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DEGREES: Ph.D., August 1986, University of Michigan, Mechanical Engineering
M.S., August 1982, University of Michigan, Mechanical Engineering
B.S., August 1980, University of Michigan, Mechanical Engineering

PROFESSIONAL EXPERIENCE:

Kourosh Danai joined the faculty of Mechanical Engineering at the University of Massachusetts Amherst in 1987 as an assistant professor. He was promoted to the rank of associate professor with tenure in Sept. 1993, and to professor in Sept. 1998. Dr. Danai's research is focused on development of robust automation solutions. With his students he has contributed novel solutions to the areas of Manufacturing Automation, Health Monitoring, and System Identification. Dr. Danai has been the recipient of three innovation awards from NASA and has been invited for two Fellow's lectures at the United Technologies Research Center. He spent the summer of 1990 at Sikorsky Aircraft Company (working on helicopter track and balance), the fall of 1994 at the United Technologies Research Center (working on sensor location selection in helicopter gearboxes), and the fall of 2001 at the National Research Council of Canada (working on plastic processing control). Dr. Danai has organized two symposia on 'control of manufacturing processes' at the 1990 and 1991 ASME WAM, and a symposium on 'applied fault diagnosis' at the 1994 ACC. Dr. Danai has been an associate editor of the *ASME Journal of Manufacturing Science and Engineering*, has chaired the Manufacturing Systems Panel of the ASME Dynamic Systems and Control Division, and was program chair of the ASME Dynamic Systems and Control Division at the 1996 Int'l Mechanical Engineering Congress and Exposition. Dr. Danai was a guest speaker at the 1994 Neural Information Processing Systems Post-Conference Workshop on *Novelty Detection and Adpative System Monitoring* and at the *First Joint Mexico-USA International Workshop on Neural Networks and Neurocontrol.* Dr. Danai is a Fellow of ASME.

PATENT:

U.S. Patent No. 8,712,927 B2 "Systems and Methods for Parameter Adaptation,"
April 29, 2014.

INVENTIONS:

- **Manufacturing Automation**
  - *Recursive Constraint Bounding (RCB)* (applied to turning and grinding)
  - *Virtual Search* (applied to injection molding and helicopter rotor tuning)
- **Health Monitoring**
  - *Multi-Valued Influence Matrix (MVIM)* (applied to tool breakage detection in machining and helicopter gearboxes)
  - *Structure-Based Connectionist Network (SBCN)* (applied to helicopter gearboxes)
  - *Damage Signature Isolation Method (DSIM)* (applied to jet engines and civil structures)
- **System Identification**
  - *Model-Based Recurrent Neural Networks (MBRNN)*
  - *Parameter Signature Isolation Method (PARSIM)*
  - *Model Structure Adaptation Method (MSAM)*

JOURNAL ARTICLES:

1. Danai, K., and Ulsoy, A. G., 1986, "A Model Based Approach for On-Line Tool Wear Estimation in Turning," *1986 SME Manufacturing Technology Review*, pp. 49-54.
2. Koren, Y., Ulsoy, A. G., , and Danai, K., 1986, "Tool Wear and Breakage Detection Using a Process Model," *Annals of the CIRP*, Vol. 35, No. 1, pp. 283-288.
3. Danai, K., and Ulsoy, A. G., 1987, "A Dynamic State Model for On-Line Tool Wear Estimation in Turning," *ASME J. of Eng. for Industry*, Vol. 109, No. 4, pp. 396-399.
4. Danai, K., and Ulsoy, A. G., , 1987, "An Adaptive Observer for On-Line Tool Wear Estimation in Turning – Part I: Theory," *Mechanical Systems and Signal Processing*, Vol. 1, No. 2, 1987, pp. 211-225.
5. Danai, K., and Ulsoy, A. G., 1987, "An Adaptive Observer for On-Line Tool Wear Estimation in Turning – Part II: Results," *Mechanical Systems and Signal Processing*, Vol. 1, No. 2, pp. 226-240.
6. Koren, Y., Ko, T., Ulsoy, A. G., and Danai, K., 1991, "Flank Wear Estimation Under Varying Cutting Conditions," *ASME J. of Dynamic Systems, Measurement and Control*, Vol. 113, No. 2, pp. 300-307.
7. Danai, K., and Chin, H., 1991, "Fault Diagnosis with Process Uncertainty," *ASME J. of Dynamic Systems, Measurement and Control*, Vol. 113, No. 3, pp. 339-343.
8. Chin, H., and Danai, K., 1991, "A Method of Fault Signature Extraction for Improved Diagnosis," *ASME J. of Dynamic Systems, Measurement, and Control*, Vol 113, No. 4, pp. 634-638.

