

Hae-Won Park, Ph.D.



CONTACT INFORMATION 291, Daehak-ro, Yuseong-gu, Daejeon, Korea 34141
82-42-350-8901, haewonpark@kaist.ac.kr

RESEARCH INTERESTS Optimization-based Control and Design of Legged Robots, Model Predictive Control, Bioinspired Robots

SUMMARY OF RESEARCH AND EDUCATION The central objective of my research is to make fundamental contributions to the understanding of legged systems to grant high efficiency, extreme agility, and remarkable versatility to robot systems. The robots with such high-performance features will possess extreme mobility capable of navigating in unstructured, dynamic, and complex environments. Efforts to understand and achieve these capabilities in legged robot systems are hampered by 1) model complexities caused by the mathematically challenging dynamic properties of legged locomotion, such as high degrees of freedom, nonlinearity, underactuation, and hybrid nature; and 2) lack of understanding of the physical system design necessary for the execution of dynamic motions. To address these challenges, my approach offers a vertically integrated research strategies across mechanical design, modeling, simulation, and control of legged systems. My group investigates novel hardware design and control framework for legged robot systems utilizing design optimization and model predictive control techniques drawing on formal approaches from convex optimization, geometric methods for robotics, and optimal control. We aim to propose a unified and systematic design method for control algorithm and hardware systems that tightly integrates the mathematical modeling of legged robot systems, trajectory optimization strategies, and the hardware design principles.

My educational goal is to prepare future generations of scientists and engineers who have a deep understanding of concepts, a broad knowledge base, good communication and interpersonal/social skills, and high levels of creativity. My education plan is structured with special emphasis on ability to identify, formulate, and solve engineering problems by applying knowledge of mathematics, science, and engineering. To foster these outcomes in students, upon joining KAIST, I reformed the robot dynamics class and introduction to robotics engineering class by integrating hands-on MATLAB activities and knowledge of contemporary issues in the field to encourage deeper understanding and application of the knowledge taught in class for the practical complex robot dynamics problem. These classes are designed to tightly integrate analytical methods in dynamics and robotics with implementation on MATLAB software through lab activities and homework problems. Students learn the derivation of the equation of motion for a robotic arm and control design on the derived model using approaches including joint space PID and inverse dynamics control, task space control, compliant force control, and impedance control with rigorous mathematical formulation. My lectures in these classes provide many motivating examples to students, including videos, photos, and experimental data from my work on various legged robots. In my lectures, I freely shares my experience with implementing control approaches on hardware platforms to illuminate the technical challenges of robot controller design and the pros and cons of state-of-the-art approaches.

PROFESSIONAL EXPERIENCE	Assistant Professor	Feb 2019 to present
	Mechanical Engineering, Korea Advanced Institute of Science and Technology	
	Director	Feb 2020 to present
	Humanoid Robot Research Center, Korea Advanced Institute of Science and Technology	
	Adjunct Professor	Feb 2019 to present
	Mechanical Science and Engineering, University of Illinois at Urbana-Champaign	
	Assistant Professor	Sep 2015 to Feb 2019

Mechanical Science and Engineering,
University of Illinois at Urbana-Champaign
Assistant Professor (affiliate appointment) Sep 2017 to Feb 2019
Coordinated Science Laboratory,
University of Illinois at Urbana-Champaign

Research Scientist June 2014 to June 2015
Mechanical Engineering,
Massachusetts Institute of Technology
Supervisor: Sangbae Kim, Ph.D

Postdoctoral Associate June 2012 to June 2014
Mechanical Engineering,
Massachusetts Institute of Technology
Supervisor: Sangbae Kim, Ph.D

Research Assistant Sep 2007 to Apr 2012
Mechanical Engineering,
University of Michigan at Ann Arbor
Supervisor: Jessy Grizzle, Ph.D

Research Assistant Feb 2005 to Feb 2007
Mechanical Engineering,
Yonsei University
Supervisor: Young-Pil Park, Ph.D

EDUCATION

University of Michigan, Ann Arbor, MI

Ph.D., Mechanical Engineering, May 2012

- Thesis: *Control of a Bipedal Robot Walker on Rough Terrain*
- Advisor: Jessy Grizzle, Ph.D

Yonsei University, Seoul, Korea

M.S., Mechanical Engineering, Feb 2007

- Thesis: *Design, Analysis, and Experiment of a Dolphin Robot*
- Advisor: Young-Pil Park, Ph.D

