Jagannathan Sarangapani, Ph.D.

Rutledge-Emerson Distinguished Professor of Electrical and Computer Engineering
Professor of Department of Computer Science (joint appointment)
Professor of Department of Engineering Management and Systems Engineering (joint appointment)
Director, Embedded Control Systems and Networking Laboratory
Missouri University of Science and Technology
222 Emerson Electric Co. Hall • 301 West 16th Street • Rolla, MO 65409-0040
Tel: (573) 341-6775; Fax: (573) 341-4532. Email: sarangap@mst.edu; www.mst.edu/~sarangap

AREAS OF INTEREST: Systems & Control, Neural Network Control, Robotics/Autonomous systems, Cyber-physical systems, Diagnostics & Prognostics

EDUCATION: **Doctor of Philosophy in Electrical Engineering (1/92-8/94)** 3.95/4.0
Automation and Robotics Research Institute, University of Texas at Arlington
Specialization: Intelligent & Embedded Control of Robotics
Awards: University Doctoral Fellowship Recipient (1/92-8/93)
Rudolf Hermanns Graduate Fellowship holder (9/93-8/94)
University Scholars Fellow (1/92-8/94)
NSF Research Grant Scholar (2/92-08/94)
Doctoral Research Award Recipient of Sigma Xi International Research Society (4/94)

Master of Science (9/87-12/89); GPA 85%
University of Saskatchewan at Saskatoon, Canada
Specialization: Embedded Control Systems and Robotics
Awards: University of Saskatchewan Summer Graduate Fellowship holder

Bachelor of Electrical Engineering (7/82-8/86); GPA 85.5%
Anna University at Madras, India
Specialization: Embedded Systems and Robotics
Awards: University Gold Medalist for being topper (82-86)
National Merit Scholar (82-86)
Won IEEE best student paper contest (85)

AWARDS/HONORS:

- Visiting Professor of International Institutions (e.g. Indian Institute of Technology Kanpur, China etc)
- Fellow of the IEEE, USA
- Fellow, Institute of Engineering Technology, UK
- Fellow, Institute of Measurement and Control, UK
- University of Missouri Leadership Development Program (2013-2014)
- Engineers Make a Difference Award in 2008
- Boeing Pride Achievement Award 2007
- Faculty Excellence Award 2005-2006, 2006-2007
- Outstanding Counselor Award for St. Louis (06, 07) and Region 5 in 2006 and Outstanding IEEE Student Branch Award (06, 07)
- Teaching Commendation Award in 2005, Commended for Teaching Excellence in 2007, 2013, 2014, Outstanding Teaching Excellence Award in 2015, 2016
- Caterpillar Research Excellence Award in 2001
- The University of Texas Presidential Award for Research Excellence in 2001
- NSF CAREER Award (2000)
- UTSA Faculty Research Award (2000)
- Received **"Patent Award"** from Automation and Robotics Research Institute (Dec.96)
- Cited in Marquis Who's Who (Science, Engineering, Finance, World, America) continuously from 1998 till do date.
- Twentieth Century Award for Achievement—International Biographical Center,

Cambridge, UK.
- Several Best Paper/session Awards in 2004, 2000

OTHER AWARDS:

- Recipient of **University Gold Medal** for being University Topper during undergraduate degree program
- Recipient of **Papu Subbarao Medal** for the best machine design (May 86)
- Awarded **Gold Medal** for being a State Ranker (Dec. 80)
- Received **Silver Medal** from International Rotary Foundation for being best student (Dec. 80)

EDITORIAL: **(**a) **Editorial Board,** Springer Journal on Intelligent Industrial Systems
(b) Series Co-Editor, IET Control Series UK (2010-2013)
(c) **Associate Editor**, UK Royal Institute Transactions on Measurement and Control (2010-2015)
(d) **Associate Editor**, IEEE Transactions on Control Systems Technology (2004-2009)
(e) **Associate Editor**, IEEE Transactions on Neural Networks (2005-2009)
(f) **Associate Editor**, IEEE Journal on Systems Engineering (2007-2010)
(g) **Editorial Board Member and Steering Committee**, International Journal of Automatic Control and Systems Engineering (ASCE)
(h) **Chair and Member**, Technical Committee on Intelligent Control (2011-2015)
(i) **Vice Chair**, CIS Tech Committee on Adaptive Dynamic Programming and RL (2013)
(j) **Editor-in-Chief**, Discrete Dynamics in Nature and Society (2013-)
(k) **Editorial board**, The Scientific World Journal (2013-)
(l) **Associate Editor**, IEEE Transactions on Systems, Man, and Cybernetics (2017-)

Research Grants: (September 98-Todate):

No.	Title/PIs/Number	Agency	Years of Support	Total Value
96.	System theoretic principles and decentralized sensor network and control algorithms for dynamic data driven and situational awareness and response applications	AFOSR (Subcontract from USF)	2017-2018	$34,999
95.	MRI: Development of an Advanced Materials Additive Manufacturing (AM2) System for Research and Education, Co-PI, PI: Frank Liou, Co-PI: Joe Newkirk	NSF	2016-2019	$881,018
94.	Investigation of Advanced Concepts in Smart Factory Data Collection, Analysis & Communication for Manufacturing Processing Monitoring	Boeing	2016-2017	$100,000
93	IMS Center Membership II	Boeing	2016-2017	$40,000
92	IMS Center Membership	Boeing	2015-2016	$40,000
91.	Eager/Cyber Manufacturing: Cyber-Enabled Additive Manufacturing of	NSF	2015-2017	$146,758

	Advanced Materials (Co-PI; PI: Frank Liou)			
90.	IMS Membership I and II (Co-PI; PI: Maciej Zawodniok)	TDA	2015-2016	$80000
89.	Investigation of Advance Concepts in Passive Tags with Sensors with Data Communication, Security and Prognosis Applications	Boeing	2015	$95,000
88.	IMS Center Membership II	Boeing	2015-2016	$40,000
87.	IMS Center Membership I	Boeing	2014-2015	$40,000
86.	Event Triggered Control of Networked Control Systems by using Adaptive Dynamic Programming	NSF	2014-2018	$360,000
85.	IMS Membership I and II (Co-PI; PI: Maciej Zawodniok)	Technical Data Analysis	2014-2015	$78,000
84.	Investigation of Advance Concepts in Passive Tags with Sensors and Data Communication and Prognosis Applications	Boeing	2014	$95,000
83.	IMS Boeing Memberships II	Boeing	2014	$40,000
82.	IMS Membership, C0-PI	TDA	2013-2014	$12,000
81.	IMS Membership	Boeing	2013-2014	$40,000
80.	Investigation of Passive Tags with Sensors and Prognosis of Structural Health	Boeing IMS second membership	2013	$105,422
79.	IMS Membership	TDA/Navair	2012-2013	$12,000
78.	"A Doctoral Program in Security and Privacy in Mobile Social Network Space", Co-PI (PI: Madria) with Zhaozheng Yin, Dan Lin and Sriram Chellappan	Dept of Education	2012-2017	$544,420
77.	I/UCRC: Collaborative Research on Coupled Models for Prognostics and Health Management, PI	NSF	2012-2014	$49,999
76.	MRI: Development of an Open-source Dual Probe Atomic Force Microscope , Co-PI, PI: Doug Bristow	NSF	2012-2015	$316,044
75.	DURIP:A Heterogeneous Secure Networking Test-Bed to Counter Explosives, Co-PI (PI: Sriram Chellappan)	ARO	2012-2013	$249,978
74.	Invention of Advance Concepts in Wireless Sensors with Flexible High and Low Storage Memory and Temperature/Humidity Sensing Capabilities and Initiation of Condition Based Maintenance for Diagnosis and prognosis of Plant Machinery: IMS second membership	Boeing	2012-2013	$116,537
73.	NSF I/UCRC Membership	Boeing	2012-2013	$40,000
72.	NSF I/UCRC memberships	Boeing, Kalscott	2011-2012	$52,000
71.	Collaborative: Design of Accelerated	NSF	2011-2013	$50,000

	Prognostics and Health Management, Co-PI			
70.	Industry/University Cooperative Research Center for Intelligent Maintenance Systems: Five Year Renewal Phase II, PI	NSF	2011-2017	$200,000
69.	Agile Systems Engineering: Experiential and Active Learning Approach—Co-PI; PI: Dagli	DoD-SERC from Stevens Institute	2011-2012	$119,988
68.	Adaptive-dynamic programming based control of networked control system	NSF	2011-2016	$346,815
67.	Digital Part Marking and Container Health Monitoring	Boeing	2011	$60,000
66.	NSF IMS Memberships—Boeing I & II, Kalscott and AVETEC	Various	2011-2012	$104,000
65.	Secure Network Protocol	Boeing	2010-2011	$25,000
64.	Unintended Emission Detection and Identification, PI	Army Research Laboratory	2010-2014	$403,873
63.	Human-the-loop with Detectors and Embedded Mobile Sensor Fusion Center for Detection, PI; Co-PI: Jeff Dalton of AVETEC	Army Research Laboratory	2010-2014	$702,120
62.	Localization and Tracking of Explosive Threats using Multi-modal Sensors, PI;	Army Research Laboratory	2010-2014	$646,127
61.	System Integration, PI; Co-PI Levent Acar	Army Research Laboratory	2010-2014	$32,881
60.	Cognitive Network and Protocols using Missouri S&T Mote, Co-PI; PI Maciej Zawodniok	Army Research Laboratory	2010-2014	$450,093
59.	Design of Hardware Platform for Multimodal Sensor Detection, Co-PI; PI-Maciej Zawodniok	Army Research Laboratory	2010-2014	$299,907
58.	Malicious Device Identification Through Statistical Pattern Modeling, Co-PI; PI-Ivan Guardiola	Leonard Wood Institute/Army Research Laboratory	2010-2011	$81,351
57.	NSF REU Supplement for Smart Engines, PI	NSF	2010-2011	$6,000
56.	A Systematic Methodology for Data Validation and Verification for Prognostics Applications, Co-PI, PI:Zawodniok	NSF	2010-2012	$49,998
55.	Agile Systems Engineering: Experiential and Active Learning Approach, Co-PI; PI: Dagli	DoD/SERC (subcontract from Stevens Institute of Technology)	2010-2011	$198,556
54.	Fault Detection, Isolation, Energy Monitoring and Prognostics	Boeing	2010	$72,101.50
53.	IMS Membership	AVETEC	2010-2011	$12,000

52.	NSF REU Site Supplement	NSF	2010	$20,020
51.	I/UCRC Memberships—Boeing I and II	Boeing	2009-2010	$80,000
50.	Smart Engines: Fuel Flexible Engine Control using Adaptive Neural Network Critics, PI	NSF	2009-2012	$330,000
49.	Condition-based Maintenance on Motors	Boeing	2009	$60,600
48.	NSF I/UCRC Supplement—parameter based prognostics	NSF	2009-2010	$49,999
47.	NSF I/UCRC on Intelligent Maintenance Systems Center Memberships	Caterpillar Chevron	2008-2009	$80,000
46.	Networked Zeolite-Capacitive Sensors for Distributed and Ubiquitous Detection of Chemical/Biological Threats, Co-PI	Army Lab/LWI	2008-2009	$529,160
45.	NSF I/UCRC Supplement: Bio immune system engineering	NSF	2008-2009	$50,000
44.	NSF I/UCRC Memberships	Boeing and AVETEC	2008-2009	$51,000
43.	Network Enabled Manufacturing: Power Utility Monitoring and Bearing Prognostics	Boeing	2008	$109,470
42.	NSF REU Site: Research and Training Experience for Undergraduates in the Area of Sensor Computing, Co-PI (PI: Madria) with Sriram Chellappan	NSF	2008-2012	$300,000
41.	NSF I/UCRC on Intelligent Maintenance Systems Center Memberships	Boeing, Caterpillar, Chevron, Honeywell, 21st Century Systems	2007-2008	$171,000
40.	RFID Application to Virtual Enterprises	Boeing	2007-2008	$25,500
39.	IED Localization using Spatial Diversity of Wireless Sensor Networks	Army Research Lab/LWI	2007-2008	$323,922
38.	Wireless Head Set for Ramp Operations	Air Force Research Lab (AFRL)	2007-2008	$147,000
37.	Secure and Adaptable Energy Efficient Sensor Networks for Infrastructure Monitoring, Co-PI	DOEducation Co-PI	2007-2010	$384,000
36.	NSF I/UCRC Memberships	AvETEC, Boeing	2007	$51,000
35.	Supply Chain Management	Boeing	2007	$60,000
34.	Network Enabled Manufacturing	Boeing	2007	$102,003