9. Nair, R., Danai, K., and Malkin, S., 1992, "Turning Process Identification Through Force Transients," *ASME J. of Eng. for Industry*, Vol. 114, No. 1, pp. 1-7.

10. Danai, K., Nair, R., and Malkin, S., 1992, "An Improved Model for Force Transients in Turning," *ASME J. of Eng. for Industry*, Vol. 114, No. 4, pp. 400-403.

11. Fathailal, M., Danai, K., and Barber, G., 1993, "Effect of Flank Wear on the Topography of Machined Surfaces," *Tribology Transactions*, Society of Tribologists and Lubrication Engineers, Vol. 36, No. 3, pp. 693-699.

12. Chin, H., and Danai, K., 1993, "Improved Flagging for Pattern Classifying Diagnostic Systems," *IEEE Trans. on Systems, Man, and Cybernetics*, Vol. 23, No. 4, pp. 1101-1107.

13. Xiao, G., Malkin, S., and Danai, K., 1993, "Autonomous System for Multi-Stage Cylindrical Grinding," *ASME J. of Dynamic Systems, Measurement, and Control*, Vol. 115, No. 4, pp. 667-672.

14. Jammu, V. B., and Danai, K., 1993, "Unsupervised Neural Network for Tool Breakage Detection in Turning," *Annals of the CIRP*, Vol. 42, No. 1, pp. 67-70.

15. Chin, H., Danai, K., and Lewicki, D. G., 1993, "Pattern Classifier for Fault Diagnosis of Helicopter Gearboxes," *IFAC J. of Control Eng. Practice*, Vol. 1, No. 5, pp. 771-778.

16. Colgan, J., Chin, H., Danai, K., and Hayashi, H., 1994, "Tool Breakage Detection in Turning: A Multi-Sensor Method," *ASME J. of Eng. for Industry*, Vol. 116, No. 1, pp. 117-123.

17. Zhu, Z., Danai, K., and McCormick, J., 1994, "Control Design of a High Speed Robot Arm," *SME Trans. on Robotics Research*, Vol. 3, pp.13-1 to 13-14.

18. Taitel, H., Danai, K., and Gauthier, D. G., 1995, "Helicopter Track and Balance with Artificial Neural Nets," *ASME J. of Dynamic Systems, Measurement and Control*, Vol. 117, No. 2, pp. 226-231.

19. Chin, H., Danai, K., and Lewicki, D. G., 1995, "Fault Detection of Helicopter Gearboxes Using the Multi-Valued Influence Matrix Method," *ASME J. of Mechanical Design*, Vol. 117, No. 2, pp. 248-253.

20. Jindani, J., Malkin, S., and Danai, K., 1995, "A Method of Cam Lift Smoothing," *J. of Design and Manufacturing*, Vol. 5, pp. 61-66.

21. Ivester, R., and Danai, K., 1996, "Intelligent Control of Machining Under Modeling Uncertainty," *CIRP Manufacturing Systems*, Vol. 25, No. 1, pp. 73-79.

22. Jammu, V. B., Danai, K., and Lewicki, D. G., 1996, "Unsupervised Pattern Classifier for Abnormality Scaling of Vibration Features for Helicopter Gearbox Diagnosis," *Machine Vibration*, Vol. 5, No. 3, pp. 154-162.

23. Ivester, R., Danai, K., and Malkin, S., 1997, "Cycle Time Reduction in Machining by Recursive Constraint Bounding, *ASME J. of Manufacturing Science and Eng.*, Vol. 119, No. 2, pp. 201-207.

24. Jammu, V. B., Danai, K., and Lewicki, D. G., 1998, "Structure-Based Connectionist Network for Fault Diagnosis of Helicopter Gearboxes," *ASME J. of Mechanical Design*, Vol. 120, No. 1, pp. 100-105.

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26. Ivester, R., and Danai, K., 1998, "Tuning and Automatic Regulation of Injection Molding by the Virtual Search Method," *ASME J. of Manufacturing Science and Eng.*, Vol. 120, No. 2, pp. 323-329.

