DAEHYUNG PARK

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CURRENT POSITION

Postdoctoral Associate, Massachusetts Institute of Technology — April 2018-Present
Computer Science and Artificial Intelligence Laboratory (CSAIL), Dr. Nicholas Roy
- Working on natural language understanding for human-robot interaction
- Working on knowledge-based planning and control for robust manipulation

EDUCATION

Georgia Institute of Technology, Atlanta, Georgia — Aug. 20th, 2012 – Jan. 17th, 2018
Ph.D. Robotics Program in the College of Computing
Thesis: "A Multimodal Execution Monitor for Assistive Robots"
Committee Members:
Dr. Charles C. Kemp, Dept. of Biomedical Engineering, Georgia Tech (Advisor)
Dr. Byron Boots, School of Interactive Computing, Georgia Tech
Dr. Sonia Chernova, School of Interactive Computing, Georgia Tech
Dr. James M. Rehg, School of Interactive Computing, Georgia Tech
Dr. Randy Trumbower, Harvard Medical School, Harvard University

University of Southern California, Los Angeles, California — May 2008
M.S. Computer Science, Concentration in Computer Science Intelligent Robotics (CSIR)
Research: "Movement reproduction and obstacle avoidance with dynamic movement primitives and potential fields"
Advisor: Prof. Stefan Schaal

Osaka University, Osaka, Japan — March 2006
B.E. Systems Science, Concentration in Systems Science and Applied Informatics
Thesis: "Dynamic Turning Control for A Humanoid Robot HRP-2"
Advisor: Prof. Tatsuo Arai

RESEARCH EXPERIENCE

Graduate Research Assistant, Georgia Tech — Aug. 2012- March 2018
Institute for Robotics and Intelligent Machines, Dr. Charles C. Kemp
- Developed multimodal execution monitoring methods for robotic task executions
- Developed a robot-assisted feeding system for people with disabilities
- Demonstrated that a robot reaches in clutter with whole-arm tactile sensing
- Resulted in 12 publications in AURO, RA-L, ICRA, IROS, etc.

Research Engineer, Samsung Electronics, Suwon, Republic of Korea — 2008-2012
Mechatronics R&D Center
- Developed 6- to 7-DoF manipulation system for assembly and transfer tasks
- Developed Samsung Robot Controller (SRC); planning, control, and user applications
- Resulted in 6 patents in USA and Korea

Graduate Research Assistant, University of Southern California — 2007-2008
Department of Computer Science, Dr. Stefan Schaal
- Researched dynamic movement primitives with obstacle avoidance
- Developed 3-DoF manipulation for a DSC System (Joint-Project with JPL)
- Resulted in 3 publications in ICRA, Humanoids, and AMAM

Research Assistant, Osaka University April 2006-June 2006
Department of System Innovation, Dr. Koh Hosoda
- Researched a linear control system of pneumatic muscles for a humanoid robot

Research Assistant, Osaka University 2005-2006
Department of Systems Science, Dr. Tatsuo Arai
- Developed a dynamic turning control method for a humanoid robot, HRP-2
- Resulted in an undergraduate thesis and was funded through Japanese and Korean government-sponsored scholarship

SCHOLARSHIPS & AWARDS

IEEE Student Travel Grant, IEEE Robotics & Automation Society September 2014
Academic Achievement Award (for student over 3.9/4.0 GPA), University of Southern California May 2008
Government-sponsored full scholarship by Japanese and Korean governments 2001-2006

TEACHING EXPERIENCE

Graduate Teaching Assistant, Georgia Tech 2015,2016
Course: Deep Learning
- Collaborated with a visiting faculty member on developing course materials and assignments
- ,Taught labs and graded assignments for 50 students
- Developed new course curriculum

Guest Lecturer, Robot Winter School at the 3rd Korean Open Society for Robotics (KOS-Robot) 2015
Course: Manipulation - Fundamentals of Manipulation System
- Invited to teach one lecture to undergraduate and Master-level audience
- Developed and delivered 1 hour lecture for 150 audience

Graduate Teaching Assistant, University of Southern California 2008
Course: Robotics
- Collaborated with a faculty member on teaching labs
- Graded assignments and exams for 50 students

MENTORING EXPERIENCE

Student Mentor, Georgia Tech 2013-2018
Guided undergraduate and Master students who have conducted research in Dr. Kemp's Lab, Georgia Tech
- Michael Park, Master in Electrical and Computer Engineering, Fall 2017
- Yuuna Hoshi, Undergraduate in College of Computing, Spring 2017 to Spring 2018
- Hokeun Kim, Undergraduate in College of Computing, Spring 2016 to Spring 2018
- Chansu Kim, Undergraduate in Biomedical Engineering, Spring 2016
- You-Keun Kim, Undergraduate in Biomedical Engineering, Spring 2013 to Spring 2016 – MS course in Johns Hopkins Univ.
- Zackory Erickson, Undergraduate student from University of Wisconsin-La Crosse, Summer 2015 – Ph.D course in Georgia Tech
- Hyder Hasnain, Undergraduate in Biomedical Engineering, Spring 2015 to Summer 2015

