

# Curriculum Vitae

## S. Massoud Amin

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### Education

- January 1990      **Washington University, St. Louis**  
Doctor of Science (D.Sc.) in Systems Science and Mathematics, Advisor E. Y. Rodin  
Dissertation: Intelligent Prediction Methodologies in the Navigation of Autonomous Vehicles
- December 1986      **Washington University, St. Louis**  
Master of Science in Systems Science and Mathematics
- February 1985      **University of Massachusetts, Amherst**  
Master of Science in Electrical and Computer Engineering, Advisor T. E. Djaferis  
Thesis: Robust Control of Linear Multivariable Systems
- September 1982      **University of Massachusetts, Amherst**  
Bachelor of Science in Electrical Engineering (cum laude)
- June 1979      **Storm King School, Cornwall-on-Hudson, New York**  
High School Diploma (Highest Honors)

### Professional Experience

- 3/2003 - present      Director, Technological Leadership Institute (TLI)  
Honeywell/H.W. Sweatt Chair in Technological Leadership  
Professor, Department of Electrical and Computer Engineering  
University Distinguished Teaching Professor (May 2008-present)  
Member, Academy of Distinguished Teachers (May 2008-present)  
University of Minnesota, Minneapolis, MN
- 02/09 - present      Founder and Director of Graduate Studies, Security Technologies  
University of Minnesota, Minneapolis, MN
- 3/03 - 8/09      Director of Graduate Studies, Management of Technology  
University of Minnesota, Minneapolis, MN
- 7/02 - 2/03      Area Manager, Infrastructure Security, Grid Operations & Planning,  
Power Markets, Risk & Policy Assessment  
Lead, Mathematics & Information Sciences  
Electric Power Research Institute (EPRI), Palo Alto, CA
- 9/01 - 7/02      Area Manager, Infrastructure Security  
Lead, Mathematics & Information Sciences  
Electric Power Research Institute (EPRI), Palo Alto, CA
- 1/98 – 9/01      Manager, Mathematics & Information Sciences  
Electric Power Research Institute (EPRI), Palo Alto, CA
- 7/97–1/98      Associate Professor, Department of Systems Science and Mathematics  
Associate Director, Center for Optimization and Semantic Control  
Washington University, St. Louis, MO
- 6/96–6/97      Assistant Professor, Department of Systems Science and Mathematics  
Associate Director, Center for Optimization and Semantic Control  
Washington University, St. Louis, MO

6/92–6/96	Visiting Assistant Professor, Department of Systems Science and Mathematics Associate Director, Center for Optimization and Semantic Control Washington University, St. Louis, MO
1/90–6/92	Lecturer, Department of Systems Science and Mathematics Senior Fellow, Center for Optimization and Semantic Control Washington University, St. Louis, MO
8/86–12/89	Lecturer, Department of Systems Science and Mathematics Research Associate, Center for Optimization and Semantic Control Washington University, St. Louis, MO
9/83–6/85	Teaching Associate with C. V. Hollot (ECE), T. Cook, and D. St. Mary (Math) Department of Electrical and Computer Engineering Department of Mathematics and Statistics University of Massachusetts, Amherst
9/82–6/83	Research Assistant with T. E. Djaferis Department of Electrical and Computer Engineering University of Massachusetts, Amherst

### Professional Organizations

American Society of Mechanical Engineers, Institute of Electrical and Electronics Engineers, Society for Industrial and Applied Mathematics, American Association for the Advancement of Science

### Honors and Awards

- **2011 Fellow of the American Society of Mechanical Engineers**, recognized for contributions in education and leadership in the profession, June 2011
- **2011 Washington University Distinguished Engineering Alumni Achievement Award**, School of Engineering & Applied Science, Washington University, February 2011
- **2010-2011 Fellow of the Academic Leadership Program (ALP)**, Committee on Institutional Cooperation (CIC) comprised of 5 fellows from each of the Big 10, University of Chicago and Northwestern University.
- **2009 IEEE Power & Energy Society (PES) Technical Committee Award for Perfect Power Systems for Energy Efficiency**, IEEE PES, Power System Operation Committee, November 2009
- **2008 University of Minnesota Award for Outstanding Contributions to Post-baccalaureate, Graduate, and Professional Education**, and induction into the **University's Academy of Distinguished Teachers** "in recognition of excellence in instruction, instructional program development, intellectual distinction, advising and mentoring, and involvement of students in research, scholarship, and Professional development," on April 28, 2008
- **2007 Fellow of the Institute for Infrastructure and Information Assurance (IIIA)** "for contributions to homeland security, scholarly achievements in infrastructure protection and information assurance, effective leadership, and commitment to teaching and mentoring university students." The grade of Fellow is awarded to only a few (2-4) highly distinguished researchers per year by the IIIA to recognize extraordinary contributions and leadership in infrastructure and/or information assurance, National Academies, Washington DC on Tuesday, May 15, 2007
- **2004 ASME Certificate of appreciation** from the American Society of Mechanical Engineers (ASME) for services as a leader of ASME's Critical Asset Protection Initiative (CAPI), launched in February 2002 in the aftermath of 9/11 to help the U.S. government formulate practices and strategies to protect against future attacks, May 2004
- **2004 CSE Certificate of appreciation** from the Department of Computer Science and Engineering (CSE) at the University of Minnesota, for "dedication to building a strong M.S. in Software Engineering program," May 2004
- **2002 Chauncey Award**, the highest annual EPRI Award in recognition for "leadership in creation and execution of the Infrastructure Security Initiative," March 2003
- **2002 President's Award** for the Infrastructure Security Initiative, EPRI, Palo Alto, CA, April 2002
- **2002 Performance Recognition Award**, "for creating and implementing the Infrastructure Security Initiative," EPRI, Palo Alto, CA, Sept. 2002
- **2002 Performance Recognition Award**, "for development, preparation and major focusing of the 2003 Power Delivery and Markets R&D programs," EPRI, Palo Alto, CA, Oct. 2002

- **2001 Special Commendation**, “for outstanding contribution in the development of the Electricity Infrastructure Security Assessment,” EPRI, Palo Alto, CA, Dec. 2001
- **2001 Performance Recognition Award**, “for helping build the CEIDS R&D plan (Consortium for Electricity Infrastructure for a Digital Society, <http://www.epri.com/ceids>),” EPRI, Palo Alto, CA, 2001
- **2001 Performance Recognition Award**, “for commitment to society in the development and advocacy of the Common Information Model (CIM), the Application Program Interface (API) standards and the application of API to Grid Operations and Planning software products,” EPRI, Palo Alto, CA, Jun. 2001
- **2000 Chauncey Award**, the highest annual EPRI Award in recognition for “creation of a world-class analytical capability for electricity market design” by the six-member power market design team, 2001
- **1999 Performance Recognition Award**, “for leadership in launching the EPRI/DoD Complex Interactive Networks/Systems Initiative,” Electric Power Research Institute, Palo Alto, CA, July 1999
- **1992-93, 93-94, 94-95 Professor of the Year**, School of Engineering & Applied Science, Washington University
- **1995-96 AGES "Big Fish" Award**, given to the faculty member "who best exemplifies excellence in graduate education" by the Association of Graduate Engineering Students (AGES), Washington University
- **Best Session Paper Presentation Awards**, American Control Conf., sessions WA9 and TA5, June 1997
- **Leadership Award**, Washington University, May 1995
- **Young Professional Award**, American Institute of Aeronautics and Astronautics, St. Louis, May 1991
- **Sigma Xi**, Scientific Research Society (initiated in 1992), serving as President of the UofM Chapter (2011-2013)
- **Tau Beta Pi**, Engineering Honor Society (initiated in 1981)
- **Eta Kappa Nu**, Electrical Engineering Honor Society (initiated in 1981)

### Current and Past Editorial Boards

- Chairman, IEEE Smart Grid e-Newsletter (8/2010-present)
- Associate Editor-in-Chief, International Journal of Mathematical and Computer Modelling (1998-present)
- Associate Editor, IEEE Power and Energy Magazine (2006-present)
- Founding member and Associate Editor, IEEE Security and Privacy magazine (2002- 2006)
- Associate Editor, IEEE Control Systems Magazine (1998-2003)
- Associate Editor-in-Chief, International Journal of Computers and Mathematics With Applications (1998-2010)
- Associate Editor-in-Chief, Applied Mathematics Letters (1998-2008)

### Advisory Boards

- Board of Directors of the Texas RE (6/2010-present)
- Vice Chair, Audit and Governance Council, Board of Directors of the Texas RE (12/2010-present)
- Board on Mathematical Sciences and Their Applications (BMSA) at the National Academy of Sciences (2006-09)
- Board on Infrastructure and Constructed Environment (BICE) at the National Academy of Engineering (2001- 07)
- Chairman, Advisory Board, Instrumentation, Control & Intelligent Systems (ICIS), Idaho National Lab (2010- )
- Scientific Advisory Committee, Computational Sciences & Engineering Division, Oak Ridge National Lab (2006)
- Vice President of Public Affairs and on the Board of the Int'l Association for Management of Technology (2010- )
- Management of Technology Accreditation Board (MOTAB, 2010- )
- Senior Advisor, General E.W. Rawlings Chapter in the Air Force Association (2003-2008)
- Advisory board, AISI (2005-2009)
- Advisory board, Full Spectrum (2006-2010)
- IEEE Computer Society’s Task Force on Security and Privacy (2002-2006)
- ASME Critical Assets Protection Initiative (2002-2004)
- Board of the Center for Security Technologies at Washington University (2002-2006)
- Several additional advisory committees and review boards at: EPRI, DOE, DOD, DHS, NSF, and the White House Office of Science and Technology Policy (OSTP)

## Qualifications Summary

### 3/03-present Directing Education and Research Institute at the University of Minnesota

- Directing the Technological Leadership Institute (TLI), serving as the Honeywell/H.W. Sweatt chair in technological leadership, and as a full Professor of electrical and computer engineering at the University of Minnesota: in addition, I serve as the director of graduate studies (DGS) for the security technologies program (2008-present), served as the DGS for the management of technology (MOT) program (2003-2009), and teach several courses including Dynamical Systems, Science & Technology Policy, Emerging and Pivotal Technologies, Global Management of Technology, Intellectual Property Valuation and Strategy, and Critical Infrastructure Security and Protection.
- Responsibilities include direction and oversight of all academic, financial and administrative elements of TLI's programs and activities. Lead a staff of five endowed chairs, 10 professional staff, and 52 associated senior faculty from across the University of Minnesota, industry and government.
- Strengthened TLI's programs and offerings while actively engaging all staff, faculty, and industry leaders and assembled an outstanding team of TLI Board members.
- Acquired and allocated budgets; and am executing four key areas identified for near to mid-term implementation. Ensured that TLI is re-energized and operates with a renewed vision and mission that is in alignment with the University's vision and mission
- Successfully developed and undertook a four-step plan to assist TLI in redefining itself, setting the stage for growth, and rebuilding and establishing connections with over 250 stakeholder organizations.
- Led national searches for four chaired professorships, three of which had been vacant for up to seven years; successfully recruited and filled all positions with world-class faculty.
- Initiated a vigorous research component, ensuring that a solid foundation of TLI knowledge is funneled into the classroom and shared with high-tech companies and government.
- Developed new research objectives in partnership with state and national stakeholders on selected areas for TLI to become a knowledge center with increased impact of science and technology, through a systematic research program.
- Created a new graduate program, Master of Science in security technologies (2004-2008), and serve as its DGS.
- Am executing TLI's strategic plan to develop and extend its global reach and to create world-class programs; developed joint graduate programs in Management of Technology with the Government of Egypt and Nile University, and have developed several collaborations with India and China.
- Attracted an endowment of \$4M for the Gemini Chair in Technology Management, in partnership with the development office, in November 2006.
- Most of our students at TLI are fast-tracked full-time professionals from Minnesota's high-tech companies; I work closely with them to succeed globally and to ensure a very high positive impact on the State's economy by supplying a leadership talent pipeline in Minnesota. As an example of that impact in Minnesota, one of the key integrative courses in the Management of Technology (MOT) program is the capstone project undertaken by these professionals; there are about 30-33 Capstone projects completed each year. The dollar impact resulting from companies' increased revenues, cost savings, product or process innovations, or new products per project amount to a range of a few hundred thousand dollars to several tens of millions of dollars.

### 1/98-2/03 Management of Research and Development at the Electric Power Research Institute (EPRI)

- Prior to joining the University of Minnesota in March 2003, held positions of increased responsibility including Area Manager of Infrastructure Security, Grid Operations/Planning, Markets, Risk and Policy Assessment, and head of Mathematics and Information Sciences at the Electric Power Research Institute (EPRI) in Palo Alto, CA.
- Development of collaborative R&D initiatives; advocacy, fundraising and teamwork with diverse groups, including the electric power industry, government, universities and other stakeholders (including Electric Power Research Institute (EPRI) and its members, California State Senate, US DOD, DOE, NSF, Nat'l Academy of Engineering, Nat'l Governors' Association, and the White House Office of Science and Technology Policy).
- Directed all security related R&D activities at EPRI in the aftermath of 9/11; infrastructure security programs, grid operations & planning, risk & policy, energy markets as well as having directed earlier programs in power delivery, electricity markets, and grid operations and planning. Responsible for managing the full scope of research, from initiation through transfer of the resultant technology to targeted areas.
- Created, successfully launched and managed a three-year \$24 million joint EPRI/DoD initiative in complex interactive networks (CIN/SI) to fund six research consortia, consisting of 108 professors and over 200

researchers from 28 U.S. universities along with two energy companies, to address modeling and management of our critical national infrastructures. Results include over 420 publications and 24 technologies extracted and implemented in the industry.

