maintenance Decision-Making "
Sponsor: National Science Foundation
PI: Prof. Jun Ni
Co-PI: Dr. Dragan Djurdjanovic

Proj. Period: 09/01/2005 - 8/31/2007

Award Amount: \$75,000

- **Project title:** "Development of a Predictive Modeling and Intelligent Decision Making Tools for the High Yield Next Generation Semiconductor Factories"
Sponsor: Semiconductor Research Corporation (SRC)
PI: Prof. Jun Ni
Co-PI: Dr. Dragan Djurdjanovic
Proj. Period: 09/01/2004 - 08/31/2007
Award Amount: \$399,998
- **Project title:** "Multi-Sensor Predictive Monitoring of Machining Process Health"
Sponsor: General Electric Aviation
PI: Prof. Jun Ni
Co-PI: Dr. Dragan Djurdjanovic
Proj. Period: 09/01/2005 - 12/31/2006
Award Amount: \$90,000
- **Project Title:** "NSF I/UCRC on Intelligent Maintenance Systems - Membership"
Sponsor: ETAS Inc.
PI: Dr. Dragan Djurdjanovic
Co-PI: Prof. Jun Ni
Proj. Period: 10/01/2005-09/30/2006
Award Amount: \$35,000
- **Project Title:** "NSF I/UCRC on Intelligent Maintenance Systems - Membership"
Sponsor: Ford Motor Company
PI: Dr. Dragan Djurdjanovic
Co-PI: Prof. Jun Ni
Proj. Period: 09/01/2005-08/31/2006
Award Amount: \$35,000
- **Project Title:** "NSF I/UCRC on Intelligent Maintenance Systems"
Sponsor: General Motors Corporation
PI: Dr. Dragan Djurdjanovic
Co-PI: Prof. Jun Ni
Proj. Period: 10/01/2005-09/30/2006
Award Amount: \$35,000
- **Project Title:** "NSF I/UCRC on Intelligent Maintenance Systems - Membership"
Sponsor: United Technologies Corporation
PI: Prof. Jun Ni
Co-PI: Dr. Dragan Djurdjanovic
Proj. Period: 06/01/2004-05/30/2005
Award Amount: \$35,000
- **Project Title:** "National Science Foundation Multi-site Industry University Cooperative Research Center: e-Intelligent Maintenance Systems"
Sponsor: University of Cincinnati
PI: Prof. Jun Ni
Co-PI: Dr. Dragan Djurdjanovic
Proj. Period: 01-09/2002-08/31/2006
Award Amount: \$168,565

- **Project title:** " Intermittent Anomalous Effect Detection in Continuous and Discrete Event Automotive Systems "

Sponsor: ETAS Inc.

PI: Dr. Dragan Djurdjanovic

Proj. Period: 01/01/2004 - 12/31/2005 (completed)

Award Amount: \$144,300
- **Project title:** "Review of the State of the Art in Automotive Diagnostics"

Sponsor: ETAS Inc.

PI: Dr. Dragan Djurdjanovic

Proj. Period: 06/01/2004 - 08/31/2004 (Completed)

Award Amount: \$10,328
- **Project title:** "Detection, Isolation, and Recovery of Sensor Performance Degradation in Complex Engineering Systems"

Sponsor: National Science Foundation

PI: Dr. Dragan Djurdjanovic

Co-PI-s: Prof. Jun Ni and Prof. Jay Lee (collaborative Project with U. of Cincinnati)

Proj. Period: 01/01/2006 – 12/31/2009

Requested Award Amount: \$ 127,878 (requested for the U. of Michigan side)

