

Curriculum Vitae

Blake Hannaford, Ph.D.

June 19, 2006

Dept. of Electrical Engineering
University of Washington
Seattle, WA 98195-2500
(206)543-2197
fax (206)221-5264
email hannaford@ee.washington.edu
www: <http://br1.ee.washington.edu>

Educational History

Ph.D. University of California, Berkeley 12/85
Electrical Engineering and Computer Science

Employment History

University of Washington 9/89 -

Department of Electrical Engineering
Professor, Adjunct Professor of Bioengineering, Adjunct Professor of Mechanical Engineering Adjunct Professor of Surgery: 9/02 - present

Jet Propulsion Laboratory, Caltech 9/88-8/89

Automation and Robotics Section (347)

Awards and Honors

- IEEE Fellow “for contributions to haptic interfaces and telerobotic systems.” January, 2006.
- Faculty Service Award, Department of Electrical Engineering, June 2005, “In recognition for excellent service to the department and the community through work in Faculty Recruiting, Educational Administration, and Curriculum Development.”
- One of Five UWEE Professors who received votes in the UW Alumni Association “Favorite Professor” poll of 2005 Graduates.

Awards and Honors won by Students

- January 2006, Ken Fodero et al., One of 10 winners of Best Poster Awards, Medicine Meets Virtual Reality, Long Beach, CA 2006.
- August 2005, William “Pete” Moss (DxARTS) and Brian Cunitz (EE) won honorable mention for their project “The Haptic Theremin,” in the Sensable Developers Challenge announced at Siggraph 2005.
- June 2005, Steven Venema (Ph.D. 1997) promoted to Boeing Associate Technical Fellow.

Recent Publications

Refereed Archival Journal Publications

- [1] J. Doshier and B. Hannaford. Human interaction with small haptic effects. *PRESENCE*, In Press., April 2004.
- [2] Jee-Hwan Ryu, Carsten Preusche, Blake Hannaford, and Gerd Hirzinger. Time domain passivity control with reference energy following. *IEEE Trans. on Control Systems Technology*, 13(5) 737, Sept. 2005.
- [3] Jee-Hwan Ryu, Yoon Sang Kim, and Blake Hannaford. Sampled and continuous time passivity and stability of virtual environments. *IEEE Trans. on Robotics*, 20(4):772–776, 2004.
- [4] Jee-Hwan Ryu, Dong-Soo Kwon, and Blake Hannaford. Control of a flexible manipulator with noncollocated feedback: Time domain passivity approach. *IEEE Trans. on Robotics*, 20(4):776–780, 2004.
- [5] Jee-Hwan Ryu, Dong-Soo Kwon, and Blake Hannaford. Stability guaranteed control: Time domain passivity approach. *IEEE Trans. on Control Systems Technology*, 12(6), 2004.
- [6] D.P. Ferris, J.M. Czerniecki, and B. Hannaford. An ankle-foot orthosis powered by artificial pneumatic muscles. *Journal of Applied Biomechanics*, 21:189–197, 2005.
- [7] M.J.H. Lum, J. Rosen, M. N. Sinanan, and B. Hannaford. Kinematic optimization of serial and parallel spherical mechanism for a minimally invasive surgical robot. *IEEE Transactions on Biomedical Engineering*, In Press, February 2006.
- [8] J. Rosen, J.D. Brown, L. Chang, M. Sinanan, B. Hannaford, 'Generalized Approach for Modeling Minimally Invasive Surgery as a Stochastic Process Using a Discrete Markov Model,' *IEEE Transactions on Biomedical Engineering*, vol. 53, pp. 399-413, March 2006.

Recent Conference Proceedings

Full papers, Peer Review

- [1] T. M. Kowalewski, J. Rosen, L. Chang, M. Sinanan, and B. Hannaford. Optimization of a vector quantization codebook for objective evaluation of surgical skill. *Medicine Meets Virtual Reality 12*, pages 174–179, 2004.
- [2] M.J.H. Lum, J. Rosen, M. Sinanan, and B. Hannaford. Kinematic optimization of a spherical mechanism for a minimally invasive surgical robot. In *Proc. IEEE International Conference on Robotics and Automation*, New Orleans, La., May 2004.
- [3] J.H. Ryu, B. Hannaford, C. Preusche, and G. Hirzinger. Time domain passivity control with reference energy behavior. In *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems*, pages 2932–2937, Las Vegas, 2003.
- [4] B. Hannaford, J.H. Ryu, D.S. Kwon, Y.S. Kim, and J.B. Song. Testing time domain passivity control of haptic enabled systems. In *Experimental Robotics*, volume 5, pages 550–559. Springer Tracts in Advanced Robotics Series, Bruno Siciliano and Paolo Dario 2003.
- [5] J. Rosen, M. Lum, D. Trimble, B. Hannaford, and M. Sinanan. Spherical mechanism analysis of a surgical robot for minimally invasive surgery - analytical and experimental approaches. *Studies in Health Technology and Informatics - Medicine Meets Virtual Reality, (MMVR05)*, 111:422–428, January 2005.