33.	Development and validation of advanced energy management control algorithms for short or long term storage, Co-PI	Sandia	2006-2007	$10,000
32.	Chemical Management using RFID	Avchem/NSF	2006-2007	$73,000
31.	RFID Hardware Integration	AFRL	2006-2008	$ 75,000
30.	NSF I/UCRC Center Membership fees, PI	Caterpillar, Chevron, Boeing, Festo, Honeywell, 21st Century Systems	2006-2007	$211,000
29.	Robust adaptive critic NN controllers for nonlinear dynamic systems, PI	NSF	2006-2010	$239,999
28.	NSF I/UCRC on Intelligent Maintenance Systems	NSF	2006-2011	$250,000
27.	Hydrualic Pump Prognostics	Caterpillar	2006-2006	$25,000
26.	Katrina SGER: Dynamic Programming based monitoring of structural health and communication infrastructure, PI (Co-PI Dr. Saygin)	NSF	2006-2007	$55,699
25.	Caterpillar Electronics University Research Award: Network Management Protocol, Co-PI	Caterpillar	2006-2007	$50,000
24.	Development and validation of advanced energy management control algorithms for short or long term storage, Co-PI (with PI: Crow, Co-PIs: McMillin, Liu)	Sandia Labs	2006-2007	$680,860
23.	Real-time Locating System Evaluation	Boeing	2006-2006	$37,250
22.	NSF I/UCRC Center Membership fees, PI	Caterpillar, Chevron, Boeing, Festo, Honeywell, 21st Century Systems	2005-2006	$211,000
21.	Real-time Locating System Evaluation (Contract #1050990), PI	Boeing	2005-2005	$4,800
20.	Planning Grant: NSF Industry University Cooperative Center, PI (EEC-0531580) (with Drs. Leu and Saygin)	NSF	2005-2006	$10,000
19.	Development and validation of advanced energy management control algorithms for short or long term storage, Co-PI (with PI: Crow, Co-PIs: McMillin, Liu)	Sandia Labs	2005-2006	$1,270,390
18.	Wireless Sensor Networks for In-quality process monitoring, PI	Air Force Research	2005-2007	$329,826

		Laboratory		
17.	Research Experiences for Undergraduate Students Supplement for ECS#0327877**,** PI (with Dr. Drallmeier as the Co-PI)	NSF	2004-2005	$6,000
16.	Shop floor management using Auto-ID technologies in Network Centric Environments, Co-PI (PI: Ming Leu, Co-PI: several) (Overall award $8.5 Million)	Air Force Research Laboratory	2004-2006	$279,854
15.	Facts Device Interactions, Co-PI (with PI: Crow, Co-PI: McMillin, Liu)	Sandia Labs	2004-2005	$727,891
14.	Wireless test bed for mobile computing research, Co-PI, (PI: Madria; Co-PI: McMillin, Ercal and Subramanya) (MRB: $16.5K, UMR: $16.5K)	NSF	2003-2005	$83,500
13.	Multidisciplinary research and training in secure wireless adhoc and sensor networks (PI) (with Rao, Wunsch, Miller, Madria, Kapila, Erickson) (UMR Match : $126,000)	Dept. of Education	2003-2006	$463,272
12.	Adaptive neural architectures for emission control of engines (PI) (ECS#0327877) (with Dr. Drallmeier)	NSF	2003-2006	$504,000
11.	Adaptive traffic management schemes for the Internet	Research Board	2002-2003	$24,400
10.	Research Experiences for Undergraduate Students Supplement	NSF	2002-2003	$10,125
9.	Equipment donation (appx. value)	Motorola, Inc	2001	$185,000
8.	CAREER: Sensor-based adaptive control of complex distributed systems (ECS#9985739, ECS#0296191)	NSF	2000-2005	$300,000
7.	Equipment Supplement (with $10K match) (ECS#0216191)	NSF	2000-2005	$10,000
6.	Bioengineering Materials (Co-PI) (with Drs. Huang and Singh)	Subcontract from UT Austin (NSF)	2000-2001	$98,000
5.	Develop. of an intelligent controller for a golf swing machine using MEMS Technologies (#26-57100-01)	Techathlon, Inc	2000-2001	$100,750
4.	Microsensor-based Autonomous robots for MARS Greenhouse operation (#26-4315-01)	TSGC/NASA	1999-2002	$126,275
3.	Develop. of an intelligent controller for a golf swing machine using MEMS technologies	Techathlon, Inc	1999-2000	$65,000
2.	Adaptive traffic rate control (#14-	Faculty	2000	$5,000

	7519-01)	Research Award		
1.	Grant Development	Research and Development	1999 and 2000	$6,000

Total Funding from all sources (99-todate):

Total **$16,923,551**
My Share: $ 9,459,338

Summary: My shared expenditure **$497,860K/year** for the past 19 years (99-todate).

Other Funded Projects (1994-1998)

No.	Title/PIs/Number	Agency	Years of Support	My Share	Funds
1.	Autonomous Mining Truck---backup loading	Decatur, Caterpillar	1994-1995	100%	$125,000
2.	Data Analysis Tool Development for Diagnostics/Prognostics	Parts & Services	1995-1998	100%	$2,000,000
3.	Condition based monitoring, fault symptom analysis, and Prognostics	Parts & Services	1995-1998	100%	$1,250,000
4.	Obstacle avoidance for autonomous trucks	Machine Research Board	1996-1997	100%	$200,000
5.	Engine diagnostics and prognostics	Decatur	1996-1997	100%	$150,000
6.	Embedded blade control of autonomous dozer	Decatur	1997-1998	100%	$500,000

Total Funding: My share (1994-1998) **$4,225,000**

Classes Taught:

Teaching at UMR/Missouri S&T

Fall 2001 Semester	EE 231 Control Systems
Spring 2002 Semester	EE 434 Nonlinear Control (New course)
Fall 2002 Semester	CpE/EE 401 High Speed Networks (New course)
Fall 2002 Semester	EE 337 Neural Networks for Control (New Course)
Spring 2003 Semester	CpE/EE/ME 301 Introduction to MEMS (New course)
Fall 2003 Semester	CpE/EE 401 High Speed Networks (second time)
Course Release	
Spring 2004 Semester	EE 433 Topics in Control Theory: Adaptive Control (New Course)
Spring 2004 Semester	EE 231 Control Systems
Fall 2004 Semester	CpE 448 High Speed Networks (third time)
Spring 2005 Semester	EE 434 Nonlinear Control Systems
Spring 2005 Semester	EE 231 Control Systems
Fall 2005 Semester	CpE 448 High Speed Networks
Spring 2006 Semester	EE 433 Topic in Control-Neural Network Control (New course)
Summer 2006 Semester	EE/CpE 301 Wireless Networks (introduced but taught by grad student)
Fall 2006 Semester	CpE 448 High Speed Networks
Fall 2006 Semester	CpE/EE 401 Wireless Adhoc and Sensor Networks (New course taught by postdoc)
Spring 2007	EE 434 Nonlinear Control Systems
Fall 2007	EE 433 Topics in Control: Discrete-time Neural Network Control
	CpE/EE 401 Wireless Ad hoc and Sensor Networks (New Course taught by postdoc)

Spring 2008	EE 433 Topics in Control: Adaptive Control
	CpE/EE/Sys 348 Wireless Networks (taught by postdoc)
Fall 2008	CpE 448 High Speed Networks
Spring 2009	EE 432 Optimal Control
Spring 2009	EE 434 Nonlinear Control Systems
Fall 2009	EE 337 Neural Networks for Control
Spring 2010	EE 432 Optimal Control
Spring 2011	EE 432 Optimal Control
Fall 2011	EE 433 Topics in Control: Discrete-time Neural Network Control
Spring 2012	EE 433 Topics in Control: Adaptive Control
Fall 2012	EE 401 Nonlinear Neural Network Control
Spring 2013	EE 434 Nonlinear Control
Fall 2013	EE 401 Discrete-time Neural Network Control
Spring 2014	EE 432 Optimal Control and Estimation
Fall 2014	EE 337/EE 5320 Neural Networks Control
Fall 2014	EE 401 Neural Network Control of Continuous-time Systems
Spring 2015	EE 6310 Optimal Control and Estimation
Fall 2015	EE 6001 Discrete-time Neural Network Control
Fall 2015	EE 5320 Neural Network Control
Spring 2016	EE 5001 Nonlinear Control
Spring 2016	EE 6310 Optimal Control and Estimation
Fall 2016	Course buyout/release
Spring 2017	EE 6310 Optimal Control and Estimation
Fall 2018	EE 6350 Neural Network Control

(Note that within the past three years, several new courses have been introduced and taught)

Teaching AT UTSA

Spring 1999	EE 3413 Analysis and Design of Control Systems
Spring 1999	EE 4443 Discrete-Time Control
Summer 1999	EE 2323 Engineering Analysis
Fall 1999	EE/CS 4723 Intelligent Robotics
Fall 1999	EE 5143 Linear Systems and Control
Spring 2000	EE 3413 Analysis and Design of Control Systems
Spring 2000	EE/CS 5343 Intelligent Robotics
One Course buyout	
Fall 2000	EE 3413 Analysis and Design of Control Systems
Fall 2000	EE/CS 5463 Artificial Neural Networks
One course buyout	
Spring 2001	EE 3413 Analysis and Design of Control Systems
Spring 2001	EE/CS 4723 Intelligent Robotics
Summer 2001	EE 3523 Electromechanical systems

Note that within three years several courses have been introduced and taught.

PROFESSIONAL EXPERIENCE:

Associate Chair of Graduate Studies (June 2014-August 2016)
Rutledge Emerson Endowed Chair (2008-present)
Tenured Full Professor and Site Director NSF I/UCRC on Intelligent Maintenance Systems (2005-2017)
Tenured Associate Professor (2001-2004)
Director, Embedded Systems and Networking Laboratory
Investigator, Intelligent Systems Center
Dept. of Electrical and Computer Engineering
The University of Missouri-Rolla

Assistant Professor & Director (98-01) (Associate Prof with Tenure 2001)
Intelligent Systems Laboratory
Dept. of Electrical and Computer Engineering
Adjunct Professor of Computer Science
Investigator, Center for Advanced Computing and Networking
6900 North Loop 1604 West
The University of Texas at San Antonio
San Antonio, Texas 78249.

