

# Curriculum Vitae

## PRAMOD P. KHARGONEKAR

### Contact Information

**Office** College of Engineering  
University of Florida  
Gainesville, FL 32611  
Tel: (352) 392-6000  
Fax: (352) 392-9673  
E-mail: [ppk@ufl.edu](mailto:ppk@ufl.edu)

**Home** 413 SW 97<sup>th</sup> Terrace  
Gainesville, FL 32607  
Tel: (352) 331-6350  
Email: [khargonekar@yahoo.com](mailto:khargonekar@yahoo.com)

**Education** Ph. D. – Electrical Engineering, University of Florida, August 1981.  
Dissertation Advisor: Professor R. E. Kalman

M. S. – Mathematics, University of Florida, December 1980.

B. Tech. – Electrical Engineering, Indian Institute of Technology,  
Bombay, India, June 1977.

### Main Fields of Interest

Systems and Control Theory and Applications, Contemporary Issues in Engineering  
Education and Research, Technology and Society

### Current and Previous Positions

1. Dean, College of Engineering  
University of Florida  
July 2001 – present
2. Associate Vice President, Engineering and Industrial Experiment Station  
University of Florida  
July 2001 – present
3. Eckis Professor of Electrical & Computer Engineering  
University of Florida  
July 2001 – present
4. Chair, Dept. of Electrical Engineering and Computer Science  
The University of Michigan  
October 1997 – June 2001

5. Claude E. Shannon Professor of Engineering Science  
The University of Michigan  
September 2000 – June 2001
6. Associate Chair, Dept. of Electrical Engineering and Computer Science  
The University of Michigan  
September 1995 – September 1997
7. Arthur F. Thurnau Professor  
The University of Michigan  
September 1995 – August 1998
8. Director  
AFOSR/ARPA MURI Research Center on Intelligent Electronics Manufacturing:  
Modeling and Control of Plasma Processing  
The University of Michigan  
September 1995 – July 2001
9. Professor, Dept. of Electrical Engineering and Computer Science  
The University of Michigan  
September 1989 – July 2001
10. Professor, Dept. of Electrical Engineering  
University of Minnesota  
September 1988 – August 1989
11. Associate Professor, Dept. of Electrical Engineering  
University of Minnesota  
August 1984 – September 1988
12. Assistant Professor, Dept. of Electrical Engineering  
University of Florida  
August 1981 – August 1984

## **Personal**

Born on August 24, 1956 in Indore, India  
Married with two children  
Naturalized US Citizen, 2000

## Major Leadership Experiences and Accomplishments

I have held several major leadership positions. Below is a brief summary of my most important achievements in these roles.

**Dean of Engineering at the University of Florida:** The College of Engineering at the University of Florida has approximately 4600 undergraduate students, 2400 graduate students, 280 faculty, and total expenditures of \$150M. Soon after taking this position in 2001, I worked closely with the faculty and senior leadership of the University to develop an ambitious strategic plan which is aimed at elevating the College of Engineering to be among the top 20 public & private engineering colleges in the nation. In the last six years, we have made substantial progress towards this goal with a significant rise in the national rankings already; the USNWR graduate program ranking has moved up to 26 (15 among public universities) from 35 (20 among public universities).

- **Major Programmatic Initiatives:** One of my highest priorities was the creation of a Biomedical Engineering Department. Through numerous substantive discussions with all segments of faculty, we secured near unanimous approval from the faculty to start a new Department of Biomedical Engineering which was formally created in July 2002. We were also able to recruit an outstanding inaugural chair, Dr. W. Ditto from Georgia Tech, for this department. A new interdisciplinary building, in collaboration with the College of Medicine and the Brain Institute, is under construction. It is estimated that this building will cost nearly \$90M and will be done by early 2009. The remaining funds are expected to become available in the next two years from the State of Florida. Recently, we have secured a \$10M naming gift for this department which, (after 1:1 match from the State of Florida,) has created a \$22M endowment for it.

College of Engineering has partnered with the College of Liberal Arts and Sciences and Health Science Center Colleges to create the Nano-science Institute for Medical and Engineering Technologies (NIMET). A new building is nearing completion with an estimated cost of \$35M. It will house a state-of-the-art multi-user laboratory facility for research into nano-scale science for biomedical and engineering applications.

Another major step was the merger of the Department of Mechanical Engineering with the Department of Aerospace Engineering, Mechanics, and Engineering Sciences. Again, we were able to secure near unanimous approval of the faculty for this merger.

- **Research and Graduate Education:** During the last five years, total research expenditures in the College have grown from about \$65M to more than \$107M. In education, the number of PhD's graduated per year has jumped dramatically from 95 to 186. We now rank in the top 10 nationally in the number of PhD's graduated and in the top 15 in the number of PhD's per faculty member. The number of undergraduate and masters' degrees has stayed essentially constant time to graduation has decreased. The

quality of graduate students has improved steadily as measured by GPA and test scores. There is a strong emphasis on multi-disciplinary research cutting across departments and colleges. Strong research and educational collaborations have been developed with Health Science Center Colleges, College of Liberal Arts and Sciences, Institute for Food and Agricultural Sciences, Fine Arts, Business and Law. There has been a steady effort to reduce barriers to interdisciplinary research. A major new initiative aimed at providing complete Masters' degrees through distance education was launched two years ago which is showing very strong results.