PRESENTATIONS

Oral Presentations:

D. Park, "A Multimodal Execution Monitor for Assistive Robots", *Korea University*, 2018
D. Park, "A Multimodal Execution Monitor for Assistive Robots", *Distributed Robotics Laboratory MIT*, 2018
D. Park, "A Multimodal Execution Monitor for Assistive Robots", *Robust Robotics Group MIT*, 2018
D. Park, "Multimodal Execution Monitoring for Assistive Robots", *Hyundai Global Top Talent Forum*, 2017
D. Park, "Movement reproduction and obstacle avoidance with dynamic movement primitives and potential fields," *IEEE-RAS International Conference on Humanoid Robots*, 2008

PROFESSIONAL SERVICE & OUTREACH

Media

- Generation Robot, *Mouser.com*, USA — March 2018
- IEEE Spectrum's Video Friday — Sept. 2017
- Documentary for robotics and artificial intelligence, *SBS*, South Korea — May 2014

Reviewing Service

- **Workshops**
  - *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* — 2014, 2016
  - *IEEE International Workshop on Advanced Robotics and its Social Impacts (ARSO)* — 2017
- **Conferences**
  - *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* — 2016,2018
  - *IEEE International Conference on Robotics and Automation (ICRA)* — 2008, 2013, 2014, 2017, 2018
  - *IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN)* — 2015,2017
  - *IEEE/RSJ International Conference on Humanoid Robots (Humanoids)* — 2016
  - *IEEE International Conference on Ubiquitous Robots (UR)* — 2018
  - *Conference on Robot Learning (CoRL)* — 2018
- **Journals**
  - Journal of Intelligent and Robotic Systems — 2015
  - Autonomous Robots — 2017
  - IEEE Transactions on Industrial Informatics — 2017, 2018
  - International Journal of Robotics and Research (IJRR) — 2018

Exhibition

- Mini soccer system for "Eco-Be! League," *Robocup*, Japan — May 2006

PROFESSIONAL AFFILIATIONS

Member, IEEE Robotics and Automation Society — 2014-Present

SKILLS

Robot Tech: Experience: Installation of industrial robots in various factories
Techniques: Vision, Servo Tuning, and Use of diverse sensor devices

Software: Program Language – Python, C, C++, Java
Deep Learning Library – Keras, Theano, Torch, Tensorflow
Tool - ROS, MATLAB, Github, CVS

LEADERSHIP & VOLUNTEERING

Representative, Korean Researchers in Robotics/Vision, Georgia Tech — 2013-2016
Volunteer Interpreter, Suwon Hwaseong Tourist Guide, Suwon, South Korea — August 2011-December 2011
Volunteer, International Conference on Robotics and Automation 2008, Pasadena, California — May 2008
Department Representative, Korean Student Association, Osaka University — April 2006-July 2006

PUBLICATIONS

Journal Articles:

[1] **D. Park**, Y. Hoshi, and C. C. Kemp. "A Multimodal Anomaly Detector for Robot-Assisted Feeding Using LSTM-based Variational Autoencoder," *IEEE Robotics and Automation Letters (RA-L)*, 2018. (Presentation at *IEEE ICRA 2018*)

[2] **D. Park**, H. Kim, and C. C. Kemp. "Multimodal Anomaly Detection for Assistive Robots," *Autonomous Robots*, 2018.

[3] A. Kapusta, P. Grice, H. Clever, Y. Chitalia, **D. Park**, and Charles C. Kemp. "An Assistive Robotic System with a Robotic Bed and a Mobile Manipulator", *PLoS ONE*, 2018 [submitted]

[4] **D. Park**, Y. Hoshi, H. P. Mahajan, W. A. Rogers, and C. C. Kemp. "Toward Active Robot-Assisted Feeding with a General-Purpose Mobile Manipulator: Design, Evaluation, and Lessons Learned" [Submitted]

Conference Articles:

[1] D. Nyga, S. Roy, R.Paul, **D. Park**, M. Pomarlan, M. Beetz, and N. Roy. "Grounding Robot Plans from Natural Language Instructions with Incomplete World Knowledge", *Conference on Robot Learning (CoRL2018)* [accepted, **31% Acceptance Rate**]

[2] J. Arkin, R. Paul, **D. Park**, S. Roy, N. Roy and T. M. Howard. "Real-Time Human-Robot Communication for Manipulation Tasks in Partially Observed Environments", International Symposium on Experimental Robotics (ISER2018) [accepted]

[3] H. M. Clever, A. Kapusta, **D. Park**, Z. Erickson, Y. Chitalia, and C. C. Kemp. "Estimating 3D Human Pose on a Configurable Bed from a Single Pressure Image", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2018)*.