Director & Staff Engineer (3/96-11/98) (Supervised 15 engineers)
Sr. Project Engineer (9/94-2/96)
Systems and Controls Research
Caterpillar Inc, Peoria.
Funding levels from Industry and federal agencies: Over 1 mil/year

- Directed a Group to Develop and Implement Embedded Systems for Applications
- Developing control algorithms for tractor type tractor machine.
- Managed advanced retarder control project for off-highway trucks.
- Applied learning-based control work automated loading system-eg. excavators
- Directed a team on rapid prototyping technology
- Directed a team to develop data analysis tools for life prediction.
- Directed a group to develop database architecture (DB2) and tool interface.
- Directed a project on extending engine oil life drain intervals.
- Developed navigation, control, and obstacle Avoidance methods for vehicles using embedded systems, multitasking operating systems, VME and PC 104 platforms.
- Directed diagnostic/prognostic programs using MEMS technologies.
- Developed novel methods to predict life for mechanical components.
- Developed performance models for mechanical components.
- Demonstrated an expert system for intelligent failure diagnosis/prognosis.
- Participated in a group to better control Electro-hydraulic Systems
- Developed and implemented novel path planner for Autonomous Systems
- Worked on obstacle detection systems and developed new techniques
- Developed novel diagnostic and prognostic algorithms for intelligent vehicle health monitoring using object oriented architecture
- Assembled an intelligent health monitoring system

Research Assistant (1/92-8/94)
Automation and Robotics Research Institute,
The University of Texas at Arlington, Fort Worth, Texas

- Implemented adaptive methods for nonlinear systems on embedded systems
- Developed novel nonlinear controllers for robotics and automation
- Developed and Implemented Intelligent controllers: Neural, Fuzzy and Artificial Intelligence based technology on Embedded Microprocessor systems
- Developed path planner and control techniques for autonomous systems
- Implemented various control techniques using Embedded Systems

Research Associate and Industrial Consultant (1/90-12/91)
Department of Mechanical and Industrial Engineering
The University of Manitoba, Winnipeg, Canada

- Developed a Microprocessor based controller in a Multi-tasking Environment for a Flexible Manufacturing Systems
- Implemented novel controllers for Industrial Processes such as Lathe and Milling Operations
- Designed, developed and Implemented an Intelligent Machine Vision approach for Automatic Inspection of Printed Circuit Boards for Northern Telecom Inc., (Bell

Northern Research), Canada

- Implemented a knowledge based approach
- Implemented a combined knowledge based with a neural network approach
- Taught Digital Control Class for undergraduate students
- Supervised undergraduate thesis work control systems and expert system projects
- Undertaken several knowledge based system projects for manufacturing applications

Research Assistant (9/87-12/89)
Department of Electrical Engineering
The University of Saskatchewan at Saskatoon, Canada

- VAX System Manager(9/88-12/89)
- Taught and graded undergraduate control and electronics courses.
- Supervised undergraduate labs

Project Engineer (7/86-8/87)
Engineers India Limited, New Delhi India

- Worked in automating the power plant by supervisory control.
- Developed various software for; operator communication, equipment health monitoring, plant performance, transformer tap change control, load sharing
- Load shedding
- Examined software for communication protocols for Local Area Networks
- Worked on PLC design and implementation
- Implemented supervisory control of gas pipe lines using VAX 11/780 through Satellite communication.
- Developed software for SCADA

Programming Languages **:** FORTRAN V and 77, Basic, Pascal, C, C++
VAL Language for controlling robots
Programming Languages Developed : EXPA-Natural language
Computer Experience **:** VAX 11/750, UNIX, DOS
Software Experience **:** Software for CRS plus, Excalibur Robot, PUMA Robot, ASEA Robot, Image processing software, Micro logic for simulation of digital circuits, Auto Cad, Lotus 123, Scribe, Telegraph, Ms Word.

ACTIVITIES:

- Member of Institution of Engineers, India (82-86)
- Member of IEEE Institution of Engineers Inc., USA (88-Present)
- Sr. Member (99-present)
- Honorary member of Eta Kappa Nu(93-Present)
- Honorary member of Tau Beta Pi (93-Present)
- Inducted as a Member into International Scientific Research Society Sigma Xi (94-Present)
- SAE Member (96-present)

Other Professional Activities:

- **Program Chairman** for IEEE Illinois Valley Section (94-95)
- **Branch Counselor**, IEEE Student Branch of Univ of Missouri Rolla and Missouri S&T (03-10)
- Secretary Institution of Engineers (86)
- **Chaired sessions**, IEEE International Conference on Intelligent Control (95,96,01, 04)
- Reviewer for IEEE Trans. on Neural Networks (93-Present)
- Reviewer for IEEE Trans. on Automatic Control (93-Present)
- Reviewer for Journal of Intelligent Robotic Systems (93-Present)

- Reviewer for IEEE Control Systems Magazine (92-Present)
- **Chaired sessions** in American Control Conference (94-Present)
- Reviewer for American Control Conference (93-Present)
- Reviewer for IEEE Conference on Decision and Control (92-Present)
- Reviewer for IEEE Conference on Robotics and Automation(93-Present)
- Reviewer for IEEE Mediterranean Symposium on Control Directions (94-Present)
- **Program Committee**, Mediterranean Symposium on Control Directions (00, 04)
- Reviewer for IEEE Symposium on Intelligent Control (93-Present)
- Reviewer for IEEE Conference on Fuzzy Systems (96-Present)
- **Program Committee** for IEEE Symposium on Intelligent Control (96, 99, 01, 03,05)
- **Chaired sessions** in Conference in Decision and Control (1997-till date)
- Reviewer for IEE Transactions and Proceedings (1995-Present)
- Reviewer for ASME Transactions on Measurements, Dynamics and Control (94-present)
- Reviewer for IEEE Transactions on Robotics and Automation (95-Present)
- Reviewer for IEEE Transactions on Information Technology in Biomedicince (99-Present)
- Reviewer for International Journal of Adaptive and Signal Processing
- Reviewer for Automatica (95-Todate)
- Reviewer, IEEE Transactions on Networking (99-Todate)
- Reviewer, Neurocomputing (04-)
- **Finance Chair**, 2004 IEEE Symposium on Intelligent Control
- **Program Committee,** 2004 IEEE Conference on Cybernetics and Intelligent Systems (http://cis-ram.nus.edu.sg/)
- **Program Committee,** 2004 International Conference on Intelligent Knowledge Systems (IKS), Turkey (http://www.ikss.org/iks-2004.htm)
- **Steering Committee,** 2005 International Congress for Global Science and Technology
- **Publicity Chair,** 2006 International Conference on Networking, Sensing and Control
- **Invited Sessions Chair,** 2006 International Symposium on Intelligent Control
- **Program Chair,** 2007 International Symposium on Intelligent Control as part of first multi conference on systems and control, Singapore
- **Publicity Chair,** 2007 International Symposium on Adaptive Dynamic Programming
- **International Technical Program Committee,** 2008, 2009 International Conference of Wireless Communication and Networking (IEEE WCNC)
- **Program Committee,** 2008 IEEE International Joint Conference on Neural Networks
- **Program Committee,** 2009 International Conference on Systems of Systems Engineering (SoSE)
- **Program Committee,** 2009,2010 IEEE Globecom
- **Program Committee**, 2009 IEEE ADPRL
- **Invited Session Chair,** 2009 IEEE Mediterranean Symposium on Controls and Automation
- **Program Committee,** 2009, 2010 IEEE IJCNN, July 20-23, Barcelona, Spain
- **Program Committee,** 2010 8th International Conference on Controls and Automation (IEEE ICCA), June 9-11th, Xiamen, China
- **Program Committee,** 2010 IEEE Wireless Communications and Networking Conference, April 18-22nd, Sydney, Australia
- **Program Committee,** 2010 7th International Conference on Informatics in Control, Automation and Robotics (ICINCO 2010), 15-18th June, Portugal

- **Program Committee,** 2010 Knowledge-based Intelligent Information and Engineered Systems (KES), Sept. 8-10th, Cardiff UK
- **Program Committee,** 2009, 2010 IEEE SenseApp, Oct 11th-14th, Denver, CO
- **Program Committee,** 2011 3rd International Symposium on Computational Intelligence and Data Mining, Paris (CIDM), April 11-25, 2011.
- **Program Chair, CCA part of** 2011 IEEE Multi-Conference on Systems and Control, Sept 28-30th, Denver CO
- **Program Chair,** 2011 IEEE ADPRL, April 11-15, Paris, France
- **Member of the International Technical Program Committee,** IEEE International Joint Conference on Neural Networks, (IJCNN), July 29-August 5, 2011, San Jose, CA.
- **Member of the International Technical Program Committee,** 8th International Conference on Informatics in Control, Automation and Robotics (ICINCO 2011), 15-18th June, 2011, Portugal.
- **International Program Committee,** 2011 IEEE International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob 2011) Shanghai China, October 10-12.
- **Technical Program Committee,** 2012 IEEE International Conference on Communications (ICC)
- **International Program Committee,** 2012 IEEE Conference on Control Applications
- **Registration Chair,** 2012 IEEE Conference on Decision and Control, Hawaii, Dec 2012.
- **Program Co-Chair,** 2013 IEEE ADPRL, April 15-19, Singapore
- **Vice Chair, Technical Committee on Adaptive Dynamic Programming and Reinforcement Learning, IEEE CIS (2013)**
- **International Program Committee**, 9th International Conference on Knowledge, Information and Creativity Support Systems, Kraków, Poland, from November 7 to 9, 2013
- **Sponsors and Exhibits Chair,** 2013 IEEE Conference on Neural Networks, Dallas, Texas
- **International Program Committee Member,** 2013 IASTED International Conference on Control and Applications (CA 2013) August 2013**.**
- **International Program Committee Member**, 2013 Informatics in Control, Automation and Robotics ICINCO,
- **International Program Committee Member**, 2013 10th IEEE International Conference on Control & Automation (ICCA)
- **International Program Committee Member,** 2013 IEEE ICC Wireless Communications Symposium
- **International Advisory Committee,** 2014 ACODS
- **Program Co-Chair Chair,** 2014 IEEE Adaptive Dynamic Programming and Reinforcement Learning, Orlando, December 2014
- **International Program Committee,** 2014 IEEE Multi Conference on Systems and Control, Antibes, France, October 2014
- **International Program Committee**, International Conference on Contemporary Computing and Informatics (IC3I), Mysore, India, November 27-29, 2014.
- **International Program Committee**, The 7th International Conference on Network Security &Applications(CNSA-2014), Zurich Switzerland
- **General Chair,** Sixth International Conference on Networks & Communications (NETCOM – 2014), Chennai, India
- **International Program Committee**, 9th International Conference on Knowledge, Information and Creativity Support Systems, Tokyo, Japan
- **International Program Committee Member**, 2014 Informatics in Control, Automation and Robotics ICINCO, October

- **International P**rogram **Committee member,** 2014 eKNOW, The Sixth International Conference on Information, Process, and Knowledge Management, Barcelona, July 2014.
- **Advisory Committee Member,** International Conference on Recent Developments in Control, Automation and Power Engineering **(RDCAPE 2015) http://rdcape.com/** on 12-13 March 2015.
- International Program Committee Member, ICPRAM 2015 http://www.icpram.org/RegistrationFees.aspx.
- International Program Committee Member, The first International Conference on Cognitive Computing and Information Processing (CCIP-15) at JSSATEN on 3-4th, March 2015.
- **International Program Committee Member**, 2015 Informatics in Control, Automation and Robotics ICINCO, October.
- **Associate Editor and International Program Committee Member**, 2015 International Joint Conference on Neural Networks (IJCNN 2015) which will take place in Killarney, Ireland, July 12-17, 2015.
- **Associate Editor**, 2015 IEEE Multi-conference on Systems and Control, Sydney Australia, Sept 21-24, 2015.
- **International Program Committee Member**, 2015 Wireless Communications Symposium (ICC 2015)
- **International Program Committee Member**, 2015 IEEE Adaptive Dynamic Programming and Reinforcement Learning, Cape Town, South Africa, December 2015.
- **International Advisory Committee**, Biennial International Conference on Control, Measurement and Instrumentation (CMI 2016), January 08-10, 2016.
- International Program Committee Member, ICPRAM 2016 http://www.icpram.org/RegistrationFees.aspx.
- **International Technical Program Committee Member**, The twelfth International Conference on Autonomic and Autonomous Systems, June 26 - 30, 2016 - Lisbon, Portugal.
- **International Program Committee Member**, The Seventh International Conference on Adaptive and Self-Adaptive Systems and Applications, March 20 - 24, 2016 - Rome, Italy.
- **International Advisory Program Committee**, National Conference in the field covering Electronics, Communication, Power Electronics and Computer Science during July 2016.
- **International Program Committee Member**, International Conference on Advances in Intelligent Control and Automation (ICAICA 2016)during March 10-12, 2016. http://rljit.co.in/icaica2016/..
- **International Program Committee Member**, 4th IFAC International Conference on Intelligent Control and Automation Sciences (ICONS 2016), in Reims, France, June 1-3, 2016.
- **International Program Committee Member**, The Eighth International Conference on Information, Process, and Knowledge Management, eKNOW April 24 - 28, 2016 - Venice, Italy.
- **International Program Committee Member**, IEEE First International Conference on Control, Measurement and Instrumentation (CMI 2016), January 8-10, Kolkota, India. www.cmi2016india.org
- **International Program Committee Member**, IEEE International Conference on Advanced Networks and Telecommuncations Systems (ANTS), Bangalore, India https://edas.info/Tyn.php?tpc=999032496.
- International Program Committee Member, ICPRAM 2017 http://www.icpram.org/RegistrationFees.aspx.
- **International Program Committee Member**, India Controls Conference, Ghawhati, January 2017.