27. Ivester, R., Danai, K., and Kazmer, D., 1998, "Automatic Tuning of Injection Molding by the Virtual Search Method," *J. of Injection Molding Technology*, Vol. 2, No. 3, pp. 103-108.

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29. Gan, C., and Danai, K., 2000, "Model-Based Recurrent Neural Network for Modeling Nonlinear Dynamic Systems," *IEEE Trans. on Systems, Man, and Cybernetics - part B: Cybernetics*, Vol. 30, No. 2, pp. 344-351.

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33. Dong, S., Danai, K., Malkin, S., and Deshmukh, A., 2004, "Continuous Optimal Infeed Control for Cylindrical Plunge Grinding - Part I: Methodology," *ASME J. of Manufacturing Science and Eng.*, Vol. 26, pp. 327-333.

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Available on-line at: http://dx.doi.org/10.1080/00207721.2015.1069905.

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Available on-line at: http://www.sciencedirect.com/science/article/pii/S0952197616301294

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EDITED VOLUMES:

- Danai, K., and Malkin, S., (Eds.), 1990, *Automation of Manufacturing Processes*, ASME, Vol. DSC-22, 162 pages.
- Danai, K., and Malkin, S., (Eds.), 1991, *Control of Manufacturing Processes*, ASME, Vol. DSC-28, 160 pages.
- Danai, K., (Ed.), 1996, *IMECE Proc. of the Dynamic Systems and Control Division*, ASME, Atlanta, Georgia, 937 pages.

CHAPTERS:

- Gan, C., and Danai, K., 2001, "Model-Based Recurrent Neural Network for Fault Diagnosis of Nonlinear Dynamic Systems," Chapter 10 in *Radial Basis Function Networks 2* (Howlett, R. J., and Jain, L. C., Eds.), Physica-Verlag (a Springer-Verlag company).
- Danai, K., 2002, "Machine Tool Monitoring and Control," Chapter 5 of *Mechanical Systems Design Handbook: Modeling, Measurement, and Control*, Nwokah, O. D. I. and Hurmuzlu, Y. (Eds.), CRC Press, pp. 75-84.
- Kazmer, D., and Danai, K., 2002, "Control of Polymer Processing," Chapter 9 of *Mechanical Systems Design Handbook: Modeling, Measurement, and Control*, Nwokah, O. D. I. and Hurmuzlu, Y. (Eds.), CRC Press, pp. 139-150.
- Danai, K., 2005, "Fault Diagnosis of Helicopter Gearboxes," C. de Silva (Ed.), Chapter 27, *Vibration and Shock Handbook*, CRC Press.

- Danai, K., 2005, "Helicopter Rotor Tuning," C. de Silva (Ed.), Chapter 24, *Vibration and Shock Handbook*, CRC Press.

CONFERENCE PAPERS:

1. Danai, K., and Ulsoy, A. G., 1985, "A Dynamic State Model for On-Line Tool Wear Estimation in Turning," *Sensors and Controls for Manufacturing*, ASME, Nov., pp. 137-148.
2. Danai, K., and Ulsoy, A. G., 1985, "A Model Based Approach for On-Line Tool Wear Estimation in Turning," *Proc. of Sensors' 85*, SME, Detroit, Michigan, Nov. 4-7.
3. Koren, Y., Danai, K., Ulsoy, A. G., , and T. Ko, 1987, "Monitoring Tool Wear Through Force Measurement," *Proc. of 15th NAMRC*, Bethlehem, Pennsylvania, May 27-29, pp. 463-468.
4. Danai, K., and Ulsoy, A. G., , 1988, "An Adaptive Observer for On-Line Tool Wear Estimation in Turning – Part I: Theory," *Proc. of the 1988 American Control Conference*, Atlanta, Georgia, pp. 1930-1936.
5. Danai, K., and Ulsoy, A. G., , 1988, "An Adaptive Observer for On-Line Tool Wear Estimation in Turning – Part II: Results," *Proc. of the 1988 American Control Conference*, Atlanta, Georgia, pp. 1937-1944.
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49. Suryavanashi, A., Wang, S., Gao, R., Danai, K., and Lewicki, D. G., 2002, "Condition Monitoring of Helicopter Gearboxes by Embedded Sensing," *Proc. of the American Helicopter Society 58th Annual Forum*, Montreal Canada, June 11-13.