Yonsei University, Seoul, Korea

B.S., Mechanical Engineering, Feb 2005

- Thesis: *Design of a Small Size Six-Legged Walking Robot Using Electromagnet Actuators*
- Advisor: Hyun-Seok Yang, Ph.D

JOURNAL PUBLICATIONS

1. Joon-Ha Kim, Seungwoo Hong, Gwanghyeon Ji, Seunghun Jeon, Jemin Hwangbo, Jun-Ho Oh, **Hae-Won Park (Corresponding Author)**, "Legged Robot State Estimation with Dynamic Contact Event Information," *IEEE Robotics and Automation Letters*, published online, 2021
2. Buyoun Cho, Min-Su Kim, Sung Woo Kim, Seunghoon Shin, Jeong Yeseong, Jun-Ho Oh, **Hae-Won Park (Corresponding Author)**, "Design of a Compact Embedded Hydraulic Power Unit for Bipedal Robots," *IEEE Robotics and Automation Letters*, 6(2): 3631-3638, 2021
3. Sungwoo Kim, Buyoun Cho, Seunghoon Shin, Jun-Ho Oh, Jemin Hwangbo, **Hae-Won Park (Corresponding Author)**, "Force Control of a Hydraulic Actuator with a Neural Network Inverse Model," *IEEE Robotics and Automation Letters*, 6(2): 2814-2821, 2021
4. Yanran Ding, Abhishek Pandala, Chuanzheng Li, Young-Ha Shin, **Hae-Won Park (Corresponding Author)**, "Representation-Free Model Predictive Control for Dynamic Motions in Quadrupeds," *IEEE Transactions on Robotics*, published online, 2021

5. **Hae-Won Park**, Patrick Wensing, Sangbae Kim, “Jumping over Obstacles with MIT Cheetah 2,” *Robotics and Autonomous Systems* , 136: 103703, 2020
 6. Chuanzheng Li, Yanran Ding, **Hae-Won Park (Corresponding Author)**, “Centroidal-momentum-based trajectory generation for legged locomotion,” *Mechatronics*, 68: 102364, 2020
 7. Abhishek Pandala, Yanran Ding, **Hae-Won Park (Corresponding Author)**, “qpSWIFT : A Real-time Sparse Quadratic Program Solver for Robotic Applications,” *IEEE Robotics and Automation Letters* , 4(4): 3355-3362, 2019
 8. Won Dong Shin, Jaejun Park, **Hae-Won Park (Corresponding Author)**, “Development and Experiments of a Bio-inspired Robot with Multi-mode in Aerial and Terrestrial Locomotion,” *Bioinspiration & Biomimetics*, 14(5):056009, 2019
 9. Jaejun Park, Do Hun Kong, and **Hae-Won Park (Corresponding Author)**, “Design of Anti-skid Foot with Passive Slip Detection Mechanism for Conditional Utilization of Heterogeneous Foot Pads,” *IEEE Robotics and Automation Letters* , 4(2):1170–1177, 2019.
 10. **Hae-Won Park**, Patrick Wensing, and Sangbae Kim, “High-Speed Bounding with the MIT Cheetah 2: Control Design and Experiments,” *International Journal of Robotics Research*, 36(2):167–192, 2017.
 11. **Hae-Won Park** and Sangbae Kim, “Quadrupedal Galloping Control for a Wide Range of Speed via Vertical Impulse Scaling,” *Bioinspiration & Biomimetics*, 10(2):025003, 2015.
 12. **Hae-Won Park** and Sangbae Kim, “The MIT Cheetah, an Electrically-powered Quadrupedal Robot for High-speed Running,” *Journal of the Robotics Society of Japan*, 32(4):323–328, 2014.
 13. **Hae-Won Park**, Alireza Ramezani, and J.W. Grizzle, “A Finite-state Machine for Accommodating Unexpected Large Ground Height Variations in Bipedal Robot Walking,” *IEEE Transaction on Robotics*, 29(2):331–345, 2013.
 14. Koushil Sreenath, **Hae-Won Park**, and J.W. Grizzle, “Embedding Active Force Control within the Compliant Hybrid Zero Dynamics to Achieve Stable, Fast Running on MABEL,” *International Journal of Robotics Research*, 32(3)324–345, 2013.
 15. **Hae-Won Park**, Koushil Sreenath, Jonathan W. Hurst, and J.W. Grizzle, “Identification of a Bipedal Robot with a Compliant Drivetrain: Parameter Estimation for Control Design,” *IEEE Control Systems Magazine*, 31(2):63–88, 2011. **Cover article on IEEE CSM, April 2011 issues.**
 16. Koushil Sreenath, **Hae-Won Park**, Ioannis Poulakakis, and J.W. Grizzle, “A Compliant Hybrid Zero Dynamics Controller for Stable, Efficient and Fast Bipedal Walking on MABEL,” *International Journal of Robotics Research*, 30(9):1170–1193, 2011.
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1. Buyoun Cho, Kim Sung Woo, Shin Seunghoon, Kim Min-Su, Jun-Ho Oh, **Hae-Won Park (Corresponding Author)**, “Energy Efficient Control of Onboard Hydraulic Power Unit for Hydraulic Bipedal Robots,” *Journal of Korea Robotics Society*, 16(2):86-93, 2020

