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Education

- 1999 – 2002 Ph.D. in Electrical and Computer Engineering
 McGill University, Montréal, Québec, Canada..
- 1992 – 1995 Master's Degree in Electrical and Computer Engineering
 Isfahan University of Technology, Isfahan, Iran.
- 1988 – 1992 Bachelor's Degree in Electrical Engineering
 K.N. Toosi University of Technology, Tehran, Iran.

Experience

06/10 – present **Instructor of Surgery**, Brigham and Women's Hospital, , Harvard Medical School, 1400 VFW Parkway, West Roxbury, MA 02132

01/10 – 06/10 **Instructor of Surgery**, Children Hospital Boston, Harvard Medical School, 300 Longwood Avenue, Boston, MA 02115

Design and control of a robotic system for MIS surgery.

09/07 – 12/09 **Assistant Research Professor**, Department of Mechanical Engineering, Boston University, Boston, MA.

Design and control of a robotic system for MIS surgery.

01/07– 08/07 **Assistant Research Professor**, Research Center for Computer Integrated Surgical Systems and Technology and Department of Computer science, Johns Hopkins University, Baltimore, MD.

Developed computer and control systems for da Vinci surgical system, Intuitive Surgical Inc. USA to provide transparent force-feedback without using any force sensor.

09/04–12/06 **Postdoctoral Fellows**, Department of Mechanical Engineering and Research Center for Computer Integrated Surgical Systems and Technology, Johns Hopkins University, Baltimore, MD.

Developed computer and control systems for da Vinci surgical system, Intuitive Surgical Inc. USA to provide transparent force-feedback without using any force sensor.

10/02–10/04 **President**, RealContact Inc. Montreal, Canada.

Developed a surgery simulator prototype for prostate surgery. Secured 100,000 CAN\$ funding from Canada Institute for Robotics and Intelligent Systems and 35,000 CAN\$ from an industrial partner.

09/99–09/02 **Research Assistant**, Center for Intelligent Machines, McGill University, Montreal, Canada.

1995–1998 **Research Engineer**, R&D Center, Isfahan University of Technology, Isfahan, Iran.

Professional Activities

Associate Editor for IEEE/RSJ International Conference on Intelligent Robots and Systems, IROS 2010.

Associate Editor for IEEE International Conference on Robotics and Automation, ICRA 2009.

Co-Founder of RealContact Inc. (McGill University Startup)

Demo and Exhibit Chair for the Haptic Symposium Conference in Washington, D. C., 2006.

Reviewers for Journals: IEEE Transactions on Biomedical Engineering, IEEE Transactions on Systems, Man, and Cybernetics, IEEE Transactions on Robotics, IEEE Transactions on Visualization and Computer Graphics, IEEE Transaction on Mechatronics, Robotica, ASME Journal of Computing and Information Science in Engineering, Sensor and Actuators. IEEE transactions on Control Technology, Presences.

Reviewers for Conferences: ICRA, MICCAI, IROS, World Haptic, CDC.

Participation in Workshops and Tutorials

Co-Organizer, workshop: Snakes, Worms and Catheters: Continuum and Serpentine Robots for Minimally Invasive Surgery, IEEE International Conference on Robotics and Automation, ICRA 2010

Speaker, workshop on Snakes, Worms and Catheters: Continuum and Serpentine Robots for Minimally Invasive Surgery, IEEE International Conference on Robotics and Automation, ICRA 2010

Invited speaker, workshop on advanced sensing and sensor integration in medical robotics, IEEE International Conference on Robotics and Automation, ICRA 2009.

Invited speaker, workshop on reality-based modeling of tissues for simulation and robot-assisted surgery, IEEE/RSJ International Conference on Intelligent Robots and Systems , IROS 2003.

Teaching Experience

Winter 2006 Lecturer for “Haptic Systems” (a graduate course that I designed), Department of Computer Science and Mechanical Engineering, Johns Hopkins University.

Course website: <http://www.cs.jhu.edu/~mahvash/hapticSystems>

1999 Teaching Assistant for Digital Signal Processing course, McGill University.

1999 – 2001 Teaching Assistant for Robotics Laboratory course, McGill University.