- Initiated and led research and development (R&D) toward the smart grids, self-healing electric power systems (in 1998), and the development of more than 24 advanced technologies to enhance the security of our national critical infrastructures (1998-2003).
- Prior to October 2001, served as manager of mathematics and information sciences at EPRI, where I led strategic research in modeling, simulation, optimization, and adaptive control of national infrastructures for energy, telecommunication, transportation, and finance.
- The area of self-healing infrastructure, pioneered by me, was recommended in 2005 by the White House Office of Science and Technology Policy (OSTP) and the U.S. Department of Homeland Security (DHS) as one of three thrust areas for the National Plan for research and development in support of Critical Infrastructure Protection.
- This work, spanning over 25 years of my professional career in the above areas, has become a leading concept in sixteen ongoing programs at EPRI, NSF, DHS, DOE and DOD. The resultant initiatives continue to be successful and now amount to several billions per year in the electricity sector (including Intelligrid at EPRI, Gridwise, Modern Grid and Smart Grid at the DOE). Defense applications of this work include Network-Centric Objective Force, which is now part of the Future Combat Systems.

Prior to joining EPRI in January 1998, I held positions of associate professor of systems science and mathematics and associate director of the Center for Optimization & Semantic Control at Washington University in St. Louis, Missouri. During my twelve years at Washington University, I served as one of the main contributors to several projects with the United States Air Force, NASA-Ames, Rockwell International, McDonnell Douglas, Boeing, MEMC, ESCO, Systems & Electronics Inc. and United Van Lines.

#### **1/90 -1/98      System Identification and Control**

- Real-time system identification and control of a damaged F-15 aircraft: Developed and implemented methods for on-line model learning and parameter estimation via dynamical neural networks. Implemented a real-time Riccati solver for optimal control of the aircraft (with McDonnell Douglas-St. Louis and NASA-Ames). These modules were integrated as part of the Intelligent Flight Control System (IFCS) damage adaptive system, which was successfully test flown in fifteen flights on a test F-15 aircraft at the NASA Dryden Flight Research Center.
- Neural networks for estimation, system identification and control:
  - Multi-layered perceptrons: air combat maneuver prediction; handwritten character recognition; aircraft antiskid system; network flow prediction for the Mobility Analysis Support System;
  - Radial-basis function neural networks: road traffic flow prediction;
  - Neurons with local memory: proofs of stability and convergence; application to simulated control of a Boeing 727 through windshear;
  - Internally dynamic neural networks: System identification and parameter estimation;
  - Recurrent high-order neural networks: on-line system identification and estimation; applied to a damaged F-15 aircraft and to the antiskid braking system of an MD-90.
- System identification for semiconductor crystal growth and tuning of multi-loop controller gains. Improved models and control methodologies for crystal growth (with MEMC Electronic Materials).

#### **1/94 – 1/98      Transportation, Optimization and Scheduling Theory**

- Modeling, simulation and optimization of DoD's large-scale air transport operations (with USAF's Air Mobility Command and the US Transportation Command).
- Urban traffic prediction and management; vehicle routing and automatic control (with SEI, Inc.)

#### **5/87 – 6/94      Learning Control for Game Theory**

- Developed a Flight & Fire Control System tested in Germany by Messerschmidt and adapted as the pilot's assistant for the Advanced Euro Fighter (with Rockwell Int'l).
- Developed a tactical decision support system for situation assessment, navigation and control of a vehicle engaged in evasive maneuvers against multiple pursuers (Electronics and Space Corp.).

## Professional experience, funding, endowments, and grants

March 2003-present      **Professor of Electrical and Computer Engineering**  
**Honeywell/H.W. Sweatt Chair in Technological Leadership**  
**Director, Technological Leadership Institute (TLI)**  
**University Distinguished Teaching Professor**  
**University of Minnesota, Minneapolis, MN**

In addition, as noted below in the Teaching and Curricular Development section, I serve as the director of graduate studies (DGS) for the security technologies program (2008-present), served as the DGS for the management of technology (MOT) program (2003-2009), and teach several courses including Dynamical Systems, Smart Grids, Critical Infrastructure Security and Protection, Emerging and Pivotal Technologies, Global Management of Technology, Intellectual Property Valuation and Strategy, and S&T Policy.

### Areas of expertise:

- **Dynamical Systems and Controls:** Theory and applications of self-healing controls including reconfigurable and self-repairing designs, on-line decision making, system optimization, and differential game theory for aerospace, energy, and transportation applications. Examples include smart self-healing grid, emergency control of stressed networks and uncertain systems, multi-agent modeling and simulation of energy enterprise, real-time topology estimation, and secure energy information networks;
- **Critical Infrastructure Protection (CIP):** Security, modeling, control and optimization of complex interactive systems for CIP; energy infrastructure and communication systems reliability and security; resilience and efficiency of national critical infrastructures for energy, cyber/communications, transportation and economic networks;
- **Development and Management of R&D initiatives** focusing on national infrastructures for energy, transportation, communication, banking and finance; strategic planning and implementation of science and technology R&D programs in partnership with diverse public/private stakeholders;
- **Research and Targeted Consulting in Science and Technology Leadership and Management:** Examples include technology scanning, mapping, assessment, valuation, and foresight, strategic management, science and technology policy, emerging and pivotal technologies.

My professional experiences and expertise noted above are rooted in systems science, mathematics, and engineering, have extended to management and leadership, and include the development of national/international energy R&D initiatives, and leadership of organizations focused on enhancing security, resilience and efficiency of critical infrastructures.

### Current research focuses on two areas:

- Smart grid and global transition dynamics to enhance resilience, security and efficiency of complex dynamic systems. These systems include national critical infrastructures for interdependent energy, computer networks, communications, transportation and economic systems. Research thesis advisor to four Master's and three doctoral students in the ECE Department.
- Technology scanning, mapping, and valuation to identify new science and technology-based opportunities that meet the needs and aspirations of today's consumers, companies and the broader society. This thrust builds coherence between short- and longer-term R&D opportunities and their potential impact.

### Research Grants/Funding:

Mar. 15, 2011- Sept. 15, 2013      **Principal Investigator**      Funding: \$405k/30 months  
Sandia National **Laboratories**

Project Title: Security Analyses of Autonomous Microgrids

- Microgrid Grand Challenges: Development of Attack-Resistant Microgrid Architectures
- Analysis, Modeling, and Simulation of Microgrid Failure Scenarios, and
- Vulnerability Analysis of Microgrids and Resilient Architectures.

January 2008-Sept. 2009      **Principal Investigator**      Funding: \$240K/21 Months

Minnesota Department of Transportation (Mn/DOT)

Project Title: Mn/DOT Master Skills Development for Project Management

September 2007-present                      **Principal Investigator**                      Funding: \$200,000 (4 years)  
National Science Foundation  
Project title: A Resilient Real-Time System for a Secure and Reconfigurable Power Grid

- Fast Risk assessment for large-scale power systems and Distributed sensing and control (Doctoral Dissertation: Laurie Miller, expected December 2009)
- Cyber Security for a Secure and Reconfigurable Power Grid (Doctoral Dissertation: Anthony Giacomoni (June 2009-present, and Jesse Gantz August 2011-present)

June 2007-Dec. 2009                      **EPRI Innovation Fellowship**                      Funding: \$150,000 (3 years)  
Electric Power Research Institute, Palo Alto, CA  
Project title: Plug-In Hybrid Electric Vehicles (PHEV) as a Distributed Energy Resource (\$, watts, emissions)  
Doctoral Dissertation: Sara Mullen (PhD completed, September 2009)

June 2005 –December 2007                      **Principal Investigator**                      Funding: \$ 170,000 (3 years)  
Oak Ridge National Laboratory, TN  
Project title: Sensor-based Power Grid Control

In addition, I serve as a Co-PI in the first Center of Excellence (COE) created by the Department of Homeland Security (DHS). The Center for Risk & Economic Analysis of Terrorism Events, headquartered at the USC, in partnership with NYU, Wisconsin, NC State, U of MN, etc. The total award to USC is \$12 million over three years (\$4M per year). There are 38 faculty members involved, the website is at <http://www.usc.edu/dept/ise/hsc/>.

July 2002 - Feb. 2003                      **Area Manager, Infrastructure Security, Grid Operations & Planning,  
Power Markets, Risk & Policy Assessment**                      \$18-20 millions per year

Nov. 2001 - July 2002                      **Area Manager, Infrastructure security  
Lead, Mathematics & Information Sciences**

Jan. 1998 - Oct. 2001                      **Manager, Mathematics & Information Sciences**                      \$8-10 millions per year

Electric Power Research Institute (EPRI), Palo Alto, CA

- Prior to joining the University of Minnesota in March 2003, held positions of increased responsibility including Area Manager of Infrastructure Security, Grid Operations/Planning, Markets, Risk and Policy Assessment, and head of mathematics and information sciences at the Electric Power Research Institute (EPRI) in Palo Alto.
- Directed all management and administrative activities in areas of infrastructure security, grid operations & planning, energy markets, risk & policy in the Science and Technology Division and the Power Delivery and Market Sector.
- Following the September 11, 2001, terrorist attacks, directed all security-related R&D activities at EPRI including the Enterprise Information Security (EIS) program with 40 participating utility organizations; led the creation, launch and management of the Infrastructure Security Initiative (ISI) to assess key vulnerabilities, develop new technologies and countermeasures that can prevent or mitigate attacks.
- During January 1998 to October 2001, held positions of increased responsibility in creation and management of R&D programs with a budget of \$8-\$10 million per year.
- Prior to October 2001, served as manager of mathematics and information sciences at EPRI, where I created and led several initiatives including EPRI/DOD Complex Interactive Networks/Systems Initiatives (CIN/SI), consisting of 108 professors, over 240 graduate students and researchers in 28 U.S. universities, together with participants from over 50 utilities and government agencies-- DOD, DOE, and OSTP, in strategic research in modeling, simulation, optimization, and adaptive control of critical national infrastructures for energy, telecommunication, transportation, and finance.
- Initiated and led research and development (R&D) toward the smart self-healing electric power grids starting in 1998, and the development of more than 24 advanced technologies to enhance the security of our national critical infrastructures (1998-2003). In the course of the CIN/SI, pioneered R&D in the smart grid and self-healing infrastructures.
- My work has become a leading concept in sixteen ongoing programs at EPRI, NSF, DHS, DOE and DOD. The resultant initiatives that I pioneered continue to be successful and now amount to several billions per year in the electricity



Sept. 1990 - Mar. 1994

**Senior Fellow**

Aug. 1987 - Aug. 1990

**Research Associate**

Center for Optimization and Semantic Control, Washington University, St. Louis, MO

US Air Force Office of Scientific Research grants (1990-1994) and Rockwell International contract (1986-89)

Project title: Artificial Intelligence methodologies in Flight-Related Differential Game, Control and Optimization Problems. Developed the following:

- A neural network module for the identification and prediction of tactical air combat maneuvers based on incomplete information.
- A simulation package for "low observables" (minimum-detection path planning), providing autonomous aircraft navigation in a time-varying environment cluttered with stationary & moving hostile radar sites.
- A computer package for situation assessment & risk prioritization in medium-range air combat (16-50 mi.).
- A simulator for system identification via dynamic neural nets, disturbance rejection/control using dynamic neurons.
- A neural network-based methodology for the recognition of handwritten characters.

Sept. 1983 - May 1985

**Teaching Associate**, University of Massachusetts, Amherst

Department of Electrical and Computer Engineering and Department of Mathematics and Statistics.

- Designed & supervised experiments and simulations in the Signal Processing and Control Engineering Lab.

Sept. 1982 - May 1983

**Research Assistant**, University of Massachusetts, Amherst

Department of Electrical and Computer Engineering.

Master's Thesis: Robust Control of Linear Multivariable Systems

- Investigated multi-input/multi-output linear systems, which contain unmodelled dynamics where stability and good transient response are desired. A sufficient condition for robust stabilization was obtained; this technique was illustrated in the design of fixed-state feedback for helicopter control.

## Teaching and Curricular Development:

### University of Minnesota (March 2003 –present)

- Created and delivered a university-wide, inter-disciplinary Master of Science in Security Technologies (MSST) degree program, along with M.S. and PhD minors in Security Technologies.
- As the Director of Graduate Studies (DGS) for the Master of Science in Management of Technology (MOT), revamped MOT curriculum in 2004-2005, modified 7 courses, added 2 new courses, and updated content in 4 key programmatic areas.
- In partnership with the broader community, formed an advisory group of Master of Science in Infrastructure Systems Engineering (ISE) alumni, executives and stakeholders, then developed and am teaching a new course on Critical Infrastructure Security and Protection.
- Developed and delivered a collaborative graduate program in Management of Technology (MOT) at Nile University, Cairo, Egypt - delivered seven graduate MOT courses (taught Pivotal Technologies and S&T Policy classes) and two new software engineering courses (in partnership with the University of Minnesota Computer Science and Engineering (CSE) department) during Dec. 2007 through March 2009, Nile University.
- Developed and delivered International MOT courses and joint seminars/courses in China and India.
- Developed and taught the following courses at the University of Minnesota:
  - *Infrastructure Systems Eng'g 5302, Critical Infrastructure Security and Protection* (2 credits, 2005-present)
  - *Infrastructure Systems Eng'g (ISE) 8105, Capstone project* (3 credits, 2004-present)
  - *Management of Technology (MOT) 8224, Pivotal Technologies* (2 credits, 2005-present)
  - *Management of Technology (MOT) 8234, Capstone Project course* (2 credits, 2004 and 2006-present)
  - *Management of Technology (MOT) 8920, Science and Technology Policy* (1.5 credits, 2003-2008)
  - *Management of Technology (MOT) 8940, Intellectual Property Valuation and Strategy* (1.5 credits, 2006)
  - *Management of Technology (MOT) 8950, International MOT Project* (1.5 credits, 2006-2008)
  - *Security Technologies 8111, Methods, Theory & Applications* (2 credits, 2010-present)
  - *Security Technologies 8330, Critical Infrastructure Protection* (3 credits, 2010-present)
  - *Security Technologies 8331, Dynamic Systems Modeling & Simulation Tools* (2 credits, 2010-present)
  - *Security Technologies 8620, Capstone Project course* (2 credits, 2010-present)

### **Washington University Teaching (August 1987-December 1997)**

Courses taught: Department of Systems Science and Mathematics, Washington University, St. Louis, MO

- *Introduction to Systems Science & Mathematics: Mathematical Modeling* (SSM 202, twelve times)
- *Linear Algebra: Theory of matrices and vector spaces* (SSM/Math 309, three times)
- *Probability and Statistics for Engineers* (SSM 326, nine times)
- Senior/graduate level course in *Numerical Analysis* (SSM/CS 465/511, three times)
- Senior/graduate level course in *Nonlinear Optimization and Optimal Control* (SSM 480/506, five times)
- Graduate level *Applied Mathematics course sequence for Engineers* (SSM 501-502, eighteen times each)
- *Computer Methods for OR and Management of Engineering and Technology* (SSM 504/EP 536, twice)
- Graduate level course in *Mathematical Modeling & Identification of Dynamic Systems* (SSM 582, once)
- Graduate level course in *Computational Methods in Artificial Neural Systems* (SSM 591, once)
- Special Topic courses: *Active Control of Vibration* (once); *Neurocontrol of Nonlinear Dynamic Systems* (three times); *Large-Scale Nonlinear Optimization via Genetic Algorithms* (once); (SSM 500)

### **University of Massachusetts Teaching (August 1983-May 1985)**

- *Classical and Digital Control Systems*, Department of Electrical and Computer Engineering (ECE 580-581)
- *Pre calculus* course sequence, Department of Mathematics and Statistics (MATH 106-107)
- Designed and supervised experiments and simulations in the Signal Processing and Control Engineering Lab.