Other Academic Activities:

* Member, Dean's Scholar Selection Committee (2016)
* Member, Tenure Policy Committee (2016-)
* Search Committee Chair, Controls Strategic Hire (2015-2016)
* Search Committee Chair, ECE Department Chair (2012-2014)
* Member, ECE representative of the Budget Affairs Committee (2009-2014)
* Member, Electronics Faculty Position Recruitment Committee (2012)
* Member, Public Occasions (2011-2014)
* Controls Area Coordinator (2011-2015)
* Member, Dept Executive Committee (2011-
* Member, Campus Professional Degree Selection Committee (2010-2012)
* Promotion and Tenure Evaluation Faculty member, Engineering Management and Systems Engineering (2010)
* Dept. P&T Chair (2010-2014)
* Member, University Wide Tenure Committee (2009)
* Faculty Service Awards Committee (2009)
* ECE Representative, Promotion and Tenure Policy Committee (2008-10)
* Chair, Control Systems Search Committee (2007-08)
* ECE representative, Campus Tenure Committee (07-08)
* Member, Compliance Committee(07-15)
* Member, UM Patent Committee (06-15)
* Member, Faculty Recruitment Committee Power (2006)
* Member, Academic Freedom Committee(05-09)
* Member, Communications Faculty Recruitment Committee (2005)
* Member, School of Engineering Honors Committee (03-06)
* Member, School of Engineering Awards Committee (02-05)
* Member, Dept Graduate Curriculum Committee (06-todate)
* Member, Dept. Laboratory Committee (02-05)
* Member, Library Committee (04-05)
* Advisor, IEEE Student Branch (03-10)
* Member, Graduate Faculty Council
* University of Texas Honors Program Committee
* University of Texas Graduate Studies Committee
* UTSA Library Committee.
* UTSA EE Faculty Committee.
* UTSA College of Engineering Implementation Committee.
* Member, Academic Policy and Curricula Committee
* Member, Committee for Several Graduate Students

Administrative Experience

1. Currently managing NSF I/UCRC Center with several companies, faculty members and part of 60+ company members over four campus network.
2. Established Embedded Systems and Networking Laboratory at the University of Missouri-Rolla.
3. Worked with other faculty on the Bioengineering Ph.D. Proposal for EE Department at UTSA and University Health Science Center. It is approved in 2001.
4. Assisted the Dean to develop Electrical Engineering Ph.D. Proposal at University of Texas at San Antonio.
5. Director & Consultant, Systems and Controls Research, Caterpillar, Inc from 1996-1998, where I supervised a total of 15 engineers with budgets planned every year. My responsibilities included hiring and guiding people.
6. Established Intelligent Systems Laboratory, funded by several agencies, at Univ. of Texas at San Antonio. Several faculty members later joined the laboratory.

Recent Keynote Talks

1. "Cyber-physical Systems", IEEE CIS and Signal Processing Workshop, held in Ahmedabad, April 11-13, 2017.
2. "A Novel Hybrid Reinforcement Learning Approach and its Application to Optimal Control of Dynamic Systems", IEEE Computational Intelligence Workshop, Chennai, January 2nd, 2017.
3. "Event-triggered Control", IEEE CSS workshop on CPS, Jan 5-8th, 2017.
4. "Cyber-physical Systems and its application to Smart Cities", International Conference on Smart Cities, December 2016.
5. "A Novel Hybrid Reinforcement Learning Approach and its Application to Optimal Control of Dynamic Systems", 2nd Cognitive Conference, Mysore, India, August 2016.
6. "Neural Networks and Control", in IEEE Workshop on Computational Intelligence, Bengaluru, August 2016.
7. "Neural Networks and Control", in IEEE Workshop on Computational Intelligence, Ahmedabad, March 2016.
8. "Event Driven Adaptive Dynamic Programming", in IEEE Workshop on Computational Intelligence, Kanpur, India 2015.
9. "Optimal adaptive control of uncertain continuous-time systems", in 2013 Chinese Conference on Decision and Control, Guiyang, China, May 25th, 2013.
10. Delivered keynote on "Cyber-Physical Systems", in NETCOM, Chennai, Dec 23rd, 2012
11. Delivered a talk in 2007 Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP), Dec 2007, Melbourne
12. Delivered a keynote talk at "Neural Network Control", ANNIE 2009.

REFEREED JOURNAL PAPERS

1. Vignesh Narayanan and S. Jagannathan, “A reinforcement learning with exploration-based event-triggered distributed control of nonlinear interconnected systems”, IEEE Transactions on Cybernetics, accepted for publication, August 2017.

2. Bo Fan, Qinmin Yang, S. Jagannathan, and Youxian Sun, “Asymptotic tracking controller design of nonlinear systems with guaranteed performance”, IEEE Transactions on Cybernetics, accepted for publication, July 2017.

3. Dzung Tran, Tansel Yucelen, Selahattin B. Sarsilmaz, S. Jagannathan, “Distributed input and state estimation using local information in heterogeneous sensor networks”, Journal of Frontiers in Robotics and AI, section Multi-Robot Systems, accepted for publication, June 2017.

4. B. Talaei, S. Jagannathan, and J. Singler, "Boundary control of two-dimensional Burgers PDE using approximate dynamic programming", IEEE Transactions on Neural Networks and Learning Systems, conditionally accepted for publication, April 2017.

5. Haci Guzey, Travis Dierks, S. Jagannathan, and Levent Acar, “Hybrid consensus-based control of nonholonomic mobile robot formation", Journal of Intelligent and Robotic Systems, accepted for publication, March 2017.

6. Nathan Szanto, V. Narayanan, S. Jagannathan, “Event-sampled direct adaptive neural network output- and state-feedback control of uncertain strict-feedback system”, IEEE Transactions on Neural Networks and Learning Systems, accepted for publication, February 2017.

7. B. Talaei, S. Jagannathan, and J. Singler, "Boundary control of linear uncertain one-dimensional parabolic PDE using approximate dynamic programming", IEEE Transactions on Neural Networks and Learning Systems, accepted for publication, February 2017.

8. B. Talaei, S. Jagannathan, and J. Singler, “Output feedback boundary control of uncertain coupled semi-linear parabolic PDE using neuro dynamic programming”, IEEE Transactions on Neural Networks and Learning Systems, accepted for publication, February 2017.

9. Vignesh Narayanan and S. Jagannathan, “Event-triggered distributed approximate optimal state and output control of affine nonlinear interconnected systems”, IEEE Transactions on Neural Networks and Learning Systems, accepted for publication, April 2017.

10. S. Kazemlou, S. Mehareen, H. Saberi, and S. Jagannathan, “Stability of the small-scale interconnected DC grids via output-feedback control”, IEEE Journal of Emerging and Selected Topics in Power Electronics, vol. 5, no. 3, pp. 960-970, September 2017.

11. W. Meng, Q. Yang, S. Jagannathan, and Y. Sun, “Decentralized control of nonlinear multi-agent systems with asymptotic consensus”, IEEE Transactions on Systems, Man and Cybernetics, vol. 47, no. 5, pp 749-757, May 2017.

12. H. Ferdowsi and S. Jagannathan, “Decentralized fault tolerant control of a class of nonlinear interconnected systems”, International Journal of Control, Automation, and Systems, vol. 15, no. 2, pp. 527-536, 2017.

13. A. Sahoo, Hao Xu and S. Jagannathan, “Approximate optimal control of affine nonlinear continuous-time systems using event sampled neuro dynamic programming”, IEEE Transactions on Neural Networks and Learning Systems, vol. 28, no. 3, pp. 639-652, March 2017.

14. A. Sahoo and S. Jagannathan, “Stochastic optimal regulation of nonlinear networked control systems by using event driven adaptive dynamic programming”, IEEE Transactions on Systems, Man and

Cybernetics, vol. 47, no. 2, pp. 425-438, February 2017.

15. A. Sahoo, H. Xu and S. Jagannathan, “Near optimal event-triggered control of nonlinear discrete-time systems using neuro dynamic programming”, IEEE Transactions on Neural Networks and Learning Systems, Vol. 27, Issue 9, pp. 1801 – 1815, September 2016.

16. V. Narayanan and S. Jagannathan, "Distributed adaptive optimal regulation of uncertain large-scale interconnected systems using hybrid Q-learning approach," IET Transactions on Control Theory & Applications, vol. 10, no. 12, pp. 1448-1457, 2016.

17. N. Guzey, M. T. Ghasr, and S. Jagannathan, “Analysis of localization methods for unintended emitting sources”, IOP Journal of Measurement Science and Technology,` vol.27, no 10, page 105104-105113, September 2016.

18. J. Ding, Y. Song, T. Chai, S. Jagannathan, F.L. Lewis, Guest Editorial, IET Transactions on Control Theory and Applications, Volume 10, Issue 12, p. 1319 – 1321, August 2016.

19. Jia Cai, H. Ferdowsi and S. Jagannathan, “Model-based fault detection, estimation and prediction for a class of linear one dimensional PDE”, Automatica, vol. 66, pp. 122-131, March 2016.

20. Haifeng Niu, E. Taquiedin, and S. Jagannathan, “EPC Gen2v2 RFID standard authentication and ownership management protocol”, IEEE Transactions on Mobile Computing, , vol. 15, no. 1, pp. 137-149, 2016.

21. A. Sahoo, H. Xu and S. Jagannathan, “Neural network-based event-triggered state feedback control of nonlinear continuous-time systems”, IEEE Transactions on Neural Networks and Learning Systems, vol. 27. No. 3, pp.497-509, March 2016.

22. A. Sahoo, H. Xu and S. Jagannathan, “Adaptive neural network-based event-triggered control of single-input single-output nonlinear discrete time systems”, IEEE Transactions on Neural Networks and Learning Systems, vol. 27, no. 1, pp. 151-164, January 2016.

23. Haci Guzey, Hao Xu and S. Jagannathan, “Neural network-based finite horizon optimal adaptive consensus control of mobile robot formations”, Optimal Control, Methods and Applications, vol. 37, pp. 1014–1034, 2015.

24. Haifeng Niu and S. Jagannathan, “Optimal defense and control of dynamic systems modeled as cyber-physical systems”, Journal of Defense Modeling and Simulation, (invited paper) vol. 12, no. 4, pp. 423-438, 2015.

25. Qiming Zhao, Hao Xu, and S. Jagannathan, “Finite-horizon near optimal adaptive control of uncertain linear discrete-time systems”, Optimal Control, Applications, and Methods, vol. 36, no. 6, pp. 853-872, November/December 2015.

26. Q. Yang, S. Jagannathan and Y. Sun, “Robust integral of neural network and error sign control of MIMO nonlinear systems”, IEEE Transactions on Neural Networks and Learning Systems, vol. 26, no. 12, pp. 3278-3286, 2015, December 2015.

27. H. Zargarzadeh, T. Dierks, and S. Jagannathan, “Optimal control of nonlinear continuous-time systems in strict-feedback form”, IEEE Transactions on Neural Networks and Learning Systems, vol. 26, no. 10, pp. 2535-2549, October 2015.