1995 Co-lecturer for Nonlinear Control Systems (Sliding Control), Isfahan University of Technology, Iran.

Awards

Differential Fee Waivers Award, McGill University Dept. of Electrical Engineering, Fall 1999 to Fall 2000 (offered to the first and the second best international student in the department).

Technology Gap Grant, Canada Institute for Robotics and Intelligent Systems, "A haptic surgery simulator," M. Mahvash, V. Hayward, B. Fong, and M. Elhilali, 100,000 CAN\$, Feb. to Dec. 2003.

Publications

Journal Articles

1. M. Mahvash, and P. E. Dupont, Stiffness control of surgical continuum manipulators, *IEEE Transactions on Robotics*, (conditionally accepted).
2. M. Mahvash, and P. E. Dupont, Mechanics of dynamic needle insertion into a biological material, *IEEE Transactions on Biomedical Engineering*, vol 57, no 4, 2010
3. M. Arbabtafti, M. Moghaddam, A. Nahvi, M. Mahvash, B. Richardson, B. Shirinzadeh, Physics-based haptic simulation of bone machining, *IEEE Transactions on Haptics*, 2010, (in press).
4. M. Mahvash, L. Voo, D. Kim, K. Jeung, J. Wainer, and A. Okamura, Modeling force of cutting with scissors, *IEEE Transactions on Biomedical Engineering*, vol 55, no 3, 2008.
5. M. Mahvash and A. Okamura, Friction compensation to enhance transparency of a haptic-feedback teleoperator with compliant transmission, *IEEE Transactions on Robotics*, vol. 23, no. 6, 2007.
6. M. Mahvash, Novel approach for modeling separation forces between deformable bodies, *IEEE Transactions on Information Technology in Biomedicine*, vol. 10, no. 3, pp. 618-926, 2006.
7. M. Mahvash and V. Hayward, High fidelity passive force reflecting virtual environments, *IEEE Transactions on Robotics*, vol. 21, no. 1, pp. 38-46, 2005.
8. M. Mahvash and V. Hayward, High fidelity haptic synthesis of contact with deformable bodies, *IEEE Computer Graphics and Applications* (special issue on haptic rendering), vol. 24, no. 2, pp. 48-55, 2004.
9. M. Mahvash and V. Hayward, Haptic rendering of cutting, a fracture mechanics approach, *Haptics-e, The Electronic Journal of Haptics Research*, vol. 2, no. 3, 2001 (the second most cited paper of Haptics_e).

Book Chapters:

10. A. Okamura, K. Kuchenbecker, and M. Mahvash, Measurement-based modeling for haptic rendering, M. Lin and M. Otaduy (Eds), *Haptic Rendering: Algorithms and Applications*, A. K. Peters, Ltd., 2008. (This book chapter is not associated to any conference)
11. A. Okamura, L. N. Verner, C. E. Reiley, and M. Mahvash, Haptics for robot-assisted minimally invasive surgery. In *International Symposium Robotics Research*, Springer Tracts in Advanced Robotics. Springer-Verlag, 2007.
12. M. Mahvash and V. Hayward, Haptic simulation of a tool in contact with a nonlinear deformable body, N. Ayache, H. Delingette (Eds), *Lecture Notes in Computer Science (LNSC2673)*, Springer Verlag. pp. 311-320, 2003

Refereed Conference Papers

13. M. Mahvash, and P. Dupont, Stiffness Control of a Continuum Manipulator in Contact with a Soft Environment, *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2010 (in press).