- **Undergraduate Education:** Several departments have made major revisions to the undergraduate curricula. We have institutionalized a minority student mentoring program for incoming freshmen called Step Up. This six week residential program was initially developed under the NSF SUCCEED Coalition. We have also developed a new one week Engineering Freshmen Transition Program (EFTP) to help all freshmen get off to a fast start in their undergraduate education. We are currently working on new lower division initiatives to help with retention and success of engineering majors. We also successfully completed our ABET accreditation review in 2007 and have received new six year accreditation for all our programs.
- **Diversity:** As is well known, the field of engineering faces major challenges in student and faculty diversity. There is a very strong and consistent emphasis on diversity programs aimed at improving representation of women and minorities in student body as well as on faculty and staff. Several programs, such as GatorTrax, have been implemented to focus on outreach to middle and high schools students and teachers to increase interest in science, mathematics, and engineering. College is the top producer of Hispanic undergraduate engineers in the nation with only the University of Puerto Rico being ahead of UF. The climate for women and minority faculty in the College is improving steadily with several individuals in key leadership positions. Among the faculty, the number of women has increased from 20 to 28 and Hispanics from 4 to 10 (from 2002 to 2007). The number of African-American faculty has stayed essentially unchanged as new hires have only offset those who left. We have also instituted mentoring programs for women and minority faculty members.
- **Faculty:** In the last six years, we have recruited more than 90 excellent new faculty members from top universities. We have also recruited several new department chairs who are becoming exemplary leaders within the college and the university. A new full year orientation program for new faculty was put in place three years ago in the College. In 2002, I implemented a new three year mid-term review for assistant professors on tenure-track with the aim of providing concrete and constructive feedback towards success in the final tenure and promotion review. We also started a process to provide internal review and feedback to associate professors to help them make progress towards promotion to full professor. These mid-career review processes are working very well and helping nurture faculty.
- **Strategic Planning:** I served on the committee, formed by President C. E. Young, to develop a strategic plan for the University of Florida. Dr. Young integrated this plan

with two other similar plans into the current strategic plan for the University of Florida. This plan was further revised by President J. B. Machen.

- **Fund Raising:** The college endowment has tripled rising from \$24M in 2001 to \$72M in 2007. The single largest private gift I have been involved in obtaining was a \$10M gift to name the Department of Biomedical Engineering as J. Crayton Pruitt and Family Department of Biomedical Engineering. With matching funds from the State of Florida, it has created a \$20M endowment for the BME Department. We have raised more than \$33M towards the new capital campaign which became public in September 2007.
- **Technology Transfer and Industrial Collaboration:** We developed a comprehensive intellectual property agreement with Harris Corp. This agreement allows our faculty and Harris engineers to undertake joint research projects without the burden of intellectual property negotiations which are covered by the umbrella agreement. Similar agreements are under consideration with other major international companies. After three years of sustained efforts, the University of Florida, under the leadership of President Machen, joined the University of Central Florida and the University of South Florida, as a full partner in the Florida High Tech Corridor. This organization allows faculty at the University of Florida to work with companies in the central Florida region to advance the technological and economic base of the state of Florida.

**Chair, Department of Electrical Engineering and Computer Science, University of Michigan:** I led a department with more than 1200 undergraduate, 600 graduate students, 90 faculty, and a total budget of \$50M. The Electrical Engineering program is among the top 5 nationally while the Computer Engineering program is in top 10. On the other hand, the Computer Science program was considerably weaker. My principal goal was to strengthen the computer science activity while maintaining and enhancing the traditional strengths in electrical and computer engineering. My biggest challenge was to deal with the exploding student enrollments in computer science and engineering in an era when it was a challenge to retain faculty who were being lured away by the booming internet revolution. I was able to secure eight new faculty positions for computer science. I also led a major curricular reform effort aimed at streamlining the electrical engineering, computer engineering and computer science degree programs. A major accomplishment was to establish an undergraduate program in computer science through the College of Engineering. During my tenure as Chair, we were able to secure an NSE Engineering Research Center on Wireless Integrated Microsystems. At the College level, I participated in planning efforts for a new capital campaign.

**Leadership in Major Interdisciplinary Research Centers:** I have held several leadership positions in large multidisciplinary research centers at the University of Michigan. I was the Director of an AFOSR/DARPA MURI Center on Modeling and Control of Plasma Processes. I was a Thrust Area leader in the Research Center for Display Technology and Manufacturing which was funded by the State of Michigan. I was a Thrust Area leader in an NSF Engineering Research Center on Reconfigurable Machining Systems. In these roles, I led efforts to develop multidisciplinary collaborations spanning several academic

departments leading to substantial research proposals and activities, mentoring of graduate and undergraduate students, and technology transfer. I have also played key leadership roles in developing consensus on scientific directions. I have helped establish connections with industry and government organizations.

## Awards & Honors

### Awards

- **Distinguished Alumnus Award**, Indian Institute of Technology, Bombay, India, 1997.
- **Research Excellence Award**, College of Engineering, The University of Michigan, 1994.
- **O. Hugo Schuck Best Paper Award** (co-authored with J. Krause, K. Nagpal, K. Poolla and A. Tikku), American Automatic Control Council, June 1993.
- **Fellow, IEEE**, 1993.
- **Teaching Excellence Award**, EECS Department, The University of Michigan, 1992.
- **W. R. G. Baker Prize Paper Award** (co-authored with J. Doyle, K. Glover and B. Francis), IEEE, 1991.
- **George S. Axelby Best Paper Award** (co-authored with J. Doyle, K. Glover and B. Francis), IEEE Control Systems Society, December 1990.
- **Donald P. Eckman Award** – Best Young (under the age of 35) Control Engineer, American Automatic Control Council, June 1989.
- **George Taylor Award for Research**, Institute of Technology, University of Minnesota, 1987.
- **Presidential Young Investigator Award**, National Science Foundation, 1985.
- **Best Faculty Paper Award**, Department of Electrical Engineering, University of Florida, 1983.
- **Sigma Xi Award for Outstanding Research on Mathematical System Theory**, University of Florida, 1982.
- **Best Ph.D. Dissertation**, Department of Electrical Engineering, University of Florida, 1981.
- **Several Conference Best Paper Awards** – See list of publications.