50. Wang, S., Danai, K., 2002, "A Forward Approach to Helicopter Track and Balance," *Proc. of the 2002 ASME Int'l Mechanical Eng. Congress and Exposition*, November 17-22, New Orleans, Louisiana, IMECE2002-33453.

51. Wang, S., Danai, K., 2003, "A Probability-Based Approach to Helicopter Track and Balance," *Proc. of the American Helicopter Society 59th Annual Forum*, Phoenix, Arizona, May 6-8.

52. Gan, C., and Danai, K., "Fault Diagnosis with a Model-Based Recurrent Neural Network," *Proc. of Safeprocess 2003*, Washington, D. C., June 9-11.

53. Danai, K., and McCusker, J. R., 2008, "Parameter Adaptation by Parameter Signature Isolation in the Time-Scale Domain," *Proc. of 2008 Dynamic Systems and Control Conference*, Oct. 20-22, Ann Arbor, Michigan.

54. Danai, K., McCusker, J. R., and Hollot, C. V., 2008, "Mutual Identifiability Analysis for Parameter Signature Isolation in the Time-Scale Plane," *Proc. of 2008 Dynamic Systems and Control Conference*, Oct. 20-22, Ann Arbor, Michigan.

55. Danai, K., McCusker, J. R., Currier, T., and Kazmer, D. O., 2009, "Validation Of Dynamic Models By Image Distances In The Time-Scale Domain," *Proc. of ASME DSCC 2009*.

56. McCusker, J. R., Currier, T., and K. Danai, 2009, "Improved Parameter Estimation by Noise Compensation in the Time-Scale Domain," *Proc. of ASME DSCC 2009*.

57. McCusker, J. R. and K. Danai, 2009, "Integrating Parameter Estimation Solutions from the Time and Time-Scale Domains," *Proc. of ASME DSCC 2009*.

58. McCusker, J. R., McKinley, M. G., and K. Danai, 2009, "Iterative Controller Tuning in the Time-Scale Domain," *Proc. of ASME DSCC 2009*.

59. McCusker, J. R., and K. Danai, 2010, "Selection of Outputs for Gas-Turbine Engines by Parameter Signatures," *Proc. of ASME DSCC 2010*.

60. La Cava, W. G., Spector, L., Danai, K., and Lackner, M., 2014, "Evolving Differential Equations with Developmental Linear Genetic Programming and Epigenetic Hill Climbing," *GECCO'14*, July 121716, Vancouver, BC, Canada.

61. La Cava, W. G., Helmuth, T., Spector, L., and Danai, K., 2015, "Genetic Programming with Epigenetic Local Search," *GECCO'15*, July 12-16, Madrid, Spain.

62. La Cava, W. G., and Danai, K., 2015, "Model Structure Adaptation: A Gradient-Based Approach," *Proc of ASME DSCC 2015*, Oct. 28-30, Columbus, Ohio.

63. La Cava, W. G., Danai, K., Spector, L., Fleming, P., Wright, A., Lackner, M., 2015, "Automatic Identification Of Closed-Loop Wind Turbine Dynamics via Genetic Programming," *Proc. of ASME DSCC 2015*, Columbus, Ohio, Oct. 28-30.

64. La Cava, W. G., Spector, L., and Danai, K., 2016, "ϵ-Lexicase Selection for Regression," *GECCO'16*, July 20 - 24, Denver, Colorado, USA.

OTHER PAPERS:

- "Fault Diagnosis of Helicopter Power Train," Chin, H., and Danai, K., *Proc. of the 1991 Annual NSF Grantees Conference in Design and Manufacturing*, Austin, Texas, pp. 787-790.
- "An Autonomous System for Cylindrical Plunge Grinding," G. Xiao, S. Malkin, and Danai, K., *Proc. of the 1993 NSF Design and Manufacturing Systems Conference*, Charlotte, North Carolina, pp. 399-403.
- "Autonomous System for Cylindrical Plunge Grinding," S. Malkin and Danai, K., *Proc. of the 1994 NSF Design and Manufacturing Grantees Conference*, Cambridge, Massachusetts, pp. 438-439.
- "Method of Tuning and Automatic Regulation for Injection Molding," Danai, K., and Kazmer, D., *Proc. of the 1998 NSF Design and Manufacturing Grantees Conference*, Monterrey, Mexico.