### **Consulting and Professional Experience:**

Electric Power Research Institute (EPRI), United States (US) Dept. of Defense, US Air Force, US Army Research Office, US Dept. of Energy, NSF, National Governors' Association, White House Office of Science and Technology Policy, McDonnell Douglas, Boeing, NASA-Ames Research Center, Rockwell International, MEMC Electronic Materials Inc., Electronics & Space Corp., Emerson Electric, TSI, IBM, and the US National Academy of Engineering.

### **Honorary Boards and Professional Service:**

- Member of the National Academy of Engineering's Board on Infrastructure and Constructed Environment (BICE), 2001- 2007
- Member of the National Academy of Sciences' Board on Mathematical Sciences and Their Applications (BMSA), 2006- 2009
- Member of the Scientific Advisory Committee for the Computational Sciences and Engineering Division of the Oak Ridge National Laboratory (ORNL) for Jan. 2006-May 2010.
- Senior Advisor, Minnesota Homeland Security Senior Advisory Committee, General E.W. Rawlings Chapter in the Air Force Association, Jun. 2003-present
- Serving on several advisory and review boards in EPRI, the US Dept. of Energy, Dept. of Defense, National Science Foundation, National Laboratories, National Research Council and the National Academy of Engineering, White House Office of Science and Technology Policy, Jan. 1998-present
- Co-chaired several events including Minnesota's Defense Industry Roundtable on April 2, 2007: Minnesota Senators Norm Coleman (R-MN) and Amy Klobuchar (D-MN) and over 150 people representing more than 100 defense and homeland security businesses and organizations attended the Defense Alliance of Minnesota's morning event at the McNamara Alumni Center at the University of Minnesota
- Served on IEEE Computer Society's Task Force on Security and Privacy, Apr. 2002- Jan. 2007
- Gave keynote addresses regarding infrastructure security and the August 14, 2003 outages at several events, including: IEEE Twin Cities 2003 Awards Banquet, Congressional Staff Briefing, "An Engineering Perspective on the Blackout of 2003", hosted by ASME, IEEE, and the U.S. Energy Association, Congressional Briefing at the Inaugural Meeting of the House Research and Development Caucus, IEEE PES and International Council on Large Electric Systems (CIGRE) joint symposium, and IEEE Southern California PES Chapter.
- Chaired the Energy Security team of ASME Critical Assets Protection Initiative (CAPI), Feb. 2002- Sept. 2003
- Serve on the ASME CAPI Steering Committee, Sept. 2003- Nov. 2005
- Serve on the Board of the Center for Security Technologies (CST) at Washington University, Jan. 2003-present

- Chaired the IEEE Control Systems Society's Technical Committee on Control of Power Systems: Organized/Chaired Sessions at various Control Systems and Power Engineering Societies' Conferences, Jan. 1999-Jan. 2003
- Served on a six-member team on the Directorate for Engineering at the NSF to determine the future investments for the national Cyberinfrastructure that may be made by the Foundation. Represented the Electrical and Communications Systems (ECS) at the NSF, to help the Directorate for Engineering's future investments in Cyberinfrastructure. Participated in three workshops, co-organized a subsequent workshop focused on the Engineering research communities, Jun. 2003-2005.
- Member, Steering Committee, Academy of Distinguished Teachers, University of Minnesota, Oct. 2009-present
- Member, Campus Club Board, University of Minnesota, Aug. 2009-present
- Member, China Center Advisory Committee, University of Minnesota, 2006-present
- Executive Committee, China Center Advisory Committee, University of Minnesota, 2008-present
- President Elect, China Center Advisory Committee, University of Minnesota, 2010-2012
- President, China Center Advisory Committee, University of Minnesota, 2010-2012
- Member, Steering committee, Network of Interdisciplinary Initiatives, University of Minnesota, Sept. 2007-present
- Advisory board of the Center for Integrative Leadership, University of Minnesota, Sept. 2006-present
- Faculty advisor for Innovation By Design (7 MBA students), University of Minnesota, Sept. 2007-present
- Elected a Member of the Management of Technology Accreditation Board (MOTAB), consisting of ten members, May 2010-present
- Elected to the Board of the International Association for Management of Technology (IAMOT), April 2009-2011
- Elected as Vice President of Public Affairs, IAMOT, March 2010-2012
- Academic Planning Committee in Rochester for the new graduate programs in Biomedical Informatics and Computational Biology.
- Teach short courses on Research Data Management and Social Responsibility as part of the Responsible Conduct of Research (RCR) training required for all PIs and Co-PIs at the University of Minnesota
- Faculty advisor (Jan.-Apr. 1994) and chief faculty advisor (Apr. 1994-Jan. 1998) to the Tau Beta Pi, Engineering Honor Society, MO Gamma Chapter, School of Eng'g & Applied Science, Washington Univ.
- Served on the Washington University School of Engineering and Applied Science's Graduate Recruiting Advisory Board, Jan. 2000-Mar. 2001
- Supervised senior and graduate students' projects and dissertations; advised undergraduates in the Dept. of Systems Science and Mathematics, Washington University, 1990-1998.
- Served as the IEEE Robotics & Automation Society's liaison to the Neural Network Council, 1992-'93.
- Served on the planning committee and refereed papers submitted to the Artificial Neural Networks in Engineering Conference, ANNIE 1992-1994.
- Served as conference Co-Chairman for the Int'l Federation of Operational Research Societies (IFORS) Conference, October 1995. Served as Track Chair for Intelligent Transportation Systems for the Int'l Federation of Operational Research Societies (IFORS) Conference, Oct. 1995.
- Refereed/reviewed papers submitted for publication to the following:
  - Journals: IEEE Trans. on Automatic Control; IEEE Trans. on Robotics and Automation; IEEE Control Systems Magazine; IEEE Trans. on Control Systems Technology; Automatica; Computers and Mathematics With Applications; Mathematics and Computer Modeling; Int'l Transactions in OR; AIAA Journal of Guidance, Navigation and Control; SIAM Journal of Control and Optimization; Neural Networks Journal.
  - Conferences: IEEE Conference on Decision and Control; American Control Conference; Int'l Federation of Operational Research Societies conference (IFORS); Artificial Neural Networks in Engineering conference (ANNIE); various conferences of the IEEE and the American Institute of Aeronautics and Astronautics.

## Publications

Author or co-author of more than 190 research papers, editor of 7 collections of manuscripts and serving on the editorial boards of 6 academic journals. Publications include:

## Edited Journals

- *Special Issue of Proceedings of the IEEE on Energy Infrastructure Defense Systems*, (Guest editor: Amin), Vol. 93, Number 5, pp. 855-1059, May 2005

- *Special issues of IEEE Security & Privacy Magazine on Infrastructure Security*, (Guest editor: Amin), Vol. 3, No. 3, May/Jun. 2005
- *Special issues of IEEE Control Systems Magazine on Control of Complex Networks*, (Guest editor: Amin), Vol. 21, No. 6, Dec. 2001 and Vol. 22, No. 1, Feb. 2002
- *Special issue of IEEE Control Systems Magazine on Power Systems and Markets*, (Guest editor: Amin), pp. 20-90, Vol. 20, Number 4, Aug. 2000
- *Operations Research Methods in Intelligent Transportation Systems*, (Guest editor: Amin), *International Transactions in Operational Research*, Vol. 6, No. 1, Jan. 1999
- *Intelligent Transportation Systems --Traffic Sensing and Management*, (Guest co-editors: Garcia-Ortiz, Amin and Wootton), *Mathematical and Computer Modeling*, Vol. 27, No. 9-11, May-Jun.1998
- *Network, Control, Communications and Computing Technologies in Intelligent Transportation Systems*, (Guest co-editors: Amin, Garcia-Ortiz and Wootton), *Mathematical and Computer Modeling*, Elsevier Science Ltd, Vol. 22, No. 4-7, 454 pp. , Aug.-Oct. 1995

### **Publications in Refereed Journals, Books and Conferences**

91. "Toward intelligent secure distribution system operation," (Giacomoni, Amin, and Wollenberg), *IEEE Transactions on Smart Grid*, 2011 (in review)
90. "Toward stronger, smarter, and more secure electric power grids: advances and challenges in distributed sensing, modeling, simulation, and control," (Amin and Giacomoni), in *Fundamentals of Materials for Energy and Environmental Sustainability*, D. Ginley and D. Cahen, Eds. London: Cambridge University Press, 2011, ch. 42. (In Press).
89. "Smart Grid as a Dynamical System of Complex Interdependent Networks/Systems," (Amin and Giacomoni), International Federation for Automatic Control (IFAC), August 2011
88. "A Control and Communications Architecture for a Secure and Reconfigurable Power Distribution System: An Analysis and Case Study," (Giacomoni, Amin and Wollenberg), International Federation for Automatic Control (IFAC), August 2011
87. "Toward More Secure, Stronger and Smarter Electric Power Grids," (Amin), 5 pp., 2011 IEEE PES General Meeting, Detroit, MI, July 2011
86. "Reconfigurable Interdependent Infrastructure Systems: Advances in Distributed Sensing, Modeling, and Control," (Giacomoni, Amin and Wollenberg), in *IEEE American Control Conference (ACC)*, San Francisco, June 2011
85. "U.S. Electrical Grid Gets Less Reliable," (Amin) *IEEE Spectrum*, page 80, January 2011
84. "The Rising Tide of Outages: The Promise of a Stronger and Smarter Grid," (Amin), *EnergyBiz Magazine*, Volume 7, Issue 6, pp. 37-38, Nov./Dec 2010
83. "Smart grids" (Amin and Wollenberg), McGraw Hill 2010 Yearbook of Science & Technology, 2010
82. "Electricity Infrastructure Security: Toward Reliable, Resilient and Secure Cyber-Physical Power and Energy Systems," (Amin), 5 pp., paper # 2010GM1719, 2010 IEEE PES General Meeting, July 25-29, 2010
81. "Self-Healing and Resilient Energy Systems," (Amin), *Wiley Handbook of Science and Technology for Homeland Security*, 2010

80. "Robustness, Resilience, and Security of National Critical Infrastructure Systems," (Amin), Wiley Handbook of Science and Technology for Homeland Security, 2010
79. "Securing the Electricity Grid," (Amin), *The Bridge*, the quarterly publication of the National Academy of Engineering, Volume 40, Number 1, pp. 13-20, Spring 2010
78. "Afterword: Technology to the Rescue?" (Amin and Marcus), Chapter 7, pp. 159-168, in *Strategic Foresight*, Palgrave MacMillan, May 2009
77. "Greening of the Power Grid: Toward increased efficiencies and integration of renewable resources," (Amin), proceedings of the 18th International Conference on Management of Technology (IAMOT), paper #1569171823, Orlando, FL, April 2009
76. "Technology Scanning, Mapping and Foresight: Energy Science, Technology and Policy Options for Electrification of Transportation Systems and Greening of the Grid," (Amin and Carlson) proceedings of the 18th International Conference on Management of Technology (IAMOT), paper #1569171827, Orlando, FL, April 2009
75. "Toward Resilient and Agile Systems: Leadership and Management of Infrastructures and Large-scale Complex Adaptive Enterprises," (Amin and Froggatt), proceedings of the 18th International Conference on Management of Technology (IAMOT), paper #1569171829, Orlando, FL, April 2009
74. "Towards Resilient and Self-healing National Critical Infrastructures," (Amin), European Critical Information Infrastructure Protection Newsletter ECN ([www.IRRIS.EU](http://www.IRRIS.EU)), issue11, v1, 21, pp. 12-17, November/December 2008
73. "For the Good of the Grid: Toward Increased Efficiencies and Integration of Renewable Resources for Future Electric Power Networks," (Amin), IEEE Power & Energy Magazine, Vol. 6, Number 6, pp. 48-59, November/December 2008
72. "The Smart Self-healing Electric Power Grid: Challenges in Security and Resilience of Energy Infrastructure," (Amin), Proceedings of the 2008 IEEE Power Engineering Society General Meeting, Pittsburgh, July 2008
71. "The Electric Power Grid: Today and Tomorrow," (Amin and Stringer), *MRS Bull.*, Vol. 33, No. 4, pp. 399-407, April 2008
70. "Toward Agile and Resilient Large-Scale Systems: Adaptive Robust National/International Infrastructures", (Amin and Horowitz), keynote address at the International Conference on Flexible Systems Management GLOGIFT-07, 22 pp., Nov. 15-17, 2007, Noida, India
69. "Preventing Blackouts", (Amin and Schewe), *Scientific American*, pp. 60-67, May 2007
68. Terrorism and the Electric Power Delivery System, with the Committee on Enhancing the Robustness and Resilience of Future Electric Transmission and Distribution in the United States to Terrorist Attack, NRC book and committee report, National Academy of Engineering and National Research Council, 342 pages, May 2007
67. "New Directions in Understanding Systemic Risk", with NAS and FRBNY Committee, National Academy of Sciences and Federal Reserve Bank of NY, 77 pages, Mar. 2007
66. "A Self-healing Network", (Amin), p. 38, *EnergyBiz*, [www.energybizmag.com](http://www.energybizmag.com), Jan/Feb. 2007
65. Defense Plan Against Extreme Contingencies - CIGRE TF C2.02.24, (with Miroslav Begovic, Gagnon Jean-Marie, Gomes Paulo, Walter Lachs, Chen-Ching Liu, Vahid Madani, Damir Novosel, Gilles Trudel, Harrison Clark, Ian Dobson, Peter Donalek, Pierre Grondin, Louis Wehenkel), Final Technical Report , CIGRE Report, 210 pages, Dec.2006
64. Defense Plan Against Extreme Contingencies, (with Miroslav Begovic, *et. al.*), 8 pages, *Electra Journal*, Oct./Nov. 2006

