Jeeseop Kim

Contact Information

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310 Goodwin Hall, Virginia Tech
Blacksburg, VA 24061, USA

Research Interests

My primary academic interests span robotics, control theory, optimization, dynamical systems, and machine learning. My research goal is to establish a firm foundation that will extend the state-of-the-art methods for designing resilient and intelligent control algorithms for a wide range of collaborative work. This overview includes but is not limited to 1) autonomous robot control and planning for various applications, 2) collaborative multi-agent systems with decentralized and distributed control policies, 3) agile robots without compromising safety features.

My research has a clear blueprint from theoretical developments to experimental validations to achieve two specific objectives: 1) Creating algorithms to systematically design robust and intelligent controllers for high-dimensional and complex hybrid dynamical systems; and 2) Transferring the control framework into practice with a highly dynamic robot platform. These algorithms advance knowledge in the design of feedback controllers for dynamical models arising from various collaborative works that I target. The theoretical innovations also offer a unique opportunity to advance autonomous robot with safety features, human-robot interaction, robot locomotion.

Academic History

Ph.D. Candidate in Mechanical Engineering — September 2017 - Expected in 2022
Advisor: Prof. Kaveh Akbari Hamed
Virginia Polytechnic Institute and State University, USA

M.S. in Transdisciplinary Studies (Program in Intelligent Systems) — March, 2017
Advisor: Prof. Jaeheung Park
Seoul National University, South Korea

B.S. in Mechanical and Aerospace Engineering — March, 2014
Seoul National University, South Korea

Professional Experience

Graduate Research Assistant — Aug. 2019 - Present
Dept. of Mechanical Engineering, Virginia Tech, Blacksburg, USA
Advisor: Prof. Kaveh Akbari Hamed

Graduate Research Assistant — Aug. 2017 - Jul. 2019
Dept. of Mechanical Engineering, Virginia Tech, Blacksburg, USA
Advisor: Prof. Tomonari Furukawa

Graduate Research Assistant — Jan. 2014 - Jul. 2017
Dept. of Transdisciplinary Studies, Seoul National University, South Korea
Advisor: Prof. Jaeheung Park

Undergraduate Research Assistant — Jun. 2013 - Sep. 2013
Dynamic Robotic Systems Lab, Seoul National University, South Korea
Supervisor: Prof. Jaeheung Park

Undergraduate Research Assistant — Mar. 2012 - Feb. 2013
Biorobotics Lab, Seoul National University, South Korea

Supervisor: Prof. Kyu-Jin Cho

Teaching Experience

Teaching Assistant
Dept. of Mechanical Engineering, Virginia Tech, Blacksburg, USA
ME5524: Bayesian Robotics
ME5984: Advanced Experimental Robotics

Teaching Assistant
Dept. of Transdisciplinary Studies, Seoul National University, South Korea
493.601: Convergent Robotics Technology
493.611: Dynamics and Control of Robot-Environment Interaction

Journal Articles

Accepted to appear

[***J*5**] V. R. Kamidi, **J. Kim**, R. T. Fawcett, A. Ames and K. Akbari Hamed, Distributed Quadratic Programming-Based Nonlinear Controllers for Periodic Gaits on Legged Robots, IEEE Control Systems Letters, Accepted, April 2022.

Published

[***J*4**] **J. Kim**, and K. Akbari Hamed, Cooperative locomotion via supervisory predictive control and distributed nonlinear controllers, ASME Journal of Dynamic Systems, Measurement, and Control, Vol. 144, Issue. 3, pp. 031005-1-031005-15, Mar, 2022.

[***J*3**] R. T. Fawcett, A. Pandala, **J. Kim**, and K. Akbari Hamed, Real-time planning and nonlinear control for quadrupedal locomotion with articulated tails, ASME Journal of Dynamic Systems, Measurement, and Control, Vol. 143, Issue. 7, pp. 071004-1-071004-15, Jul, 2021.

[***J*2**] K. A. Hamed, **J. Kim**, A. Pandala, Quadrupedal locomotion via event-based predictive control and QP-based virtual constraints, IEEE Robotics and Automation Letters, Vol. 5, Issue. 3, pp. 4463-4470, Jul, 2020.

[***J*1**] **J. Kim**, Y. Omori, A. Sifat, and T. Furukawa, Adjustably designed torque controlled humanoid platform, International Journal of Mechanical and Production Engineering, Vol. 7, Issue. 2, pp. 52-57, May, 2019.

Conference Papers

Published

[***C*4**] **J. Kim**, Y. Omori, A. Sifat, and T. Furukawa, Adjustably designed torque controlled humanoid platform, International Conference on Control, Automation, Robotics and Vision Engineering, Washington DC, USA, 21-22 Nov, 2018.

[***C*3**] **J. Kim**, M. Kim, and J. Park, Improvement of humanoid walking control by compensating actuator elasticity, International Conference on Humanoid Robots (ICHR), Cancun, Mexico, 15-17 Nov, 2016.

[***C*2**] J. Jung, **J. Kim**, S. Kim, W. Kwon, S. Na, K. Kim, J. Lee, G. Suh, and J. Park, Application of robot manipulator for cardiopulmonary resuscitation, International Symposium on Experimental Robotics (ISER), Tokyo, Japan, 3-6 Oct, 2016.

[***C*1**] **J. Kim**, M. Kim, and J. Park, Improvement of humanoid gait stability using reduction gear deformation model, The 31st Institute of Control, Robotics and Systems (ICROS), Seoul, Korea, 10-11 Mar, 2016.

Patent

[*P*2-2] **J. Kim**, *et al*, Automatic cardiopulmonary resuscitation device and control method therefor,

2021. No. US11071686B2 (US Patent)

[P2-1] **J. Kim**, *et al*, Automatic cardiopulmonary resuscitation device and control method therefor, 2020. No. 108697572B (CN Patent), No. 3409258B1 (EU Patent)

[P1] **J. Kim**, *et al*, Apparatus for automatic cardiovascular pulmonary resuscitation, 2016. Korea Patent No.10-2016-0172286.

Honors

Awards

The Best Presentation Award, Institute of Control, Robotics and Systems 2016 — 2016
Darpa Robotics Challenge DRC Finalist — 2015
The Best Presentation Award from Bachelor Thesis Presentation, Seoul National University — 2012

Graduate Fellowship

Research Assistant Scholarships, Virginia Tech, Blacksburg, USA — Jul. 2017 - present
Gwan-ak Scholarship, Seoul National University, Seoul, South Korea — Mar. 2014 - Feb. 2015

Undergraduate Fellowship

National Scholarship from Korea Student Aid Foundation, South Korea — Mar. 2009 - Feb. 2010

Academic Services

Reviewer

IEEE American Control Conference (ACC) — 2022
IEEE International Conference on Robotics and Automation (ICRA) — 2020 - 2022
IEEE Conference on Decision and Control (CDC) — 2020 - 2022
IEEE International Conference on Intelligent Robots and Systems (IROS) — 2021 - 2022

Professional Skills

- Robotics
- Cooperative Robotics
- Robot Locomotion
- Autonomous Robots
- Control Theory
- Nonlinear Control
- Distributed Control
- Hybrid Dynamical Systems
- Multiagent Systems
- Optimization

Technical skills

Operating Systems: Ubuntu(Linux), ROS
Programming Language: C/C++, Python, MATLAB
Design and Simulation Software: Solidworks, Unigraphics(NX)

References available upon request

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