

Yanran Ding

Ph.D. Candidate, University of Illinois at Urbana-Champaign

Contact Information

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Research Interests

My research interests are centered around designing and controlling agile robotics systems. I strive to develop high performance machines that could physically interact with the environment. My research concentrates on using applied optimization and control theory to enable robots to realize behaviors similar to the biological counterparts. I am particularly interested in application on high torque capability quadrupedal robots to achieve dynamic maneuvers.

Topics: Quadrupedal robots, bio-inspired Design, optimization-based control, model-predictive control, motion planning, dynamic maneuvers.

Academic Experience

University of Illinois at Urbana-Champaign Ph.D. Candidate, Mechanical Science and Engineering Advisor: Dr. Hae-Won Park	Urbana, IL 2017-Present
Korean Advanced Institute of Science and Technology Visiting Scholar, Mechanical Engineering	Daejeon, South Korea 2019 June-Aug.
University of Illinois at Urbana-Champaign Master of Science, Mechanical Science and Engineering	Urbana, IL 2015-2017
Shanghai Jiao Tong University Bachelor of Science, Mechanical Engineering	Shanghai, China 2011-2015

Journal Publications

1. **Yanran Ding**, Abhishek Pandala, Chuanzheng Li, Young-Ha Shin, and Hae-Won Park. Singularity-Free Model Predictive Control for Various Dynamic Motions in Quadruped Robots (in review)
2. Chuanzheng Li, **Yanran Ding**, and Hae-Won Park. Centroidal-Momentum-Based Trajectory Generation for Legged Locomotion (in review)
3. Abhishek Pandala, **Yanran Ding**, and Hae-Won Park. qpSWIFT: A Real-time Sparse Quadratic Program Solver for Robotic Applications, *Robotics and Automation Letters*, 2019.
doi: [10.1109/LRA.2019.2926664](https://doi.org/10.1109/LRA.2019.2926664)

Conference Publications

1. **Yanran Ding**, Chuanzheng Li, and Hae-Won Park, “Kinodynamic Motion Planning for Multi-Legged Robots via Mixed-Integer Convex Optimization” (in preparation)
2. **Yanran Ding**, Abhishek Pandala, and Hae-Won Park, “Real-time Model Predictive Control for Versatile Dynamic Motions in Quadrupedal Robots,” *International Conference on Robotics and Automation (ICRA)*, Montreal, Canada, 2019.
3. **Yanran Ding**, Chuanzheng Li, and Hae-Won Park, “Single Leg Dynamic Motion Planning with Mixed-Integer Convex Optimization,” *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Madrid, Spain, 2018.
4. **Yanran Ding** and Hae-Won Park, “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, 2017. (**Best Student Paper Award Finalist**)

Professional Service

- Dedicated reviewer for a number of robotics conferences (*IEEE ICRA*, *IEEE IROS*, *IEEE CASE*) and journals (*IJRR*, *IEEE RAL*)

Teaching Experience

University of Illinois at Urbana-Champaign

Teaching Assistant, ME 340, ME 360, ME446

Urbana, IL

2016 Spring-2019 Fall

Co-instructor with Dr. Hae-Won Park for the robotics course (ME446). Delivered a 90-minute lecture on inverse dynamics control and an introduction on legged robots. Instructed the laboratory sections for the dynamics (ME340) and signal processing (ME360) courses.

Shanghai Jiao Tong University

Teaching Assistant, ME395

Shanghai, China

2015 Spring

Designed and implemented laboratories with the instructors on various topics.

Honors and Awards

- Best Robotics Demo Award, *Coordinated Science Lab Student Conference*, UIUC (2017/2019)
- Finalist of Best student paper, *IROS*, Vancouver (2017)
- Outstanding graduate student, *Shanghai Jiao Tong University* (2015)
- Senior Design project Gold Prize, *Shanghai Jiao Tong University* (2015)
- National Scholarship of China, *Ministry of Education* (2014)

Poster Presentations

Real-time Model Predictive Control for Versatile Dynamic Motions in Quadrupedal Robots, *International Conference on Robotics and Automation (ICRA)*, Montreal, Canada, 2019.

Vertical Jumping Demonstration of a Quasi-Direct-Drive Leg, *International Conference on Robotics and Automation (ICRA)*, Brisbane, Australia, 2018.

Design and Experimental Implementation of a Quasi-Direct-Drive Leg for Optimized Jumping, *Midwest Robotics Workshop*, Toyota Technological Institute, Chicago, IL, May 2018.