63. "Toward a self-healing Energy Infrastructure", (Amin) Proceedings of the General Meeting of the IEEE Power Engineering Society, 7 pages, Montreal, Jun. 18-22, 2006
62. "The North American power delivery system: Balancing market restructuring and environmental economics with infrastructure security", (Amin and Gellings) *Energy*, Vol. 31, Issues 6-7, pp. 967-999, May-Jun. 2006
61. "Galvin Electricity Initiative: Technology Scanning, Mapping and Foresight", (Amin, Carlson, and Gellings), EPRI, Palo Alto, CA and Galvin Electricity Project, Inc., Chicago, IL, [www.galvinelectricity.org](http://www.galvinelectricity.org), Apr. 2006
60. "Electricity Infrastructure Security", (Amin) Chapter 9 in *The CRC Handbook of Energy Conservation and Renewable Energy* Y.D. Goswami, and F. Kreith (editors), 24 pp., CRC Press, 2006
59. "Toward a Smart Grid", (Amin and Wollenberg), *IEEE Power and Energy Magazine*, Vol.3, No 5, pp. 34-38, Sept/Oct. 2005
58. "Scanning the Issue", *Special Issue of Proceedings of the IEEE*, (Amin), Vol. 93, Number 5, pp. 855-860, May 2005
57. "Energy Infrastructure Defense Systems", *Special Issue of Proceedings of the IEEE*, (Amin), Vol. 93, Number 5, pp. 861-875, May 2005
56. "Strategic Insights into Security, Quality, Reliability, and Availability", (Amin, Forsten, Key, and Kirby) Electric Power Research Institute (EPRI), Report 1008566, 128 pp., Palo Alto, CA, Mar. 2005
55. "Powering the 21st century: We can—and must—modernize the grid", (Amin), *IEEE Power and Energy Magazine*, pp. 93-96, Mar./Apr. 2005
54. "Electricity", (Amin), in *Digital Infrastructures: Enabling Civil and Environmental Systems through Information Technology*, R. Zimmerman and T. Horan (Editors), Chapter 7, pp. 116-140, Jul. 2004
53. "North American Electricity Infrastructure: System Security, Quality, Reliability, Availability, and Efficiency Challenges and their Societal Impacts", (Amin), Chapter 2 in the National Science Foundation (NSF) report on "Continuing Crises in National Transmission Infrastructure: Impacts and Options for Modernization", Jun. 2004
52. "Balancing Market Priorities with Security Issues: Interconnected System Operations and Control under the Restructured Electricity Enterprise", (Amin), *IEEE Power and Energy Magazine*, Vol.2, No 4, pp. 30-38, Jul./Aug. 2004
51. "North American Electricity Infrastructure; Are We Ready for More Perfect Storms?" (Amin), *IEEE Security and Privacy* magazine, volume 1, no. 5, pp. 19-25, Sept./Oct. 2003
50. "Power System Infrastructure for a Digital Society: Creating the New Frontiers", (M. Samotyj, C. Gellings, and M. Amin), 10 pp. proceedings of the GIGRE/IEEE-PES Symposium on Quality and Security of Electric Power Delivery, Montreal, Oct. 7-10, 2003
49. "Global Transition Dynamics: Unfolding the Full Social Implications of National Decision Pathways", (Chauncey Starr and Massoud Amin), 11 pp., submitted to the President of the US National Academy of Engineering, Sept. 2003
48. "Restructuring the Electric Enterprise: Simulating the Evolution of the Electric Power Industry with Adaptive Agents", (Amin), Chapter 3, pp. 27-50, in *Electricity Pricing in Transition*, Ahmad Faruqui and Kelly Eakin (editors), Kluwer Academic Publishers, Sept. 2002
47. "Security Challenges for the Electricity Infrastructure", (Amin), Special issue of the *IEEE Computer Magazine* on Security and Privacy, Apr. 2002

46. "Evolving Energy Enterprise: Possible road ahead and challenges for R&D", (M. Amin and S.T. Lee), Proceedings of the International Conference on Electrical Engineering, panel on Future development of power systems in the 21st century, paper # 0324, 8pp., Xi'an, China, Jul. 22-26, 2001
45. "Development and Leadership of Research Consortia: Lessons learned and possible road ahead for continued innovation", (Amin), Proceedings of the IEEE Power Engineering Society Summer Conf., panel on Organizing Research Consortia, 6pp., Vancouver, BC, Jul. 18, 2001
44. "Toward Self-Healing Energy Infrastructure Systems", (Amin), cover feature in the *IEEE Computer Applications in Power*, pp. 20-28, Vol. 14, No. 1, Jan. 2001
43. "Defining New Markets for Intelligent Agents", (Amin and Ballard), *IEEE IT Professional*, pp. 29-35, Vol. 2, No. 4, Jul./Aug. 2000
42. "Modeling and Control of Electric Power Systems and Markets", (Amin), *IEEE Control Systems Magazine*, pp. 20-25, Vol. 20, No. 4, Aug. 2000
41. "Toward Self-Healing Infrastructure Systems", (Amin), cover feature in the *IEEE Computer Magazine*, pp. 44-53, Vol. 33, No. 8, Aug. 2000
40. "Energy Infrastructure Interdependencies: Challenges for R&D", (Amin), Proceedings of the 8th International Energy forum (ENERGEX'2000 conference) and the Global Energy Exposition, pp. 703-708, Las Vegas, NV, Jul. 23-28, 2000
39. "EPRI/DoD Complex Interactive Networks/Systems Initiative: Self-Healing Infrastructures", (Amin), 11 pp., invited paper and keynote address at the 2nd DARPA-JFACC Symposium on Advances in Enterprise Control, Minneapolis, MN, Jul. 10-11, 2000
38. "National Infrastructures as Complex Interactive Networks", (Amin), chapter 14 in: *Automation, Control, and Complexity: An Integrated Approach*, T. Samad & J. Weyrauch (Eds.), pp. 263-286, John Wiley and Sons Ltd., NY, Mar. 2000
37. "Human Performance Issues in the Security of the National Infrastructure", (Wildberger and Amin), 6 pp., Proceedings of the ASTC2000 (Advanced Simulation Technology Conference), Washington, DC, Apr. 16-20, 2000
36. "Adaptive Infrastructures – the Complex Interactive Networks and Systems Initiative", (Amin and Holmes), 9 pp., Proceedings of the ISA 2000 conference, San Antonio, TX, Jun. 5-9, 2000
35. "Neural Network Augmented Anti-skid Controller for Transport Aircraft", (Tunay, Amin and Rodin), Proceedings of the 37<sup>th</sup> AIAA Aerospace Sciences Meeting and Exhibit, paper # AIAA 99-0260, 9 pp., Jan. 11-14, 1999
34. "Simulating the Evolution of the Electric Enterprise with Autonomous Adaptive Agents", (Wildberger, Amin, Harp and Morton), 32<sup>nd</sup> Annual Hawaii International Conference on System Sciences (HICSS), 13 pp., Jan. 5 - 8, 1999
33. "Self-Healing Electric Power Grid as a Complex Adaptive System", (Amin, Wildberger, McCarthy), Proceedings of the 4th Joint Conf. on Information Sciences- JCS'98, and the 2nd International Workshop on Intelligent Control, Vol. I, pp. 295-301, RTP, N.C., Oct.23-28, 1998
32. "Complexity and the Deregulation of the Electric Power Industry", (Amin), Proceedings of the third Embracing Complexity (EC3) Conference, pp. 101-106, Cambridge, MA, Aug. 2-4, 1998
31. "Simulation of Military Airfields", (Cusick, et. al.), paper #AIAA-98-4822, Proc. of 7<sup>th</sup> AIAA/USAF/ NASA /ISSMO Symp. on Multidisciplinary Analysis and Optimization, St. Louis, MO, Sept. 2-4, 1998

30. "Object Oriented Modeling of the Strategic Brigade Airdrop Operation", (Grindey, et. al.), paper # AIAA-98-4881, Proc. of 7<sup>th</sup> AIAA/USAF/NASA/ISSMO Symp. on Multidisciplinary Analysis and Optimization, St. Louis, MO, Sept. 2-4, 1998
29. "Implementation of NRMO to Study the Airlift Problem at Air Mobility Command", (Rink, et. al.), paper # AIAA-98-4821, Proc. of 7<sup>th</sup> AIAA/USAF/NASA/ISSMO Symp. on Multidisciplinary Analysis and Optimization, St. Louis, MO, Sept. 2-4, 1998
28. "Robust Control of a Hydraulic Valve for Aircraft Anti-skid Operation", (Tunay, Amin and Beck), Proc. of the 7<sup>th</sup> IEEE Conf. on Control Applications (CCA), Vol.1, pp. 689 – 693, Trieste, Italy, Sept. 1-4, 1998
27. "Traffic Prediction & Management via RBF Neural Nets & Semantic Control", (Amin, et. al.), *Journal of Computer-Aided Civil and Infrastructure Engineering*, 13, pp. 315-327, 1998
26. "Operations Research in ITS-A Semantic Control Approach", (Garcia, et. al.), *International Trans. on OR*, Vol. 6, No. 1, 1999
25. "Neurocontrol of Nonlinear Systems via Local Memory Neurons", (Amin, Rodin and Wu), *Mathl. Comput. Modelling*, Vol. 27, No. 3, pp. 65-92, 1998
24. "System Identification via Artificial Neural Networks: Applications to On-line Aircraft Parameter Estimation", (Amin, Gerhart and Rodin), Proc. of AIAA/SAE 1997 World Aviation Congress, Anaheim, CA, 22 pp., Oct. 14-16, 1997
23. "A Kalman Filter Approach to Traffic Modeling and Prediction", (Grindey, et. al.), Proc. of the 1997 SPIE's Int'l Symp. on Intelligent Systems and Advanced Manufacturing, , Pittsburgh, PA, 8 pp., Oct. 1997
22. "Evasive Adaptive Navigation and Control against Multiple Pursuers", (Amin et. al.), Proc. of 1997 American Control Conference (ACC), pp. 1453-1457, Albuquerque, NM, June 4-6, 1997
21. "Application of Dynamic Neural Networks to Approximation and Control of Nonlinear Systems", (Amin, Rodin and Wu), Proc. of 1997 ACC, pp. 222-226, Albuquerque, NM, Jun. 4-6, 1997
20. "Traffic Flow Prediction by Radial Basis Function Neural Networks", (Liu, Amin, Rodin, and Garcia), Proc. of Neural Network Applications in Highway and Vehicle Engineering, US DOT and George Washington Univ., Report # FHWA- RD-96-154, Washington D.C., pp. 1-12, Jul. 1996
19. "Modeling and Optimization of Mobility Analysis: Optimal Requirement Studies", (Yang, Rodin and Amin), *Military Operations Research*, Vol. 1, No. 4, pp. 81-106, Winter 1996
18. "A Semantic Control Approach to Intelligent Transportation Systems", (Amin et. al.), Proc. of the Intelligent Vehicles '95 Symposium, Detroit, MI, pp. 430-435, Sept. 25-26, 1995
17. "Evasion from Multiple Pursuers via Semantic Control Theory", (Amin, et. al.), Proceedings of the Guidance, Navigation, and Control Conference, Vol. 1, pp. 478-493, Paper # 95-3226, American Institute of Aeronautics and Astronautics, Baltimore, MD, Aug. 7-9, 1995
16. "Intelligent Transportation Systems: Enabling Technologies", (Garcia-Ortiz, Amin and Wootton), *Mathl. Comput. Modelling* , Vol. 22, No. 4-7, pp. 11-81, 1995
15. "Network, Control, Communication and Computing Technologies for Intelligent Transportation Systems: An Overview", (Amin, Garcia-Ortiz and Wootton), *Mathl. Comput. Modelling* , Vol. 22, No. 4-7, pp. 1-10, 1995
14. "Intelligent Transportation Systems: A Global Perspective", (Wootton, Garcia-Ortiz and Amin), *Mathl. Comput. Modelling* , Vol. 22, No. 4-7, pp. 259-268, 1995

