YANRAN DING

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RESEARCH INTEREST

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 achievable by 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.

EDUCATION

University of Illinois at Urbana-Champaign Dec. 2017 - present
Doctor of Philosophy Candidate, Mechanical Science and Engineering *Advisor: Dr. Hae-Won Park*

Korean Advanced Institute of Science and Technology June 2019 - Aug. 2019
Visiting Scholar, Mechanical Engineering

University of Illinois at Urbana-Champaign Aug. 2015 - Dec. 2017
Master of Science, Mechanical Science and Engineering

Shanghai Jiao Tong University Sept. 2011 - Aug. 2015
Bachelor of Science, Mechanical Engineering (with honor) *Advisor: Dr. Peisen Huang*

PUBLICATIONS

PRE-PRINT

7. [**Under Review**] Yanran Ding, Abhishek Pandala, Chuanzheng Li, Young-Ha Shin, and Hae-Won Park. " Representation-Free Model Predictive Control for Dynamic Motions in Quadrupeds." , 2020.

JOURNAL

6. [**Mechatronics' 20**] Chuanzheng Li, Yanran Ding, and Hae-Won Park. "Centroidal-Momentum-Based Trajectory Generation for Legged Locomotion." *Mechatronics*, 2020. [pdf]
5. [**RA-L'19**] Abhishek Pandala, Yanran Ding, and Hae-Won Park. "qpSWIFT: A Real-time Sparse Quadratic Program Solver for Robotic Applications." *Robotics and Automation Letters*, 2019. [pdf]

CONFERENCE

4. [**IROS' 20**] Yanran Ding, Chuanzheng Li, and Hae-Won Park. "Wrench-based Kinodynamic Motion Planning for Multi-Legged Robots via Mixed-Integer Convex Program." *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2020.
3. [**ICRA' 19**] 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*, 2019.[pdf]
2. [**IROS' 18**] 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*, 2018.[pdf]

1. **[IROS' 17]** 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*, 2017.[pdf] (**Best Student Paper Award Finalist**)

PATENT

[CN104648665A]. "A Linkage Mechanism for Quadrotor Power Cable Cruise ." *China*, granted Dec. 2016.

HONORS AND AWARDS

Coordinated Science Laboratory Video of the month, UIUC — 2019 March
Best Robotics Demo Award, Coordinated Science Lab Student Conference, UIUC — 2017,2019
Finalist of Best student paper, IROS, Vancouver — 2017
Senior Design project Gold Prize, Shanghai Jiao Tong University — 2015
National Scholarship of China, Ministry of Education — 2014

TEACHING EXPERIENCES

University of Illinois at Urbana-Champaign

Teaching Assistant, ME446 Robot Dynamics and Control — *2020 Spring*

- Developed simulation leading to students implementing impedance control on a hopping leg robot
- Delivered a 90-minute lecture on inverse dynamics control and an introduction on legged robots

Teaching Assistant, ME360 Fundamentals of Signal Processing — *2019 Fall*

- rated as excellent TA by students [19Fall]

Teaching Assistant, ME340 Modeling and Analysis of Dynamical Systems — *2016 Spring, 2017 Fall*

- rated as excellent TA by students [16Spring] [17Fall]

Shanghai Jiao Tong University

Teaching Assistant, ME395 Engineering Laboratory — *2015 Spring*

- Designed and implemented laboratory experiments with the instructors on various topics

ACADEMIC SERVICES

- **Reviewer for the following journals**: IEEE Transactions on Robotics, IEEE Robotics and Automation Letters, The International Journal of Robotics Research
- **Reviewer for the following conferences**: IEEE ICRA, IEEE IROS, IEEE CASE, IEEE UR

INVITED TALKS

3. "Planning and Control of Legged Robots in Challenging Terrains", *Virtual Seminar in Robotics, Optimization, and Assistive Mobility (ROAM) Lab*, University of Notre Dame, Notre Dame, IN, 2020.
2. "Design and Control of a Quadruped Robot Panther for Highly Dynamic Motions", *RoboGrads Fall 2020 Student Virtual Seminar*, Georgia Tech., Atlanta, GA, 2020.
1. "Design, Planning and Control of a Highly Dynamic Quadrupedal Robot", *CSL Student Conference*, University of Illinois at Urbana-Champaign, Urbana, IL, 2019.