- "Method of Tuning and Automatic Regulation for Injection Molding," Danai, K., and Kazmer, D., *Proc. of the 1999 NSF Design and Manufacturing Grantees Conference*, Vancouver, Canada.
- "Methodology for Continuous Infeed Cylindrical Plunge Grinding," Danai, K., and Malkin, S., *Proc. of the 1999 NSF Design and Manufacturing Grantees Conference*, Vancouver, Canada.

TECHNICAL REPORTS:

- Chin, H., Danai, K., and Lewicki, D. G., 1993, "Pattern Classifier for Health Monitoring of Helicopter Gearboxes," NASA Technical Memorandum 106099.
- Chin, H., Danai, K., and Lewicki, D. G., 1993,"Fault Detection of Helicopter Gearboxes Using the Multi-Valued Influence Matrix Method," NASA Technical Memorandum 106100.
- Chin, H., Danai, K., and Lewicki, D. G., 1993,"Efficient Fault Diagnosis of Helicopter Gearboxes," NASA Technical Memorandum 106253.
- Jammu, V. B., Danai, K., and Lewicki, D. G., 1995,"Diagnosing Helicopter Gearboxes Using Connectionist Networks," NASA Technical Memorandum 106932.
- Jammu, V. B., K. Wang, Danai, K., and Lewicki, D. G., 1996,"Model-Based Placement of Gearbox-Monitoring Accelerometers," NASA Technical Memorandum 107219.
- Jammu, V. B., and Danai, K., 1997, "Diagnostic Analyzer for Gearboxes (DAG): User's Guide," NASA Contractor Report 4762.

INVITED TALKS:

CONFERENCES:

- "Helicopter Track and Balance with Artificial Neural Nets," *1992 Annual UTC Engineering Conference (UTECA)*, April 27-30, 1992, Springfield, Massachusetts.
- "Novelty Detection and Adpative System Monitoring," *1994 Neural Information Processing Systems Post-Conference Workshops*, Dec. 2-3, 1994, Vail Colorado.
- "Application of Neural Networks in Process Monitoring and Fault Diagnosis," *the First Joint Mexico-USA International Workshop on Neural Networks and Neurocontrol*, Sept. 5-15, 1995, Cancun, Mexico.
- "Vibration Monitoring in Helicopter Gearboxes," *Workshop on Fault Tolerant Control of Unmanned Underwater Vehicles*, Naval Post-Graduate School, Monterey, California, March 17-18, 1997.
- "Model-Based Neural Networks for Fault Diagnosis," *10th Annual UTC Engineering Conference (UTECA)*, April 20-22, 1999, Cromwell, CT.
- "Cycle-Time Reduction in Machining by Recursive Constraint Bounding," Keynote Lecture at 2005 Tehran Int'l Manufacturing Engineering Congress, Dec. 12-15, 2005, Tehran, Iran.

INDUSTRY:

Ford Scientific Research Lab.; General Motors Research Lab.; General Electric Research and Development; Sikorsky Aircraft Company; United Technologies Research Center; Technology Integration Inc.; Naval Command, Control, and Ocean Surveillance Center; National Research Council of Canada, Drapers Laboratory, Pratt & Whitney Aircraft, SABCO Automotive Parts

ACADEME:
Northeastern University; Colorado School of Mines, Worcester Polytechnic Institute, South China University of technology, South China Agricultural University, University of Michigan Ann Arbor, Khajeh Naseer Univ. in Tehran

DOCTORAL ADVISEES:

- Hsinyung Chin (1993), Owner/Consultant at ACR, Inc. and Instructor at MIT
- Vinay B. Jammu (1996), Technology Leader, Aero Thermal and Mechanical Systems India, GE Global Research
- Robert Ivester (1996), Manufacturing Engineer at National Institute of Standards and Technology
- Guoxian Xiao (Co-Advised, 1996), Staff Researcher at General Motors
- Chengyu Gan (2000), Senior Software Engineer at Ipreo
- Dongzhe Yang (2001), Development Manager at The MathWorks
- Shaoqiang Dong (2004), Embedded Software Engineer at CSR
- Shengda Wang (2005), Experienced Software Engineer & Tech Lead, VMware
- James R. McCusker (2010), Assistant Professor, Wentworth Institute of Technology
- Jeffrey L. Simmons (2013), Pratt & Whitney Co.
- William La Cava (2016), University of Pennsylvania