13. "Neurocontrol of an Aircraft: Application to Windshear", (Amin, Rodin & Wu), *Mathematical and Computer Modelling*, Elsevier Science Ltd, Vol. 22, No. 1, pp. 63-78, May 1995
12. "A Semantic Control Approach to Evasive Maneuvering", (Meusey, *et al.*), Proceedings of the First World Congress on Intelligent Manufacturing Processes and Systems, San Juan, Puerto Rico, 8 pp., Feb. 13-17, 1995
11. "Systems Identification and Disturbance Attenuation via Dynamic Neural Nets", (Amin, Rodin and Wu), Proceedings of Neural Nets for Aero Control Symp., NASA Ames Research Center, Moffett Field, CA, 16 pp., Aug. 1994
10. "Application of Semantic Control to a Class of Pursuer-Evader Problems", (Garcia-Ortiz *et al.*), *Computers and Mathematics With Applications*, Special Issue on Pursuit-Evasion Differential Games, edited by Y. Yavin, Vol. 26, No. 6, pp. 97-124, 1993
9. "System Identification with Dynamic Neural Networks", (De, Amin and Rodin), *Intelligent Engineering Systems Through Artificial Neural Networks*, edited by C.H. Dagli, Y.C. Shin and L.I. Burke, ASME Press, pp. 97-103, 1992
8. "Control and Disturbance Rejection with a Dynamic Neurocontroller", (Wu, Amin and Rodin), *Intelligent Engineering Systems Through Artificial Neural Networks*, edited by C.H. Dagli, Y.C. Shin and L.I. Burke, ASME Press, pp. 643-649, 1992
7. "Maneuver Prediction in Air Combat via Artificial Neural Networks", (Rodin & Amin), *Computers and Mathematics With Applications*, Vol. 24, No. 3, pp. 95-112, Aug. 1992
6. "Collision Avoidance and Low-Observable Navigation in a Dynamic Environment", (Rodin, Amin & Ruan), *Mathematical and Computer Modelling*, Vol. 16, No. 5, pp. 77-98, 1992
5. "Character Recognition: Qualitative Reasoning and Neural Networks", (Rodin, Wu & Amin), *Mathematical and Computer Modelling*, Vol. 16, No. 2, pp. 95-104, 1992
4. "Intelligent Autonomous Navigation: Minimum Detection/Low-Observable Aircraft Path Planning", (Amin, Rodin and Ruan), Proc. of the Fifth Annual Aerospace Appl. of AI Conf., Dayton, OH, Oct. 1989
3. "Prediction of Tactical Air Combat Maneuvers; Neural Network Implementation of a Qualitative Approach", (Rodin and Amin), Proceedings of the Fifth Annual Aerospace Applications of AI Conference, Dayton, OH, Oct. 1989
2. "Development of a Real-Time Flight and Fire Control System", (Geist, Amin *et al.*), Proceedings of the 4th Annual Aerospace Applications of AI Conf., Dayton, OH, Oct. 1988
1. "Intelligent Navigation for an Autonomous Mobile Robot", (Rodin and Amin), Proc. of the Third IEEE Int'l Symp. on Intelligent Control, Alexandria, VA, pp. 366-369, Aug. 1988

### **EPRI technical reports for projects under my management**

During January 1998 through January 2003 supervised several programs/initiatives which resulted in over 420 publications and 45 EPRI technical reports published as deliverables; these reports include:

24. "Complex Interactive Networks/Systems Initiative: Final Summary Report", (Author: M. Amin), 155 pp., Overview and Summary Final Report for Joint EPRI and U.S. Department of Defense University Research Initiative, EPRI, Mar. 2004
23. Development of Analytical and Computational Methods for the Strategic Power Infrastructure Defense (SPID) System - EPRI/DoD CIN/S Program: Final Report, Mar. 2004 (Authors: PI and Co-PIs at the U. of Washington, Arizona State U., Iowa State U., Virginia Tech.)

22. TR-1006091: Intelligent Management of the Power Grid: An Anticipatory, Multi-Agent, High Performance Computing Approach-- EPRI/DoD CIN/S Program: Final Report, Mar. 2004 (Authors: PI and Co-PIs at Purdue U., U. of Tennessee, and Fisk U.)
21. TR-1006092: Modeling and Diagnosis Methods for Large-Scale Complex Networks-- EPRI/DoD CIN/S Program: Final Report, Mar. 2004 (Authors: PI and Co-PIs at Harvard U., Boston U., MIT, U. of Massachusetts-Amherst, Washington U.-St. Louis)
20. TR-1006094: Context-Dependent Network Agents-- EPRI/DoD CIN/S Program: Final Report, Mar. 2004 (Authors: PI and Co-PIs at Carnegie Mellon U., RPI, Texas A&M U., U. of Illinois, U. of Minnesota)
19. TR-1006095: From Power Laws to Power Grids: A Mathematical and Computational Foundation for Complex Interactive Networks-- EPRI/DoD CIN/S Program: Final Report, Mar. 2004 (Authors: PI and Co-PIs at CalTech, MIT, Stanford UCLA, UC-Santa Barbara, U. of Illinois)
18. TR-1006089: Development of Analytical and Computational Methods for the Strategic Power Infrastructure Defense (SPID) System-- EPRI/DoD CIN/S Program: Second Annual Report, June 2001 (Authors: PI and Co-PIs at the U. of Washington, Arizona State U., Iowa State U., Virginia Tech.)
17. TR-1006091: Intelligent Management of the Power Grid: An Anticipatory, Multi-Agent, High Performance Computing Approach-- EPRI/DoD CIN/S Program: Second Annual Report, Jun. 2001 (Authors: PI and Co-PIs at Purdue U., U. of Tennessee, and Fisk U.)
16. TR-1006092: Modeling and Diagnosis Methods for Large-Scale Complex Networks-- EPRI/DoD CIN/S Program: Second Annual Report, Jun. 2001 (Authors: PI and Co-PIs at Harvard U., Boston U., MIT, U. of Massachusetts-Amherst, Washington U.-St. Louis)
15. TR-1006093: Minimizing Failures While Maintaining Efficiency of Complex Interactive Networks and Systems-- EPRI/DoD CIN/S Program: Second Annual Report, Jun. 2001 (Authors: PI and Co-PIs at Cornell U., George Washington U., UC-Berkeley, U. of Illinois, Washington State U., U. of Wisconsin)
14. TR-1006094: Context-Dependent Network Agents-- EPRI/DoD CIN/S Program: Second Annual Report, Jun. 2001 (Authors: PI and Co-PIs at Carnegie Mellon U., RPI, Texas A&M U., U. of Illinois, U. of Minnesota)
13. TR-1006095: From Power Laws to Power Grids: A Mathematical and Computational Foundation for Complex Interactive Networks-- EPRI/DoD CIN/S Program: Second Annual Report, June 2001 (Authors: PI and Co-PIs at CalTech, MIT, Stanford UCLA, UC-Santa Barbara, U. of Illinois)
12. TP-1000466: Extended Common Information Model (CIM) Standard for Planning Applications: CIM Interface, PC Upgrade, and Enhancements for Competitive Energy Markets, Dec. 2000
11. TP-114660: Complex Interactive Networks/Systems Initiative: Overview and Progress Report for Joint EPRI/Dept. of Defense University Research Initiative, May 2000 (Author: M. Amin)
10. TP-114661: Conceptual Design of a Strategic Power Infrastructure Defense (SPID) System, May 2000, (Authors: PI and Co-PIs at the U. of Washington, Arizona State U., Iowa State U., Virginia Tech.)
9. TP-114662: Intelligent Management of the Power Grid: An Anticipatory, Multi-Agent, High-Performance Computing Approach, May 2000 (Authors: PI and Co-PIs at Purdue U., U. of Tennessee, and Fisk U.)
8. TP-114663: Modeling and Diagnosis Methods for Large-Scale Complex Networks, May 2000 (Authors: PI and Co-PIs at Harvard U., Boston U., MIT, U. of Massachusetts-Amherst, Washington U.-St. Louis)

7. TP-114664: Minimizing Failures While Maintaining Efficiency of Complex Interactive Networks and Systems, May 2000 (Authors: PI and Co-PIs at Cornell U., George Washington U., UC-Berkeley, U. of Illinois, Washington State U., U. of Wisconsin)
6. TP-114665: Context-Dependent Network Agents, May 2000 (Authors: PI and Co-PIs at Carnegie Mellon U., RPI, Texas A&M U., U. of Illinois, U. of Minnesota)
5. TP-114666: From Power Laws to Power Grids: A Mathematical and Computational Foundation for Complex Interactive Networks, May 2000 (Authors: PI and Co-PIs at CalTech, MIT, UCLA, UC-Santa Barbara, U. of Illinois)
4. TP-114659: E-Commerce Applications and Issues for the Power Industry, Apr. 2000 (Author: PI at the Illinois Inst. of Technology)
3. CM-112817, Environment for Specification and Analysis of Sequential Control Systems: Final Report and TimeLine User Manual, Dec. 1999 (Authors: PI at the Uniview Corp., Mtn. View, CA)
2. TR-112816: Simulator for Electric Power Industry Agents (SEPIA): Complex Adaptive Strategies, Dec. 1999 (Authors: PI and Co-PI at Honeywell Technology Center, Minneapolis, MN)
1. TR-113366: Prototype Intelligent Software Agents for Trading Electricity: Competitive/Cooperative Power Scheduling in an Electronic Marketplace, Nov. 1999 (Author: Reticular Corp, San Diego, CA)

### **Other Major Technical Reports and Publications**

23. "Highway Traffic Management: Traffic Estimation and Modeling, Sensor Mix and Placement, Incident Detection and Localization", with E.Y. Rodin et al., Decision and Control Project, FY 1997 final report, 101 pp., submitted to the Advanced Development Center, Systems & Electronics Inc. (Dec. 10, 1997)
22. "Controller Design for the Brake-By-Wire Anti-Skid Valve", (Tunay, Amin and Rodin), Task 3 Report, submitted to Boeing-Long Beach (Oct. 14, 1997)
21. "Neural Network Augmented Antiskid System: Neural Network Identification of Brake Torque Function", (Tunay, Amin and Rodin), Task 2 Report, submitted to McDonnell Douglas-Long Beach (May 25, 1997)
20. "Neural Network Augmented Antiskid System: Optimum Controller Design and Software Description", (Tunay, Amin and Rodin), Task 1 Report, submitted to McDonnell Douglas-Long Beach (Mar. 20, 1997)
19. "Intelligent Flight Control System: System Identification via Dynamical Neural Networks", (Gerhart, Amin & Rodin) Final Report and the User's Manual for the RHONNI Simulator, submitted to McDonnell Douglas and NASA-Ames Research Center (Jan. 1996)
18. "Video Surveillance and Image Compression Project", (K.S. Ruland and S.M. Amin) Final Report, 46 pp., submitted to Comtrak division of the E&S Corp., St. Louis (Oct. 1995)
17. "Real-Time Riccati Solver; Vol. II: Implementation and Results", (Chen, Amin & Rodin) Final Report submitted to McDonnell Douglas Aerospace Corp., St. Louis (Sept. 1995)
16. "Real-Time Riccati Solver; Vol. I: Theory and Algorithms", (Chen, Amin & Rodin) Final Report submitted to McDonnell Douglas Aerospace Corp., St. Louis (Sept. 1995)
15. "Evasive Adaptive Navigation and Control against Multiple Pursuers", (Amin et. al.), COSC Tech. Rep., 23 pp., Washington Univ. (May 1995)
14. "Application of Dynamic Neural Networks to Approximation and Control of Nonlinear Systems", (Amin, Rodin and Wu), COSC Tech. Rep., 25 pp., Washington Univ. (Jan. 1995)

13. "Vehicle Routing for Inter- and Intra-City Travel", Final Report, submitted to the Advanced Dev. Center, Electronics and Space Corp., ES-ADC-94-3, 20 pp. (Jun. 1994)
12. "Next Steps in Process Modeling and Controller Design for Crystal Growth", MEMC Electronic Materials Inc., St. Peters, Missouri, CT-5-94-1, 21 pp. (May 1994)
11. "Layered Defense Project, Vol. I: Methodologies and Algorithms", FY 1993 report, Advanced Dev. Center, Electronics and Space Corp., ES-ADC-94-1, 118 pp. (May 1994)
10. "Layered Defense Project, Vol. II: Implementation and Software", FY 1993 report, Advanced Dev. Center, Electronics and Space Corp., ES-ADC-94-2, 143 pp. (May 1994)
9. "Introduction to Process Modeling, Controller Design Methods and Algorithms", MEMC Electronic Materials Inc., St. Peters, Missouri, CT-10-93-1, 106 pp. (Oct. 1993)
8. "Process Modeling, PID Design and Tuning Algorithms", MEMC Electronic Materials Inc., St. Peters, Missouri, CT-10-93-2, 72 pp. (Oct. 1993)
7. "Layered Defense Project", with E.Y. Rodin et. al., FY 1992 report, 124 pp., submitted to the Advanced Development Center, Electronics and Space Corp. (Oct. 1992)
6. "Multiple Cooperating Vehicles: Navigation and Control", with A. Garcia-Ortiz and E.Y. Rodin, submitted to DARPA, 30 pp. (Dec. 1992)
5. "A Layered Defense Expert System", with E.Y. Rodin et al., FY 1991 report, 118 pp., submitted to the Advanced Development Center, Electronics and Space Corp. (Oct. 1991)
4. "Signature Recognition via Artificial Neural Networks and Wavelet Transformations", with E.Y. Rodin, 25 pp., submitted to the FBI Res. Laboratory, Washington D.C. (Aug. 1991)
3. "Multisensor Tracking of Low-Observable Targets", 52 pp., sub. to USAF/RADC (Jul. 1990)
2. "Prediction and Situation Assessment in Medium-Range Air Combat", tech. report, 24 pp., Center for Optimization and Semantic Control, Washington Univ., St. Louis (Mar. 1990)
1. "Mobile Autonomous Robot Simulation: Intelligent Navigation in a Dynamic Environment", tech. report, 18 pp., Center for Optimization and Semantic Control, Washington University (Jan. 1990)

## **Invited Presentations**

Given over 480 invited presentations and more than 85 keynote addresses during 1990-2010.

- During 2010 I gave 41 invited presentations, including those given at the MN Senate, Smart Grid Summit (keynotes at both the U.S. and Canadian SG summits), the White House OSTP, ARPA-E and Kaufman Foundation, and 12 keynote addresses on smart grids, technological innovation, S&T policy, security and methods to assess and reduce multi-hazard vulnerability of the interdependent critical infrastructures.

