

BIOGRAPHICAL SKETCH

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NAME Sarkar, Nilanjan PhD	POSITION TITLE Associate Professor of Mechanical Engineering (primary) and Computer Engineering (secondary)		
eRA COMMONS USER NAME (credential, e.g., agency login) sarkarn			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
University of Calcutta, India	BE	1985	Mechanical Engineering
Indian Institute of Science, Bangalore, India	ME	1988	Mechanical Engineering
University of Pennsylvania, Philadelphia	PhD	1993	Mechanical Engineering
Queen's University, Kingston, Canada	Post-doctoral	1993-95	Mechanical Eng., Computer Science, & Psychology

A. Positions and Honors

Positions and Employment

1985-1986 Engineer, Calcutta Electric Supply Corporation, Calcutta, India
 1988-1989 Research Assistant, Department of Mechanical Engineering, Indian Institute of Science
 1993-1995 Post-Doctoral Fellow, Computing & Information Science, Mechanical Engineering, and Psychology, Queen's University, Kingston, Canada
 1995-1996 Research Scientist, Department of Computing and Information Science, Queen's University
 1997-1999 Assistant Professor, Department of Mechanical Engineering, University of Hawaii
 2000-2004 Assistant Professor, Department of Mechanical Engineering, and Department of Electrical Engineering and Computer Science, Vanderbilt University
 2004-Pres Associate Professor, Department of Mechanical Engineering, and Department of Electrical Engineering and Computer Science, Vanderbilt University

Honors and Awards

1979 National Scholarship, Government of West Bengal, India
 1982-1985 Merit Scholarship, University of Calcutta, India
 1986-1989 University Grant Commission Scholarship, Government of India
 1989-1990 Teaching Fellowship, University of Pennsylvania
 1990-1993 Research Fellowship, University of Pennsylvania
 1993-1995 Post-doctoral Fellowship, Queen's University, Canada
 2000 Patent granted: Method for improved reproduction of digital signals, US Patent No. 6,075,475
 2000-2004 Associate Editor, IEEE Transactions on Robotics and Automation
 2002-2003 Guest Editor, IEEE/ASME Transactions on Mechatronics
 2003 Chancellor's Research Award for human-robot research, Vanderbilt University
 2004 Distinguished Faculty Award, Vanderbilt University
 2005 Co-Technical Chair for 14th IEEE International Workshop on Robot and Human Interactive Communication (RO-MAN 2005)
 2006- Pres Associate Editor, Journal of Intelligent and Robotic Systems
 2007 Co-Program Chair for 16th IEEE International Workshop on Robot and Human Interactive Communication (RO-MAN 2007)
 2007 – Pres Associate Editor, Journal of Advanced Robotic Systems
 2007 Editor, Human-Robot Interaction, ISBN 978-3-902613-13-4
 2007 Second Best Paper of IEEE ROMAN 2006

