Siyuan Feng

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Research Interests

I am interested in using optimization and learning techniques to generate complex robot behaviors. My current research focuses on enabling humanoid robots to traverse rough terrain with robustness and agility.

Education

Carnegie Mellon University, Pittsburgh, PA
Doctor of Philosophy in Robotics, February 2016
Thesis: Online Hierarchical Optimization for Humanoid Control
Advisor: Christopher G. Atkeson

Carnegie Mellon University, Pittsburgh, PA
Master of Science in Robotics, August 2014

Carnegie Mellon University, Pittsburgh, PA
Bachelor of Science in Computer Science, Minor in Robotics, May 2010, GPA 3.71 / 4.0

Research Experience

Full Body Control for Humanoid Robots, CMU, Pittsburgh, PA　　　　Fall 2012 to present
Developing an online optimization-based hierarchical controller for humanoid robots that is capable of both traversing rough terrain and full body manipulation. Participate as the control lead of Team WPI-CMU in the DARPA Robotics Challenge.

Trajectory Library, CMU, Pittsburgh, PA　　　　Fall 2011 to Fall 2012
Researched on approximating globally optimal control for nonlinear systems with a library of locally optimal trajectories. Proposed a more accurate method for value estimation and investigated multiple lookup schemes and sampling distributions for library generation.

Simple Model for Biped Locomotion, CMU, Pittsburgh, PA　　　　Fall 2010 to Spring 2011
Analyzed biped running and walking gait stability using the Spring Loaded Inverted Pendulum model. Developed robust dead-beat controllers and gait transition behaviors.

Dynamic Climbing Robots, CMU, Pittsburgh, PA　　　　Spring 2008 to Spring 2010
Developed state estimation, control, communication, and optical tracking software for the ParkourBot. Used Poincaré map for gait and passive stability analysis.

Publications

S. Feng, X. Xinjilefu, C. Atkeson and J. Kim. Optimization Based Controller Design and Implementation for the Atlas Robot in the DARPA Robotics Challenge Finals. *Proceedings of IEEE-RAS International Conference on Humanoid Robots*, Seoul, Korea, 2015.

X. Xinjilefu, **S. Feng** and C. Atkeson. Center of Mass Estimator for Humanoids and its Application in Modelling Error Compensation, Fall Detection and Prevention. *Proceedings of IEEE-RAS International Conference on Humanoid Robots*, Seoul, Korea, 2015.

C. Liu, C. Atkeson, **S. Feng** and X. Xinjilefu. Full-body Motion Planning and Control for The Car Egress Task of the DARPA Robotics Challenge. *Proceedings of IEEE-RAS International Conference on Humanoid Robots*, Seoul, Korea, 2015.

S. Feng, E. Whitman, X. Xinjilefu and C. Atkeson. Optimization-based Full Body Control for the DARPA Robotics Challenge. *Journal of Field Robotics*, Volume 32, Issue 2, pages 293-312, March

2015.

M. DeDonato, V. Dimitrov, R. Du, R. Giovacchini, K. Knoedler, X. Long, F. Polido, M. A. Gennert, T. Padir, **S. Feng**, H. Moriguchi, E. Whitman, X. Xinjilefu and C. Atkeson. Human-in-the-loop Control of a Humanoid Robot for Disaster Response: A Report from the DARPA Robotics Challenge Trials. *Journal of Field Robotics*, Volume 32, Issue 2, pages 275-292, March 2015.

S. Feng, E. Whitman, X. Xinjilefu and C. Atkeson. Optimization Based Full Body Control for the Atlas Robot. In *Proceedings of IEEE-RAS International Conference on Humanoid Robots*, Madrid, Spain, 2014.

X. Xinjilefu, **S. Feng** and C. Atkeson. Dynamic State Estimation Using Quadratic Programming. In *Proceedings of IEEE/RSJ International Conference on Intelligent Robots and Systems*, Chicago, IL, 2014.

X. Xinjilefu, **S. Feng**, W. Huang and C. Atkeson. Decoupled State Estimation for Humanoids Using Full-body Dynamics. In *Proceedings of IEEE International Conference on Robotics and Automation*, Hong Kong, China, 2014.

S. Feng, X. Xinjilefu, W. Huang and C. Atkeson. 3D Walking Based on Online Optimization. In *Proceedings of IEEE-RAS International Conference on Humanoid Robots*, Atlanta, GA, 2013.

A. Degani, A. Long, **S. Feng**, H. B. Brown, R. D. Gregg, H. Choset, M. T. Mason and K. Lynch. Design and Open-Loop Control of the ParkourBot, a Dynamic Climbing Robot. *IEEE Transactions on Robotics*, 30(3):705-718, 2014.

A. Degani, **S. Feng**, H. B. Brown, K. Lynch, H. Choset and M. T. Mason. The ParkourBot - A Dynamic BowLeg Climbing Robot. In *Proceedings of IEEE International Conference on Robotics and Automation*, Shanghai, China, 2011.

A. Degani, **S. Feng**, H. Choset and M. T. Mason. Minimalistic, Dynamic, Tube Climbing Robot. In *Proceedings of IEEE International Conference on Robotics and Automation*, Anchorage, AK, 2010.

Awards and Honors	Control lead of Team WPI-CMU, finalist in the DARPA Robotics Challenge, December 2013, June 2015.
	Best Oral Paper, 3D Walking Based on Online Optimization. International Conference on Humanoid Robots, October 2013.
	Best Video Award, Minimalistic, Dynamic, Tube Climbing Robot. International Conference on Robotics and Automation, May 2010.
	Graduation with University Honors, May 2010.
Invited Talks	Controller and State Estimator Design and Implementation for the Atlas Robot, Humanoids 2015 Workshop on Proprioceptive and Exteroceptive Data Fusion for State Estimation and Whole-Body Control of Humanoid Robots, Seoul, Korea, 2015
	Full-Body Control for the Atlas Robot, IROS 2014 Workshop on Whole-Body Control for Robots in the Real World, Chicago, IL, September 2014.
	Optimization-Based Full Body Control For The DARPA Robotics Challenge, RSS 2014 Workshop on Dynamic Locomotion, Berkeley, CA, July 2014.

Optimization-Based Full Body Control For The DARPA Robotics Challenge, Workshop on Humanoid Control, IHMC, Pensacola, FL, March 2014.

Teaching Experience
Humanoids, **Robotic Manipulation**, CMU, Pittsburgh, PA   Spring 2011, Fall 2008, Fall 2009
Teaching assistant for undergraduate classes. Designed projects. Graded assignments and exams. Held office hours. Gave guest lectures.