In 2009, gave 45 invited presentations, including 5 keynote addresses:

- January 15, 2009: "Illuminating our Future: Renewable Energy Resources," presented during 6:30-9:00 p.m. at the Radisson Roseville hosted by The Indus Entrepreneurs (TiE), Stillwater, Minnesota
- February 2, 2009: "Toward Resilient Self-healing Complex Dynamical Systems," Conflict Dynamics: Simple Strategies for Complex Times, Collaborative Leadership Development Series, Mississippi Room, Coffman Memorial Union, UofM

- February 24, 2009: "Our Nation's Energy Infrastructure: Toward Stronger and Smarter Grid," Citizen's Energy Summit, Willmar, Minnesota
- March 6, 2009: "Smart Grid: Opportunities and Challenges -- Toward a Stronger and Smarter Grid," kickoff of the Smart Grid part of the 2009 MIT Energy Conference – Accelerating Change in Global Energy, sponsored by the Sandia National Laboratories, MIT, Cambridge, MA
- March 11, 2009: "Toward a Stronger and Smarter Grid," Overview for the State of Minnesota – College of Science & Engineering meeting on the Smart Grid Opportunities and Challenges, UofM
- March 26, 2009: "Smart Grid: Opportunities and Challenges -- Toward a Stronger and Smarter Grid," invited presentation at the U.S. Congressional Research and Development [R&D] Caucus, sponsored by the ASME/IEEE-USA ([www.researchcaucus.org](http://www.researchcaucus.org))
- April 7, 2009: "Greening of the Power Grid: Toward increased efficiencies and integration of renewable resources," (paper #1569171823), 18th International Conference on Management of Technology (IAMOT), Orlando, FL
- April 8, 2009: "World Economy, What happened?... *the Role of Technology in the recovery process*," Gave a Plenary talk and served on the opening panel, 18th International Conference on Management of Technology (IAMOT), Orlando, FL
- April 8, 2009: "Technology Scanning, Mapping and Foresight: Energy Science, Technology and Policy Options for Electrification of Transportation Systems and Greening of the Grid," by S. Massoud Amin and Lockwood Carlson (paper #1569171827), 18th International Conference on Management of Technology (IAMOT), Orlando, FL
- April 9, 2009: "Toward Resilient and Agile Systems: Leadership and Management of Infrastructures and Large-scale Complex Adaptive Enterprises," by Kirk Froggatt and S. Massoud Amin (paper #1569171829), 18th International Conference on Management of Technology (IAMOT), Orlando, FL
- April 13, 2009: "Minnesota's Technological Leadership Role: Enabling Economic Growth," invited presentation and meeting with Governor Tim Pawlenty
- April 14, 2009: "Energy Infrastructure Security & Protection," invited presentation and served on a panel at the InfraGard Minnesota and the FBI, Saint Paul, MN
- April 15, 2009: "Our Nation's Energy Infrastructure: Toward Stronger and Smarter Grid," invited presentation on behalf of the University of Minnesota Alumni Association (UMAA), UM-Rochester, UMAA, and RAAFUM, Rochester, MN
- May 18, 2009: Our Nation's Energy Infrastructure: Toward Stronger, more Secure and Smarter Grid," Los Alamos National Lab. (LANL), Center for Nonlinear Studies (CNLS), 29th Annual CNLS Conference, Santa Fe, New Mexico
- May 18, 2009: "Energy and Global Dimensions: Transformation pathways to carbon-neutral energy systems to meet increasing demand for energy by growing population and higher standards of living," LANL, CNLS, 29th Annual CNLS Conference, Santa Fe, New Mexico
- June 18, 2009: "Stronger, Smarter and Greener Power Grid: Toward increasingly efficient, secure, resilient and sustainable system" invited presentation at the Howard Baker, Jr. Center for Public Policy and the Woodrow Wilson International Center for Scholars, Joint Program on the Presidential Policy-Making: Formulating a Bipartisan Energy and Climate Policy Process for America, Washington, DC
- June 18, 2009: Chaired a session on Formulation of Energy and Climate Policy: Toward and Open and Transparent Process, at the Howard Baker, Jr. Center for Public Policy and the Woodrow Wilson International Center for Scholars, Washington, DC
- June 23, 2009: Presented an hour-long Webinar titled "Making the Electric Grid Smarter, Stronger and More Secure" with attendance of over 700 participants from 23 nations. To see his presentation slides, go to [www.smartgridlearninginstitute.com](http://www.smartgridlearninginstitute.com)
- June 24, 2009: "Our Nation's Energy Infrastructure: Toward Stronger, more Secure and Smarter Grid," at the Great River Energy for the annual meeting of the National Rural Economic Developers Association (NREDA).
- June 30, 2009: Gave a keynote on "Toward Resilient, Smart and Self-healing Interdependent Infrastructures," at the ASCE - TCLEE 2009 Conference, LIFELINE EARTHQUAKE ENGINEERING IN A MULTHAZARD ENVIRONMENT, Oakland, California
- August 12, 2009: presented "Toward a Stronger, More Secure and Smarter Grid" to the Minnesota Rural Electric Association (MREA) Energy Issues Summit on. MREA is comprised of 44 member owned electric cooperatives and generation and transmission cooperatives, and serves more than 1.6 million Minnesotans, largely rural residents.
- September 17-18, 2009: Gave a keynote address in Cyprus for the initiation of a new European Cooperation Project entitled "Intelligent Monitoring, Control and Security of Critical Infrastructure Systems (IntelliCIS)". About

- 20 nations (including EU countries) are participating in this cooperation project (<http://www.kios.org.cy/ICANN09/>)
- September 24, 2009: "Making the Electric Power Grid Smarter, Stronger, Greener, and more Secure," 3M Tech Forum, for welcoming Ginny and me to the very impressive 3M Innovation Center.
  - October 8, 2009: "Toward a Stronger, More Secure and Smarter Grid," ECE colloquium, University of Minnesota.
  - October 14, 2009: Gave a keynote at the Canadian Smart Grid Summit in Toronto on: [http://www.strategyinstitute.com/101409\\_csgs/dsp.php](http://www.strategyinstitute.com/101409_csgs/dsp.php)
  - October 15th, 2009: Gave a Congressional briefing in DC, on Transitional Technologies: The Road to the New Energy Economy. This event was hosted by Discover magazine, The National Science Foundation (NSF), IEEE and ASME at the Rayburn House Office Building <http://discovermagazine.com/events/road-to-new-energy-economy/>
  - October 23, 2009: Presented "The Smart Grid" at PopTech 2009 "America Reimagined" <http://poptech.org/massoudamin>, summary at : [http://www.poptech.org/blog/massoud\\_amin\\_on\\_fixing\\_the\\_whole\\_system](http://www.poptech.org/blog/massoud_amin_on_fixing_the_whole_system)
  - November 9, 2009: Presented at the 6th MIT Pan-Arab Energy Conference in Abu Dhabi, on Global Energy Challenges and Opportunities (hosted by the MIT Arab Alumni Association) <http://www.mitpanarabconf.org/>
  - November 17, 2009: Served on a panel and presented at the E3 Conference (<http://www1.umn.edu/iree/e3/>)
  - November 18, 2009: Gave a keynote address on "The Smart Grid Landscape: What's on the Horizon?" at the Putting Minnesota on the Map: Next Steps for Building a Smart Grid Coalition ([http://environment.umn.edu/news\\_events/events/smartgrid.html](http://environment.umn.edu/news_events/events/smartgrid.html))
  - November 19th: Presented "Globalization and Policy Impact on Innovation" at the annual Boston Scientific Cardiovascular R&D Technology Forum "Innovation Happens Here," Boston Scientific Corporation.
  - December 7, 2009: "Leadership," Presentation in the Dept. of English, 207A Lind Hall University of Minnesota
  - December 8, 2009: "Toward Resilient, Self-healing, and Smart Interdependent Infrastructure Systems," departmental seminar at the Dept. of Civil Engineering & Engineering Mechanics, Columbia University, NYC
  - January 22, 2010: Gave two presentations at the "National Council for Science and the Environment (NCSE) 10th National Conference on Science, Policy and the Environment: The New Green Economy.
  - February 11<sup>th</sup> and March 8th: Facilitated and led the Smart Grid Roundtables with Brian Isle (Adventium), Bill Malcolm (Midwest ISO), John Setala (Great River Energy), Lara Greden (Verisae), Dick Hemmingsen (IREE), Betsy Lulfs, (DEED), Tariq Samad (Honeywell), Richard Kalisch (Midwest ISO), Georgios Giannakis (DTC and ECE), Dan Gunderson (Minnesota Power), John Frederick (Silent Power), Steve Riedel (MN Trade Office), Bill Bushnell (Adventium), Gary Smaby (IbD, U of M), Bob Long (Energy Harvest Group), Arif Quarashi (Johnson Controls), Randy Huston (Xcel Energy), Georgie Hilker (MN Office of Energy Security), Bruce Sayler (Connexus Energy), Lynn Meredith (Lockheed Martin), Jeffrey Haase ( Office of Energy Security), Laurie Miller (ECE Ph.D. Candidate), Rod Larkins (IoE, IREE), Mike Bull (Xcel Energy), Mike Kaluzniak (MN Public Utilities Commission), Todd Headlee (Silent Power), Bill Glahn (MN Office of Energy Security), and Anthony Giacomoni (ECE Ph.D. Candidate).
  - February 12, 2010: Colab Ideation Session with Innovation by Design team, colleagues from IBM, Connexus Energy, and Arcadian Networks, focused on Smart Grid security. Gary Smaby and I were assisted by a team of MBAs from the Carlson School of Management to create a pre-read for everyone to use to prepare for the meeting. Explored possibilities of working together and formalizing an 18 month project.
  - February 16, 2010: Invited presentation on "Smart Grid: Toward stronger, smarter, and more secure energy infrastructure," MN Senate Energy, Utilities, Technology & Communications Committee, 3:00-5:30 p.m.
  - March 9, 2010: Invited presentation in the opening panel: "MOT Education & Research: Lessons Learned & Pathways Forward," at the 19th IAMOT Int'l Conference, Cairo, Egypt
  - March 22, 2010: "Smart Energy: Pathways to Transforming Public Policy" PA8001, HHH, University of Minnesota, 6:45-8:30 p.m.
  - March 25, 2010: "Cyber and Critical Infrastructure Security: Toward Smarter and More Secure Power and Energy Infrastructures," invited by the Consul General of Canada, at the Canada-U.S. Workshop on Smart Grid Technologies, 8:00 am to 12:30 pm, Vancouver, BC
  - April 14, 2010: "Smart Grid: Toward stronger, smarter, and more secure energy infrastructure," invited presentation at the UM Alumni Association event, at the Prior Lake Rotary
  - April 16, 2010: "Stronger, Smarter and Greener Power Grid: Toward increasingly efficient, secure, resilient and sustainable infrastructure system," Seminar co-hosted by the Center for Information and Systems Engineering (CISE), Departments of ECE, Mechanical Engineering, and Division of Systems Engineering at Boston University
  - April 17, 2010: "Smart Grid Cities" 2010 Tufts Energy Conference, Medford, Massachusetts

- April 17, 2010: “Stronger, Smarter and Greener Energy Systems and Power Grid,” workshop, 2010 Tufts Energy Conference, Medford, Massachusetts

In 2008, gave 41 invited presentations including the following:

- January 29, 2008: “Energy Infrastructure Security and Protection,” Invited presentation to the University’s Emergency Management folks and faculty/staff at the UofM medical school, University of Minnesota Medical Center, University of Minnesota
- March 11, 2008: “Toward Agile and Resilient Large-Scale Systems: Adaptive Robust National/International Infrastructures,” Keynote address at the Spring 2008 Howe School Technology Management Lecture Series, Wesley J. Howe School of Technology Management, Stevens College of Science & Engineering, Castle Point on Hudson, Hoboken, NJ
- March 12, 2008: “High Voltage Lessons from Managing Risk in the Power Grid,” invited presentation at the 2008 Global Conference on Operational Risk, New York, NY
- March 18, 2008: “Energy Infrastructure Security,” invited presentation to the Minnesota InfraGard Board of Directors and FBI, Bloomington Fire Department, MN
- April 8, 2008: “Power to the People: Modernizing our Nation’s Electric Power Grid,” Young Scientists Roundtable, with participation of about 150 6<sup>th</sup>-12<sup>th</sup> graders and their parents, Wayzata Central Middle School, MN
- May 6, 2008: “College of Science & Engineering Global seminar: Science, technology and Culture,” Physics 4993
- May 15-16, 2008: “Maxed Out Grid,” for the filming a documentary on the North American power grid for the Canadian Learning Channel and Smithsonian.
- May 20, 2008: “The role of innovation, emerging and pivotal technologies in shaping business,” two hour seminar at the Twin Cities IEEE Engineering Management Society
- June 4, 2008: “Critical Infrastructure Security and Protection,” at the Tech Tune-Up, ECE department, University of Minnesota.
- June 15, 2008: “Technology Development and Management in a Global Environment,” keynote address at the 8<sup>th</sup> Global Conf. on Flexible Systems Management, GLOGIFT 08, Stevens College of Science & Engineering, Hoboken, NJ
- June 17, 2008: “North American Electric Power Grid: Present/Possible Futures,” at the Post Petroleum Energetics Workshop, hosted by the MITRE Corporation for the National Intelligence Council and the Scientific and Technical Intelligence Committee, June 17-19, 2008, McLean, VA
- June 24, 2008: “Toward Agile and Resilient Large-Scale Systems: Adaptive Robust National/International Infrastructures,” at the Technion, Haifa, and two shorter class presentations in the Industrial Engineering and Management, and in the MBA classes.
- June 30, 2008: “Technology Development and Management in a Global Environment,” presentation at the Workshop on ICT Policy Development in the Globalization Era, Nile University in collaboration with the Seoul National University, and the Information & Communication University (ICU) of Korea.
- July 13, 2008: “Shaping Business for Success: The Role of Innovation, Emerging and Pivotal technologies,” Aida Ballroom, Cairo Marriott Hotel, Zamalek, hosted by Nile University.
- July 22, 2008: “Challenges in Reliability, Security, Efficiency, and Resilience of Energy Infrastructure: Toward Smart Self-healing Electric Power Grid,” IEEE paper 08GM1398, presentation at the 2008 PES General Meeting, July 20 – 24, Pittsburgh, PA
- August 7, 2008: “Capstones and Int’l MOT projects: Update on MOT and CDTL,” presentation/meeting with MOT Alumni at Medtronic
- August 16, 2008: “China and India’s emerging S&T–driven Economic Power,” 3 hour workshop at the MN Futurists Society.
- September 10, 2008: “Advanced IT Needs of the Electric Power Industry,” presentation at the CA ISO, Folsom, CA
- September 16, 2008: “Scoping Study and Survey of Electric Utility Industry Chief Information Officers: Changing roles of Utility CIOs and CTOs in the ‘Smart Grid’ era,” Electric Power Research Institute (EPRI), Knoxville, TN
- October 14, 2008: “Resilience and Self-healing Challenges: Present/Possible Futures,” keynote address at the 3rd International Workshop on Critical Information Infrastructures Security CRITIS’08, Frascati (Rome), Italy
- October 19, 2008: “Minnesota’s leadership role in Pivotal & Emerging Technologies,” presentation to Commissioner Gopal Khanna for Governor Pawlenty.