[4] **D. Park**, H. Kim, Y. Hoshi, Z. Erickson, A. Kapusta, and C. C. Kemp. "A Multimodal Execution Monitor with Anomaly Classification for Robot-Assisted Feeding", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2017)*.

[5] **D. Park**, Z. Erickson, T. Bhattacharjee, and C. Kemp. "Multimodal Execution Monitoring for Anomaly Detection During Robot Manipulation," *IEEE International Conference on Robotics and Automation (ICRA2016)*.

[6] T. Bhattacharjee, A. A Shenoi, **D. Park**, J. Rehg, and C. Kemp. "Combining Tactile Sensing and Vision for Rapid Haptic Mapping," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2015).*

[7] A. Kapusta, **D. Park**, and C. Kemp, "Task-Centric Selection of Robot and Environment Initial Configurations to Perform Assistive Tasks," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2015).*

[8] **D. Park**, A. Kapusta, J. Hawke, and C. Kemp. "Interleaving Planning and Control for Efficient Haptically-guided Reaching in Unknown Environments," *IEEE-RAS International Conference on Humanoid Robots (Humanoids 2014).*

[9] **D. Park**, A. Kapusta, Y. Kim, J. Rehg, and C. Kemp. "Learning to Reach into the Unknown: Selecting Initial Conditions When Reaching in Clutter," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS2014).*

[10] H. Hoffmann, P. Pastor, **D. Park**, and S. Schaal. "Biologically-inspired dynamical systems for movement generation: Automatic real-time goal adaptation and obstacle avoidance," *IEEE International Conference on Robotics and Automation*, 2009.

[11] **D. Park**, H. Hoffmann, P. Pastor, and S. Schaal. "Movement reproduction and obstacle avoidance with dynamic movement primitives and potential fields," *IEEE-RAS International Conference on Humanoid Robots*, 2008. [**Oral presentation**]

Workshop Papers, Abstracts, Posters:

[1] **D. Park**, Y. Hoshi, H Kim, H. P. Mahajan, W. Rogers, and C. C. Kemp, "Active Feeding System using a General-purpose Manipulator," *IEEE International Symposium on Medical Robotics (ISMR)*, 2018

[2] **D. Park** and C. C. Kemp, "Multimodal Execution Monitoring for Robot-Assisted Feeding," *TechSAge State of the Science Conference*, 2017

[3] A. Kapusta, Y. Chitalia, **D. Park**, and C. C. Kemp. "Collaboration Between a Robotic Bed and a Mobile Manipulator May Improve Physical Assistance for People with Disabilities," *IEEE ROMAN workshop on Behavior, Adaptation and Learning for Assistive Robotics" (BAILAR)*, 2016

[4] **D. Park**, Y. Kim, Z. Erickson, and C. C. Kemp. "Towards Assistive Feeding with a General-Purpose Mobile Manipulator", *ICRA2016 workshop on Human-Robot Interfaces for Enhanced Physical Interactions, 2016*

[5] T. Bhattacharjee*, P. M. Grice*, A. Kapusta*, M. D. Killpack*, **D. Park***, and C. C. Kemp. "A System for Reaching in Unknown Clutter that Integrates Model Predictive Control, Learning, Haptic Mapping, and Planning," *IROS2014 Workshop on Robots In Clutter* (***- authors contributed equally**)

[6] **D. Park**, H. Hoffmann, and S. Schaal. "Combining dynamic movement primitives and potential fields for online obstacle avoidance," *Adaptive Motion of Animals and Machines (AMAM08)*, Cleveland, Ohio, 2008.

PATENTS

[1] K. Lee, Y. Hong, C. An, and **D. Park**. "Motor control apparatus and motor control method thereof." US8614558 B2, Dec. 24, 2013.

[2] **D. Park**, K. Lee, C. An, and Y. Hong. "Teaching and playback method based on control of redundancy resolution for robot and computer-readable medium controlling the same." US8560122 B2, Oct. 15, 2013.

[3] K. Lee, Y. Hong, C. An, and **D. Park**. “모터 제어장치 및 모터 제어 방법(MOTOR CONTROL APPARATUS AND CONTROL METHOD THE SAME),” KR Patent App. 1,020,100,006,682, Aug. 2, 2011
[4] K. Lee, Y. Hong, C. An, and **D. Park**. “Motor control apparatus and motor control method thereof.” US20110181223 A1, July 28, 2011.
[5] **D. Park**, K. Lee, C. An, and Y. Hong. “여유자유도 제어를 이용한 로봇의 교시 및 재현 방법 (TEACHING AND PLAYBACK METHOD USING REDUNDANCY RESOLUTION CONTROL FOR MANIPULATOR),” KR Patent App. 1,020,090,099,003, Apr. 22, 2011
[6] **D. Park**, K. Lee, C. An, and Y. Hong. “Teaching and playback method based on control of redundancy resolution for robot and computer-readable medium controlling the same.” US20110093119 A1, Apr. 21, 2011.