BENJAMIN J. STEPHENS

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PERSONAL STATEMENT

I am very interested in the research of complex systems such as the humanoid robots I have been studying as a Ph.D. student at the Robotics Institute. The emphasis of my work has been control of full body compliance to make systems more robust to unknown perturbations. In addition, I have explored the role of online optimal control and state estimation in such systems. I believe humanoid robots are useful tools for studying complex robotics problems and are applicable to both service jobs and the study of human balance and control. I am very motivated to see humanoid robots become more useful in real-world applications where they interact with people. I also hope that this research can one day help design better robotic assistive devices, such as prosthetics or exoskeletons.

EDUCATION

Carnegie Mellon University, Pittsburgh, PA
Ph.D. Candidate in Robotics **2006-Present**
Thesis: "Control of Full-Body Humanoid Robot Push Recovery"

Northwestern University, Evanston, IL
B.S. in Mechanical Engineering with Honors **2002-2006**
Honors Thesis: "Quasistatic Climbing with Application to Tunnel Climbing Robot"

HONORS AND AWARDS

National Science Foundation Graduate Research Fellowship Honorable Mention (2006,2007,2008)
NSF IGERT Fellowship, Carnegie Mellon
Undergraduate Research and Innovation Award, Northwestern University
Ford Undergraduate Research Grant, Northwestern University
Tau Beta Pi, Engineering Honor Society
Pi Tau Sigma, Mechanical Engineering Honor Society

PROJECTS

Humanoid Push Recovery, Carnegie Mellon **2006-Present**
Developed theory and real-time control algorithms for push recovery control of full-body hydraulic force-controlled humanoid robot including standing balance, stepping and walking.

Mechatronics, Northwestern **2006**
Helped design the new mechatronics laboratory, including a PC/104 computer kit running Matlab xPC for use in student projects and research. Created a wiki website that includes kit documentation, mechatronics theory, and example circuits.

Tunnel Climbing Robot, Northwestern **2004-2006**
Designed a prototype tunnel climbing robot for use in search and rescue. Studied quasistatic climbing with friction and motor torque constraints.

Snakeboard, Northwestern **2003-2004**
Developed motion planning and nonlinear controls for the snakeboard robot running real-time QNX

PUBLICATIONS

- Benjamin Stephens, Christopher Atkeson, "Push Recovery by Stepping for Humanoid Robots with Force Controlled Joints," IEEE International Conference on Humanoid Robots, 2010
- Benjamin Stephens, Christopher Atkeson, "Dynamic Balance Force Control for Compliant Humanoid Robots," IEEE International Conference on Intelligent Robots and Systems, 2010
- Benjamin Stephens, Christopher Atkeson, "Modeling and Control of Periodic Humanoid Balance using the Linear Biped Model," IEEE International Conference on Humanoid Robots ,2009
- Christopher Atkeson, Benjamin Stephens, "Random Sampling of States in Dynamic Programming," in *IEEE Transactions on Systems, Man, and Cybernetics - Part B: Cybernetics*, Vol. 38, No. 4, pp. 924-929, August, 2008
- Christopher Atkeson, Benjamin Stephens, "Multiple Balance Strategies from One Optimization Criterion," IEEE International Conference on Humanoid Robots, 2007
- Benjamin Stephens, "Humanoid Balance Strategies," IEEE International Conference on Humanoid Robots, 2007
- Christopher Atkeson, Benjamin Stephens, "Random Sampling of States in Dynamic Programming," NIPS 2007
- Benjamin Stephens, "Integral Control of Humanoid Balance," IEEE International Conference on Intelligent Robots and Systems, October, 2007
- Benjamin Stephens, "Decoupled Control for the Snakeboard," Northwestern Undergraduate Research Journal, Vol. 2, May 2005