- October 27, 2008: "Science and Its Contributions to Policy Change: Toward Smart Self-healing Critical Infrastructures" invited presentation at the Humphrey Institute for PA8001 Transforming Public Policy.
- October 29, 2008: "Energy and Environmental Policy: Toward Smart Self-healing Electric Power Grid," invited presentation at the Humphrey Institute for PA5721 Energy and Environmental Policy.
- November 11, 2008: "Understanding the implications of 'World is Flat' for science- and technology-intensive organizations," Eugenie ballroom, Cairo Marriott Hotel, 9-noon, hosted by Nile University.
- November 17, 2008: "Innovations in Sustainable Energy," presentation to the ASME ITI, Washington, D.C.
- November 21, 2008: "Green Energy: Reconfiguring the North American Power Grid," Keynote address, University of Massachusetts- Environmental Lecture Series-- Building Green Communities, and kick-off the Massachusetts Energy Conference, Cape Cod Lounge, Student Union, Amherst.
- December 8, 2008: "Tomorrow's Infrastructure: Researching Sustainable Solutions -- Smart Grid and Self-healing Interdependent Critical Infrastructures," Congressional Staffer Briefing, presented and served on a 3-member panel at the U.S. Congress, Washington D.C.

During 2007, gave 34 invited presentations that included the following:

- February 23, 2007: Served as the Master of Ceremonies at the 43rd Annual Engineers Week Awards and Recognition Banquet, Minnesota Society of Professional Engineers (MSPE), and Minnesota Federation of Engineering, Science and Technology Societies.
- March 14, 2007: "Autonomic Mishap Management," invited presentation at the Global Conference on Operational Risk, New York City.
- March 19th, 2007: "Toward Smart Self-healing Critical Infrastructures," in Transforming Public Policy (PA 8001), Humphrey Center
- April 5, 2007: Served on an eight-member review team, together with Mr. Kurt Yeager (retired CEO/President of EPRI), Mr. Clark Gellings (VP-Technology, EPRI) and colleagues for the progress review of the Galvin Electricity Initiative prototype Perfect Power microgrid design for the Illinois College of Science & Engineering (IIT) campus in Chicago. This prototype design is being developed as a collaborative effort led by Endurant Energy with the active involvement and support of Exelon/Commonwealth Edison, EPRI, et al.
- April 7, 2007: I was interviewed by Mr. Mukhtar Thakur (MOT Class of 1997) on "Technology's Impact on World Economies" broadcast on TPT Channel 17 at 9 p.m. on 09/16/07
- April 26, 2007: "The Role of Innovation, Emerging and Pivotal Technologies in Shaping Business Development," invited lecture at the IEEE Bangalore Section Lecture, Indian Institute of Science (IISc), Bangalore, India
- May 16, 2007: Chaired a panel and presented on "Cascading Failure Assessment and Modeling" at the Homeland Security Symposium on "Cascading Infrastructure Failures: Avoidance and Response" at the National Academy of Sciences.
- June 4, 2007: Served on the MN Governor's energy roundtable, follow with collaborations with Mr. Gary Smaby (Innovation by Design) and visit with Governor's Chief of Staff, Commissioner Garvey and their colleagues VP Mulcahy and Mr. Smaby to assist charting priorities for NGA and collaborative programs.
- July 9-11, 2007: Served on the opening panel with Hon Jay Cohen (Under Secretary for Science & Technology, US Department of Homeland Security), and presented on Homeland Security: Policy & Technology to Answer the Challenge, at the 2007 Heartland Security Conference and Exposition, Minneapolis Convention Center.
- July 29 – 31, 2007: Presented a 2.5 hour workshop with David Keenan and Rolf Nordstrom on "The Future of Fuels for Transportation," at the World Future Society (WFS) Conference, in Minneapolis.
- August 31, 2007: "Preventing Blackouts and Increasing Energy Efficiency," invited presentation to the American Physical Society, in Washington D.C.
- September 25, 2007: "The Role of Innovation, Emerging and Pivotal Technologies in Shaping Business Development," invited presentation on behalf of the University of Minnesota Alumni Association (UMAA), Brainerd Rotary Club, Brainerd, MN.
- October 2-3, 2007: "Secure and Sustainable Critical Infrastructure," invited presentation at the Workshop Toward Critical Infrastructure Systems: Framing the Challenges, Board on Infrastructure and the Constructed Environment (BICE), National Research Council, in Washington, D.C.
- October 12, 2007: "Technology Development and Transition Strategy: Unfolding the Potential, Energy Infrastructure Defense," invited presentation at the Cummins Power Generation, Fridley, MN
- October 15-16, 2007: Served as chairman of the 7-member National Science Foundation's Trustworthy Cyber Infrastructure for the Future Power Grid (TCIP) onsite program review at the University of Illinois for the 2<sup>nd</sup>-year.

- Onsite review team members in attendance: Massoud Amin (University of Minnesota), Ben Cook (Sandia National Laboratory), Katherine Drew (Center for Naval Analyses), Ron Hebert (NSA), Hank Kenchington (DOE), Douglas Maughan (DHS), and Ralph Wachter (ONR/NSF).
- October 29, 2007: "Science and Its Contributions to Policy Change: Toward Smart Self-healing Critical Infrastructures" invited presentation at the Humphrey Institute for PA8001 Transforming Public Policy,
  - November 6, 2007: "Pivotal Technologies: Smart Transportation, Energy, Security and Nanotechnologies," Invited presentation at the Minnesota Society of Professional Engineers (MSPE) "Beyond Coal and Oil: Engineering our Energy Alternatives"
  - November 15, 2007: "Toward Agile and Resilient Large-Scale Systems: Adaptive Robust National/International Infrastructures," Keynote address at the International Conference on Flexible Systems Management GLOGIFT-07, New Delhi/Noida, India
  - November 19, 2007: "The Human Side of Electricity," invited presentation on behalf of the University of Minnesota Alumni Association (UMAA), Stillwater, MN
  - In 2006, gave 42 presentations, including eleven keynote addresses on S&T policy and methods to assess and reduce multi-hazard vulnerability of the interdependent critical national and International infrastructures (including the energy system and power grids) to a broad array of destabilizers ranging from natural disasters to terrorist attacks to pandemic flu outbreaks.
  - In 2005, gave 41 presentations in Minnesota and nationally. I also served on several advisory and review panels at the national level and within the NSF, DHS, OSTP, National Academy of Engineering (three Boards and Committees at the NAE), and was interviewed by the national media on issues regarding energy and infrastructure security. Publications included a special issue of the *Proceedings of the IEEE on Energy Infrastructure Defense Systems*, published in May 2005, and IEEE Security & Privacy's special issue on Infrastructure Security published in May/June 2005.
  - In 2004, gave 38 presentations, including twelve keynote addresses at: The ASME/DHS National Homeland Security Forum, Plug Power fuel cells, California ISO, NSF, NSF Cyberengineering/ Cyberinfrastructure initiative, MN Public Works Association, Board on Infrastructure and Constructed Environment at the National Academy of Engineering, TSI, MIPSYCON, IEEE Engineering Management Society, SMMPA, U.S. Department of Energy (DOE) Conference, EPRI SQRA meeting, EPRI Council, MN Dept. of Commerce, and the 40th Annual Minnesota Power Systems Conference. Other presentations included the following: 2004 AAAS Annual Meeting, Princeton U, University of Virginia, University of Missouri-Rolla, University of Minnesota, at four NSF workshops including Engineering Directorate's Cyberinfrastructure, US DOE's Energy 2003 Conference, Los Alamos National Laboratory (LANL), National Regulatory Research Institute, ASME CAPI Steering Committee, ASME Congress, represented ASME at the Department of Homeland Security (DHS) S&T Forum, presentations at three IMA workshops, and the NAE.
  - In 2003, gave 32 presentations, including eleven keynote addresses: The annual Int'l Conf. of the Instrumentation, Systems, and Automation (ISA) Society, Santa Fe Institute, U.S. Department of Energy (DOE) 2003 Conference, 100th Fall Convention of the Rocky Mountain Electric League, IEEE Twin Cities 2003 Awards Banquet, Congressional Staff Briefing, "An Engineering Perspective on the Blackout of 2003", hosted by ASME, IEEE, and the U.S. Energy Association, Congressional Briefing at the Inaugural Meeting of the House Research and Development Caucus, EPRI Grid Reliability and Power Markets Council, Infrastructure Security, and Enterprise Information Security Meetings, IEEE and International Council on Large Electric Systems (CIGRE) joint symposium, SAIC Senior Executive Meeting, MN Chamber of Commerce, and the 39th Annual Minnesota Power Systems Conference.
  - In addition, gave several additional invited presentations regarding the August 14, 2003 power outages and related infrastructure issues to a variety of organizations including: Institute of Electrical and Electronics Engineers (IEEE), IEEE Computer Society's Security and Privacy Journal, U.S. Energy Association, U.S. Congress, Air Force Association, Minnesota Chapter, Electric Power Research Institute, National Science Foundation, National Academy of Engineering (NAE), American Society of Mechanical Engineers (ASME), ASME Critical Asset Protection Initiative, Society of Industrial and Applied Mathematics (SIAM). Gave two congressional briefings: 1)

Congressional Staff Briefing, “An Engineering Perspective on the Blackout of 2003”, hosted by ASME, IEEE, and the U.S. Energy Association, and 2) was one of two speakers at the Congressional Briefing at the Inaugural Meeting of the House Research and Development Caucus.

- Media interviews during 2003 were published in: New York Times, Chicago Tribune, Congressional Quarterly, Times-Picayune, Scientific American, Healthcare Informatics, Society of Industrial and Applied Mathematics (SIAM) News, Oil Daily, Natural Gas Week, International Oil Daily, World Gas Intelligence, and Energy Compass.
- In 2002, gave 47 presentations at the AAAS Annual Meeting and Science Innovation Exposition, the White House and U.S. Department of Commerce, EMP Commission, ASME Industry Advisory Board, UC-Berkeley, Stanford U, CISAC, RAND and the Woodrow Wilson International Center for Scholars, DistribuTech 2002 Conference, University of Minnesota, EEI Executives Workshop, CBI's Safety and Security in the Electric Power Industry, Entergy, presented at seven EPRI Council meetings, IEEE Manpower Development Workshop, two IEEE PES conferences, IMA, Japanese delegation, AECC IT conference, Memphis Light, Gas and Water Division, BPA, NYPA, ONCOR/TXU, SCE, and Southern California IEEE PES Chapter, Lawrence Livermore National Laboratory (LLNL), two presentations at the NAE/NRC, NASA-Ames, four NSF workshops, TISP Congress on Infrastructure Security for the Built Environment, also gave keynote addresses at Westinghouse Process Control Inc., and the Santa Fe Institute.
- In 2001, gave 26 invited seminars and presentations on areas of work including infrastructure security, CIN/SI, load forecasting, control of complex networks, distributed control through intelligent adaptive agents, next generation communication infrastructure, organizing R&D consortia, fostering innovation at EPRI. Gave presentations at several member utilities (including ONS, BPA, AmerenUE, Exelon), two presentations at the National Academy of Engineering, Army Corp. of Engineers (utilities' group on Interagency Forum on Infrastructure Protection), Argonne National Laboratory, Idaho National Engr'g. and Environmental Laboratory, Sandia, and Los Alamos, at several additional events sponsored by CA State Senate, IBM, NSF, DARPA, DOE, and the White House OSTP.
- In 2000, gave 23 invited seminars and presentations at several conferences, member utilities, government (including at three meetings of the White House OSTP, at two meetings of the National Governors' Association, several at NSF, DARPA, ARO, DoD, DOE and the National Laboratories), two presentations at the National Academy of Engineering, as well as at several universities (including UC-Berkeley, University of Illinois at Urbana-Champaign, Iowa State University, Virginia Tech, Stanford University, etc.).

Prior to January 2000, gave the following invited presentations:

75. “EPRI/DoD Complex Interactive Networks Initiative”, served as chair of an all-day tutorial workshop held during the Institute of Electrical and Electronics Engineers' Conference on Decision & Control, Phoenix, Arizona (Dec. 5, 1999)

74. “Complex Interactive Networks and Systems Initiative”, invited presentation at EPRI's Electronic Infrastructure Security Workshop, Houston, TX (Nov. 9-10, 1999)

73. “Self-healing Infrastructures”, invited presentation at EPRI FACTS User's Group meeting, Chattanooga, TN (Nov. 5, 1999)

72. “Energy Infrastructure Interdependencies: Challenges for R&D” invited presentation at the Critical Infrastructures R&D Workshop: Interdependencies, White House Office of Science and Technology Policy (OSTP) and National Infrastructure Protection Center (NIPC), McLean, VA (Aug. 11-12, 1999)

71. “EPRI/DoD Complex Interactive Networks Initiative”, Invited presentation at the EPRI Grid Operation and Planning meeting, Atlanta, GA (June 8, 1999)

70. “Focus Group on Grid Reliability: Complex Interactive Networks Issues”, Invited presentation at the EPRI Grid Operation and Planning meeting, Atlanta, GA (Jun. 7, 1999)