14. J. Lock, G. Laing, M. Mahvash, P. Dupont, Kinematic Modeling of Concentric Tube Robots Incorporating Externally Applied Loading , IEEE /RSJ International Conference on Intelligent Robots and Systems, 2010 (in press).
15. M. Mahvash, and P. Dupont, Fast needle insertion to minimize tissue deformation and damage IEEE International Conference on Robotics and Automation, 2009.
16. J. Gwilliam, M. Mahvash, B. Vagvolgyi, A. Vacharat, D. Yuh, and A. Okamura, Effects of haptic and graphical force feedback for teleoperated palpation, IEEE International Conference on Robotics and Automation, 2009.
17. M. Mahvash, J. Gwilliam, R. Agarwal, B. Vagvolgyi, L.-M. Su, D. D. Yuh, and A. M. Okamura. Force-feedback surgical teleoperator: Controller design and palpation experiments. In 16th Symposium on Haptic Interfaces for Virtual Environments and Teleoperator Systems, pages 465-471, 2008
18. M. Arbabtafti, M. Moghaddam, A. Nahvi, M. Mahvash, and A. Rahimi, Haptic and visual rendering of virtual bone surgery: a physically realistic voxel-based approach, IEEE International Workshop on Haptic, Audio Visual Environments and their Applications, HAVE 2008.
19. M. Mahvash, and P. E. Dupont, Bilateral teleoperation of flexible surgical robots, IEEE International Conference on Robotics and Automation, Workshop on New Vistas and Challenges in Telerobotics 2008.
20. M. Moghaddam, A. Nahvi, M Arbabtafti, and M. Mahvash, A physically realistic voxel-based method for haptic simulation of bone machining, Proceeding of Eurohaptic 2008.
21. M. Mahvash and A. Okamura, Enhancing transparency of a position-exchange teleoperator, WorldHaptics Conference 2007, pp. 470 – 475.
22. M. Mahvash and A. Okamura, Friction compensation for a teleoperator with compliant transmission, 45th IEEE Conference on Decision and Control (45th CDC), 2006, pp. 4508-4513.
23. M. Mahvash and A. Okamura, Friction compensation for a force-feedback telerobotic system, IEEE International Conference on Robotics and Automation, 2006, pp. 3268-3273.
24. M. Mahvash and A. Okamura, A fracture mechanics approach to haptic synthesis of tissue cutting with scissors, Proc. WorldHaptics Conference 2005, pp. 356-362.
25. M. Mahvash and V. Hayward, Passivity-based high-fidelity haptic rendering of contact, Proc. IEEE International Conference on Robotics and Automation, 2003, pp. 3722-3728.
26. M. Mahvash, V. Hayward, and J. E. Lloyd, Haptic rendering of tool contact, Proc. Eurohaptics 2002, pp. 110-115.

Conference Abstracts

27. S. Saha, M. Mahvash, L. N. Verner, and A. M. Okamura. Force sensing in robot-assisted surgery: Which degrees of freedom are most important? In Medicine Meets Virtual Reality (MMVR) 15, Long Beach, CA, USA, February 6-9 2007.
28. M. Mahvash, R. Agarwal, J. Gwilliam, A. Okamura, and L. Su, Investigating Haptic Feedback For Detecting Prostate Nodules During Robot-Assisted Laparoscopic Radical Prostatectomy, Engineering & Urology Society Meeting 2008.

Invited Talks

“Control of Continuum Robots for Enabling New Minimally Invasive Procedures”, Dept of Electrical Engineering, Worcester Polytechnic Institute, March 2010

“A Robotic System for Intracardiac Surgery”, MEMeet 2009 –2nd International Medical Engineering Symposium, Spain, October 2009.

“Haptic Feedback for Surgical Teleoperators and Training Simulators”, Dept of Mechanical Engineering, Worcester Polytechnic Institute, March 2009

“Impedance Control of Concentric Tube Robots for Image-Guided Intracardiac Surgery “, Philips Research, NY, January 2009.

“High-Fidelity Haptic Feedback for a Surgical Teleoperator” Intuitive Surgical, Sunnyvale, CA, April 2008.

“High-Fidelity Haptic Feedback for Teleoperators and Virtual Environments”, Dept of Mechanical Engineering Boston University, February 2008.

“Teleoperation of Robots for Minimally Invasive Surgery” Department of Electrical Engineering, University of Waterloo, Canada, March 2008.

“High-Fidelity Haptic Feedback for Teleoperators and Virtual Environments” School of Computer Science, Carnegie Mellon University, Pittsburgh, USA, April 2007.

“Haptic Feedback for Surgical Teleoperators and Training Simulators” Lindbergh Lecture, Department of Mechanical Engineering, University of Wisconsin, Madison, Wisconsin, USA, March 2006.

“Haptic Feedback for Surgical Teleoperators and Training Simulators”. Department of Electrical and Computer Engineering, University of Western Ontario, London, Ontario, Canada, July 2005.

“Holep Surgical Simulator” Center of Excellence for Surgical Education and Innovation, Vancouver General Hospital, Vancouver, Canada, March 2002, Invited Demo.