### Honors

- **ISI Web of Science Highly Cited Author**
- **Japan Society for Promotion of Science Fellowship**, 2007, 1992.
- **Eckis Professor of Electrical and Computer Engineering**, University of Florida, July 2001 – present.
- **Claude E. Shannon Professor of Engineering Science**, The University of Michigan, September 2000 – June 2001.
- **Fellow**, CIC (Committee on Institutional Cooperation) Academic Leadership Program, September 2000 – May 2001.
- **Russell Springer Professor**, University of California – Berkeley, August 1997 (could not carry out this invitation due to scheduling problems.)
- **Arthur F. Thurnau Professor**, University of Michigan, 1995-1998.
- **Plenary Speaker**, SCI'07, Kyoto, JAPAN, May 2007.
- **Plenary Speaker**, Turkish Automatic Control Conference, Ankara, Turkey, 2002.

- **Keynote Speaker**, International Conference on Automation, Robotics, Control, and Vision, Singapore, 2000.
- **Plenary Speaker**, Spring Research Conference on Statistics in Industry and Technology, Minneapolis, 1999.
- **Plenary Speaker**, IFAC Robust Control Design Symposium, Budapest, Hungary, 1997.
- **Plenary Speaker**, Feedback Control, Nonlinear systems, and Complexity, Conference held to Honor Professor George Zames on his 60<sup>th</sup> Birthday, McGill University, 1994.
- **Plenary Speaker**, 32<sup>nd</sup> IEEE Conference on Decision and Control, San Antonio, TX December 1993.
- **Plenary Speaker**, International Conference on Control Theory and Applications, Jerusalem, Israel, October 1993.
- **Special Topics Lecturer**, International Symposium on the Mathematical Theory of Networks and Systems, Kobe, Japan, June 1991.
- **Keynote Speaker**, Robust Control System Design using  $\mathcal{H}_\infty$  and Related Methods, Cambridge, U.K., 1991
- **Plenary Speaker**, First International Conference on Mathematical Theory of Control, Bombay, INDIA, December 1990.
- **Plenary Speaker**, 2<sup>nd</sup> SIAM Conference on Linear Algebra in Signals, Systems and Control, San Francisco, CA, November 1990.
- **Keynote Speaker**, 1<sup>st</sup> International Conference on Systems Engineering, Dayton, OH, August 1989.
- **Plenary Speaker**, International Symposium on the Mathematical Theory of Networks and Systems, Beer Sheva, Israel, 1983.

## Selected Professional Activities and Service

### National and International

1. Associate Editor, *IEEE Transactions on Automatic Control*, January 1987-December 1989.
2. Associate Editor, *SIAM Journal on Control and Optimization*, January 1992-September 1994.
3. Associate Editor, *Mathematics of Control, Signals, and Systems*, December 1986-December 1998.
4. Associate Editor, *Systems and Control Letters*, July 1988-June 1993.
5. Associate Editor, *International Journal of Robust and Nonlinear Control*, April 1991-March 1999.
6. Associate Editor, *Mathematical Problems in Engineering*, November 1994-
7. Program Vice Chair for Invited Sessions, American Control Conference, June 1992.
8. Member, External Review Team, Faculty of Engineering, Yale University, November 2006.
9. Member, Advisory Board, Indian Institute of Technology, Mumbai, India, 2006-present
10. Member, Executive Committee, Board of Directors, IIT Bombay Heritage Fund, 2005-present
11. Member, Board of Advisors, Pan-IIT
12. Participant, International Forum for University Presidents on ICT Education, Beijing University of Posts and Telecommunications, 2005.
13. Site Visit Team Chair, NSF Science and Technology Center on Control, Dynamics, and Feedback in Nature, Caltech (in collaboration with Princeton and University of California, Santa Barbara), November 2004.
14. External Assessor, Vision 2010, Department of Electrical and Computer Engineering, University of Waterloo, June 2005.
15. Member, Public Policy Committee, Engineering Deans Council, September 2005 – present.
16. Chair, Awards Committee, American Automatic Control Council, 2005 – present.