1. Seung-Woo Hong, Joon-Ha Kim, **Hae-Won Park (Corresponding Author)**, “Real-Time Constrained Nonlinear Model Predictive Control on $SO(3)$ for Dynamic Legged Locomotion,” *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Las Vegas, NV, Nov 2020. **Robocup Best Paper award.**
2. Yanran Ding, Chauanzheng Li, **Hae-Won Park (Corresponding Author)**, “Kinodynamic Motion Planning for Multi-Legged Robot Jumping Via Mixed-Integer Convex Program,” *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Las Vegas, NV, Nov 2020.
3. Okkee Sim, Hyobin Jeong, Jaesung Oh, Moonyoung Lee, Kang Kyu Lee, **Hae-Won Park**, Jun-Ho Oh, “Joint Space Position/Torque Hybrid Control of the Quadruped Robot for Locomotion and Push Reaction,” *2020 IEEE International Conference on Robotics and Automation (ICRA)*, Paris, France, May 2020.
4. Yanran Ding, Abhishek Pandala, and **Hae-Won Park (Corresponding Author)**, “Real-time Model Predictive Control for Versatile Dynamic Motions in Quadrupedal Robots,” *2019 IEEE International Conference on Robotics and Automation (ICRA)*, Montreal, Canada, May 2019.
5. Taekyoung Kim, Jaejun Park, Sohee John Yoon, Do Hun Kong, **Hae-Won Park**, Yong-Lae Park, “Design of a Lightweight Inflatable Sensing Sleeve for Increased Adaptability and Safety of Legged Robots,” *2019 IEEE International Conference on Soft Robotics (RoboSoft)*, Seoul, Korea, April 2019. **Best conference paper award.**
6. Yanran Ding and **Hae-Won Park (Corresponding Author)**, “Single Leg Dynamic Motion Planning with Mixed-Integer Convex Optimization,” *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Madrid, Spain, Oct 2018.
7. Won Dong Shin, Jae-jun Park, and **Hae-Won Park (Corresponding Author)**, “Bio-Inspired Design of a Gliding-Walking Multi-Modal Robot,” *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Madrid, Spain, Oct 2018.
8. Yanran Ding and **Hae-Won Park (Corresponding Author)**, “Design and Experimental Implementation of a Quasi-Direct-Drive Leg for Optimized Jumping,” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vancouver, Canada, Sep 2017. **Best Student Paper Award Finalist**
9. **Hae-Won Park**, Patrick Wensing, and Sangbae Kim, “Online Planning for Autonomous Running Jumps Over Obstacles in High-Speed Quadrupeds,” *Robotics Science and Systems (RSS)*, Rome, Italy, Jul 2015.
10. **Hae-Won Park**, Sangin Park, and Sangbae Kim, “Variable-speed Quadrupedal Bounding Using Impulse Planning: Untethered High-speed 3D Running of MIT Cheetah 2,” *IEEE/RSJ International Conference on Robotics and Automation (ICRA)*, Seattle, WA, May 2015, 5163–5170.
11. **Hae-Won Park**, Meng Yee Chuah, and Sangbae Kim, “Quadruped Bounding Control with Variable Duty Cycle via Vertical Impulse Scaling,” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Chicago, IL, Sep 2014, 3245–3252.
12. **Hae-Won Park**, Koushil Sreenath, Alireza. Ramezani, and J. W. Grizzle, “Switching Control Design for Accommodating Large Stepdown Disturbances in Bipedal Robot Walking,” *International Conference on Robotics and Automation (ICRA)*, St. Paul, MN, May 2012, 45–50.