B. Selected Peer-Reviewed Publications

- Sarkar, N., Ellis, R., & Moore, T. (1997). Backlash detection in geared mechanisms: modeling, simulation, and experimentation. *Journal of Mechanical Systems and Signal Processing*, 11(3), 391-408.
- Sarkar, N., Kumar, V., & Yun, Y. (1997). Dynamic control of 3-D rolling contacts in two-arm manipulation. *IEEE Transactions on Robotics and Automation*, 13(3), 364-376.
- Sarkar, N., Yun, X., & Kumar, V. (1997). Control of contact interactions with acatastatic nonholonomic constraints. *International Journal of Robotics Research*, 16(3), 357-374.
- Sarkar, N., Yun, X., & Ellis, R. (1998). Live-constraint-based control for contact transition. *IEEE Transactions on Robotics and Automation*, 14(5), 743-754.
- Yun, X., & Sarkar, N. (1998). Unified formulation of robotic systems with holonomic and nonholonomic constraints. *IEEE Transactions on Robotics and Automation*, 14(4), 640-650.
- Sarkar, N., & Sarkar, M. (1999). An introduction to graph-rewriting framework for high-level robotic task planning. *International Journal of Intelligent Automation and Soft Computing*, 5(2), 129-138.
- Antonelli, G., Chiaverini, S., Sarkar, N., & West, M. (2001). Adaptive control of an autonomous underwater vehicle: Experimental results on ODIN. *IEEE Transactions on Control Systems Technology*, 9(5), 756-765.
- Cui, Y., & Sarkar, N. (2001). A unified force control approach to autonomous underwater manipulation. *Robotica*, 19, 255-266.
- Podder, T., Antonelli, G., & Sarkar, N. (2001). An experimental investigation into the fault-tolerant control of an autonomous underwater vehicle. *Journal of Advanced Robotics*, 15(5), 501-520.
- Podder, T., & Sarkar, N. (2001). Fault tolerant control of an autonomous underwater vehicle under thruster redundancy. *Journal of Robotics and Autonomous Systems*, 34, 39-52.
- Sarkar, N., & Podder, T. (2001). Coordinated motion planning and control of autonomous underwater vehicle-manipulator systems. *IEEE Journal on Oceanic Engineering*, 26(2), 228-239.
- Antonelli, G., Chiaverini, S., & Sarkar, N. (2002). External force control for underwater vehicle-manipulator systems. *IEEE Transactions on Robotics and Automation*, 1(6), 931-938.
- Antonelli, G., Sarkar, N., & Chiaverini, S. (2002). Explicit force control for underwater vehicle-manipulator systems. *Robotica*, 20(3), 251-260.
- Sarkar, N., Podder, T., & Antonelli, G. (2002). Thruster force allocation of an auv considering thruster redundancy and saturation. *IEEE Transactions on Robotics and Automation*, 18(2), 223-233.
- Rani, P., Sims, J., Brackin, R., & Sarkar, N. (2002). Online stress detection using psychophysiological signal for implicit human-robot cooperation. *Robotica*, 20(6), 673-686.
- Ji, M., Zhang, Z., Biswas, G., & Sarkar, N. (2003). A hybrid fault adaptive control of an autonomous mobile robot. *IEEE/ASME Transactions on Mechatronics*. 8(2), 226-233.
- Kawamura, K., Peters, A., Bodenheimer, B., Sarkar, N., Park, J., and Spratley, A. (2004). A parallel distributed cognitive control system for a humanoid robot. *International Journal of Humanoid Robotics*. 1(1), 65-94.
- Podder, T., & Sarkar, N. (2004) A unified dynamics-based motion planning algorithm for autonomous underwater vehicle-manipulator systems (UVMS). *Robotica*, 22(1), 117-128.
- Rani, P., Sarkar, N., Smith, C., & Kirby, L. (2004). Anxiety detecting robotic systems – towards implicit human-robot collaboration. *Robotica*, 22(1), 85-95.
- Rani, P., Sarkar, M. Brackin, R., and Sarkar, N. (2005). "Semi-Autonomous Human-Robot Interaction for People with Disability." In Springer Tracts in Advanced Robotics Publisher: Springer-Verlag GmbH ISSN: 1610-7438 (Paper) 1610-742X (Online) Subject: Engineering Volume 18 / 2005 Title: Multi-point Interaction with Real and Virtual Objects Editors: Federico Barbagli, Domenico Prattichizzo, Kenneth Salisbury. ISBN: 3-540-26036-6 DOI: 10.1007/b136620 Chapter: p. 131.
- Rani, P., Sarkar, N., & Liu, C. (2005) "Maintaining Optimal Challenge in Computer Games Through Real-Time Physiological Feedback," 184-192, in D.D. Schmorrow: Foundations of Augmented Cognition. ISBN: 0-8058-5806-7 Lawrence Erlbaum Associates, Mahwah, NJ, 2005.
- Sarkar, N., Kawamura, K., Ratnaswasd, P., Dodd, W., Ferguson, S., Bluethman B, Ambrose R, and Alder, K. (2006) "Toward Intelligent System Health Monitoring for NASA's Robonaut," in Intelligence for Space Robotics (ed. A. Howard and E. Tunstel) TSI Press, pp. 181-200, 2006.
- Rani, P., Liu, C., Sarkar, N., & Vanman, E. (2006) . An Empirical Study of Machine Learning Techniques for Affect Recognition in Human-Robot Interaction. *Pattern Analysis and Applications*, 9(1), 58 - 69.