17. Participant, NSF Workshop on Nanosystems Modeling and Control, March 2004.
18. Participant, IEEE Deans' Summit – II, Miami, FL, January 2003.
19. Participant, Panel Discussion on Women in Control, IEEE Conference on Decision and Control, December 2003.
20. Participant, NAE LEAP Conference on Gender Equity in Engineering, Washington, DC, January 2003.
21. Participant, IEEE Joint Engineering Education Deans Workshop on Science, Mathematics and Technology in School Education, October 2001.
22. Workshop on Control of Semiconductor Manufacturing Processes, American Automatic Control Conference, Organizers and Main Lecturers, P. P. Khargonekar and B. H. Krogh, IFAC, 1996.
23. Member, Organizing Committee (T. Kailath, Chairman), Workshop on Signal Processing, Institute for Mathematics and Applications, University of Minnesota, June-August 1988.
24. Member, Organizing Committee (H. Sussmann, Chairman), Full Year on Control Theory, Institute for Mathematics and Applications, University of Minnesota, 1992-1993.
25. Participated in the Industry-University-Government Roundtable on Enhancing Engineering Education, Worcester Polytechnic Institute, May 1998.
26. Fellow, CIC (Committee for Institutional Cooperation) Academic Leadership Program, September 2000 – May 2001.
27. Chair, Theory Committee, *IEEE Control Systems Society*, 1993-1995.
28. Member, Program Committee, SPIE Microelectronic Manufacturing Conference, September 2000.
29. Member, Program Committee, *1987 IEEE Conference on Decision and Control*
30. Participated in the SIAM Workshop on the Mathematics of Systems and Signal Processing, Stanford University, August 31-September 3, 1987.
31. Member Program Committee, *1988 American Control Conference*.
32. Member, Technical Committee on Linear Systems *IEEE Control Systems Society*. In charge for reviewing technical notes and correspondence items submitted to the *IEEE Transactions on Automatic Control*, August 1981-December 1982.
33. Co-organizer and co-chairman of the invited session on “Algebraic Techniques in Feedback Control,” *21<sup>st</sup> IEEE Conference on Decision and Control*, December 1982.

34. Co-chairman of the session entitled, “Algebraic Methods in Linear Systems,” 21<sup>st</sup> *IEEE Conference on Decision and Control*, December 1982.
35. Chairman of the session entitled, “Systems Over Groups, Rings, and Algebras,” *International Symposium on the Mathematical Theory of Networks and Systems*, Beer Sheva, Israel, June 1983.
36. Co-chairman of the session entitled, “Design of Robust Feedback Systems,” 23<sup>rd</sup> *IEEE Conference on Decision and Control*, December 1984.
37. Chairman of the session entitled, “Robustness and Sensitivity in Feedback Systems,” 23<sup>rd</sup> *Allerton Conference Communication, Control, and Computing*, Monticello, Illinois, October 1985.
38. Co-organizer and co-chairman of the invited session on, “Robustness and  $\mathcal{H}_\infty$  Synthesis Theory,” 24<sup>th</sup> *IEEE Conference on Decision and Control*, December 1985.
39. Participated in the Government-University-Industry Roundtable Conference organized by NAS, NAE, and IOM, Washington, DC, February 1996.
40. Technical Consultant to the Honeywell Corp., Boeing Co., General Electric Co., Xerox Corp., Delphi Corp., Mitsubishi Heavy Industries, Japan, DARPA (Defense Advanced Research Projects Agency).
41. Several NSF Proposal Review Panels.
42. Member, Technical Advisory Board, Voyan Corp., 1998-2002.
43. Member, Technical Advisory Board, Ubiquiti Corp., 1999-

### **University of Florida**

1. Member, Presidential Task Force on Strategic Planning, University of Florida, 2002.
2. Member, Search Committee, President of the University of Florida, February 2003 – October 2003.
3. Member, Budget Allocation Committee, September 2006-April 2007
4. Member, Board of Directors, University of Florida Foundation, May 2003 – present
5. Chair, Search Committee, Director of Institutional Research, January 2006-April 2006.
6. Member, Board of Directors, Center for Entrepreneurship and Innovation, College of Business, August 2002 – present
7. Member, Advisory Board, International Center for Automated Information Research, Levin College of Law, August 2002 - present

8. Member, Board of Directors, University of Florida Research Foundation, July 2001 – present
9. Member, Advisory Board, School of Natural Resources and Environment, July 2003 - present
10. Member, Research Policy Council, University of Florida, July 2001 – present
11. Member, Advisory Board, Digital Worlds Institute, January 2002 - present
12. Member, Deans Advisory Group, University of Florida Foundation, August 2004 – present
13. Chair, Search Committee, Dean of College of Liberal Arts and Sciences, September 2007 - present

### **University of Michigan**

1. Member, President's Information Revolution Commission, University of Michigan, Fall 2000.
2. Member, College of Engineering Campaign Planning Committee, September 1999-May 2000.
3. Member, Executive Committee, NSF Engineering Research Center on Reconfigurable Machining Systems, September 1998-June 2001.
4. Member, Executive Committee, Tauber Manufacturing Institute, 1996-1997.
5. Member, Executive Committee, Center for Display Technology and Manufacturing, 1997-1998.
6. External Visitor, Department of Mechanical Engineering and Applied Mechanics, 1997.
7. Member, College of Engineering Honors and Awards Committee, 1995-1997.
8. Member, Executive Committee, Department of Electrical Engineering and Computer Science, 1989-1991, 1996-2001.
9. Member, Executive Committee, College of Engineering Control Group, 1991-1993. Chaired the committee during 1992.
10. Graduate Advisor, Control Area, 1992.
11. Financial Aid chair, Systems Division, Department of Electrical Engineering and Computer Science, 1993-1995.

## Teaching Activities

During the last 25 years, I have taught a variety of courses, both at the undergraduate and graduate levels, in systems and control at Michigan, Minnesota and Florida. These include courses on signals and systems, classical feedback control, digital control, linear systems, multivariable control design, optimal control, robust and  $\mathcal{H}_\infty$  control, adaptive control and system identification, and intelligent systems. In addition, I have taught a graduate level computer science course on machine learning.

In the 1993 fall term, under an NSF Research-Curriculum Grant, Professor F. L. Terry, Jr. and I developed and taught a new course on the subject of Process Control for Microelectronics Manufacturing. This was among the first set of grants awarded by NSF to combine curriculum development and research. This program was the fore-runner of the current NSF IGERT program.

Over the years, I have given short courses at various conferences based on my research activities.