13. Koushil Sreenath, **Hae-Won Park**, and J. W. Grizzle, “Design and Experimental Implementation of a Compliant Hybrid Zero Dynamics Controller with Active Force Control for Running on MABEL,” *International Conference on Robotics and Automation (ICRA)*, St. Paul, MN, May 2012, 51–56.
14. Koushil Sreenath, **Hae-Won Park**, Ioannis Poulakakis, and J. W. Grizzle, “Design and experimental implementation of a compliant hybrid zero dynamics controller for walking on MABEL,” *IEEE Conference on Decision and Control (CDC)*, Atlanta, GA, Dec 2010, 280–287.
15. Jeffrey Koncsol, **Hae-Won Park**, and Koushil Sreenath, “Real world issues with real-time control of Mabel: A platform for experimental control of bipedal locomotion,” *IEEE-RAS International Conference on Humanoid Robots (Humanoids)*, Nashville, TN, Dec 2010, 659-664.
16. J.W. Grizzle, Jonathan Hurst, Benjamin Morris, **Hae-Won Park**, and Koushil Sreenath, “Mabel, A New Bipedal Walker and Runner,” *American Control Conference (ACC)*, St. Louis, MO, Jun 2009, 2030–2036.

INTERNATIONAL
CONFERENCE
PROCEEDINGS

1. **Hae-Won Park**, Sung-Hyun Kim, No-Cheol Park, Hyun-Seok Yang, Young-Pil Park, Seung-Ho Kim, Yong-Heon Park, and Young-Hwan Kang, “Design of Tracked Vehicle with Passive Mechanism for Uneven Terrain,” *SICE-ICASE International Joint Conference*, 2006, 3132–3136.

DOMESTIC
CONFERENCE
PROCEEDINGS

1. Yeseong Jeong, Shin Seunghoon, Soonpyo Kwon, Buyoun Cho, Kim Sung Woo, Joon-Ha Kim, Jun-Ho Oh, **Hae-Won Park**, “Real-time Bilateral Teleoperation with Electric and Hydraulic Actuator,” *The Korea Robotics Society Annual Conference*, 2021
2. Soonpyo Kwon, Joon-Ha Kim, Juwoong Byun, **Hae-Won Park**, “GPU Acceleration of Probabilistic Local Height Map that Resolves Race Condition,” *The Korea Robotics Society Annual Conference*, 2021
3. Mingyu Kim, Seungwoo Hong, Joon-Ha Kim, **Hae-Won Park**, “Design of Foothold Optimization Model for Controlling Legged Robots,” *The Korea Robotics Society Annual Conference*, 2021
4. Soonpyo Kwon, Mingyu Kim, **Hae-Won Park**, Jun-ho Oh, “Design of an Under-actuated Robot Finger that Control Initial Contact Point by Activating the Passive Joint before Contact,” *The Korea Robotics Society Annual Conference*, 2020
5. JongHun Choe, Young-Ha Shin, **Hae-Won Park**, Jun Ho Oh, “Design Method of 2-DOF Rolling Motion Joint for Humanoid Shoulder Joint,” *The Korea Robotics Society Annual Conference*, 2020
6. Buyoun Cho, Minsu Kim, Sungwoo Kim, Seunghoon Shin, Jeasung Oh, **Hae-Won Park**, Jun-Ho Oh, “Mobile Pump Control for Energy-Efficient Driving of Hydraulic Actuators,” *The Korea Robotics Society Annual Conference*, 2020
Best Paper Award
7. Seok-Woo Kim, **Hae-Won Park**, Kang-Jin Cho, No-Cheol Park, Hyun-Suk Yang, and Young-Pil Park, “Straight Line Swimming Simulation and Experiment of Robotic Fish,” *The Korean Society for Precision Engineering Conference*, 2008, 569–570.
8. Seok-Woo Kim, **Hae-Won Park**, Kang-Jin Cho, No-Cheol Park, Hyun-Suk Yang, and Young-Pil Park, “Straight Line Swimming Simulation and Experiment of Robotic Fish,” *The Korean Society for Precision Engineering Conference*, 2008, 569–570.
9. Kang-Jin Cho, **Hae-Won Park**, Seok-Woo Kim, Hyun-Suk Yang, Young-Pil Park, and No-Cheol Park, “Development of a robot with fish locomotion,” *The Korean Society of Mechanical Engineers Conference*, 2007, 40–45.

