Junggon Kim

Robotics Institute
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Citizenship: Republic of Korea (South Korea)
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Research Interests

My research goal is to understand mechanics behind the motions seen in humans and animals, and apply the knowledge to planning and control of artificial creatures such as robots and simulated animation characters. My areas of interest include motion optimization, manipulation and grasp planning, biped walking and footstep planning, and physically-based character animation. I am also interested in developing dynamic simulation techniques for articulated rigid/soft body systems, and validating the effectiveness of using them in predicting, analyzing and improving performance of robotic systems in the real environment.

Education

Ph.D. in Mechanical Engineering, Seoul National University, Seoul, Republic of Korea, February 2007.
Dissertation Title: *Dynamics-based Motion Optimization for Skeleton-driven Deformable Body Systems*
Advisor: Frank C. Park

M.S. in Mechanical Engineering, Seoul National University, February 1998.
Advisor: Frank C. Park

B.S. in Mechanical Engineering, Seoul National University, February 1996.

Employment History

Project Scientist   2/2010 – Present
The Robotics Institute, Carnegie Mellon University, Pittsburgh, PA
- Motion optimization for biped walking and footstep planning
- Physically-based hand simulation and animation
- Physically-based robot grasp quality evaluation under pose uncertainty
- Robot manipulation and grasp planning

Postdoctoral Fellow   2/2007 – 1/2010
The Robotics Institute, Carnegie Mellon University, Pittsburgh, PA
- Physics simulation of skeleton-driven soft body characters
- Intuitive user interface system for controlling physically simulated character motions

Visiting Student   1/2005 – 1/2007
The Robotics Institute, Carnegie Mellon University, Pittsburgh, PA
- Physically-based motion optimization for skeleton driven articulated body systems

Researcher   1/2000 – 1/2005
Hyundai Heavy Industries Co., Ltd., Yongin, Republic of Korea
- Developed C++ library for kinematics and dynamics of serial and parallel manipulators.
- Developed dynamics-based path planning algorithm for industrial robots.
- Contributed to reducing noise and vibration of industrial robots.

Research Assistant (Part-time internship)   3/1998 – 2/2000
Korea Institute of Science and Technology, Seoul, Republic of Korea
- Conducted research on generating optimal arm motions of a humanoid robot.

Publications

Refereed Journal Publications

Junggon Kim, Kunihiro Iwamoto, James J. Kuffner, Yasuhiro Ota, and Nancy S. Pollard, "Physically-based grasp quality evaluation under pose uncertainty," *IEEE Transactions on Robotics* (In press).

Junggon Kim and Nancy S. Pollard, "Fast Simulation of Skeleton-driven Deformable Body Characters," *ACM Transactions on Graphics*, Volume 30, Issue 5, 2011 *(Also presented at SIGGRAPH 2012)*.

Junggon Kim and Nancy S. Pollard, "Direct Control of Simulated Non-human Characters," *IEEE Computer Graphics and Applications*, vol. 31, no. 4, pp. 56-65, July/Aug 2011 *(Special Issue on Physically Based Character Animation)*.

Sunghee Lee, Junggon Kim, F.C. Park, Munsang Kim, and J.E. Bobrow, "Newton-type algorithms for generating physically natural motions," *IEEE Transactions on Robotics*, pp. 657-667, Aug 2005.

Sanghoon Yeo, Jinwook Kim, Sung Hee Lee, F.C. Park, Wooram Park, Junggon Kim, Changbeom Park and Intaeck Yeo, "A modular object-oriented framework for hierarchical multi-resolution robot simulation," *Robotica*, vol 22, pp. 141-154, 2004.

Seungwoong Gwak, Junggon Kim and F.C. Park, "Numerical optimization on the Euclidean group with applications to camera calibration," *IEEE Transactions on Robotics and Automation*, vol. 19, no. 1, Feb 2003.

J.E. Bobrow, B. Martin, G. Sohl, E.C. Wang, F.C. Park, and Junggon Kim, "Optimal robot motions for physical criteria," *Journal of Robotic Systems*, vol. 18, no. 12, pp. 785-795, Dec 2001.

F.C. Park, Junggon Kim, and Changdon Kee, "Geometric descent algorithms for attitude determination using the global positioning system," *AIAA Journal of Guidance, Control, and Dynamics*, vol. 23, no. 1, pp. 26-33, January 2000.

Refereed Conference Publications

Junggon Kim, Nancy S. Pollard and Christopher G. Atkeson, "Quadratic Encoding of Optimized Humanoid Walking," *Proc. IEEE-RAS International Conference on Humanoid Robots (Humanoids)*, 2013 (To appear).

Weiwei Huang, Junggon Kim and Christopher G. Atkeson, "Energy-Based Optimal Step Planning for Humanoids," *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, 2013.

Junggon Kim, Kunihiro Iwamoto, James J. Kuffner, Yasuhiro Ota, and Nancy S. Pollard, "Physically-based grasp quality evaluation under uncertainty," *Proc. IEEE International Conference on Robotics and Automation (ICRA)*, St. Paul, Minnesota, May 14-18, 2012.

Junggon Kim, Jonghyun Baek, and F.C. Park, "Newton type algorithms for robot motion optimization," *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Kyongju, Korea, October 17-21, 1999.

F.C. Park, Junggon Kim, and Changdon Kee, "Geometric descent algorithms for attitude determination using GPS," *Proc. 14th World Congress of IFAC*, Beijing, China, July 5-9, 1999.

F.C. Park, Junggon Kim, and J.E. Bobrow, "Algorithms for dynamics-based robot motion optimization," *Proc. 10th World Congress on Theory of Machines and Mechanisms*, Oulu, Finland, June 20-24, 1999.

Teaching Experience

Guest Lecturer, Technical Animation (by Prof. Nancy Pollard), Carnegie Mellon University, Fall 2009.

Guest Lecturer, Physically Based Character Animation (by Prof. Nancy Pollard), Carnegie Mellon University, Spring 2009.

Teaching Assistant, Robot Kinematics (by Prof. Frank Park), Seoul National University, Spring 1996.

Honors and Awards

Outstanding Researcher Award, Hyundai Heavy Industries Co., Ltd., 2002.

Scholarship, Seoul National University, 1992-1998.

Scholarship, Nongpa Scholarship Foundation, 1993-1995.