RESEARCH GRANTS:

- PI: *Society of Manufacturing Engineers* ($5,000), Research Initiation Award: "Effect of Tool Wear on the Topography of Machined Surfaces," May 1988 - April 1989.
- Co-PI: *Massachusetts Centers of Excellence* ($133,000) "Intelligent Control of Grinding Machines," with Stephen Malkin, Oct. 1988 - May 1990.
- PI: *National Science Foundation/Sikorsky Aircraft Co.* ($20,000) Faculty Summer Internship at Sikorsky Aircraft: "Fault Diagnosis of Helicopter Power Train," May 1990 - Dec. 1991.

- PI: *National Science Foundation* ($225,431), "Fault Diagnosis with Process Uncertainty," June 1991 - Dec. 1994.
- Co-PI: *National Science Foundation* ($295,148), "Autonomous System for Cylindrical Plunge Grinding," with Stephen Malkin, Aug. 1991 - Jan. 1995.
- PI: *Massachusetts Center for Manufacturing Productivity* ($18,900), "Development of Fault Diagnostic Software for Paper Mill Gearboxes," April 1991 - May 1992.
- PI: *Sikorsky Aircraft Company* ($64,909), "Helicopter Track and Balance with Artificial Neural Nets," Oct. 1991 - Dec. 1994.
- PI: *NASA Lewis Research Center* ($182,255), "Model-Based Fault Diagnosis of Helicopter Gearboxes," March 1993 - July 1996.
- PI: *Massachusetts Center for Manufacturing Productivity* ($19,787), "Control Design of a New Electro-Pneumatic Robot Arm," August 1993 - August 1994.
- PI: *National Science Foundation* ($180,000), "Robust Residual Generation for Model-Based Fault Diagnostic Systems," with Giorgio Rizzoni (Ohio State Univ.), Sept. 1995 - August 1999.
- PI: *NASA Lewis Research Center* ($67,306), "Model-Based Sensor Selection for Helicopter Gearbox Monitoring," Nov. 1996 - Nov. 1997.
- PI: *National Science Foundation* ($180,000), "Method of Tuning and Automatic Regulation for Injection Molding," with David Kazmer, Sept. 1997 - August 2001.
- PI: *NASA Glenn Research Center*, ($205,807), with Robert Gao, "Embedded Sensors for Condition Monitoring of Helicopter Gearboxes," June 2000 - Sept. 2003.
- PI: *National Science Foundation* ($229,634), "Methodology for Continuous Infeed Cylindrical Plunge Grinding," with Stephen Malkin, Sept. 1999 - August 2003.
- PI: *U.S. Army Research Office* ($207,837), "Method for Knowledge-Based Helicopter Track and Balance," June 2000 - April 2004.

TECHNICAL AWARDS:

- Recipient of NASA Technical Innovation Award for the technical report "Detecting Faults in Helicopter Gearboxes by the MVIM Method," Aug. 1996.
- Recipient of NASA Technical Innovation Award for the technical report "Diagnosing Helicopter Gearboxes Using Connectionist Networks," Jan. 1997.
- Recipient of NASA Technical Innovation Award for the technical report "Model-Based Placement of Gearbox-Monitoring Accelerometers," Jan. 1997.

CONSULTING:

- *United Technologies Research Center*, East Hartford, Connecticut (Sept. - Dec. 1993)
  A new methodology was developed to quantify the significance of accelerometers for fault diagnosis of helicopter gearboxes. The basis for this methodology is an influence model which represents the effect of various component faults on accelerometer readings. Based on this model, a set of selection indices are defined to characterize the diagnosability of each component, the coverage of each accelerometer, and the relative redundancy between the accelerometers. The effectiveness of these indices was evaluated experimentally by measurement-fault data obtained from an OH-58A main rotor gearbox. These data were used to obtain a ranking of individual accelerometers according to their significance in diagnosis. Comparison between the experimentally obtained rankings and those obtained from the selection indices indicates that the proposed methodology offers a systematic means for accelerometer selection [28].

- *Draper Research Laboratory*, Cambridge, Massachusetts (Jan. - March 1997)
  Provided a technology assessment report on integrated mechanical diagnostics of helicopters. It consisted of two reports: one on integrated mechanical diagnostics of helicopters, and the other on helicopter track and balance. These two reports are included as Appendix B of the Charles Stark Draper Laboratory Report: "Technology Assessment and Architectural Alternatives for Integrated Mechanical Diagnostics," No. R-2781.