TECHNICAL
REPORTS

1. **Hae-Won Park**, Koushil Sreenath, Jonathan Hurst, and J. W. Grizzle, “Identification and Dynamic Model of a Bipedal Robot with a Cable- Differential-Based Compliant Drivetrain,” *University of Michigan Control Group Report*, No. CGR 10-06, Mar 2010.

AWARDS

Early Career Spotlight, Robotics: Science and Systems (RSS), 2021
IEEE Robotic Automation Society, TC Best Paper Award Finalist, Technical Committee for Model-based Optimization for Robotics, 2020
RoboCup Best Paper Award, IEEE IROS, 2020
Best Paper Award, The Korea Robotics Society Annual Conference, 2020
Research Prize, Outstanding Faculty Awards, KAIST, 2020
Best Conference Paper Award, IEEE RoboSoft (Collaboration with Prof. Yong-Lae Park at SNU), 2019
NSF CAREER Award, National Science Foundation, 2018
IROS Best Student Paper Award Finalist, 2017 (Advising Student: Yanran Ding)
The 2015 World Technology Awards Finalist, 2015
Cover Article, IEEE Control Systems Magazine, 31(2), 2011

RESEARCH
GRANTS

KAIST, Department of Mechanical Engineering

1. **Principal Investigator**, Quadrupedal Robots for Surveillance, Reconnaissance, and Guard Post with Improved Mobility in Challenging Terrain, Agency for Defense Development (Nov. 2019-Nov. 2024, 6472M KRW(5.65M USD))
2. **Principal Investigator**, Model Predictive Control Design of Wheel-legged Hybrid Mobile Robot, Principal Investigator, NAVER Labs (Jul. 2019-Mar. 2022, 247M KRW(210K USD))
3. **Principal Investigator**, Negative pressure stretchers and transport devices for infectious diseases services, KAIST (Aug. 2020-Nov. 2021, 1420M KRW (1.24M USD))
4. **Principal Investigator**, “Development of Electro Permanent Magnet using AlNiCo and Neodymium Magnets,” Korea Shipbuilding and Offshore Engineering (Oct. 2019-Dec. 2020, 29M KRW (25K USD))

UIUC, Department of Mechanical Science and Engineering

1. **Principal Investigator**, CAREER: Trajectory Planning for Highly Dynamic Legged Robots in Complex Environments, National Science Foundation (5 years, 500K USD)
2. **Principal Investigator**, Robot Flying Squirrel: A Legged and Winged Robot Glider, DARPA (1 year, 150K USD)
3. **Principal Investigator**, Agile, Soft, and Adaptable Platform (ASAP) for Humanitarian Assistance and Disaster Relief, Air Force Office of Research (3 years, 350K USD)
4. **Principal Investigator**, Motion Planning for Legged Robots: Algorithm Development and Hardware Implementation, NAVER Labs, (2 years, 400K USD)

5. **Co-Principal Investigator**, EAGER: Collaborative Research: Center-of-Mass Control for Expressive and Effective Movement in Bipedal Robots, National Science Foundation (1 year, 65K USD)

TEACHING
EXPERIENCE

KAIST, Department of Mechanical Engineering

ME561 Linear System Control	Spring 2021
ME400 Capstone Design I	Spring 2021
ME453 Introduction to Robotics Engineering	Fall 2020
ME401 Capstone Design II	Fall 2020
ME561 Linear System Control	Spring 2020
ME400 Capstone Design I	Spring 2020
ME453 Introduction to Robotics Engineering	Fall 2019
ME401 Capstone Design II	Fall 2019
ME553 Robot Dynamics	Spring 2019
ME400 Capstone Design I	Spring 2019

UIUC, Department of Mechanical Science Engineering

ME370 Mechanical Design I	Fall 2018
ME446 Robot Dynamics and Control	Spring 2018
ME446 Robot Dynamics and Control	Spring 2017
ME370 Mechanical Design I	Spring 2016
ME446 Robot Dynamics and Control	Fall 2015