During 2004 and 2006 Fall Semesters, I have taught a new Freshman Seminar Course entitled “Contemporary Issues in Technology and Society” at the University of Florida. This course aims to educate students for critical independent thinking in the context of contemporary economic, global, legal, environmental, and policy issues arising from cutting edge technological developments.

## External Research Support

Since the early 80’s, I have had continued extensive research support from the National Science Foundation, Air Force Office of Scientific Research, the Army Research Office, and Defense Advanced Research Projects Agency. I estimate the total research funding to be in excess of \$20M. My most recent research grants were as follows:

- I served as the Center Director and PI on a multi-investigator AFOSR/ARPA MURI Center at the University of Michigan entitled “Intelligent Electronics Manufacturing: Modeling and Control of Plasma Processing.” The total amount from sponsors was \$5.3MM over 5 years. (1994-2001)
- I was the Thrust Area Leader for Measurement and Control and co-leader with Prof. S. Kota of the Cluster of Projects (CoP2) focused on Reconfigurable Machines and Controls in the NSF Engineering Research Center on Reconfigurable Machining Systems at the University of Michigan. The annual budget for this Thrust Areas was approximately \$750K. I was also the coordinator for “reconfiguration science” in the ERC. (1995-2001)
- I was a co-PI on a the NSF GOALI research project “Modeling and Control of Xerographic Processes,” at the University of Michigan (PI: D. Koditscheck, Co-PIs : P. P. Khargonekar, L. K. Mestha (Xerox) and T. Thierret (Xerox)), \$220,000 over three years, 1996- 1999.

## Doctoral Students

### University of Florida (1981-1984)

1. Dr. A. B. Ozguler (Co-Supervisor with Professor R. E. Kalman)  
Thesis Title: Skew-Primeness in the Regulator problem with Internal Stability  
Graduation Date: December 1982
2. Dr. T. T. Georgiou (Co-Supervisor with Professor E. W. Kamen)  
Thesis Title: Partial Realization Problem for Covariance Sequences  
Graduation Date: August 1983
3. Dr. K. R. Poolla (Co-Supervisor with Professor E. W. Kamen)  
Thesis Title: Linear Time-Varying systems: Representation and Control via Transfer Function Matrices  
Graduation Date: August 1984

### University of Minnesota (1984-1989)

4. Dr. A. M. Pascoal  
Thesis Title: Nonlinear Controllers for Robust Control of Linear Time-Invariant Plants  
Graduation Date: September 1987
5. Dr. J. Krause (Co-Supervisor with Prof. K. S. P. Kumar)  
Thesis Title: Robust Identification and Adaptation  
Graduation Date: December 1987
6. Dr. K. Zhou  
Thesis Title: Robust Control of Uncertain Systems  
Graduation Date: June 1988
7. Dr. G. Gu (Co-Supervisor with Professor E. B. Lee)  
Thesis Title: An  $\mathcal{H}_\infty$  Approach to the Control of Multivariable Systems with Time Delays  
Graduation Date: June 1988
8. Dr. K. Lenz  
Thesis Title: Topics in Applied  $\mathcal{H}_\infty$ -Optimal Control  
Graduation Date: August 1988
9. Dr. R. Ravi  
Thesis Title: Robust Control of Linear Time-Varying Systems  
Graduation Date: July 1990
10. Dr. M. Rotea  
Thesis Title: Multiple Objective Optimal Control of Linear Systems  
Graduation Date: May 1990

### University of Michigan (1989-2001)

11. Dr. P. M. Olin (Co-Supervisor with Professor W. P. Ribbens)  
Thesis Title: Fault Detection and Isolation in the Joint Time-Frequency Domain  
Graduation Date: May 1992
12. Dr. I. Kaminer  
Thesis Title: Application of  $\mathcal{H}_\infty$  Synthesis to the Motion Control of Rigid Bodies and Related Theory

- Graduation Date: June 1992
13. Dr. H. Akcay  
Thesis Title: Robust Identification in  $\mathcal{H}_\infty$   
Graduation Date: December 1992
  14. Dr. W. Sun  
Thesis Title:  $\mathcal{H}_\infty$  Filtering and Control for Sampled-Data Systems  
Graduation Date: April 1993
  15. Dr. N. Sivashankar  
Thesis Title: Robust Sampled-Data Systems  
Graduation Date: December 1993
  16. Dr. D. Shim  
Thesis Title: Analysis and Synthesis of Linear Time-Invariant Systems with Positive Real Uncertainty  
Graduation Date: December 1993
  17. Dr. S. Lee (Co-Supervisor with Professor J. Stein)  
Thesis Title: A Study of Robust Control and Estimation for Systems with Real Parameter Uncertainties  
Graduation Date: December 1993
  18. Dr. J. Friedman  
Thesis Title: Modeling, Identification and Control of Flexible Systems  
Graduation Date: April 1996
  19. Dr. M. Hankinson (Co-Advisor with Professor K. Irani))  
Thesis Title: Process Improvement Using Classification Trees for Run-to-Run Control of a Reactive Ion Etching Process  
Graduation Date: May 1997
  20. Dr. C. Schumacher  
Thesis Title: Tactical Missile Autopilots: Gain Scheduled  $\mathcal{H}_\infty$  Control and Dynamic Inversion  
Graduation Date: December 1997
  21. Dr. T. Vincent  
Thesis Title: Nonlinear Estimation with Applications to In-Situ Etch Rate and Film Thickness Measurements in Reactive Ion Etching  
Graduation Date: December 1997
  22. Dr. A. Yoon  
Thesis Title: Randomized Algorithms and Global Optimization for Optimal and Robust Control  
Graduation Date: December 1997
  23. Dr. E. Hamby (Co-Advisor: Prof. P. Kabamba)  
Thesis Title: A Bayesian Approach to Modeling and Control  
Graduation Date: June 1998
  24. Dr. O. Patterson  
Thesis Title: A Methodology for Selection of Feedback Variables for the Control of Reactive Ion Etching  
Graduation Date: October 1998
  25. Dr. C. Galarza

