Hyungju Andy Park

Greater Boston Area | US Perm. Resident | andypark.purdue@gmail.com
(765) 430-2447(C)
https://www.linkedin.com/in/robodreamer

PROFILE

I am a passionate Roboticist with 10+ years of work experience. I enjoy solving challenging complex problems with my analytical thinking, hands-on experiences, and ability to think outside the box.

WORK EXPERIENCE

Sr. Robotics Research Scientist **KUKA US R&D**, Boston, MA Dec. 2022 – Present
- Leading the development of advanced compliant behaviors on iisy series cobots
- Leading the development of coordinated motion algorithms for multi-arm general surgery systems

Robotics Research Scientist **KUKA US R&D**, Boston, MA Nov. 2018 – Nov. 2021
- Leading the development of real-time-compatible software libraries in C++ / Java for state-of-the-art multi-task inverse kinematics and redundancy management algorithms for Industrial/Medical products
- Developing various manipulator performance metrics and formulated pose/trajectory optimization algorithms which can consider multiple criteria including singularity, joint limit, and collision avoidance
- Formulated various advanced algorithms – e.g., handling manipulator singularities, multi-task impedance & force controller with torque limits considered, path speed limiter given joint / Cartesian limits, and etc.
- Collaborating with colleagues across other KUKA R&D sites including KUKA Coporate Research and Medical in Germany and KUKA Robotics Michigan/Austin
- Delivered numerous presentations and demos during meetings with customers as well as internal R&D showcase events

Sr. Robotics Engineer **Rethink Robotics**, Boston, MA June 2016 – Oct. 2018
- Developed advanced impedance/force control features on Sawyer's 7-DOF arm utilizing its redundancy
- Developed 7-DOF arm's pose nullspace optimization based on a variety of pose quality metrics for better performance in different applications
- Developed a log analysis tool for robot diagnostics data based on ELK stack and docker
- Created various analysis tools for a generic manipulator's Kinematics and Dynamics in MATLAB
- Developed advanced inverse kinematics algorithms that handle multiple tasks as well as joint limits for redundant robots (currently maintaining SNS-IK open source project on github)

Research Assistant **Assistive Robotics Technology Lab at Purdue** *Aug. 2009 – May 2016*
- Developed closed-form inverse kinematics solutions for humanoid robot limbs with high accuracy and computational efficiency
- Modeled kinematics and dynamics of Hubo-II+ / DRC-Hubo humanoid robots and developed whole-body motion control software for manipulation and locomotion tasks
- Developed a multi-arm tele-manipulation system using two Baxter robots for various types of coordinated-motion tasks with compliant behaviors

Control Lead **Team DRC-Hubo for DRC Trials** *Oct. 2012 – Dec. 2013*
- Led Purdue Team and control software development in DRC-Hubo Team of Track A
- Developed whole-body motion planner & controller with compliance behaviors in C++ for industrial ladder climbing task (one of 8 tasks for disaster-response) in collaboration with Indiana University
- Successfully completed the ladder climbing task (8 steps out of 9) at DRC-Trials, Dec 2013

EDUCATION

Purdue University, West Lafayette, IN, United States GPA: 3.64/4.0 *May 2016*
Ph.D. in Electrical and Computer Engineering with specialty in Robotics
Dissertation Topic: Representation and Control of Coordinated Tasks for Human-Robot Systems
Advisor: Prof. C. S. George Lee

Kwangwoon University, Seoul, South Korea GPA: 4.37/4.5, Summa Cum Laude (1st/109) *Feb. 2009*
B.S. in Electronic Engineering

SKILLS

Programming Languages: C/C++, Python, Java, MATLAB

Applications: KUKA.Sim, ROS, V-REP, Gazebo, OpenRave, Webots

Software: Git, Docker, ELK Stack, Tensorflow, Keras, Eclipse, VSCode, Visual Studio, Linux, LaTeX

Robot Hardware: Cobots (LBR iiwa, Sawyer, Baxter, UR-5), Full-size humanoids (Hubo-II+, DRC-Hubo)

Languages: Korean (native), English (fluent), Chinese (conversational)

