Peter Berkelman

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The Robotics Institute
Carnegie Mellon University
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Objective:

Faculty or research position relating to robotics or dynamics and control areas, such as haptic interfaces, dynamic physical simulations, teleoperation, electromechanical design, biomechanics, and mechatronic devices, sensors, and actuators.

Education:

The Robotics Institute, Carnegie Mellon University Pittsburgh PA 15213
Aug 1993-Present, 4.0/4.0 GPA, Ph.D. in Robotics, Completed June 2 1999

- Advised by Dr. Ralph Hollis
- Ph.D. Thesis, *Tool-Based Haptic Interaction with Dynamic Physical Simulations using Lorentz Magnetic Levitation.*
  - Tool-based haptic interaction provides user with the sensation of manipulating a handheld tool as a task is performed in a physically simulated virtual environment by generating tool forces and motion against the user's hand.
  - Conducted research in magnetic levitation haptic interface project to realize higher sensitivity and control bandwidths and more detailed and complex physical simulations for more realistic six degree-of-freedom haptic interaction:
    - Completed design, fabrication, and control of a high-performance Lorentz force magnetic levitation device to enable 6-DOF direct physical user interaction with dynamic simulations of physical environments through a levitated tool handle.
    - Implemented algorithms for haptic display of dynamic systems including moving rigid-body contacts, surface texture and friction, and virtual coupling between physical simulations and the haptic device controller.
    - Details at *http://www.cs.cmu.edu/~msl/haptic/haptic_desc.html.*
- Course concentration in mobile robot navigation, perception, and design.
- Teaching Assistant for Dr. Yangsheng Xu in graduate robot manipulation class.

Massachusetts Institute of Technology Cambridge MA 02139
Sep 1987-Mar 1992, 4.7/5.0 GPA, M.S. and B.S. in Mechanical Engineering

- Advised by Dr. Kamal Youcef-Toumi (M.S.) and Dr. Igor Paul (B.S.)
- M.S. thesis, *Compliant Control of a Robot Arm.*
  - Research in compliant control implementation, experimentation, and simulation with a two-link direct-drive tabletop robot arm.
- Graduate course concentration in control and dynamics.
- MIT Engineering Internship Program at Philips Laboratories.

Employment Experience:

Toshiba Manufacturing Engineering Research Center Isogo-ku, Yokohama 235 Japan
May-Jul 1995

- Prepared report of user interface recommendations for teleoperation of experimental satellite manipulator.
- Developed testbed for DSP controller with automatically generated software.

Fujitsu Laboratories, Space Mechatronics Dept. Nakahara-ku, Kawasaki 211 Japan
Oct 1992-Aug 1993

- Reformulated compliant and impedance control for improved surface following with a robot arm.
- Implemented and tested control algorithms on robot arm.
- System identification and simulation of robot arm.

Philips Laboratories Briarcliff Manor NY 10510
May 1989-Aug 1989, May 1990-Aug 1990, May 1991-Feb 1992

- Developed and implemented hybrid compliant control for two-link direct drive robot.
- Developed automated laser soldering process with visual inspection for mass production of capacitor components.

Publications:

Interaction with a Realtime Dynamic Environment Simulation using a Magnetic Levitation Haptic Interface Device, P. J. Berkelman, R. L. Hollis, and D. Baraff, IEEE International Conference on Robotics and Automation, Detroit, May 10-15, 1999.

Haptic Interaction using Magnetic Levitation, P. J. Berkelman, R.J. Furness, ed., Proc. of the ASME Dynamic Systems and Control Division, ASME International Mechanical Engineering Congress and Exposition, Anaheim, Nov. 19-20, 1998, DSC-Vol. 64.

Dynamic Performance of a Magnetic Levitation Haptic Device, P. J. Berkelman and R. L. Hollis, Proc. of Conference on Telemanipulator and Telepresence Technologies, SPIE Int'l Symposium on Intelligent Systems and Intelligent Manufacturing, Greensburgh PA, Sept 1997, SPIE Proceedings Vol. 3602.

Magnetic levitation haptic interfaces will impact training and design, P. J. Berkelman and R. L. Hollis, interview by Frederick Su, SPIE OE Reports no. 165, Sept. 1997.

Design of a Hemispherical Magnetic Levitation Haptic Interface Device, P. J. Berkelman, Z. J. Butler, and R. L. Hollis, K. Danai, ed., Proc. of the ASME Dynamic Systems and Control Division, ASME International Mechanical Engineering Congress and Exposition, Atlanta, Nov. 21, 1996, DSC-Vol. 58.

Advantages of Magnetic Levitation for Haptic Interaction, P. J. Berkelman, Proceedings of U.S.-Japan Graduate Student Forum in Robotics, Osaka, Japan, Nov. 8-9, 1996.

Design of a Day/Night Lunar Rover, P. Berkelman, M. Chen, J. Easudes, J. Hancock, T. Martin, A. Mor, E. Rollins, A. Sharf, J. Silberman, T. Warren, and D. Bapna, tech. report CMU-RI-TR-95-24, Robotics Institute, Carnegie Mellon Univ., Pittsburgh, 1995.

Interacting with Virtual Environments using a Magnetic Levitation Haptic Interface, P. J. Berkelman, R. L. Hollis, and S. E. Salcudean, Proc. of IEEE/RSJ Int. Conf. on Intelligent Robots and Systems, Pittsburgh, Aug. 1995.

Awards and Activities:

- Best Video Award, 1999 IEEE International Conference on Robotics and Automation, May 13, 1999.
- Program Committee, Telemanipulator and Telepresence Technologies, Part of SPIE Symposium on Intelligent Systems and Advanced Manufacturing, Oct. 1997-Present.
- Presentation of haptic interface system at demonstration and poster session, "Haptic Interaction using Magnetic Levitation", Haptic Symposium at ASME International Mechanical Engineering Congress and Exposition, Nov. 19, 1998.
- U.S.-Japan Graduate Student Forum in Robotics, Osaka, Japan, Nov. 8-9, 1996.
- Sigma Xi, Tau Beta Pi, Pi Tau Sigma research and engineering organizations.

Computer Experience:

- Programming in C, C++, Fortran, Pascal, Lisp, Assembly
- UNIX, VxWorks, and other DSP, embedded, and realtime operating systems
- OpenGL and Open Inventor graphics libraries
- Pro/Engineer CAD
- Matlab and Simulink numerical computation and simulation
- Ansoft and EMRC finite element analysis

Background:

- Practical language experience in French, Indonesian/Malay, and Japanese.
- Personal interests in inline speedskating, ceramic art, and travel.

Transcripts and references available upon request.