- Thesis Title: Learning and Estimation Theory for Manufacturing Systems Applied to Microelectronics Manufacturing  
 Graduation Date: February 1999
26. Dr. E. Park (Co-Advisor: Professor D. Tilbury)  
 Thesis Title: Modular Logic Controllers for Reconfigurable Machining Systems  
 Graduation Date: October 1999
27. Dr. D. Kalita  
 Thesis Title: Formal Verification for Analysis and Synthesis of Logic Controllers for Reconfigurable Machining Systems  
 Graduation Date: May 2001
28. Dr. J.-W. Lee  
 Thesis Title: Nonlinear Filtering for Real-Time Sensing of Patterned Wafers  
 Graduation Date: May 2002
29. Dr. R. E. Groff (Co-advisor with Dr. D. E. Koditschek)  
 Thesis Title: Piecewise Linear Homeomorphisms for Approximation of Invertible Maps  
 Graduation Date: April 2003

### **Post-Doctoral Associates**

1. Dr. K. Nagpal (September 1988 – August 1990)
2. Dr. A. Stoorvogel (January 1991 – December 1991)
3. Dr. C. Scherer (March 1992 – August 1992)
4. Dr. A. Tikku (October 1995 – August 1996)
5. Dr. S. Rangan (October 1997 – August 1998)
6. Dr. X. Chen (Septmeber 1999-April 2000)
7. Dr. J.-W. Lee (May 2005 - )

### **Visiting Faculty Members**

1. Prof. T. Georgiou (September 1985 – April 1986)
2. Prof. M. Verma (July 1987)
3. Prof. E. Nobuyama (March 1993 – February 1994)
4. Prof. T. Matsuo (March 1993 – February 1994)
5. Prof. A. Ohara (April 1995 – August 1995)
6. Prof. E. Baeyens (July 1997 – August 1997)
7. Prof. J. Turiel (June 1999 – October 1999)

## Publications

### Edited Books

L. Auslander, F. A. Grunbaum, J. W. Helton, T. Kailath, P. Khargonekar, S. Mitter, *Signal Processing*, Parts I and II, The IMA Volumes in Mathematics and its Applications, vols. 22-23, Springer-Verlag, 1990.

B. A. Francis and P. P. Khargonekar, *Robust Control Theory*, The IMA Volumes in Mathematics and its Applications, vol. 66, Springer-Verlag, 1994.

### A. Book Chapters

1. P. P. Khargonekar, "Identification and Robust Control," in *The Modeling of Uncertainty in Control Systems; Proceedings of the 1992 Santa Barbara Workshop*, edited by Roy S. Smith and Mohammed Dahleh, pp. 3-9, 1994.
2. P. P. Khargonekar, "State-Space  $\mathcal{H}_\infty$  Control Theory," in *Mathematical System Theory: The Influence of R. E. Kalman*, edited by A. C. Antoulas, Springer-Verlag, pp. 159-176, 1991.
3. J. Abedor, K. Nagpal, P. P. Khargonekar, and K. Poolla, "Robust Regulation with an  $\mathcal{H}_\infty$  Constraint," in *Control of Uncertain Dynamic Systems*, edited by S. P. Bhattacharyya and L. H. Keel, CRC Press, pp. 95-110, 1991.
4. P. P. Khargonekar and M. A. Rotea, "Controller Synthesis for Multiple Objective Control," in *Control of Uncertain Dynamic Systems*, edited by S. P. Bhattacharyya and L. H. Keel, CRC Press, pp. 261-280, 1991.
5. M. A. Rotea and P. P. Khargonekar, "Generalized  $\mathcal{H}_2/\mathcal{H}_\infty$  Control," in *Robust Control Theory*, editors - B. A. Francis and P. P. Khargonekar, The IMA Volumes in Mathematics and its Applications, vol. 66, Springer-Verlag, pp. 81-104, 1994.
6. G. Gu and P. P. Khargonekar, "Identification in Frequency Domain," in *Feedback Control, Nonlinear Systems and Complexity*, editors - B.A. Francis and A.R. Tannenbaum, Invited to speak at a Conference held in honor of Professor G. Zames' 60<sup>th</sup> birthday, Lecture Notes in Control and Information Sciences, vol. 202, pp. 99-113, Springer-Verlag, London, UK.
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#### E. Invited Conference Papers

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248. B. R. Barmish and P. P. Khargonekar, "Robust Stability of Feedback Systems with Uncertain Parameters and Unmodeled Dynamics," *Proc. 1988 American Control Conference*, pp. 1857-1862.
249. J. Krause and P. P. Khargonekar, "Robust Parameter Adjustment," *Proc. 1988 American Control Conference*, pp. 331-336.
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286. P. P. Khargonekar and A. Yoon, "Randomized Algorithms in Control Analysis and Design," *Proc. American Control Conference*, pp. 383-387, June 1999.
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289. E. Park, D. Tilbury, and P. P. Khargonekar, "Modeling, Analysis, and Implementation of Logic Controllers of Machining Systems Using Petri Nets and SFC," *5<sup>th</sup> Workshop on Discrete Event Systems (WODES 2000)*, pp. 265-274, August 2000.