Status: Pending

RESEARCH SUMMARY

- I conducted research and served as the research team leader in the NSF co-sponsored Industry/University Collaborative Research Center (I/UCRC) for Intelligent Maintenance Systems (IMS) in the area of "Watchdog Agent" research. In this research, my research team and I explored and developed a toolbox of algorithms for multi-sensor assessment and prediction of equipment performance. Such algorithms allow extraction of degradation related information out of seemingly meaningless data and thus enable intelligent maintenance practices based on early warnings of equipment's performance degradation. My research led to innovative and efficient methods of using Cohen's class of time-frequency signal energy distributions and development of performance similarity measures that facilitated performance assessment and prediction of highly dynamic processes characterized by non-stationary signatures. In addition, non-stationary signal analysis techniques have been coupled with Self-Organizing Maps (SOM-s) to facilitate detection of anomalous behavior in highly dynamic, control systems, such as cars or aircraft engines. Due to control inputs and environmental disturbances, these systems display a multi-regime behavior which is captured by the SOM and anomalous behavior is detected independently of the input/disturbance regime in which the system is operating. Achievements of my research briefly described above found numerous industrial applications in GM and USPS facilities, automotive diagnostic software applications currently developed by ETAS Inc., as well as in new industrial automation devices currently developed by the Rockwell Automation and Omron. In this research, I closely collaborate with Prof. Jun Ni (Mechanical Engineering Dept., University of Michigan) and Prof. Jay Lee (Mechanical, Industrial and Nuclear Engineering, University of Cincinnati). The research involves 5 graduate students and several undergraduate students who contribute through independent studies.

- I also conducted and led research efforts in the area of the maintenance Decision Support Tool in the I/UCRC for Intelligent Maintenance Systems, where predictive information obtained from the Watchdog Agents was utilized for obtaining optimal maintenance decisions that are the least intrusive to the overall manufacturing process. Simulation of the interaction between maintenance and production processes led to a highly credible representation of maintenance effects on the overall system. This detailed maintenance and production simulation was coupled with heuristic optimization methods that facilitate the search for maintenance actions (priority of maintenance work-orders or a maintenance schedule) that result in optimal system-level cost effects. GM strongly supported this research by offering their facilities for validation of intelligent maintenance decision making tools, some of which are now actively used on the factory floor. In this research, I closely collaborate with Prof. Jun Ni (Mechanical Engineering Dept.) and Prof. and Prof. Jay Lee (Mechanical, Industrial and Nuclear Engineering, University of Cincinnati). The research involves 2 graduate students.
- In the past 5 years, I had a significant research effort conducted in the NSF Engineering Research Center (ERC) for Reconfigurable Manufacturing Systems (RMS). In this center, I did my doctoral thesis research in which a state space model of the flow of dimensional errors in machining has been developed with machining station index serving as the time index in usual discrete state space models used in control theory. The control theory formalism was then used to evaluate “informativeness” of any set of measurements taken in the machining system, based on which a Genetic Algorithm optimization method was proposed for finding the most informative combination of measurements one can take, given the cost constraints on the measurement system. These research achievements are currently used in Ford’s Windsor Engine Plant and are in the implementation stage in GM and Cummins. My research involvement in the ERC continued through my research and service as the coordinator for the Research Thrust Area 4 on responsive operations in RMS. This thrust area consists of 6 ERC projects and my personal research deals with utilizing reconfigurable resources to maximize benefits of maintenance by strategically reconfiguring manufacturing systems simultaneously with maintenance operations. Service of the coordinator involves coordination of faculty and students from the Mechanical, Industrial and Electrical Engineering, as well as from the Business School. In this research, I closely collaborate with Prof. Jun Ni (Mechanical Engineering Dept.), Prof. J. Simmons-Ivy (UM Business School) and Prof. Jianjun Shi (Industrial and Operations Engineering). The research involves 2 graduate students (one in quality control related research and one in maintenance decision-making research).
- I also conducted research in the area of automatic diagnosis of temporomandibular joint (jaw joint) disorders based on sounds emitted from those joints during motion. Such capability is aimed at enabling early detection of arthritic changes and thus facilitating early treatment using anti-inflammatory drugs and splints instead of costly surgeries which are necessary in the later stages of the pathology. My research resulted in overcoming of the highly transient nature of the signals that lasted less than 5ms, using an analytically tractable and highly accurate classification tool based on the reduced interference joint time-frequency distributions of signal energy and zero-subspace classifiers. Results of this research spurred strong interests in the biomedical community and clinical studies are under way to correlate the engineering findings with actual joint pathology diagnosed using conventional methods. Currently, these research results are expanded and tested in detection of fatigue level based on the Electro Encephalogram (EEG) signals. In this research, I closely collaborate with Prof. Swen E. Widmalm (School of Dentistry, University of Michigan) and it is planned to start involving graduate and undergraduate students into this project.