PRESENTATIONS

Conference Workshop

- International Conference on Intelligent Robots and Systems (IROS), MIT Mini-Cheetah Workshop, “Trajectory Planning and Model Predictive Control for Dynamic Legged Locomotion”, Las Vegas, USA 2020
- IFAC Workshop on Robot Control (WROCO), Special Session, “Design of a Torque-Controlled Actuator for Dynamic Maneuvers of Legged Robots”, Daejeon, Korea 2019
- Ubiquitous Robots 2018, 2018 MOTIE/OSD Program Review/Workshop on Korea-US Disaster Relief Robots, “Adaptable Robot Platform (ASAP) for Humanitarian Assistance and Disaster Relief Hae Won Park”, Honolulu, USA 2018
- IEEE International Conference on Robotics and Automation (ICRA), Workshop on Which Torque Controlled Actuator Do I need? – On Criteria, Metrics and Experiments for Design, Selection and Comparison, “Design of a Torque-Controlled Actuator for Dynamic Maneuvers”, Brisbane, Australia 2018
- Workshop on Korea-US Disaster Relief Robot, “Agile, Soft, and Adaptable Robot Platform (ASAP) for Humanitarian Assistance and Disaster Relief: Actuator and Leg Design”, Jeju, Korea 2017
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Workshop on Biologically Inspired Based Strategies for Hybrid and Multi-modal Locomotion, “Galloping Control for Quadruped Robots: Application to the MIT Cheetah Robot,” Tokyo, Japan 2013

Invited Talks

- Early Career **Keynote**, Robotics: Science and Systems (RSS), “Model-based Design and Control of Dynamic Legged Robots,” held virtually, USA 2021
- Seoul National University, “Optimization-based Motion Planning and Model Predictive Control of Legged Robots,” held virtually, Korea 2021
- Seoul National University, “Introduction to Legged Robots: Intelligent Control of Quadrupedal Robots,” held virtually, Korea 2021
- Pusan National University, “Optimization-based Trajectory Planning and Intelligent Control of Multi-legged Robots,” Pusan, Korea 2021
- Embassy of Switzerland in the Republic of Korea, Swiss-Korean Science Club, “Robotics Inspired by Nature,” held virtually, Korea 2021
- **Keynote**, Fall Annual Conference of Korean Society for Noise and Vibration Engineering, “Optimization-based Intelligent Control of Legged Robots,” Jeju, Korea 2020
- **Invited Talk**, Conference for the Development of Dronebot and AI for Combat, “Introduction to Defense Quadrupedal Robots,” Sejong, Korea 2020
- **Invited Talk**, Korea Robotics Society Annual Conference (KRoC), “Optimization-based Actuator, Trajectory Planning, and Model Predictive Control of Dynamic Legged Robots,” Pyeongchang, Korea 2020
- Young Researcher **Invited Talk**, Korean Society of Precision Engineering (KSPE) Autumn Conference “Optimization-based Trajectory Planning and Feedback Design of Dynamic Legged Locomotion Robots, Changwon, Korea 2019
- Young Researcher **Invited Talk**, Korean Society of Mechanical Engineers Dynamics and Control, “Optimization-based Trajectory Planning and Control of Legged Robots, Busan, Korea 2019
- Seoul National University ASRI Robotics Festival, “Optimization-based Actuator and Control Design of Dynamic Legged Robots,” Seoul, Korea 2019
- Daegu Gyeongbuk Institute of Science and Technology (DGIST), “Walking, Running, and Jumping of Legged Robots,” Daegu, Korea 2019
- Coordinated Science Lab (CSL) Seminar Series, “Dynamic Walking, Running, and Jumping Robots,” Urbana, IL 2016
- Korea University, “MIT Cheetah 2, A Fast Runner and Jumper,” Seoul, Korea 2015
- Yonsei University, “Inspiration from Biology: Control Design for Highspeed Running Legged Locomotion Robot,” Seoul, Korea 2015
- NAVER LABS, “Control Design for Bio-inspired Legged Locomotion Robot,” Sungnam, Korea 2015
- University of Waterloo, “Control Design for Dynamic Legged Locomotion Robots,” Waterloo, Ontario, Canada 2015
- University of Illinois at Urbana-Champaign, “Feedback Control Design for Dynamic Walking and Running on Legged Robots,” Urbana, IL 2015
- Chung-Ang University, “Highly Dynamic Legged Locomotion Robot for Walking and Running,” Seoul, Korea 2015
- Sungkyunkwan University, “Control Design for Dynamic Locomotion of Legged Robots,” Suwon, Korea 2015
- Korea Institute of Science and Technology (KIST) “Control Design for Dynamic Locomotion of Legged Robots,” Seoul, Korea 2015
- Korea University, “Control Design for Agile and Robust Locomotion,” Seoul, Korea 2015
- Field Robotics Research Center, Korea Advanced Institute of Science and Technology (KAIST), “Achieving Dynamic Walking and Running on Legged Robots: a Feedback Control Design,” Daejeon, Korea 2015
- Department of Mechanical Engineering, Korea Advanced Institute of Science and Technology (KAIST), “MABEL and MIT Cheetah 2: Dynamic Walker and Runner,” Daejeon, Korea 2014
- Columbia University, “Bio-inspired Legged Robots for Robust and Highly Agile Locomotion,” New York, New York 2014
- Daegu Gyeongbuk Institute of Science and Technology (DGIST), “Robust Walking and High-speed Running of Bio-inspired Legged Robot,” Daegu, Korea 2013