28. Hao Xu, Qiming Zhao, and S. Jagannathan, “Finite-horizon near optimal output feedback neural network control of quantized nonlinear discrete-time systems with input constraint, IEEE Transactions on Neural Networks and Learning Systems, vol. 26, no. 8, pp. 1776-1788, August 2015.

29. N. Guzey, Hao Xu, and S. Jagannathan, "Localization of near-field sources in spatially colored noise", IEEE Transactions on Instrumentation and Measurement, vol. 64, no. 8, pp 2302-2311, August 2015.

30. Qiming Zhao, Hao Xu, and S. Jagannathan, "Optimal control of uncertain quantized linear discrete-time systems", International Journal of Adaptive Control and Signal Processing, vol. 29, no. 3, pp. 325-345, March 2015.

31. Qiming Zhao, Hao Xu, and S. Jagannathan, "Neural network-based finite-horizon optimal control of quantized uncertain affine nonlinear discrete-time systems", IEEE Transactions on Neural Networks and Learning Systems, vol. 26, no. 3, pp. 486-499, March 2015.

32. Hao Xu and S. Jagannathan, "Neural network based finite horizon stochastic optimal control design for nonlinear networked control systems", IEEE Transaction on Neural Networks and Learning Systems, vol. 26, no. 3, pp. 472-485, March 2015.

33. V. Thotla, M. Zawodniok, M. Ghasr, S. Jagannathan, and S. Agarwal, "Detection and localization of multiple R/C electronic devices using array detectors", IEEE Transactions on Instrumentation and Measurement, vol. 64, no. 1, pp. 241-251, January 2015.

34. Hao Xu. A. Sahoo, and S. Jagannathan, "Stochastic adaptive event-triggered control and network scheduling protocol co-design for distributed networked systems", IET Transactions on Control Theory and Applications, vol. 8, issue 18, pp. 2253-2265, December 2014.

35. N. Guzey, Hao Xu, and S. Jagannathan, "Localization of near field radio controlled unintended emitting sources in the presence of multipath fading", IEEE Transactions on Instrumentation and Measurement, Vol. 63, no. 11, pp. 2696-2703, Nov 2014.

36. Qiming Zhao, Hao Xu, and S. Jagannathan, "Near optimal output feedback control of nonlinear discrete-time systems based on neural network reinforcement learning", IEEE/CAA Journal of Acta Automatica Sinica, Vol. 1, no. 4, pp. 372-384, October 2014. (invited paper).

37. R. Basheer and S. Jagannathan, "Localization and tracking of objects using cross-correlation of shadow fading noise", IEEE Transactions on Mobile Computing, vol. 13, no. 10, pp. 2293-2305, Oct 2014.

38. Hao Xu, S. Jagannathan, and F.L. Lewis, "Stochastic optimal output feedback design for unknown linear discrete-time system zero-sum games under communication constraints", Asian Journal of Control, vol. 16, no. 5, pp. 1263-1276, Sept 2014. (invited paper).

39. Hao Xu, Qiming Zhao and S. Jagannathan, "Optimal regulation of uncertain dynamical systems by using adaptive dynamic programming", Chinese Journal of Control and Decision Sciences, Vol. 1, no. 3, pp. 226-256, July 2014. (Invited paper for Special Inaugural Issue).

40. Balaje Thumati, Miles Fienstein and S. Jagannathan, "A model based fault prognostics scheme for Takagi-Sugeno systems", IEEE Transactions on Fuzzy Systems, vol. 22, no. 4, pp. 736-748, June 2014.

41. W. Meng, Q.Yang, S. Jagannathan, and Y. Sun "Adaptive neural control of high-order uncertain nonaffine systems: A transformation to affine systems approach", Automatica, vol. 50, no.5, pp.1473-1480, May 2014.

42. Balaje Thumati and S. Jagannathan, "A model based fault prognostics scheme for uncertain nonlinear discrete-time systems with multiple distinct faults", Transactions of the Institute of Measurement and Control, UK, Vol. 36, no.4, pp. 445-464, May 2014.

43. H. Ferdowsi, S. Jagannathan, and M. Zawodniok, "An online outlier identification and removal scheme for improving fault detection performance", IEEE Transactions on Neural Networks and Learning Systems, vol. 25, no. 5, pp. 908-919, May 2014.

44. Hassan Zargarzadeh, Travis Dierks and S. Jagannathan, "Adaptive neural network based optimal control of nonlinear continuous-time systems in strict feedback form", International Journal of Adaptive Control and Signal Processing, Vol. 28, no. 3-5, pp. 305-324, March-May 2014.

45. David Nodland, H. Zargarzadeh, A. Ghosh, and S. Jagannathan, "Neuro-optimal control of an unmanned helicopter", Journal of Defense Modeling and Simulation, in Guest editorial by Greg Hudas, D. Mikulski, and F. Lewis, vol. 11, no. 1, pp.5-18, January 2014.

46. S. Mehraeen, T. Dierks, S. Jagannathan, and Mariesa Crow, "Zero-sum two-player game theoretic formulation of affine nonlinear discrete-time systems using neural networks", IEEE Transactions on Systems, Man and Cybernetics, vol. 43, no. 6, pp. 1641-1655, December 2013.

47. V. Thotla, M. Ghasr, M. Zawodniok, S. Jagannathan, and S. Agarwal, "Detection of super-regenerative receivers using Hurst parameter", IEEE Transactions on Instrumentation and Measurement, vol. 62, no. 11, pp. 3006-3014, November 2013.

48. H. Ferdowsi and S. Jagannathan, "A unified model-based fault diagnosis scheme for nonlinear discrete-time systems with additive and multiplicative faults", Transactions of the Institute of Measurement and Control, pp. 452-462, vol. 35, no. 6, August 2013.

49. T. Dierks, B. Brenner and S. Jagannathan, "Neural network-based optimal control of mobile robot formation with reduced information exchange", IEEE Transactions on Control Systems Technology, vol. 21, no. 4, 1407-1415, July 2013.

50. Qiming Zhao, Hao Xu, and S. Jagannathan, "Fixed final time optimal adaptive control of linear discrete-time systems in input-output form", Journal of Artificial Intelligence and Soft Computing Research, vol. 3, no. 3, pp. 175-187, 2013. DOI 10.2478/jaiscr-2014-0012 (invited paper).

51. J. Hertenstein and S. Jagannathan, "Simulation and detection of unintended electromagnetic emissions from super-regenerative receivers", IEEE Transactions on Instrumentation and Measurement, vol. 62, no. 7, pp. 2093-2100, July 2013.

52. M. Ghasr, Vivek Thotla, M. Zawodniok and J. Sarangapani, "Detection of super regenerative receiver using amplitude modulated stimulation", IEEE Transactions on Instrumentation and Measurement, vol. 62, no. 7, pp. 2029-2036, July 2013.

53. David Nodland, Hassan Zargarzadeh and S. Jagannathan, "Neural network-based optimal adaptive output feedback control of a helicopter UAV", IEEE Transactions on Neural Networks and Learning Systems, vol. 24, no. 7, pp. 1061-1073, July 2013.

54. R. Basheer and S. Jagannathan, "Localization of RFID tags using stochastic tunneling", IEEE Transactions on Mobile Computing, Vo. 12, no. 6, pp. 1225-1235, June 2013.

55. B. T. Thumati, G. Halligan and S. Jagannathan, "A novel fault diagnostics and prognostics scheme using a nonlinear observer with artificial immune system as an online approximator", IEEE Transactions on Control Systems Technology, vol. 21, no. 3, pp. 569-578, May 2013.

56. Hao Xu and S. Jagannathan, "Stochastic optimal controller design for uncertain nonlinear networked control system via neuro dynamic programming", IEEE Transactions on Neural Networks and Learning Systems, , vol. 24, issue. 3, pp. 471-484, March 2013.

57. Priya Kasirajan, Carl Larsen, and S. Jagannathan," A new data aggregation scheme via adaptive compression for wireless sensor networks", ACM Transactions on Sensor Networks, vol.9, no.1, pp. 5:1-5:26, Feb. 2013.

58. Hao Xu and S. Jagannathan, “Optimal adaptive distributed power allocation for enhanced cognitive radio network in the presence of channel uncertainties”, International Journal of Computer Networks and Communications, vol. 5, no. 1, pp. 1-20, January 2013.

59. Hassan Zargarzadeh, S. Jagannathan and J. Drallmeier, “Optimal adaptive NN control of nonaffine nonlinear discrete-time systems with application to HCCI engines”, International Journal of Adaptive Control and Signal Processing, pp. 592-613, vol. 26, no. 7, 2012. (invited paper)

60. J. Massey, J.B. Bettis, J. Drallmeier and J. Sarangapani, “A thermodynamic based HCCI engine model for adaptive nonlinear controller development" , Proceedings of the Institution of Mechanical Engineers, Part D, Journal of Automobile Engineering, Volume 226, no. 11, pp. 1547 - 1563, November 2012.

61. Travis Dierks and S. Jagannathan, “Online optimal control of affine nonlinear discrete-time systems with unknown internal dynamics by using time-based policy update”, IEEE Transactions on Neural Networks and Learning Systems, vol. 23, no. 7, July 2012.

62. Hao Xu, S. Jagannathan, F. L. Lewis, “Stochastic optimal control of unknown networked control systems in the presence of random delays and packet losses”, Automatica, vol. 48, no. 6, pp. 1017-1030, June 2012. (second highly downloaded paper per the journal website)

63. Q. Yang and S. Jagannathan, “Reinforcement learning controller design for affine nonlinear discrete-time systems using online approximators”, IEEE Transactions on Systems, Man and Cybernetics: Part B, vol. 42, no. 2, pp. 377-390, April 2012.

64. T. Dierks, B. Thumati, and S. Jagannathan, “An online model-based fault accommodation scheme for nonholonomic mobile robots in formation”, Journal of Defense Modeling and Simulation, in Guest editorial by Greg Hudas, D. Mikulski, and F. Lewis, vol. 9, no. 1, pp.17-32, January 2012.

65. A. Soylemezoglu, S. Jagannathan and C. Saygin, “Mahalanobis-Taguchi system as a multi-sensor based decision making prognostics tool for centrifugal pump”, IEEE Transactions on Reliability, vol.60, no.4, pp.864-878, December 2011.

66. S. Mehraeen and S. Jagannathan, “Decentralized near optimal control of a class of interconnected nonlinear discrete-time systems by using online Hamilton-Jacobi-Bellman formulation”, IEEE Transactions on Neural Networks, vol. 22, no. 11, pp. 1757-1769. November 2011.

67. S. Mehraeen, S. Jagannathan, and M. L. Crow, “Decentralized dynamic surface control of large scale interconnected systems in strict feedback form by using neural networks with asymptotic stabilization”, IEEE Transactions on Neural Networks, vol.22, no. 11, pp. 1709-1722. November 2011.

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69. C. Saygin and S. Jagannathan, “Radio frequency identification (RFID) enabling lean manufacturing”, International Journal of Manufacturing Research, vol. 6, no. 4, pp. 321-336, 2011.

70. S. Ferrari, S. Jagannathan and F. Lewis, “Approximate dynamic programming and reinforcement learning: editorial”, Journal of Control Theory and Applications, vol. 9, no.3, pp.309, August 2011.

71. T. Dierks and S. Jagannathan, “Online optimal control of nonlinear discrete-time systems using approximate dynamic programming”, Journal of Control Theory and Applications, vol. 9, no.3, pp.361-369, August 2011.

72. Gary Halligan and S. Jagannathan, “PCA-based fault isolation and prognostics with application to pump”, International Journal of Advanced Manufacturing Technology, vol. 55, no. 5, pp. 699-707, 2011.

73. E. Taqieddin, A. Miller and S. Jagannathan, Survivability and reliability analysis of the trusted link state protocol for wireless ad hoc networks", International Journal of Wireless and Mobile Networks, vol. 3, no. 2, pp. 77-89, April 2011.