PUBLICATIONS

"A Nonparametric Motion Flow Model for Human Robot Cooperation"
Sungjoon Choi, Kyungjae Lee, **H. Andy Park**, Songhwai Oh
In proceedings of IEEE International Conference on Robotics and Automation (ICRA), May 2018

"Dual-Arm Coordinated-Motion Task Specification and Performance Evaluation"
H. Andy Park, and C.S. George Lee
In proceedings of IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS), Oct. 2016

"Extended-Cooperative-Task-Space for Manipulation Tasks of Humanoid Robots"
H. Andy Park, and C.S. George Lee
In proceedings of IEEE International Conference on Robotics and Automation (ICRA), May 2015

"Robust Ladder-Climbing with a Humanoid Robot with Application to the DARPA Robotics Challenge"
J. Luo, Y. Zhang, K. Hauser, **H. A. Park**, M. Paldhe, C. S. G. Lee, M. Grey, M. Stilman
In proceedings of IEEE International Conference on Robotics and Automation (ICRA), May 2014

"Motion Planning of Ladder Climbing for Humanoid Robots"
Y. Zhang, J. Luo, K. Hauser, R. Ellenberg, P. Oh, **H. A. Park**, M. Paldhe, and C.S.G. Lee
In proceedings of IEEE Conf. on Technologies for Practical Robot Applications (TePRA), April 2014

"Cooperative-Dual-Task-Space-based Whole-body Motion Balancing for Humanoid Robots"
H. Andy Park, and C.S. George Lee
In proceedings of IEEE International Conference on Robotics and Automation (ICRA), May 2013

"Closed-Form Inverse Kinematic Joint Solution for Humanoid Robots"
H. Andy Park, Muhammad A. Ali and C.S. George Lee
The International Journal of Humanoid Robotics (IJHR), Vol. 09, No. 03, September 2012

"Convolution-Sum-Based Generation of Walking Patterns for Uneven Terrains"
H. Andy Park, Muhammad. A. Ali and C.S. George Lee
In proceedings of IEEE-RAS Intl. Conf. on Humanoid Robots (Humanoid), Dec. 2010

"Closed-Form Inverse Kinematic Joint Solution for Humanoid Robots"
Muhammad A. Ali, **H. Andy Park** and C.S. George Lee
In proceedings of IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems (IROS), Oct. 2010

ONLINE COURSE CERTIFICATES

Coursera: Deep Learning Specialization (5 Courses)	July 2018
Coursera: Chinese for HSK 1, 2, 3 (Peking)	July 2017
Coursera: Algorithms: Design and Analysis (Stanford)	Dec. 2015
Coursera: Machine Learning (Stanford)	Nov. 2015

RELEVANT COURSES

Robotics	Pattern Recognition	Computer Vision	Optimal Control	Computer Network
Artificial Intelligence	Optimization	Linear Systems	Random Variables	Linear Algebra

HONORS AND AWARDS

"They Call Me Marlin" – Intera Hackathon Best Team Award at RethinkRobotics	Nov. 2017
"Best of What Makes Rethink Special" – Intera Hackathon Best Team Award at RethinkRobotics	Dec. 2016
ICRA2015 Travel Grant Award, Travel Award for Purdue Engineering Ph.D. Candidates	May 2015
Bronze Award at Intl. Competition for Intelligent Robot Software hosted by IEEE Systems	Nov. 2007
Prize for Excellence at National Eng. Math Competition, Korean Mathematical Society	Nov. 2007
1st place at Intl. Robot Contest, Center for the Advancement of Robot Industry of Korea	Oct. 2006
2nd place at Humanoid Robot Dance Competition at Korean Technology Contest	Dec. 2005
2nd place at Robot Festival hosted by Korean Industrial Technology Foundation	Nov. 2005
$2,000 Award for the 8th Hackers Bridge scholarship	July 2009
$5,000 Scholarship for outstanding eng. and sci. students, Korean Broadcasting System	Aug. 2008
$10,000 Award for excellent college research proposal by Korean government	Oct. 2006
$2,000 Scholarship for students with enterprising spirit, Korean Ministry of Education	2007
$5,000 Scholarship for academic excellence (1st place) awarded by Kwangwoon Univ.	2005-2006