69. "Overview of the EPRI/DoD Complex Interactive Networks initiative", served as chair at the kickoff meeting for the Complex Interactive Networks Initiative, held as an all-day meeting in the Virginia Campus of George Washington University (May 5, 1999)
68. "EPRI/DoD Complex Interactive Networks/Systems Initiative: Program overview" invited presentation at the Tennessee Valley Authority, Chattanooga, TN (May 3, 1999)
67. "EPRI/DoD Complex Interactive Networks/Systems Initiative", invited presentation at the NSF workshop on Education and Research, Washington, D.C. (Apr. 12-13, 1999)
66. "Complex Interactive Networks/Systems Initiative: Self-healing Infrastructures As Complex Adaptive Systems", keynote presentation at the annual Systems and Software Workshop, Honeywell Technology Center, Phoenix, Arizona (Mar. 16, 1999)
65. "EPRI/DoD Complex Interactive Networks/Systems Initiative", invited presentation at the Bonneville Power Administration, Vancouver, WA (Feb. 26, 1999)
64. "Complex Interactive Networks/Systems Initiative" invited presentation at EPRI's Power Market Design meeting, Palo Alto, CA (Feb. 12, 1999)
63. "Complex Interactive Networks and Systems Initiative and Simulator for Electric Power Applications", invited presentation at the EPRI Research Advisory Committee, La Jolla, CA (Oct. 21, 1998)
- 43-62. "Complex Interactive Networks/Systems Initiative: Self-Healing Infrastructures", during July 20-August 14, 1998 visited and gave the above invited presentation at the following universities: U. of Washington-Seattle, Washington State Univ.-Pullman, Case Western Reserve Univ., Univ. of Missouri-Rolla, Washington Univ.-St. Louis, Michigan State Univ., Purdue Univ., Univ. of Illinois- Champaign, Univ. of Pittsburgh, Carnegie Mellon Univ., Cornell, UMass-Amherst, Harvard, MIT, BU, Univ. of Virginia, George Washington Univ., Naval Post Graduate School, UC-Davis, and CalTech.
42. "Complexity and the Deregulation of the Electric Power Industry", Invited presentation at the Embracing Complexity Workshop, Cambridge, MA (Aug. 2 – 4, 1998)
41. "Neural Network Augmented Anti-skid Brake Controller, "(Tunay, Amin, and Rodin) final report presentation at the Boeing Research Center, Everett, WA (Dec. 5, 1997)
40. "Dynamical Neural Networks for Approximation and Control of Uncertain Nonlinear Systems ", Invited presentation at the Boeing Research Center, Everett, WA (Dec. 5, 1997)
39. "Overview of Cosc's Projects for Highway Traffic Management: Estimation and Modeling, Sensor Mix and Placement, Incident Detection and Localization", Presented to the Missouri DOT's Director of Planning, St. Louis, MO (Aug. 6, 1997)
38. "Neural Network Augmented Antiskid System", invited presentation, ABSC/MDC-Long Beach/WU meeting, Aircraft Braking Systems Corp., Akron, OH (Sept. 13, 1996)
37. "Highway Traffic Management via Semantic Control II", SEI Corp., St. Louis, MO (Aug. 2, 1996)
36. "System Identification via Dynamical Neural Networks", invited presentation, Mathematical Theory of Networks and Systems Conference, St. Louis, MO (Jun. 24-28, 1996)
35. "Traffic Flow Prediction by Radial Basis Function Networks", invited presentation at George Washington University, Ashburn, VA (Apr. 10, 1996)
34. "Reflections on Graduate Education, Research and Development: Lessons learned and the "possible" road ahead", Mentor of the Year award lecture, Assoc. of Grad. Eng'g Students, Washington Univ. (Feb. 9, 1996)

33. "Computational Methods for Learning Control and Optimization", invited presentation, Pi Mu Epsilon Mathematics Honorary seminar, Dept. of Mathematics, Washington University, St. Louis (Feb. 7, 1996)
32. "On-Line System Identification for an F-15 Aircraft via Dynamical Neural Networks", invited presentation, Intel. Flight Control Systems Meeting, NASA-Ames, CA (Nov. 13, 1995)
31. "Pickup and Delivery with Time-Window Constraints", (with E.F. Yang and E.Y. Rodin), IFORS Fourth Specialized Conference, OR and Eng'g Design, St. Louis, MO (Oct. 26, 1995)
30. "Intelligent Transportation System: Tutorial", (with J. Wootton and A. Garcia-Ortiz), IFORS Fourth Specialized Conference, OR and Eng'g Design, St. Louis, MO (Oct. 25, 1995)
29. "Video Surveillance and Image Compression Project", (with K. Ruland) presentation and final report, Comtrak division of ESCO, St. Louis, MO (Oct. 1995)
28. "Modeling of Airfield Operations via Semantic Control", USAF Air Mobility Command, Scott AFB, IL (Aug. 15, 1995)
27. "System Modeling and Identification: Formulation of Maximum On Ground (MOG) Capabilities", USAF Air Mobility Command, Scott AFB, IL (Aug. 15, 1995)
26. "Traffic Management via Semantic Control", Executive Briefing, E&S Corp., (Jun. 16, 1995)
25. "NETO: Network Optimization with Time Window Constrained Routing and Scheduling", invited presentation at the Third Air Mobility Modeling Workshop, Air Force College of Science & Engineering, Wright-Patterson AFB (May 25, 1995)
24. "System Identification via Dynamical Neural Networks", Intelligent Flight Control: Advanced Concept Program Meeting, NASA/MDA/TSU/WU, St. Louis, MO (May 23, 1995)
23. "Computational Methods for Learning Control and Optimization", invited seminar at the Department of Mathematics and Computer Science, University of Missouri, St. Louis, MO (Apr. 5, 1995)
22. "Modeling and Systems Identification for Medical Decision Support", Command Surgeon's Office, US Transportation Command (TRANSCOM), Scott AFB, IL (Mar. 23, 1995)
21. "Approximate Reasoning Applications to Transportation Modeling, Routing and Scheduling", Mobility Modeling and Simulation User's Group, Scott AFB, IL (Nov. 16, 1994)
20. "Systems Identification and Disturbance Attenuation via Dynamic Neural Networks", Invited presentation at the Neural Nets for Aero Control Symposium, NASA Ames Research Center, Moffett Field, CA (Aug. 25, 1994)
19. "Learning and Computational Methodologies for Decision Support", Advanced Development Center, Electronics and Space Corp., St. Louis, MO (May 18, 1994)
18. "Next Steps in Process Modeling and Controller Design for Crystal Growth", MEMC Electronic Materials Inc., St. Peters, MO (May 12, 1994)
17. "Computational Methods for Learning Control and Optimization", Department of Mathematics, Penn. State University, Wilkes-Barre, PA (May 9, 1994)
16. "AFOSR Research Review: Approximate Reasoning Applications to Transportation Modeling, Routing & Scheduling", presented to the Director of the Operations Research group, USAF Office of Scientific Research, (Apr. 29, 1994)
15. "Approximate Reasoning: Brief Overview of Methodologies and Applications", CME Conference, USAF AMC, Command Surgeon's Office, Scott AFB, IL (Mar. 25, 1994)

14. "Artificial Neural Networks: Paradigms and Applications", Invited Presentation, John M. Olin School of Business, Washington University, St. Louis, MO (Mar. 2, 1994)
13. "Neural Networks for Mobility Analysis Support System (MASS)", USAF Air Mobility Command, Scott AFB, IL (Nov. 18, 1993)
12. "Fuzzy Linear Programming", USAF AMC, Scott AFB, IL (Nov. 18, 1993)
11. "Process Modeling, PID Design and Tuning Algorithms", MEMC Electronic Materials Inc., St. Peters, MO (Oct. 29, 1993)
10. "Introduction to Process Modeling, Controller Design Methods and Algorithms", MEMC Electronic Materials Inc., St. Peters, MO (October 6, 1993)
9. "Intelligent Embedded Control & Decision-Aiding Systems: Summary of Projects and Overview of Research", Invited Presentation, United Technologies Research Center, East Hartford, CT (September 27, 1993)
8. "Layered Defense Project: Application of Semantic Control to a Class of Pursuer-Evader Problems III", Advanced Development Center, E&S Corp., St. Louis, MO (May 21, 1993)
7. "A Summary of Projects and an Overview of Research", Invited Presentation, United Van Lines HQ, St. Louis, MO (April 14, 1993)
6. "Research Ideas & Applications from the Center for Optimization and Semantic Control", USAF Air Mobility Command, Scott AFB, IL (March 19, 1993)
5. "A Summary of Projects: Intelligent and Process Control Algorithms", Invited Presentation, MEMC Electronic Materials Inc., St. Peters, MO (December 11, 1992)
4. "Neural Network Approach, Optimal Scheduling & Multiple Knapsack Algorithms", USAF Air Mobility Command, Scott AFB, IL (November 20, 1992)
3. "System Identification with Dynamic Neural Networks", ANNIE '92 Conference, St. Louis, MO (November 17, 1992)
2. "Control and Disturbance Rejection with a Dynamic Neurocontroller", ANNIE '92 Conference, St. Louis, MO (November 16, 1992)
1. "Layered Defense Project: FY 1992 Progress Report", Advanced Development Center, Electronics and Space Corp., St. Louis, MO (October 1992)

### **Undergraduate Advisees**

Matt Dushek	B.S.	May 2004
Brent King	B.S.	May 1998
Christian Hoge	B.S.	May 1997
Bryan Russina	B.S.	Aug. 1997
Richard Woodworth	B.S.	May 1997
Debra Goldstein	B.S.	May 1995
Scott L. Carpenter	B.S.	Dec. 1993
Alvaro R. Jimenez	B.S.	May 1993

### **Senior Project Advisees**

Matt Dushek	B.S.	May 2004
Senior Honors Project:	"Analysis, Simulation, and Detection of Large-Scale Network Vulnerabilities: National Infrastructure Interdependencies".	

Babak Razavi	B.S.	Dec. 1998	
Senior Project:			"Intelligent Trans. Syst.: Simulation and Automated Incident Detection"
Mabel Sin-Yi Chau	B.S.	May 1998	
Senior Project:			"Road Traffic Sensor Mix and Placement"
Felix Landaeta	B.S.	May 1998	
Senior Project:			"NN Identification of Processes for the MD-90 Anti-skid System"
Stefanie Hill	B.S.	Dec. 1997	
Senior Project:			"Intelligent Traffic Systems: Incident Detection and Localization"
Bryan Russina	B.S.	Aug. 1997	
Senior Project:			"Simulation and Control of Czochralski Silicon Crystal-Growth Process"
Hajnal Szilagyi	B.S.	Aug. 1997	
Senior Project:			"St. Louis Highway Traffic Modeling and Analysis"
Richard Woodworth	B.S.	May 1997	
Senior Project:			"Optimal Selection of DHL Offices for Installation of Imaging Systems"
Amy Lewin	B.S.	May 1997 (Senior Project Co-advisor)	
Senior Project:			"Conflict Resolution Between Selfish Agents in a Network: Modeling/Optimization"
Chris Hoge	B.S.	May 1997 (Senior Project Co-advisor)	
Senior Project:			"Conflict Resolution Between Selfish Agents in a Network: Simulation /GUI"
Cammie Humke	B.S.	Dec. 1996	
Senior Project:			"Asset Allocation on the Web"
Jong Hur	B.S.	Dec. 1996	
Senior Project:			"A Matlab-based Simulation and Control of Semiconductor Crystal Growth"
Doo H. Pak	B.S.	May 1996	
Senior Project:			"NN Modeling of Inverse Kinematics for Real-Time Control of a Rhino Robot Arm"
Leonard Gutnikov	B.S.	Dec. 1995	
Senior Project:			"Neurocontroller Design for Vibration Control"
Elliot Vermes	B.S.	May 1995	
Senior Project:			"A Fuzzy Model Approach to the Optimization of Airlift Movements"
Michelle Osburn	B.S.	Dec. 1994	
Senior Project:			"Simulation of Shortest-Path Algorithms for Vehicle Routing in IVHS"
Jamali Samsuddin	B.S.	May 1994	
Senior Project:			"Multiple Knapsack Loading Algorithm for Mobility Analysis Support System"
Amy Piggot	B.S.	May 1993	
Senior Project:			"Optimal Route Planning for Mobility Analysis Support System (MASS)"
Ronald B. Segal	B.S.	May 1992	
Senior Project:			"Optimizing Operations of the Motor Vehicle Administration"
Kevin O'Brien	B.S.	May 1991	
Senior Project:			"Situation Assessment in Medium-Range Air Combat: Interface/Simulations"
Kristi Yamagata	B.S.	May 1991	
Senior Project:			"Situation Assessment in Medium-Range Air Combat: Rules/Implementation"
Elizabeth A. Lamon	B.S.	May 1991	
Senior Project:			"Computational Geometry"

## Graduate Advisees

Anthony Giacomoni	Ph.D. 2012 (doctoral research advisor)	
Dissertation:		"Secure and Reconfigurable Power Grid"
Laurie Miller	M.S. (Dec. 2005), Ph.D. 2010 (Master's and doctoral research advisor)	
Dissertation:		"Fast Power System Risk Analysis"
Sarah Mullen	M.S. (Dec. 2005), Ph.D. 2009 (Master's and doctoral research co-advisor)	
Dissertation:		"Plug-In Hybrid Electric Vehicles as a Source of Distributed Frequency Regulation"
Michael M. Meusey	D.Sc. May 1996 (Doctoral Research Co-supervisor)	
Dissertation:		"A Semantic Control Approach to Evasive Maneuver Selection"
Volker Gerhart	M.S. Dec. 1995 (Master's Project Advisor)	
Master's thesis:		"On-line Systems Identification and Control of a Damaged Aircraft"

Kevin Ruland	D.Sc.	Aug. 1995 (Doctoral Research Co-supervisor)
Dissertation:		"Polyhedral Solution To The Pickup and Delivery Problem"
Edward Fan Yang	D.Sc.	May 1995 (Doctoral Research Co-supervisor)
Dissertation:		"Network Optimization with Time Window Constrained Routing & Scheduling"
Yuanlan Wu	D.Sc.	Dec. 1992 (Doctoral Research Co-supervisor)
Dissertation:		"Artificial Intelligence Methodologies in Aerospace and Control Systems"

In addition to the above advisees, I have also served in the following theses/dissertation committees at Washington University:

- in six additional doctoral dissertation committees in the Systems Science and Mathematics Department
- in over twenty doctoral qualifying examination committees in the SSM Department
- in four doctoral dissertation and three masters' thesis committees in the Mechanical Engineering Dept.
- in two doctoral dissertation committees in the Department of Electrical Engineering
- in one doctoral dissertation committee in the Department of Computer Science
- in one doctoral dissertation committee in the Department of Civil Engineering
- in one doctoral dissertation committee in the Department of Earth and Planetary Sciences
- in one doctoral dissertation committee in the Department of Chemistry

Served on seven doctoral dissertation committees and over 240 Capstone Projects at the University of Minnesota (March 2003-present).

For additional information, including sample publications and presentations, please see <http://umn.edu/~amin>