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79. T. Dierks and S. Jagannathan, "Neural network output feedback control of robot formations", IEEE Transactions on Systems, Man and Cybernetics: Part B, vol.40, no. 2, pp. 383-399, April 2010.

80. B. Thumati and S. Jagannathan, "A model based fault detection and prediction scheme for nonlinear multivariable discrete-time systems with asymptotic stability guarantees", IEEE Transactions on Neural Networks, vo. 21, no.3, pp. 404-423, March 2010. (A short review appeared in IEEE Computational Intelligence Magazine)

81. S. Mehraeen, S. Jagannathan, and K. Corzine, "Energy harvesting from vibration with high voltage (>100V) scavenging circuitry and tapered cantilever beam", IEEE Transactions on Industrial Electronics, vol.57, no. 3, pp. 820-830, March 2010.

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185. W. Liu, S. Jagannathan, G.K. Venayagamoorthy, D. Wunsch and M. Crow, “Neural Network Stabilizing Control of Single Machine Power System with Control Limits”, Proc. of the IEEE International Joint Conference on Neural Networks, pp. 1823-1828, July 2004.

186. N. Regatte and S. Jagannathan, "A new fair scheduling MAC protocol for wireless sensor networks", Sensor-Actuator Networks, International Conference on Embedded Systems and Applications, June 2004.

187. N. Regatte and S. Jagannathan, "Adaptive and distributed fair scheduling scheme for wireless adhoc networks", Proc. of the Word Wireless Congress, pp. 101-106, May 2004.

188. Sarat Dontula and S. Jagannathan, "Active link protection with distributed power control of wireless networks", Proc. of the World Wireless Congress, pp. 612-617, May 2004.

189. M. Zawodniok and S. Jagannathan, "A distributed power control MAC protocol for wireless adhoc networks", Proc. of the IEEE Wireless Communications and Networking Conference, vol. 3, pp. 1915-1920, March 2004.

190. S. Jagannathan, M. Zawodniok, and Q. Shang, "Distributed power control of wireless cellular networks in the presence of channel uncertainties", IEEE INFOCOM, vol.2, 1055-1066, March 2004.

191. S. Jagannathan and Hameed Mohammed, "Adaptive force-balancing control of MEMS gyroscope with actuator limits", Proc. of American Controls Conference, vol.2, pp. 1862-1867, 2004.

192. Pingan He and S. Jagannathan, "Discrete-time neural network output feedback control of nonlinear systems in nonstrict feedback form", Proc. of the American Controls Conference, vol.3, pp, 2439-2444, 2004.

193. Pingan He and S. Jagannathan, "Reinforcement-learning based output feedback control of nonlinear systems with input constraints", Proc. of the American Controls Conference, vol. 3, pp. 2563-2568, 2004.

194. Pingan He and S. Jagannathan, "Adaptive critic neural network-based controller for nonlinear systems with input constraints", Proc. of the IEEE Conference on Decision and Control, vol. 6, pp. 5709-5714, 2003.

195. Pingan He and S. Jagannathan, "Discrete-time neural network control of a class of nonlinear systems in nonstrict feedback form", Proc. of the IEEE Conference on Decision and Control, vol. 6, pp. 5703-5708, 2003.

196. S. Subramanya, S. Jagannathan, and Mingsheng Peng, "End to end rate-based congestion control of multi-media traffic in packet switched networks", Proc. of the IEEE Conference on Multimedia and Expo, vol.3, pp. 357-360, Aug. 2003.

197. S. Subramanya, Mingsheng Peng and J. Sarangapani, "Rate-based end to end congestion control of packet switched networks", Proc. of the IEEE Conference on Infor. Technology, pp. 342-346, July 2003.

198. Pingan He and S. Jagannathan, "Lean combustion stability of spark ignition engines using backstepping scheme", Proc of the IEEE Conference on Controls Applications, vol.1, pp. 167-172, 2003.

199. Ping an He and S. Jagannathan, "Neuro emission controller for minimzing cyclic dispersion in spark ignition engines", Proc of the IEEE Joint Conference on Neural Networks, vol. 2, pp. 1535-1540, 2003.

200. Ping an He, S. Jagannathan and S. Balakrishnan, "Adaptive critic-based neural network controller for nonlinear systems with unknown deadzones", Proc of the IEEE Conference on Decision and Control, vol.1, pp. 955-960, Dec 2002.

201. S. Jagannathan, "A system theoretic approach to the design of admission controller for high-speed

networks", Proc of the IEEE Conference on Decision and Control, vol.4, pp. 3638-3643, Dec 2002.

202. S. Jagannathan, A. Chronopoulos, and S. Ponipireddy, "Distributed power control in wireless communication systems", Proc of the IEEE International Conference on Computer Communications and Networks, pp. 493-496, Nov. 02.

203. S. Jagannathan, "A hybrid system theoretic approach for admission control design in multimedia networks", Proc of the IEEE International Conference on Local Computer Networks, pp. 150-159, Nov 2002.

204. S. Jagannathan, "End to end congestion control of multicast high-speed networks", Proc of the IEEE International Conference on Local Computer Networks", pp. 547-556, Nov 2002.

205. S. Jagannathan, A. Tohmaz, A. Chronopoulos, and H.G. Cheung, "Adaptive admission control of multimedia traffic in high-speed networks", Proc. of the IEEE Symposium on Intelligent Control, pp. 728-733, Oct 2002.

206. S. Jagannathan, "Adaptive critic neural network-based controller for nonlinear systems", Proc. of the IEEE Symposium on Intelligent Control, pp. 303-308, Oct 2002.

207. S. Jagannathan, "End to end congestion control of packet switched networks", Proc. of the IEEE Conference on Control Applications", vol. 1, pp. 519-524, Sept. 2002.

208. S. Jagannathan, "Admission controller design for high-speed networks: A hybrid systems approach", Proc. of the IEEE Conference on Control Applications", vol. 1, pp. 542-546, Sept. 2002.

209. A. Chronopoulos, S. Ponipireddy, and S. Jagannathan, "Constructing energy efficient broadcast trees in wireless adhoc networks", Proc of the International Symposium on Parallel and Distributed Computing, Romania, pp. 205-213, July 2002.

210. A. Chronopoulos and S. Jagannathan, "A distributed discrete-time neural network architecture for pattern allocation and control", Proc. of IEEE Symposium on Parallel and Distributed Systems (IPADS), Workshop on Bio-Inspired Solutions to Parallel Processing Problems (BioSP3), April 15-19, pp. 204-211, 2002.

211. G. Galan and S. Jagannathan, "Adaptive critic-based object grasping controller for a three-fingered gripper", Proc of the IEEE Conference on Decision and Control, vol.4, pp. 3140-3145, Dec. 2001.

212. S. Jagannathan A. Tohmaz, "congestion control of ATM networks using a Learning Methodology", Proc. of the IEEE Conference on Control Applications, pp. 135-140, September 2001.

213. S. Jagannathan, Annie Levesque and Yesh Singh, "Approximation-based control and avoidance of a mobile base with an onboard arm for MARS greenhouse operation", Proc of the IEEE Symposium on Intelligent Control, pp. 103-108, September 2001.

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215. S. Jagannathan and J. Talluri, "Congestion control of ATM networks using a multilayered approach: multiple sources/single buffer scenario", Proc of American Controls Conference, vol.5, pp. 3789-3794, June 2001.

216. S. Jagannathan, Annie Levesque and Yesh Singh, "Adaptive network control of a mobile base with an arm", Proc of the American Controls Conference, pp. 606-611, 2001.

217. S. Jagannathan, "Control of a multiple link robot arm at very high speeds for an industrial

application", Proc. of the American Controls Conference, vol. 2, pp. 793-798, June 2001.

218. S. Jagannathan, G. Galan and F. L. Lewis, "Control of autonomous underwater vehicles using neural network Approach", Proc of the IFAC Symposium on System Structure and Control, August 2001.

219. S. Jagannathan and J. Talluri, "Predictive congestion control of ATM networks: multiple sources/single buffer scenario", Proc of IEEE Conference on Decision and Control, vol.1, pp. 47-52, Dec. 2000.

220. S. Jagannathan and J. Talluri, "Traffic Rate Control of ATM Networks Using Neural Network Approach: Single Source/Single Buffer Scenario", Proc of the IEEE Symposium on Intelligent Control, pp. 315-320, July 2000.

221. S. Jagannathan and J. Talluri, "Adaptive traffic rate control of ATM networks", Proc of the American Control Conference, vol.3, pp.1577-1581, June 2000.

222. S. Jagannathan and G.V.S. Raju, "Remaining useful life prediction of automotive engine oils using MEMS technologies", Proc. of the American Controls Conference, vol.5, pp.3511-3512, June 2000.

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224. S. Jagannathan, "Robust backstepping control of a robotic systems using neural networks", Proceedings of the IEEE Conference on Decision and Control, vol.1, pp. 943-948, Dec. 98.

225. S. Jagannathan, "Robust backstepping control of nonlinear systems using multilayered neural networks", Proceedings of the IEEE Conference on Decision and Control, vol.1, pp.480-485, Dec. 97.

226. S. Jagannathan and F. L. Lewis, "Multilayer neural network control of a class of nonlinear systems", Proceedings of the IEEE International Conference on Intelligent Control, pp. 181-186, July 97.

227. S. Commuri and S. Jagannathan, "Modular controls design for robot manipulators using CMAC neural networks", Proceedings of the IEEE Conference on Robotics and Automation, vol. 3, pp. 1725-1730, April 1997.

228. S. Jagannathan, "Adaptive control of unknown feedback linearizable nonlinear systems", Proceedings of the IEEE Conference on Decision and Control, pp. 4747-4752, Dec. 96.

229. S. Jagannathan, S. Commuri and F. L. Lewis, "Feedback linearization using CMAC neural networks", Proceedings of the IEEE Conference on Decision and Control, pp.3304-3309, Dec. 96.

230. S. Jagannathan, "Discrete-time fuzzy logic control of a mobile robot with an onboard manipulator", Proceedings of the IEEE Conference on Decision and Control, pp. 1135-1140, Dec. 96.

231. S. Jagannathan, F. L. Lewis, M. Vandegrift, and S. Commuri, "Feedback linearization of nonlinear systems using fuzzy logic systems", Proceedings of the ISAI/IFIS, pp. 385-392, Nov. 96.

232. S. Jagannathan, "Adaptive fuzzy logic control of a feedback linearizable discrete-time nonlinear systems ", Proceedings of the IEEE International Conf. on Intelligent Control, pp. 133-138, Sept. 96.

233. S. Jagannathan, "Discrete-Time CMAC NN control of a feedback linearizable nonlinear systems under a persistence of excitation", Proceedings of the IEEE International Conf. on Intelligent Control, pp. 462-467, Sept. 96.

234. S. Jagannathan, "Adaptive discrete-time fuzzy logic control of a feedback linearizable nonlinear systems", Proceedings of the IEEE International Conf. on Fuzzy Systems, pp. 1273-1278, Sept. 96.

235. S. Jagannathan, "Adaptive control of feedback linearizable discrete-time nonlinear systems using neural networks under a persistence of excitation", Proceedings of the IEEE Mediterranean Symposium on New Directions, pp. 35-40, Jun. 96.

236. S. Jagannathan, "Discrete-Time fuzzy logic control of a mobile robot with an onboard manipulator", Proceedings of the IEEE Mediterranean Symposium on New Directions, pp.451-456, Jun. 96.

237. S. Jagannathan, "Discrete-time adaptive control of feedback linearizable nonlinear systems using neural networks", Proceedings of the IEEE Conf. on Neural Networks, vol.4, pp. 1704-1709, Jun. 96.

238. S. Jagannathan and F. L.Lewis, "Discrete-time adaptive fuzzy logic control of robotic systems", Proceedings of the IEEE Conf. on Robotics and Automation, vol.3, pp.2586-2591, April 96.