- Rani, P, and Sarkar, N, (2006) "A New Approach to Implicit Human-Robot Interaction Using Affective Cues", pp. 233-252, Mobile Robots, Towards New Applications editor: Aleksandar Lazinica, published by Advanced Robotic Systems International and proliteratur Verlag.
- Podder, T. and Sarkar, N. (2007) "Unified Dynamics-based Motion Planning Algorithms for Autonomous Underwater Vehicle-Manipulator Systems (UVMS)," pp. 321-356, Mobile Robots, Perception and Navigation, editor: Sascha Kolski, published by Advanced Robotic Systems International and proliteratur Verlag.
- Halder, B. and Sarkar N. (2007) "Robust Fault Detection of Robotic Manipulator," 26(3): 273-285, International Journal of Robotics Research.
- Halder, B. and Sarkar N. (2007) "Robust Nonlinear Analytic Redundancy for Fault Detection and Isolation in Mobile Robot," 4(2): 183-188, International Journal of Automation and Computing.
- Ji, M. and Sarkar, N. (2007) "Supervisory Fault Adaptive Control of a Mobile Robot and its Application in Sensor Fault Accommodation," 23(1): 174-178, IEEE Transactions on Robotics.
- Rani, P., Sarkar, N., and Adams, J. (2007) "Anxiety-based affective communication for implicit human-machine interaction," Advanced Engineering Informatics, 21(3): 323-334.
- Rani, P. and Sarkar, N. (2007) "Operator engagement detection for robot behavior adaptation in human-robot interaction," 4(1): 1-12, International Journal of Advanced Robotic Systems.
- Rani P., Liu, C. and Sarkar, N. (2007) "Interaction between Humans and Robots - An Affect-inspired Approach," (accepted for publication) In Journal of Interaction Studies.
- Mallapragada, V., Erol, D., and Sarkar, N. (2007), "A New Method of Force Control for Unknown Environments," Vol. 4, No. 3, pp. 313 - 322, Sep 2007. International Journal of Advanced Robotic Systems.
- Erol, D. and Sarkar, N. (2007) "Design and Implementation of an Assistive Controller for Rehabilitation Robotic Systems," vol. 4, no.3, pp. 271-278, 2007 in International Journal of Advanced Robotic Systems.
- Erol D. and Sarkar N. (2007) "Intelligent Control for Robotic Rehabilitation after Stroke", Journal of Intelligent and Robotic Systems, vol. 50, no. 4, pp. 341-360, 2007.
- Erol D. and Sarkar N. (2008) "Coordinated Control of Assistive Robotic Devices for Activities of Daily Living Tasks", IEEE Transactions on Neural Systems and Rehabilitation Engineering, vol 16, no. 3, pp. 278-285.
- Liu, C., Conn, K., Sarkar, N., and Stone, W. "Online Affect Detection and Robot Behavior Adaptation for Intervention of Children with Autism," *IEEE Transactions on Robotics*, Vol. 24, Issue 4, pp. 883-896, 2008.
- Liu, C., Conn, K., Sarkar, N., and Stone, W. "Physiology-Based Affect Recognition for Computer-assisted Intervention of Children with Autism Spectrum Disorder," *International Journal of Human-Computer Studies*, Vol. 66, Issue 9, pp. 662-677, September 2008.
- Conn, K., Liu, C., Sarkar, N., Stone, W., and Warren, Z. "Towards affect-sensitive assistive intervention technologies for children with autism." In *Affective Computing: Focus on Emotion Expression, Synthesis and Recognition*. Jimmy Or, (Ed.), Vienna, Austria: I-Tech, 2008.
- Mallapragada, V., Sarkar, N., Podder, T., "Robot Assisted Real-time Tumor Manipulation for Breast Biopsy," *IEEE Transactions on Robotics*, vol 25, no. 2, pp. 316-324, 2009.
- Duygun Erol Barkana and Nilanjan Sarkar (in press) "Towards a Smooth Human-Robot Interaction for Rehabilitation Robotic Systems," *Advanced Robotics*.
- Haldar B. and Sarkar, N., (in press) "Analysis of order of redundancy relation for robust actuator fault detection," *Control Engineering Practice*.
- Liu, C., Rani, P., Sarkar, N, (in press) "Dynamic Difficulty Adjustment in Computer Games through Real-Time Affective Feedback", *International Journal of Human-Computer Interaction*.