- Sogang University, “Control and Real-time Software Design for Highly Dynamic Bio-inspired Locomotion Robot,” Seoul, Korea 2013
- Ulsan National Institute of Science and Technology (UNIST), “Bio-inspired Legged Locomotion Robot: Bipedal Walker MABEL and High-speed Runner MIT Cheetah,” Ulsan, Korea 2013
- Yonsei University, “Control and Design of Highly Dynamic Bio-inspired Locomotion Robot,” Seoul, Korea 2013
- Korea Institute of Science and Technology (KIST), “Control Design for Bipedal Robot Walking on Uneven Ground and High-Speed Running of Quadruped Robot,” Seoul, Korea 2013
- University of Michigan, Control Seminar Series, “Modeling, Feedback Control and Experimental Results for MABEL, a Planar Bipedal Robot,” Ann Arbor, MI 2010

Posters

- Hae-Won Park and Sangbae Kim, “Dynamic Quadruped Bounding Control with Duty Cycle Modulation Using Vertical Impulse Scaling,” Dynamic Walking Conference, Zurich, Switzerland. 2014
- Hae-Won Park and Sangbae Kim, “Impulse-Based Gait Design and Control for Variable Speed Galloping on MIT Cheetah Robot,” Dynamic Walking Conference, Pittsburgh, PA, USA. 2013
- Hae-Won Park and J. W. Grizzle, “Control of Bipedal Walking on Uneven Terrain,” The University of Michigan Engineering Graduate Student Symposium. 2010
- Hae-Won Park, Koushil Sreenath, Jonathan Hurst, and J. W. Grizzle, “System Identification and Modeling of MABEL, A Bipedal Robot With a Cable-Differential-Based Compliant Drivetrain,” Dynamic Walking Conference. 2010
- Koushil Sreenath, Hae-Won Park, Jonathan Hurst, and J. W. Grizzle, “Hybrid Zero Dynamics Based Control Design for Efficient Walking,” Dynamic Walking Conference. 2010
- Hae-Won Park, Koushil Sreenath, and J. W. Grizzle, “Parameter Identification of MABEL, a New Bipedal Robot with Differential-Based Compliant Drivetrain,” The University of Michigan Engineering Graduate Student Symposium. 2009
This poster won the second prize in the session.
- Koushil Sreenath, Hae-Won Park, and J. W. Grizzle, “Nonlinear Feedback Control of a Novel Robotic Bipedal Walker,” The University of Michigan Engineering Graduate Student Symposium. 2009

Robot Demonstration

- Quadrupedal robot demonstration at the Conference for the Development of Dronebot and AI for Combat 2021
- Jumping Robot Demo at Robotics Demonstration Session at CSL Student Conference 2017. 2017
This demonstration won the Robotics Demonstration Award.
- MIT Cheetah 2 Dynamic Demonstration at DARPA Robotics Challenge. 2015

PROFESSIONAL ACTIVITIES

- Member,
 - IEEE, ASME, Korea Society of Mechanical Engineers, Korea Robotics Society
- Committee Member for Publication
 - Korea Society of Mechanical Engineers, Dynamics and Control
- Grant Proposal Review Panel,
 - Agency for Defense Development 2020
 - (United States) Army Research Office (ARO) 2017
 - (United States) NSF Robust Intelligence Program 2016
- Organizing Committee for International Conference,
 - Program Chair, IEEE International Conference on Robot Intelligence Technology and Applications (RiTA) 2021

- Publicity Co-Chair, International Conference on Control, Automation and Systems (ICCAS) 2021
- Editor, The First IFAC Workshop on Robot Control (IFAC WROCO) 2019
- Publicity Chair, International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), 2015