COURSES DEVELOPED:

UNDERGRADUATE: Dynamic Systems Modeling

GRADUATE:

- *Computer-Controlled Systems*
  Topics: sampling of continuous-time systems, description and analysis of discrete-time systems, design of digital control systems, system identification, adaptive control, and implementation of digital controllers. Text: Astrom and Wittenmark, *Computer-Controlled Systems*, 3rd Edition, Prentice Hall, 1997.

- *Applied Data Analysis*
  Topics: theories of data analysis and data acquisition, system identification and pattern classification, and their application in modeling and learning. Texts: Bendat and Piersol, *Random Data, Analysis and Measurement Procedure*, 3rd Edition, Wiley Interscience, 2000; Duda, Hart, and Stork, *Pattern Classification*, Wiley-Interscience, 2001; and Ljung, *System Identification: Theory for the User*, Prentice Hall, 1987

LABORATORIES DEVELOPED:

Modeling and Identification Laboratory (research laboratory) and
Computer Control Laboratory (teaching laboratory)

TEACHING GRANTS:

- *Society of Manufacturing Engineers*, ($12,000) "Capital Equipment Grant for the Micro-Computer Control Laboratory," 1988-1989.

- *Society of Manufacturing Engineers*, ($4,000) "Faculty Release Time to Develop the Micro-Computer Control Laboratory," 1989-1990.

TEACHING AWARDS:

- Selected 'Best Teacher of the Year' by the Mechanical Engineering Student Societies, Univ. of Massachusetts, 1987/88, 1992/93, and 2006/07.
- Recipient of the General Electric Outstanding Teaching Award, Univ. of Massachusetts, 1990/91.

ADMINISTRATION AND SERVICE:

- Served on the MIE Department Computer Committee ('87/88), MIE Dept. Laboratory Committee ('88/89, '90/91), MIE Dept. Personnel Committee ('91/92, '93/94, '99/00 chair, '07/08 chair, and '08/09), MIE Dept. Graduate Committee ('93/94, '01/02, '02/07 Chair), College Freshman Recruiting Committee ('93/94), College of Eng. Personnel Committee ('95-98), MIE Dept. Newsletter Editor (1995-1998), College of Eng. Publications Board ('95/96), Faculty Advisor to ASME Student Section ('95/96), MIE Dept. Search Committee ('95/96, '01/02 Chair), Dean of Eng. Evaluation Committee ('96/97), Dean of Eng. Search Committee ('04), MIE Graduate Program Director ('02-07), UMass Research Council (2002 - 2009)
- Review panelist for NSF Programs *Dynamic Systems & Control* and *Manufacturing Machines & Processes*
- Paper reviewer for various ASME and IEEE transactions
- Chair of the Manufacturing Systems Panel of the ASME Dynamic Systems and Control Division (1992-1995)
- Associate Editor of the *ASME J. of Manufacturing Science and Engineering* (1993-1996, 2002-2008)
- Program Chair of the ASME Dynamic Systems and Control Division at 1996 Int'l Mechanical Engineering Congress and Exposition, Atlanta, Georgia, Nov. 17 - 22, 1996.
- Program committee member of *The Seventh Int'l Workshop on Principles of Diagnosis*, Val Morin, Quebec, Canada, Oct. 13- 16, 1996.
- Program committee member of *The Fifth IEEE Mediterranian Conference on Control and Systems*, Paphos, Cyprus, July 21 - 23, 1997.
- Program committee member of *The Eight Int'l Workshop on Principles of Diagnosis*, Mont-Saint-Michel, France, September 15-18, 1997.
- Scientific Committee of *NAMRC 2001 and 2002*.
- National Organizing Committee of *Safeprocess 2003*, Washington, D.C., June 9-11, 2003.

- Scientific Committee of *2003 American Control Conference*, Denver, Colorado, June 4-6, 2003.

MEMBERSHIPS:

Fellow of the American Society of Mechanical Engineers (ASME), American Society of Engineering Education (ASEE), Institute of Electrical and Electronic Engineers (IEEE), American Helicopter Society (AHS), and the Pi Tau Sigma Honor Society.

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