239. S. Jagannathan, "Adaptive control of unknown feedback linearizable systems in discrete-time using neural networks", Proc. of the IEEE Conf. on Robotics and Automation, vol.1, pp. 258-263, April 96.

240. S. Commuri, F. L. Lewis and S. Jagannathan, “Discrete-time CMAC neural networks for Control Applications”, Proceedings of the IEEE Conference on Decision and Control, pp. 2420-2426, Dec. 1995.

241. S. Jagannathan, "Robust modified implicit self tuning regulator/MRAC convergence and stability", Proceedings of the IEEE Conference on Systems, Man and Cybernetics, vol.3, pp. 2171-2175, Oct. 95.

242. S. Jagannathan and F. L. Lewis, "Multilayer neural net controller for a class of nonlinear dynamical systems", Proceedings of the IEEE International Symposium on Intelligent Control, pp. 427-432, Aug. 95.

243. S. Jagannathan and F. L. Lewis, "Robust implicit self tuning regulator/MRAC convergence and stability", Proceedings of the IEEE International Symposium on Intelligent Control, pp. 42-46, Aug. 95.

244. S. Jagannathan and P.S. Shiakolas, "A comparison of neural network controllers for a mobile base with an onboard manipulator using neural networks", Proceedings of the IEEE International Symposium on Intelligent Control, vol. 1, pp. 405-410, Aug. 95.

245. M. Vandergrift, F. L. Lewis, S. Jagannathan, and K. Liu, "Adaptive fuzzy logic control of discrete-time dynamical systems", Proceedings of the IEEE International Symposium on Intelligent Control, pp. 395-401, Aug. 95.

246. P. Shiakolas and S. Jagannathan, "Control of a mobile robot with an onboard arm using neural networks", Proceedings of the IEEE Mediterranean Symposium on New Directions and Automation, pp. 315-323, June 95.

247. S. Jagannathan and F. L. Lewis, "Identification of nonlinear dynamical systems using multilayer neural networks", Proceedings of the IEEE International Symposium on Intelligent Control, pp. 345-351, Aug. 94.

248. A. Yesilderek, S. Jagannathan, and F. L. Lewis, "Continuous and discrete-time neural controllers", Proceedings of the IEEE Mediterranean Symposium on New Directions and Automation, Crete, pp. 9-16, June 94.

249. S. Jagannathan and M. Evans, "Intelligent control of flexible autonomous robots Part I: architectural considerations", Proceedings of the IEEE Conf. on Neural Networks, vol.5, pp. 2837-2841, June 94.

250. S. Jagannathan, "Intelligent control of flexible autonomous robots Part II: implementation", Proceedings of the IEEE Conf. on Neural Networks, vol.5, pp. 2831-2836, June 94.

251. S. Jagannathan, F. L. Lewis, and O. C. Pastravanu, "MRAC of nonlinear dynamical systems using multilayer neural networks", Proceedings of the IEEE Conf. on Neural Networks, vol.7, pp. 4766-4771, June 94.

252. S. Jagannathan and F. L. Lewis, "Discrete-time neural net controller with guaranteed performance", Proceedings of the American Control Conference, pp. 3334-3339, May 1994.

253. S. Jagannathan, F. L. Lewis and K. Liu, "Modeling, control, and obstacle avoidance of a mobile robot with an onboard manipulator", Proceedings of the IEEE Symposium on Intelligent Control, vol. 1, pp. 196-201, Aug. 93.

254. F. L.Lewis, H-Huang, and S. Jagannathan, "A systematic approach to discrete-event controller design for manufacturing applications control", Proceedings of the American Control Conference, vol.2, pp. 1525-1531, June 1993.

255. S. Jagannathan, S. Balakrishnan and N. Popplewell, "Visual inspection of wave soldered joints using neural networks", Proceedings of the IEEE-IJCNN Conference on Neural Networks, vol.1, pp.7-12, Dec. 91.

256. S. Jagannathan, S. Balakrishnan and N. Popplewell, "Sampling and loop delay intervals for digital control", Proceedings of the ISMM Conference on Mini and Microcomputers, vol.2, pp.114-117, Dec. 91.

257. S. Jagannathan, N. Popplewell and S. Balakrishnan, "Digital control of a CNC milling machine", Proceedings of the ISMM Conference on Mini and Microcomputers, vol.2, pp.118-121, Dec. 91.

258. S. Jagannathan, S. Balakrishnan and N. Popplewell, "Task level language for robot arm control", Proceedings of the modeling and simulation conference, vol.3, pp.995-1001, May 91.

259. K. Udayakumar, S. Jagannathan, D. Shankar and E. Vadivelu, "Magnetic levitation and propulsion", Proceedings of the International Conference on Railway Electrification, New Delhi, Vol.1, pp. 221-223, Oct. 85.

Summary: 9 conference papers/year.

PRESENTATIONS ONLY

1. Soylemezoglu, A., J. Birt, Sarangapani, J, D. Trimble and C. Rouse, "Auto-ID Technologies and Solutions for Aerospace Manufacturing," *AEROMAT'05*, Orlando , Florida , June 6-9, 2005.

2. K. Cha, Soylemezoglu, A., J. Birt, M. Zawodniok, J. Fonda, E. Taqieddin, E. M. Millis-Harris, Saygin, and J. Sarangapani, "A Testbed for Validation and Benchmarking of Auto-ID Solutions," *AEROMAT'05*, Orlando, Florida, June 6-9, 2005.

3. C. Saygin and J. Sarangapani, "Auto-ID Technologies Research Group at the University of Missouri-Rolla", US Air Force Depot Maintenance Transformation (DMT) Automatic Identification Technology (AIT) Workshop, Sept. 12-15, Ogden, Utah, 2005.

4. J. Sarangapani and C. Saygin, "Monitoring, Diagnostics, and Prognostics Research at the University of Missouri-Rolla," 9th Bi-annual Industry Advisory Board Meeting of the Intelligent Maintenance Systems (NSF I/UCRC) Center, May 2005, Ann Arbor, Michigan.

5. J. Sarangapani and C. Saygin, "Monitoring, Diagnostics, and Prognostics Research at the University of Missouri-Rolla ," 8th Bi-annual Industry Advisory Board Meeting of the Intelligent Maintenance

Systems (NSF I/UCRC) Center, Nov 1-2, 2004 , Milwaukee , Wisconsin.

6. S. Jagannathan, “Energy Efficient Protocols for Wireless Networks”, Indian Institute of Technology, Dept. of Computer Science, Chennai, June 2004.

7. J. Sarangapani, “Monitoring, Diagnostics, and Prognostics Research at the University of Missouri-Rolla ,” 9th Bi-annual Industry Advisory Board Meeting of the Intelligent Maintenance Systems (NSF I/UCRC) Center, May 2004, Ann Arbor , Michigan.

8. J. Sarangapani, “Monitoring, Diagnostics, and Prognostics Research at the University of Missouri-Rolla ,” 8th Bi-annual Industry Advisory Board Meeting of the Intelligent Maintenance Systems (NSF I/UCRC) Center, Nov 2003 , Milwaukee , Wisconsin.

9. S. Jagannathan and J. Drallmeier, “Neuro Emission Controller for Spark Ignition Engines”, Sandia National Laboratories, June 2004.

10. S. Jagannathan and G.V.S Raju, “Integration of Microsensor Arrays”, Tex MEMS, August. 99. (invited).

11. S. Jagannathan, "Computers and society", National Seminar, Feb. 1983.

12. S. Jagannathan and M. Arif, "Digital techniques in nuclear instrumentation", IEEE Student Chapter, Madras, pp. 1-7, April 85.

SHORT COURSES

1. “Embedded Computer Systems”, Offered at IEEE MOCON March 2004
2. “Wireless Networking”, Offered at IEEE MOCON March 2004. (With Dr. Subramanya)
3. “Embedded Computer Systems for Control”, IEEE ISIC Symp. on Intel. Control, Oct 2003.

PATENTS AWARDED

1. Jagannathan Sarangapani, M. Zawoniok, Vivek Thotla, T. Ghasr, and Jake Hertenstein, “Electronic Device Detection Systems and Method”, US Patent No. 9689964B2, June 27, 2017.

2. Jagannathan Sarangapani, A. Ramachandran, C. Saygin, and K. Cha, “Decentralized Radio Frequency Identification System”, US Patent No. 8143996B2, March 27, 2012.

3. S. Mehraeen and J. Sarangapani, “System and method for harvesting energy from environmental energy”, US Patent 8,129,887B2, March 6, 2012.

4. Jagannathan Sarangapani, A. Ramachandran, C. Saygin, and K. Cha, “Adaptive Inventory Management System”, US Patent No. 7752089B2, July 2010.

5. S. Jagannathan and S.K. Rangarajan, “A Method to Predict Severity of a Trend toward an Impending Machine Failure and Responding to the Same”, US Patent No. 6,442,511, August 2002.

6. S.R. Rangarajan, and S. Jagannathan, “Method and Apparatus for Predicting a Fault Condition using Nonlinear Curve Fitting Techniques”, US Patent No. 6,363,332, March 26, 2002.

7. S. Jagannathan, “Apparatus and Method for Diagnosing an Engine Using Computer-Based Models in Combination with a Neural Network”, US Patent No. 6,240,343, May 29, 2001.

8. S. Jagannathan, “A Method for Determining a Desired Response to Detection of an Obstacle”, US Patent No 6,173,215, January 2001.

9. S. Jagannathan, “Energy-Based Approach for Obstacle Avoidance”, US Patent No. 6,134,502, Oct. 17, 2000.

10. S. Jagannathan, “Method and Apparatus of Predicting a Fault Condition”, US Patent No. 6,119,074, Sept. 12, 2000.

11. S. Jagannathan and D.R. Schricker, “Apparatus and Method for Diagnosing an Engine Using an Exhaust Temperature Model “, US Patent No. 6,092,016, July 18, 2000.

12. S. Jagannathan and C. A. Kemner, “Method and Apparatus for Determining an Alternate path in Response to Detection of An Obstacle”, US Patent No. 60,64,926, May 16, 2000.

13. S. Jagannathan and F.L.Lewis, "Discrete-Time Neural Network Tuning of a Class of Nonlinear Dynamical Systems", The Univ. of Texas, US Patent No. 6,064,997, May 16, 2000.

14. S. Jagannathan, “Method and Apparatus for Detecting Obstacles Using Multiple Sensors for Range Selective Detection“, US Patent No. 6,055,042, April 25, 2000.

15. S. Jagannathan, “Method for Determining the Condition of Engine Oil based on TBN Modeling”, US Patent 5,987,976, November 23, 1999.

16. S. Jagannathan and D. R. Schricker, "Method and Apparatus for Predicting a Fault Condition", Caterpillar Inc., US Patent No. 5,950,147, September 7, 99.

17. C. Kemner, C. Khoerson, and S.Jagannathan, “System and Method for Managing a Fleet of Mobile Machines for Dumping at a Plurality of Dump Points”, US Patent No. 5,931,875, August 3, 99.

18. S. Jagannathan et al., “Automated Systems—Automated Loader System”, Defensive Publication, Research Disclosure Technology Journal, Pub. No. 42368, July 99.

19. S. Jagannathan, D. R. Schricker, and Trent Simpson, “Method for Determining the Condition of Engine Oil based on Soot Modeling”, US Patent No. 5,914,890, June 22, 1999.

20. S. Jagannathan, “Method and Apparatus for Determining a Path for a Machine between a Predetermined Route and a Final Position”, US Patent No. 5,752,207, May 12, 98.

21. D.R. Schricker, S. Jagannathan, D. G. Young, Satish M. Shetty, "Method and Apparatus for Comparing Machines in Fleet", US Patent No. 5,737,215, April 7, 98.

Summary: 1.1 patents/year for the past 17 years

PATENT/PROVISIONAL PATENT FILED

1) K. Cha, M. Zawodniok, A. Ramachandran, S. Jagannathan and C. Saygin, “Decentralized Radio Frequency Identification System”, Patent Filed, Nov 2007.