- [6] M.J.H. Lum, D. Warden, J. Rosen, M.N. Sinanan, and B. Hannaford. Hybrid analysis of a spherical mechanism for a minimally invasive surgical (MIS)robot - design concepts for multiple optimizations. In *Proceedings of Medicine Meets Virtual Reality*, pages 349–354, Long Beach, CA, January 2006.
- [7] K. Fodero, H. King, M. J.H. Lum, C. Bland, J. Rosen, M.N. Sinanan, and B. Hannaford. Control system architecture for a minimally invasive surgical robot. In *Proceedings of Medicine Meets Virtual Reality*, pages 156–158, Long Beach, CA, January 2006.
- [8] T. Mackel, J. Rosen, and C. Pugh. Data mining of the E-pelvis simulator database A quest for a generalized algorithm for objectively assessing medical skill. In *Proceedings of Medicine Meets Virtual Reality*, pages 355–360, Long Beach, CA, January 2006.
- [9] M.J.H. Lum, D. Trimble, J. Rosen, K. Fodero, H. King, G. Sankaranarayanan, J. Doshier, R. Leushke, B. Martin-Anderson, M.N. Sinanan, and B. Hannaford. Multidisciplinary approach for developing a new minimally invasive surgical robot system. In *Proceedings of the 2006 BioRob Conference*, Pisa, Italy, February 2006.
- [10] J.C. Perry and J. Rosen. Design of a 7 degree-of-freedom upper-limb powered exoskeleton. In *Proceedings of the 2006 BioRob Conference*, Pisa, Italy, February 2006.
- [11] S. De, P. Swanson, M.N. Sinanan, J. Rosen, A. Dagon, and B. Hannaford. Tissue damage due to mechanical stresses as applied during minimally invasive surgery. In *Proceedings of the 2006 BioRob Conference*, Pisa, Italy, February 2006.
- [12] G. Sankaranarayanan and B. Hannaford. Virtual coupling schemes for causality control in networked haptic environments. In *Proceedings of the 2006 BioRob Conference*, Pisa, Italy, February 2006.
- [13] J. Lester, B. Hannaford, and G. Borriello. 'are you with me?' - using accelerometers to determine if two devices are carried by the same person. In *Proceedings of the Second International Conference on Pervasive Computing*, pages 33–50, Vienna, Austria, 2004.
- [14] J. Lester, T. Choudhury, N. Kern, G. Borriello, and B. Hannaford. A hybrid discriminative/generative approach for modeling human activities. In *Proceedings of the Nineteenth International Joint Conference on Artificial Intelligence*, pages 766 – 722, Edinburgh, Scotland, 2005.

Miscellaneous

Recent Patents

- [1] M. Lum, D. Trimble, J. Rosen, M. Sinanan Spherical Mechanism for Surgical Manipulation, US Patent Application filed 25-April-2005.
- [2] B. Hannaford and J.H. Ryu. U.S. Patent #7,027,965, Passivity based method for stable haptic interaction. April 11, 2006
- [3] P. Buttolo and B. Hannaford. US Patent Revision: #RE37,528 “ Direct-drive manipulator for pen-based force display ” assigned to WRF, licensed to Immersion Corp., San Jose Ca.

Recent Invited Lectures and Seminars

Jan. 06 “Surgical Robotics: An Engineer’s Perspective,” DOD (TATRC) sponsored panel, NextMed/MMVR 2006 Conference, Long Beach, CA.

Nov. 05 “Saving Soldiers, Robots to the Rescue” (with Dr. Mika Sinanan). University of Washington College of Engineering/Alumni Association Lecture Series, “Engineering the Unexpected”, covered by UWTV. 15-Nov-2005.

Oct. 05 “Science at the Movies,” University of Washington Department of Chemistry Outreach Lecture, “Actuator Technology in I-Robot”. 24-Oct-2005.
Mar. 05 Dept. of Surgery and Bioengineering, Imperial College London. 21-Mar-2005.
Mar. 05 IMT Lucca Institute for Advanced Studies, Lucca Italy. 18-Mar-2005.
Jan. 05 DOD (TATRC) sponsored panel “Are Haptics Really Necessary”, NextMed 2005 Conference, Long Beach, CA January 2005.
Nov 04 Industrial and Operations Engineering Departmental Seminar, University of Michigan
Oct. 04 Keynote Speaker, IEEE Industrial Applications Society 39th Annual Meeting, 5-Oct-2004, Seattle.
Sep. 04 Faculty Member. Society for Laparoscopic Surgeons 13th International Congress and Endo Expo SLS Annual Meeting, September 29-October 2, 2004. New York. Multidisciplinary Plenary Session and Future Technology Session.
Sep. 04 Invited Participant. US Army Medical Research Command (TATRC) workshop on Surgical Robotics, Marina del Rey, California.
Aug. 04 Invited Plenary Talk, International Conference on Control, Automation, and Systems, Bangkok, Thailand.
Aug. 04 Invited Seminar, Samsung Advanced Institute of Technology (SAIT), Seoul Korea.
Aug. 04 Invited Seminar, Korean Advanced Institute of Technology (KAIST), Daejeon Korea.
Feb. 04 Robotics, Controls and Mechatronics Colloquium, University of Washington College of Engineering.
Feb. 04 Departmental Seminar: Department of Electrical Engineering and Computer Science, Case Western Reserve University.
Jan. 04 Distinguished Lecture: Department of Computer Science, University of Southern California.
Dec. 03 Intuitive Surgical Inc. Sunnyvale, CA.
Sept. 03 Invited Instructor: European Summer School on Surgical Robotics, University of Montpellier, France.

Professional Society Memberships

IEEE Robotics and Automation Society (IEEE Fellow), AAAS.

Chaired Masters Degrees

16 Completed and 2 in progress.

Post Doctoral Students and Surgical Fellows

4 Engineering PostDocs completed 1 in progress. 6 surgical fellows jointly supervised with M. Sinanan.