## **F. Patents**

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292. E. Park, D. Tilbury, and P. P. Khargonekar, "Method and System for Creating a Control-Flow Structure Which Represents Control Logic, Reconfigurable Logic Controller Having the Control Logic, Method for Designing the Controller and Method for Changing Control Logic," U.S. Patent 6256598, July 2001.

### G. Other Publications

293. E. W. Kamen and P. P. Khargonekar, "A Transfer-Function Type Approach to Linear Time-Varying Systems," *Proc. 21<sup>st</sup> IEEE Conference on Decision and Control*, pp. 152-157, 1982. (This paper was part of an Invited Session in which I was a co-organizer.)
294. E. W. Kamen and P. P. Khargonekar, "Regulator Design for Linear Systems Whose Coefficients Depend on Parameters," *Proc. 4<sup>th</sup> Meeting of the Coordinating Group on Modern Control Theory*, Oakland University, Rochester, MI, pp. 359-366, 1982. (This paper was part of an Invited Session in which I was a co-organizer.)
295. K. R. Poolla and P. P. Khargonekar, "Stability Margins for Distributed Systems," *Proc. 24<sup>th</sup> IEEE Conference on Decision and Control*, pp. 257-259, 1985. (This paper was part of an Invited Session in which I was a co-organizer.)
296. P. P. Khargonekar, I. R. Petersen, and K. Zhou, "Robust Stabilization of Uncertain Systems and  $\mathcal{H}_\infty$ -Optimal Control," Internal Report No. 87-KPZ, Department of Electrical Engineering, University of Minnesota, September 1987. (Abridged versions of this technical report appeared as 52 and 72.)

### H. Book Reviews

297. P. P. Khargonekar, Review of "System Theory: A Hilbert Space Approach," by A. Feintuch and R. Saeks, *SIAM Review*, vol. 28, pp. 595-597, December 1986.
298. P. P. Khargonekar, Review of "Control System Synthesis: A Factorization Approach," by M. Vidyasagar, *SIAM Review*, vol. 29, pp. 658-660, December 1987.
299. P. P. Khargonekar, Review of "A Course in  $\mathcal{H}_\infty$  Control Theory," by B. A. Francis, *SIAM Review*, vol. 30, pp. 335-336, June 1988.

## Selected Invited Lectures

1. Series of lectures on the Theory of Systems over Rings, Department of Electrical Engineering, University of Waterloo, October 1980.
2. On the Partial Realization Problem for Covariance Sequences, Department of Mathematics, Rutgers University, February 1982.
3. On the Regulator Problem with Internal Stability, Department of Electrical Engineering, Rice University, February 1983.
4. Advances in Control System Design, Distinguished Lecture Series, Department of Electrical Engineering, Florida Atlantic University, November 1983.
5. Design of Robust Control Systems, Honeywell Workshop on Multivariable Control Systems Design, October 1984.
6. On the Regulator Problem with Internal Stability, Plenary Lecture at the 1983 International Symposium on the Mathematical Theory of Networks and Systems, Beer Sheva, Israel.
7. Robust Stabilization of Systems with parameter Variations, Department of Electrical Engineering, McGill University, October 1984.
8. Sensitivity Minimization of Periodic Systems, Department of Electrical Engineering, University of Toronto, November 1985.
9. Nonlinear Time-Varying Controllers for Linear Time-Invariant Plants, Minisymposium Speaker, SIAM Conference on Linear Algebra in Signals, Systems, and Control, Boston, August 1986.
10. Nonlinear Time-Varying Controllers for Robust and Optimal Control of Linear Time-Invariant Plants, University of Michigan, February 1987.
11. Robust Stabilization and  $\mathcal{H}_\infty$  Optimal Control, Coordinated Science Lab, University of Illinois, April 1988.
12. Invited Speaker, International Workshop on Control of Uncertain Systems, University of Bremen, FRG, June 1989.
13. Keynote Speaker, Recent Advances in Robust Multivariable Control, 1<sup>st</sup> International Conference on Systems Engineering, Dayton, OH, August 1989.
14. Recent Advances in Robust and  $\mathcal{H}_\infty$  Control Theory, Department of Electrical Engineering, Clarkson University, October 1989.
15. Recent Advances in Robust and  $\mathcal{H}_\infty$  Control Theory, Department of Aeronautical and Astronautical Engineering, Purdue University, March 1990.