TEACHING INTERESTS

Undergraduate level

- Introduction to Manufacturing Processes, Systems and Design
- Data and Signal Processing
- Design and Analysis of Experiments
- Engineering Probability, Statistics and Random Processes
- Optimization Methods in Engineering
- Automatic Control
- Dynamics and Vibrations

Graduate level

- Monitoring and Control of Manufacturing Processes
- Maintenance in Manufacturing and Service Systems
- Statistical Quality Control
- Reconfigurable Manufacturing Systems
- Time-Series Analysis

TEACHING EXPERIENCE

COURSES TAUGHT

- **Winter 2006**
ME360 Modeling, Analysis and Control of Dynamic Systems
Enrollment 87 students.
- **Fall 2005**
ME360 Modeling, Analysis and Control of Dynamic Systems
Teaching jointly with Prof. Anna Stefanopoulou
Enrollment 87 students.
- **Winter 2005**
ME401 Statistical Methods for Manufacturing Systems
Teaching jointly with Prof. Jun Ni
Enrollment 36 students
- **Fall 2004**
ME240 Introduction to Dynamics and Vibrations
Enrollment 94 students

Teaching Evaluation:

Q1: Overall, this was an excellent course: 2.80/5

Q2: Overall, the instructor was an excellent teacher 2.58/5

School/College 50th percentiles (Q1/Q2): 3.85/3.98

- **Winter 2004**

ME360 Modeling, Analysis and Control of Dynamic Systems

Enrollment 87 students.

Teaching Evaluation:

Q1: Overall, this was an excellent course: 4.10/5

Q2: Overall, the instructor was an excellent teacher 4.29/5

School/College 50th percentiles (Q1/Q2): 3.77/4.00

- **Fall 2003**

ME461 Automatic Control

Enrollment: 54 students.

Teaching Evaluation:

Q1: Overall, this was an excellent course: 4.53/5

Q2: Overall, the instructor was an excellent teacher 4.63/5

School/College 50th percentiles (Q1/Q2): 4.01/4.13

- **Winter 2003**

ME360 Modeling, Analysis and Control of Dynamic Systems

Enrollment: 73 students.

Teaching Evaluation:

Q1: Overall, this was an excellent course: 4.10/5

Q2: Overall, the instructor was an excellent teacher 4.48/5

School/College 50th percentiles (Q1/Q2): 4.00/4.13

- **Fall 2002**

IOE565/ME563/MFG561 Time Series Analysis, Forecasting and Control

Enrollment: 60 students.

Teaching Evaluation:

Q1: Overall, this was an excellent course: 3.97/5

Q2: Overall, the instructor was an excellent teacher 4.14/5

School/College 50th percentiles (Q1/Q2): 4.21/4.37

PH.D. COMMITTEES CO-CHAIR

- Co-chair (with Prof. Jun Ni) in the doctoral committee for Min Zhang
Thesis title: *Product DNA Concept Development for Manufacturing Process Faults Diagnosis and Product Performance Prognosis*
- Co-chair (with Prof. Jun Ni) in the doctoral committee for Jianbo Liu
Thesis title: *Diagnosis and Prognosis in Automotive Applications*