C. Research Support

Ongoing Support

Autism Speaks Foundation Sarkar (PI)

07/01/07- 06/30/09

Innovative Technology for Mapping Social Engagement in Children with Autism: Adaptive Physiological Profiling in Real Time

Description: We seek to understand physiological response of children with autism when they are involved in social engagement tasks in virtual reality environment.

N00014-06-1-0146 Sarkar (PI)

12/01/05-11/30/09

Intelligent Fault Accommodation in Autonomous Systems

Description: We investigate how fault can be detected using intelligent signal processing and pattern recognition techniques and how best the fault features can be conveyed to a human operator.

NIH R21 Labadie(PI)

08/01/07 – 07/31/09

Robotic Mastoidectomy

Description: Design a novel robotic system to aid in Mastoidectomy.

Role:co-PI

MARI Sarkar (PI)

12/01/05-12-31/09

Marino Autism Research Institute

Toward a Real-time Psychophysiological Analysis of Affective States

Description: We investigate how physiological signals can be used to infer the affective states of children with autism spectrum disorder.

NSF MRI: Acquisition of Instruments for Interaction, Learning and Perception in Virtual Environments Sarkar (co-PI)

08/01/08-07/31/11

Description: Major research instrumentation grant

NIH (Subcontract from Rehabilitation Inst of Chicago) Sarkar (co-PI) 04/01/08 – 03/31/10

R21 - Development of a hand exoskeleton for rehabilitation after stroke

Description: We seek to develop a hand exoskeleton involving the thumb and the index fingers to be used for stroke rehabilitation

NIH (Subcontract from Rehabilitation Inst of Chicago) Sarkar (co-PI) 04/01/08 – 03/31/10

R24 - Understanding Reach-to-Grasp Movement Following Stroke

Description: We seek to develop a arm and hand robotic system that will allow us to investigate reach-to-grasp movement following stroke

Recently Completed Support

N00014-03-1-0052 Sarkar (PI)

10/01/02-09/30/06

Office of Naval Research

Intelligent Fault Adaptive Control of a Team of Autonomous Mobile Robots

Description: We investigate biologically inspired novel control techniques for fault adaptive control of a team of mobile robots.

DAAD19-02-1-0160 Sarkar (PI)

06/01/02-10/31/06

Army Research Office

Online Fault Adaptive Control of Hybrid Systems

Description: We conduct theoretical studies on the design and analysis of fault adaptive hybrid systems.

N00014-06-1-0146 Sarkar (PI)

12/01/05-11/30/08

Intelligent Fault Accommodation in Autonomous Systems

Description: We investigate how fault can be detected using intelligent signal processing and pattern recognition techniques and how best the fault features can be conveyed to a human operator.

MARI Sarkar (PI)

12/01/05-11-30/06

Marino Autism Research Institute

Toward a Real-time Psychophysiological Analysis of Affective States

Description: This research is funded by Marino Autism Research Institute to investigate how physiological signals can be used to infer the affective states of children with autism spectrum disorder. We are developing mathematical tools and algorithms, and subsequently robot and computer-based interaction tasks that can optimally engage these children.