16. Recent Advances in Robust and  $\mathcal{H}_\infty$  Control Theory, Berkeley Center for Systems and Control, University of California, Berkeley, April 1990.
17. State-Space  $\mathcal{H}_\infty$  Control Theory, Main Lecturer, Dutch System and Control Theory Network Summer School on  $\mathcal{H}_\infty$  Control and Robust Stabilization, June 1990, Schiermonnikog, The Netherlands.
18. Mixed  $\mathcal{H}_2/\mathcal{H}_\infty$  Control, Coordinated Science Laboratory, University of Illinois, Urbana, June 1990.
19. Recent Advances in Robust and  $\mathcal{H}_\infty$  Control Theory, Department of Electrical Engineering Colloquium, University of Pittsburgh, October 1990.
20. Recent Advances in Robust and  $\mathcal{H}_\infty$  Control Theory, Plenary Talk, SIAM Conference on Linear Algebra in Signals, Systems, and Control, November 1990.
21. State-Space  $\mathcal{H}_\infty$  Control Theory, First International Conference on Mathematical Theory of Control, Bombay, India, December 1990.
22. Topics in State-Space  $\mathcal{H}_\infty$  Control Theory, Department of Electrical and Computer Engineering, Wayne State University, Detroit, Michigan, January 1991.
23. Controller Synthesis for Multiple Objective Optimal Control, International Workshop on Robust Control, San Antonio, March 1991.
24. On  $\mathcal{H}_2$ ,  $\mathcal{H}_\infty$  and  $\mathcal{H}_2/\mathcal{H}_\infty$  Control, Keynote Speech, Workshop on Robust Control Design using  $\mathcal{H}_\infty$  and Related Methods, Cambridge, UK, March 1991.
25. State-Space  $\mathcal{H}_\infty$  Control Theory and Robust Control, Special Topics Invited Lecture, International Symposium on Mathematical Theory of Networks and Systems, June 1991.
26. Analysis and Synthesis of Sampled-Data Control Systems, Osaka University, June 1991.
27. Identification in  $\mathcal{H}_\infty$ : A Class of Algorithms, Kyushu Institute of Technology, Japan, June 1991.
28. Identification in  $\mathcal{H}_\infty$ : A Class of Algorithms, McGill University, Canada, March 1992.
29. Applications of Control to Semiconductor Manufacturing, Institute for Mathematics and its Applications, University of Minnesota, October 1992.
30. Robust Identification and Identification in  $\mathcal{H}_\infty$ , Center for Control Science and Dynamical Systems, University of Minnesota, November 1992.
31. Real-Time Control of Reactive Ion Etching, SEMATECH Advanced Equipment Control Workshop, April 1993.

32. Applications of Control to Semiconductor Manufacturing: Real-Time Control of Reactive Ion Etching, Colloquium, Department of Electrical, Computer, and Systems Engineering, Rensselaer Polytechnic Institute, October 1993.
33. Applications of Control to Semiconductor Manufacturing: Real-Time Control of Reactive Ion Etching, Colloquium, NSF Engineering Research Center on Plasma Aided Manufacturing, University of Wisconsin, February 1994.
34. Robust Identification, General Electric Research and Development Center, October 1993.
35. Identification in  $\mathcal{H}_\infty$ , Main Lecturer, NATO Advanced Study Institute "From Identification to Learning," Como, Italy, August 1994.
36. Identification in Frequency Domain, Purdue University, October 1994.
37. Control and Estimation in Microelectronics Manufacturing, Department of Electrical Engineering and Computer Science, University of California, Berkeley, 1996.
38. Control and Estimation in Microelectronics Manufacturing, Plenary Talk, IFAC Workshop on Robust Control Design, Budapest, Hungary, June 1997.
39. Randomized Algorithms for Robust Stability Analysis, Invited Lecture, Department of Electrical Engineering, Louisiana State University, November 1997.
40. Randomized Algorithms for Robust Stability Analysis, Invited Presentation, Workshop on Learning and Control Systems, Bangalore, India, December 1997.
41. Control and Estimation in Plasma Processing, Invited Talk, DARPA/NSF Workshop on Virtual Integrated Prototyping, Washington, DC, April 1998.
42. Experiences in Control of Semiconductor Manufacturing: Lessons Learned for Control Education and Research, Plenary Talk, Japan-USA-Vietnam Workshop Research and Education in Systems, Computation, and Control Engineering, Hanoi, Vietnam, May 1998.
43. A Probabilistic Approach to the Robustness of Run-to-Run Control in Semiconductor Manufacturing, Quality and Productivity Research Conference, Berkeley, CA, May 1998.
44. Estimation and Control in Semiconductor Manufacturing, LIDS Colloquium, MIT, May 2000.
45. Modeling and Control of Color Xerography, Middle East Technical University, Ankara, TURKEY, September 2002.
46. Logic Control of Reconfigurable Machining Systems, Bilkent University, Ankara, TURKEY, September 2002.

47. Invited Speaker and Participant, Workshop on Cross-Disciplinary Research and the Role of Industry, Sponsored by the National Science Foundation, 42<sup>nd</sup> IEEE Conference on Decision and Control, Hawaii, December 2003.
48. Invited Panelist, Special session on Women in Control, 42<sup>nd</sup> IEEE Conference on Decision and Control, Hawaii, December 2003.
49. Invited Speaker, Special Industry Session on Control Enabled Color Production Printing and Publishing Systems, Xerox Corporation, 42<sup>nd</sup> IEEE Conference on Decision and Control, Hawaii, December 2003.
50. Logic Control for Reconfigurable Manufacturing Systems, Invited Speaker, Workshop on Algebraic System Theory in honor of Edward W. Kamen, Georgia Institute of Technology, Atlanta, January 2004.
51. Learning Piecewise Linear Maps for Approximation of Invertible Maps, Kyoto University, Japan, March 2004.
52. Analysis and Design of Logic Controllers for Reconfigurable Manufacturing Systems using Formal Verification, Department of Electrical Engineering, Indian Institute of Technology, Mumbai, India, January 2005.
53. Nonlinear Estimation for Real-Time In-Situ Sensing of Etch Geometry in Reactive Ion Etching, Invited Speaker, Workshop on Nanotechnology Research, Indian Institute of Technology, Mumbai, India, January 2005.
54. Estimation and Control in Semiconductor Manufacturing, Dhirubhai Ambani Institute of Information and Communications Technology, Gandhinagar, India, January 2005.
55. Stabilization and Optimal Regulation of Discrete-Time Switched Systems, University of Tokyo, Kyoto University, Nagoya University, and Tokyo Institute of Technology, June 2007.
56. Numerous Invited Presentations at Conferences and Workshops without Published Papers.