PARTICIPATION IN PH.D. COMMITTEES

- Member of the doctoral committee for Jing Zhou
Thesis title: *Integrated Maintenance and Reconfiguration Policies in Reconfigurable Manufacturing Systems*
- Member of the doctoral committee for Yong Lei
Thesis title: *Intelligent Maintenance in Networked Industrial Automation Systems*
- Member of the doctoral committee for Qing Chang
Thesis title: *Dynamic Maintenance Control Based on Real Time Status of Manufacturing System*
- Member of the doctoral committee for Bryon Sohns
Thesis title: *Parameterization of Large Dynamic Models through the use of Model Reduction and Optimization Techniques*
- Member of the doctoral committee for Zimin (Max) Yang
Thesis title: *Dynamic Maintenance Scheduling Using Online Information about System Condition*
Graduated in January 2005

M.S. COMMITTEES CO-CHAired

- Co-Chair (with Prof. Jun Ni) of the committee for the M.S. Thesis of Jie Zhu
Thesis title: *Stream-of-Variations Based Error Compensation in the Multi-Station Manufacturing Processes*
- Co-Chair (with Prof. Jun Ni) of the M.S. Thesis committee for Kathryn Johnson
Thesis title: *Integration and Implementation of a Watchdog Agent™ Toolbox for Performance Assessment of Machinery Systems*

GRADUATE SPECIAL PROJECTS DIRECTED

- **Fall 2005**
ME590 Independent Study
 - Supervising independent study “Elimination of Negative Effects of Anomalies in Immune System Engineering for a Throttle Plate Mechanism” by Shiming Duan
- **Winter 2005**
ME590 Independent Study
 - Supervising independent study “Compensability and Diagnosability Study for the Multi-Station Manufacturing Processes” by Jie Zhu
 - Supervising independent study “Automatic Detection of Fatigue Level Based on the Time-Frequency Signal Analysis of EEG Signals” by Qi Zhuang

UNDERGRADUATE SPECIAL PROJECTS DIRECTED

- **Fall 2004**

ME490 Independent Study

- Supervised independent study “Cost-Effects of Proactive Maintenance based on Predictive Equipment Condition Information” by Yung Keong Teo

- **Winter 2004**

ME491 Independent Study

- Supervised independent study “Predictive Sensor Validity Checking and Improved Description of Time-Frequency Distribution” by Jiang Li
- Supervised independent study “Stream-of-Variations Based Error Compensation in the Multi-Station Manufacturing Processes (II)” by Jie Zhu

- **Fall 2003**

ME490 Independent Study

- Supervised independent study “Sensor Validity Checking and Failure Prediction” by Jiang Li
- Supervised independent study “Stream-of-Variations Based Error Compensation in the Multi-Station Manufacturing Processes” by Jie Zhu

SHORT COURSES AND WORKSHOPS

- Workshop “Prognostic Tools for Intelligent Maintenance Systems”, University of Michigan, May 16, 2005, Enrolment 32 students, Lecturer together with Prof. Jay Lee (chair), Dr. Hai Qiu (U. of Wisconsin, Milwaukee), Dr. Haitao Liao (U. of Wisconsin, Milwaukee), Dr. Leandro Barajas (GM) and Dr. Jeff Butterbaugh (National Instruments)
- Short course “Introduction of E-Manufacturing and E-Maintenance Systems”, University of Manchester, UK, Jan. 24-28, 2005, Enrolment 25 students, Co-Chair with Prof. Ashraf Labib from the University of Manchester, UK.
- Short course “Achieving Near-Zero Breakdown of Machinery: Predictive Maintenance Tools and Techniques”, University of Wisconsin, Milwaukee, Sep. 13-16, 2004, enrolment 30 students, Lecturer together with Prof. Jay Lee (chair) and Dr. Hai Qiu from the University of Wisconsin, Milwaukee.