2) M. Thiagarajan, M. Zawodniok, S. Jagannathan, “RFID-based Adaptive Inventory Management System”, Provisional patent application filed in Dec 2007.

INVENTION DISCLOSURES

1) S. Jagannathan, K. Cha, A. Ramachandran, and C. Saygin, “Read Rate and Coverage Improvement Through Reader Power Control”, Invention Disclosure, January 2006. (patent being filed)

2) S. Jagannathan, S. Ratnaraj, J. Fonda and M. Zawodniok, “Optimal Energy Delay Routing Protocol for Wireless Sensor Networks”, Invention Disclosure, May 2006.

3) S. Jagannathan, N. Regatte, and M. Zawodniok, “Adaptive and Distributed Fair Scheduling Schemes for Wireless Sensor Networks”, Invention Disclosure, May 2006.

4) S. Jagannathan and J. Drallmeier, “Neural Network Control of Spark Ignition Engines Operating Lean”, Invention Disclosure, May 2006.

5) S. Jagannathan and J. Drallmeier, “Neural Network Control of Spark Ignition Engines with High EGR Levels”, Invention Disclosure, May 2006.

6)S. Jagannathan, “Adaptive HE Implement Control”, Invention Disclosure, November 1998.

7) S. Jagannathan, “On-line HE Learning Control”, Invention Disclosure, November 1998.

8) S. Jagannathan, “A Method to Predict Confidence”, Invention Disclosure, December 1998.

9) S. Jagannathan, F. Lombardi, and C. Ramamoorthy, “A System and Method to Control ON/OFF Valves and Associated Implement Circuits”, Invention Disclosure, January 1999.

Past Graduate Students

Doctoral Students

1. Pingan He*, "Neural network control of a class of discrete-time nonlinear systems with application to engine emission control", December 2004. (GM Power Train, Michigan)
2. Maciej Zawodniok, "Power sensitive algorithms and protocols for wireless ad hoc and sensor networks", December 2005. (Associate Professor, Dept. of Computer Engg, Missouri University of Science and Technology, Rolla, USA)
3. Jianjun Guo, "Decentralized control and placement of multiple unified power flow controllers", co-advisor, September 2006. (Los Angeles)
4. Eyad Taqeiddin, "Trust level energy efficient routing protocols for wireless ad hoc networks", May 2007, co-advisor, (Associate Professor, Department of Computer Science and Information Technology, Jordon University of Science and Technology).
5. Qinmin Yang, "Advanced control design using neural networks for micro/nano robotics", August 2007. (Associate Professor, Zhejiang University, China)
6. J. Vance, "Neural network control of nonstrict feedback and nonaffine nonlinear discrete-time systems with application to engine control", Sept. 2007. (Associate Tech. Fellow, Advanced Computing and Information Technology Group, Boeing, Advanced Technologist)
7. James W. Fonda, "Energy efficient wireless sensor network protocols for monitoring and prognostics of large scale systems", January 2008. (Associate Tech Fellow, Advanced Computing and Information Technology Group, Boeing as an Advanced Technologist).
8. Travis Dierks, "Formation control of mobile robots and UAVs", August 2009. (DRS Technologies, St. Louis)
9. Carl Larsen, "Quality of service provisioning through resource allocation and data aggregation in wireless sensor networks", August 2009. (Patent Examiner, United States Patents and Trademarks Office)
10. Shahab Mehraeen, "Decentralized adaptive neural network control of interconnected nonlinear dynamic systems with application to power systems", Nov. 2009. (Associate Professor, Louisiana State University, Baton Rouge; NSF Career Awardee)
11. Balaje Thumati, "A control theoretic fault prognostics and accommodation framework for a class of nonlinear discrete-time systems", Nov 2009. (Associate Tech Fellow-Boeing, St. Louis)
12. Ahmet Soylemezoglu, "Sensor-based decision making", Mar. 2010. USACE ERDC-CERL (United States Army Corps of Engineers - Engineer Research and Development Center - Construction Engineering Research Laboratory, Urbana Champaign, IL).
13. Behdis Eslamnour, "Adaptive resource allocation for cognitive wireless ad hoc and hybrid networks", October 2010. (Faculty in Iran)
14. Rana Basheer, "Real-time localization system by using received signal strength indicator", April. 2012. (Broadcom, Irvine, CA now having his own company).
15. Hao Xu, "Stochastic optimal adaptive controller and communication protocol design for the networked control system", May 2012. (Assistant Professor, University of Nevada, Reno).
16. Hassan Zargarzadeh, "Lyapunov based optimal control of a class of nonlinear systems", August 2012 (Assistant Professor, Lamar University, Beamont, Texas).
17. Hasan Ferdowsi, "Model based diagnosis and prognosis of nonlinear systems", October 2013. (Assistant Professor, Texas A&M University, Texarkhana)
18. Qiming Zhao, "Finite horizon optimal control of a class of linear and a class of nonlinear systems", October 2013. (Denso, Michigan).
19. Avimanyu Sahoo, "Event-sampled regulation of a class of linear and nonlinear systems", April 2015. (Assistant Professor-Oklahoma State University, Stillwater, OK)
20. Nurbanu Guzey, "Localization and tracking of unintended emitting sources", October 2015. (Department of Electrical Engineering, Erzurum Technical University, Turkey)
21. Behzad Talaei, "Boundary control of distributed parameter systems using adaptive dynamic programming", March 2016. (American Axle Association, Warren, MI)
22. Jia Cai, "Model-based diagnosis and prognosis of a class of linear and nonlinear distributed parameter systems", April 2016. (Start-up company)

23. Haifeng Niu, “A control theoretic approach to security in cyber-physical systems”, April 2016. (Amazon Corp, Seattle)
24. Haci Guzey, “Consensus based formation control of unmanned vehicles”, November 2016. (Department of Electrical Engineering, Erzurum Technical University,Turkey)
25. Xiang Gao, “Using wireless sensors and networks program for chemical particle propagation mapping and chemical source localization”, November 2016 (co-advisor)
26. Vignesh Narayanan, “Event triggered optimal adaptive control of interconnected systems”, June 2017. (Postdoctoral Fellow—Washington University, St. Louis)

Additional Advisor for Doctoral Students:

1. Wenxin Liu, “Power system stabilizing control using neural networks”, May 2005. Additional advisor (Assistant Professor, New Mexico State University, Las Cruses)
2. Ivo Grondman, “Online Model-based Learning Algorithms for Actor-Critic Control”, Tu Delft, Netherlands, March 2015.

Master Students

1. J. Talluri, “Adaptive traffic management in ATM Networks”, Dec 2000. (Software company Austin)
2. A. Tohmaz, “Adaptive congestion control and bandwidth estimation in high-speed networks”, May 2001. (Beckwith Electronic Engineering Company, San Antonio)
3. G. Galan, “Neural network control of a class of nonlinear systems”, August 2001. (Software Engineer Lead in San Antonio)
4. A. Levesque, “Neural Network-based robot control”, August 2001. Grubber Engineering San Antonio, Texas.
5. Satish Ponipireddy, “Distributed power control of wireless networks”, August 2002. (co-advisor) (SBC Communications)
6. M. Peng, “End to end congestion control of the INTERNET”, December 2002. co-advisor (working as a software engineer, California)
7. S. Dontula, “Power sensitive algorithms and protocols for wireless cellular and adhoc networks”, May 2003. (Software Engineer, Florida)
8. M. Hameed, “Adaptive force balancing control of MEMS gyroscope”, May 2003. (Student State University of New York, Bio Engineering using MEMS sensors)
9. N. Regatte, “Distributed fair scheduling and optimal routing protocols for wireless ad hoc and sensor networks”, May 2004. (Design Engineer)
10. V. Janardhan, “Implementation and control of a class of nonlinear systems”, Sept. 2005. (Embedded Systems Engineer, Peoria, IL)
11. Jonathan Vance, “Embedded networked system controller for spark ignition control”, November 2005. (Boeing St. Louis)
12. Sibala Ratnaraj, “Self organizing and routing protocols for wireless sensor networks”, December 2005. (Boeing, CA)
13. Kainan Cha, “Interference mitigation using distributed power control algorithms for RFID reader networks,” April 2006. (Garmin, Kansas City)
14. Tim Landstra, “Hybrid key management and secure routing protocol”, May 2006. (Sandia National Labs)
15. Anil Ramachandran, “Diversity techniques for signal strength based WLAN location determination systems”, November 2006. (Sprint, Kansas City and now at Emerson, St. Louis)
16. Peter Shih, “Reinforcement learning-based NN control of complex nonlinear discrete-time systems with application to engine control”, November 2006. (Software Engineer, Hugh Res. Lab)
17. Deepak Mohan, “Real-time grip length detection of rotary tools: A Mahalanobis Taguchi Strategy”, May 2007, Co-advisor. (Software Engineer at Intel; Now at Garmin, Kansas City)
18. Travis Dierks, “Nonlinear control of nonholonomic mobile robot formations”, June 2007. (Doctoral student at Missouri S&T and DRS Technologies, St. Louis)
19. Amit Shah, “Terahetrz data processing for standoff detection of improvised explosive devices”, August 2007. Co-advisor (Florida Engineer)
20. Phani Gajjala, “Energy efficient processor operation and vibration-based energy harvesting schemes for wireless sensor nodes”, August 2007. (Dallas Engineer)

21. Reghu Anguswamy, “Wireless mote-based in-process diagnostics using hand held tools in network enabled manufacturing environments”, May 2008. (Doctoral student at Virginia Tech in Dept of ECE, now in India)
22. Hindu Kothapalli, “Localization in wired and wireless networks”, May 2009. (Morgan & Chase, MD)
23. Gary Halligan, “Fault detection and prediction with application to rotating machinery”, Nov 2009. (Rockwell Collins, Iowa)
24. Priya Kasirajan, “Data aggregation in wireless sensor networks”, Dec 2009 (with graduation May 2010). (Garmin International, Kansas City)
25. Jake Hertenstein, “Detection of explosive threats by using embedded wireless sensor-based networks”, Jan 2010. (DRS Technologies, St. Louis)
26. Bryan Brenner, “Embedded optimal control of mobile robot formations using neural networks,” August 2010.
27. David Nodland, “Optimal control of helicopter unmanned air vehicle”, Oct 2011 (Caterpillar, Peoria, IL).
28. Deepthi Raja, “Decentralized diagnostics and prognostics of discrete-time systems”, May 2012.
29. R. Kraleti, “Diagnostics and prognostics of a class of industrial systems”, May 2012. (Co-advisor)
30. Nathan Szanto, “Event sampled control of strict feedback systems with application to quadrotor UAV”, Sept 2016.

Current Graduate Students (All Ph.D.) (expected)

1. Krishnan Raghavan, “Bigdata analytics for prognosis applications”, August 2018.
2. Chandreyee Bhowmick, “Security in control systems”, December 2019.
3. Akhilesh Raj, “Control of nonlinear systems”, December 2019.

Current M.S: None

Undergraduate Students:

1. Van Hai Bui, “Neural network control of spark ignition engines with high levels of EGR”, (Summer 03, Fall 04, Spring 04). Supported by NSF 0327877 grant.
2. Robert Stewart, “Spark ignition engine modeling with high EGR”, Summer 03. NSF #0327877.
3. Jamie McChesney, “Autonomous navigation of a mobile base with an onboard arm for MARS greenhouse operation (Fall 00, Spring 01) Supported by NASA/TSGC grant.
4. Juan Portillo, “Obstacle avoidance of a mobile base with an onboard arm”, (Fall 00, Spring 01). Supported by NASA/TSGC.
5. Adam Wolf, “Interfacing the real world-robots and sensors”, Spring 2001. Supported by Office of Naval Research through ONR Scholar’s program.
6. Cynthia Green, “Force controller”, Spring 2001. ONR Scholars program.
7. P. Au, Gilani, and J.Putz, “Sensor network alert system,” B.S Thesis, 2003.