Program Committee for International Conference,

- Robotics Science and Systems 2017

Organizing Committee for Domestic Conference,

- Korea Robotics Society Annual Conference (KRoC) 2020-2021

Journal Editorial Board,

- Technical Editor, IEEE/ASME Transactions on Mechatronics 2020-Current
- Associate Editor, Journal of Intelligent Service Robotics (JISR) 2016-Current

Conference Editorial Board,

- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2019-Current
- IEEE International Conference on Robotics and Automation (ICRA) 2016-Current
- International Conference on Ubiquitous Robots 2018-Current
- IEEE International Conference on Soft Robotics (RoboSoft) 2019

Reviewer,

- Journals: Science Robotics, IEEE Transactions on Robotics, IEEE Transactions on Mechatronics, International Journal of Robotics Research, IEEE Control Systems Technology, IEEE Robotics and Automation Magazine, Journal of Field Robotics, Control Engineering Practice, Robotica, Bioinspiration & Biomimetics, Nonlinear Dynamics, ASME Journal of Mechanisms and Robotics, ASME Applied Mechanics Review, International Journal of Control, Automation and Systems
- Conferences: IEEE International Conference on Robotics and Automation, IEEE International Conference on Intelligent Robots and Systems, IEEE Humanoids, IEEE American Control Conference, IEEE Conference on Decision and Control

PUBLICITY

- MIT Cheetah 2 Boston Museum of Science Exhibition, 2016
- TIME: New Robot Cheetah Can Run (And Jump) Without a Tether (Sep. 30, 2014)
- Washington Post: New algorithm could help ‘cheetah’ robot outrun humans soon. (Sep. 15, 2014)
- IEEE Spectrum: MIT Cheetah Robot Bounds off Tether, Outdoors. (Sep. 15, 2014)
- MIT News: Bound for robotic glory – New algorithm enables MIT cheetah robot to run and jump, untethered, across grass. (Sep. 14, 2014)
- Chicago Field Museum Exhibition: MABEL on Exhibit (Jan. 2014)
- IEEE Spectrum: Video Tuesday: BigDog, MABEL, and Quadrotors (Sep. 20, 2011)
- CNN newsroom: Fast-moving bipedal robot with knees (Sep. 19, 2011)
- ESPN Road Trip (Sep. 14, 2011)
- The Discovery Channel Canada: Daily Planet (Mar. 28, 2011)
- Chicago Tribune: “U-M robot Mabel clears stacked wood, may jog soon” (Jun. 13, 2010)
- Engadget: “University of Michigan’s MABEL robot hits a stride, breaks a leg” (May. 25, 2010)

STUDENTS ADVISING

KAIST, Department of Mechanical Engineering

Current Ph.D. Students

KangKyu Lee	Fall 2015-present
Buyoun Cho (Co-advising with Prof. Hyung-soon Park)	Fall 2017-present
Sung-woo Kim	Fall 2017-present
Seungwoo Hong	Fall 2018-present
Seunghoon Shin	Fall 2019-present
Joon-Ha Kim	Fall 2019-present
Jonghun Choe	Spring 2020-present
Soonpyo Kwon	Spring 2020-present
Youngha Shin	Spring 2021-present
Mingyu Kim	Spring 2021-present
Yong Um	Spring 2021-present

Current Master Students

Donghoon Youm	Spring 2020-present
Hajun Kim	Spring 2020-present
Joowoong Byun	Spring 2020-present
Sangyoung Woo	Spring 2020-present
Harim Son	Spring 2020-present
Yeseong Jeong	Spring 2020-present
Yunmo Yang	Fall 2020-present
Kijeong Kim	Spring 2021-present

Alumni

Uiuk Jeong, M.S. 2020 (Currently at Rainbow Robotics)
 Youngha Shin, M.S. 2021 (Currently Ph.D. Student at my group)
 Mingyu Kim, M.S. 2021 (Currently Ph.D. Student at my group)
 Lorenzo Amatucci, M.S. 2021 (Currently M.S. Student at Politecnico di Milano)

UIUC, Department of Mechanical Science Engineering

Current Ph.D. Students

Jaejun Park	Fall 2016-present
Chuanzheng Li	Fall 2017-present

Alumni

Yanran Ding, Ph.D. 2021 (Currently Postdoc at MIT)
 Won Dong Shin, M.S. 2018 (Currently Ph.D. Student at EPFL)
 Abhishek Pandala, M.S. 2019 (Currently Ph.D. Student at Virginia Tech.)