INVITED TALKS AND SEMINARS

- University of Michigan Mechanical Engineering Departmental Seminar “Watchdog Agent – Toolbox of Algorithms for Assessment and Prediction of Equipment Performance,” delivered on Sep. 16, 2004.
- Invited Talk, “New and Emerging Technologies: Smart Machines”, given at the 2004 IMTS Manufacturing Conference, Sep. 8-10, 2004 in Chicago, IL.

- Invited Talk “Algorithms for Multisensor Assessment and Prediction of Equipment Performance – Advances in E-Prognostics” at the INTEL University Day, Oct. 14-15, 2003, Chandler, AZ.
- Invited Talk “Watchdog Agent for Multisensor Assessment and Prediction” delivered as a part of Intel Speaker Series on Jan. 29, 2003.
- Industrial presentations at Intel, GM, Ford, USPS, Timken, GE, Wright-Patterson Air Force Base, United Technologies etc.

PROFESSIONAL SERVICE

- Chair Panelist for the Manufacturing Systems Panel of the Dynamics Systems and Control Division of ASME.
- Co-organizing a symposium titled “Diagnostics, Performance Prediction and Decision Making for Intelligent Maintenance of Manufacturing Systems”, Jointly Organized by the Manufacturing Systems Technical Panel of the Dynamic Systems and Controls Division and the Manufacturing Equipment Technical Committee of the Manufacturing Engineering Division at the 2006 ASME International Mechanical Engineering Congress and Exposition Chicago, IL, USA - November 5-10.
- Co-organizing a symposium titled “Diagnostics, Performance Prediction and Decision Making for Intelligent Maintenance of Manufacturing Systems”, Jointly Organized by the Jointly Organized by the Quality and Reliability Technical Committee of the Manufacturing Engineering Division and the Manufacturing Systems Technical Panel of the Dynamic Systems and Controls Division, Engineering Division at the 2006 ASME International Mechanical Engineering Congress and Exposition Chicago, IL, USA - November 5-10.
- Co-organizing a session "Diagnostics, Performance Prediction and Decision Making for Intelligent Maintenance of Dynamic Systems" at the 2006 International Symposium on Flexible Automation (ISFA).
- Grand Awards judge for the 2006 Intel International Science and Engineering Fair, May 7-13, 2005, Indianapolis, IN.
- Grand Awards judge for the 2005 Intel International Science and Engineering Fair, May 10-12, 2005, Phoenix, AZ.
- Serving on the NSF SBIR/STTR Panel MI - B.2 “Machining & Material Removal Processes”
- Co-organizing a symposium titled “Diagnostics, Monitoring and Prediction for Life Cycle Control of Dynamic Systems” jointly sponsored by the ASME Manufacturing Engineering Division and the Dynamic Systems and Controls Division at the 2005 ASME International mechanical Engineering Congress and Exposition (IMECE).
- Co-organizing a symposium titled “Process Model Based Control of Dimensional Errors in Multistage Manufacturing Systems” jointly Sponsored by the ASME Manufacturing Engineering Division and the Dynamic Systems and Controls Division at the 2005 ASME International mechanical Engineering Congress and Exposition (IMECE).
- Organized a session on Responsive Maintenance in Flexible and Reconfigurable Manufacturing Systems at 2004 INFORMS in Denver, CO, October 24-27, 2004.
- Member of ASME, SME and INFORMS.
- Served as a referee for a number of journals and conferences including ASME Journal of Manufacturing Systems and Engineering, ASME Journal of Dynamic Systems,

Measurement and Control, IEEE Trans. on Automation Science and Engineering,
International Journal of Machine Tools and Manufacture, Transactions of IIE, SME
North American Manufacturing Research Conference, ASME International Mechanical
Engineering Congress and Exposition and Japan-USA Symposium on Flexible
Automation.

OTHER

- Student internship completed in the Physicalisch Technische Bundesanstalt, Berlin, Germany in 1997
- Fluently speaking English, Serbo-Croatian and French, with the additional reading knowledge of Russian and German.