

# Junjie SHEN

ROBOTICS RESEARCHER

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## Research Interests

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LEGGED ROBOTS | LOCOMOTION | OPTIMIZATION-BASED MOTION PLANNING AND CONTROL | KINEMATICS & MECHANISMS

## Education

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### University of California, Los Angeles (UCLA)

M.S. & PH.D. IN MECHANICAL ENGINEERING, DEPARTMENT OF MECHANICAL & AEROSPACE ENGINEERING, GPA: 3.92/4.0

Los Angeles, USA

Sept. 2016 - Dec. 2022

### Shanghai Jiao Tong University (SJTU)

B.S. IN MECHANICAL ENGINEERING, UNIVERSITY OF MICHIGAN – SJTU JOINT INSTITUTE, GPA: 3.70/4.0, RANKING: 3/61

Shanghai, China

Sept. 2012 - Aug. 2016

## Research Experience

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### Robotics & Mechanisms Laboratory (RoMeLa), UCLA

GRADUATE RESEARCH ASSISTANT, ADVISOR: DR. DENNIS HONG

Los Angeles, USA

Sept. 2016 - Present

### State Key Laboratory of Mechanical Systems & Vibration, SJTU

UNDERGRADUATE RESEARCH ASSISTANT, ADVISOR: DR. PEISEN HUANG

Shanghai, China

Mar. 2014 - Aug. 2016

- Implemented real-time feedback motion control algorithm in LabVIEW for a large-stroke piezo-actuated planar motor which achieved omnidirectional mobility and nanoscale resolution.
- Developed a novel large-range active planar encoder based on flat panel display with nanoscale resolution.

## Publications

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### PH.D. DISSERTATION

1. [UCLA'22] **Junjie Shen**. "Locomotion Analysis and Control of a Miniature Bipedal Robot." *University of California, Los Angeles, 2022*.

### JOURNAL PAPER

1. [RA-L & IROS'20] **Junjie Shen** and Dennis Hong. "Optimal Linearization via Quadratic Programming." *IEEE Robotics and Automation Letters*, July 2020. *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems, Las Vegas (NV), USA*.

### CONFERENCE PAPERS

9. [Humanoids'22] **Junjie Shen**, Jingwen Zhang, Yeting Liu, and Dennis Hong. "Implementation of a Robust Dynamic Walking Controller on a Miniature Bipedal Robot with Proprioceptive Actuation." *2022 IEEE-RAS 21st International Conference on Humanoid Robots, Ginowan, Japan*.
8. [UR'22] **Junjie Shen** and Dennis Hong. "Model Predictive Control Using Dynamic Model Decomposition Applied to Two-Wheeled Inverted Pendulum Mobile Robot." *2022 19th International Conference on Ubiquitous Robots, Jeju, Korea*.
7. [ICRA'22] **Junjie Shen** and Dennis Hong. "Convex Model Predictive Control of Single Rigid Body Model on SO(3) for Versatile Dynamic Legged Motions." *2022 IEEE International Conference on Robotics and Automation, Philadelphia (PA), USA*.
6. [ICRA'22] Yeting Liu, **Junjie Shen**, Jingwen Zhang, Xiaoguang Zhang, Taoyuanmin Zhu, and Dennis Hong. "Design and Control of a Miniature Bipedal Robot with Proprioceptive Actuation for Dynamic Behaviors." *2022 IEEE International Conference on Robotics and Automation, Philadelphia (PA), USA*.
5. [ICRA'21] **Junjie Shen** and Dennis Hong. "A Novel Model Predictive Control Framework Using Dynamic Model Decomposition Applied to Dynamic Legged Locomotion." *2021 IEEE International Conference on Robotics and Automation, Xi'an, China*.
4. [UR'20] **Junjie Shen**, Yeting Liu, Xiaoguang Zhang, and Dennis Hong. "Optimized Jumping of an Articulated Robotic Leg." *2020 17th International Conference on Ubiquitous Robots, Kyoto, Japan*.
3. [UR'20] Jingwen Zhang, **Junjie Shen**, and Dennis Hong. "Kinematic Analysis and Design Optimization for a Reduced-DoF Quadruped Robot with Minimal Torque Requirements." *2020 17th International Conference on Ubiquitous Robots, Kyoto, Japan*.
2. [ICRA'20] **Junjie Shen** and Dennis Hong. "OmBURo: A Novel Unicycle Robot with Active Omnidirectional Wheel." *2020 IEEE International Conference on Robotics and Automation, Paris, France*.

1. [IROS'19] Xuan Lin, Jingwen Zhang, **Junjie Shen**, Gabriel Fernandez, and Dennis Hong. "Optimization Based Motion Planning for Multi-Limbed Vertical Climbing Robots." *2019 IEEE/RSJ International Conference on Intelligent Robots and Systems, Macau, China*. (**IROS Best Paper Award on Safety, Security, and Rescue Robotics in memory of Motohiro Kiso**)

## MANUSCRIPT

1. [PE'15] Junbin Zhang, Yanran Ding, **Junjie Shen**, Hui Zou and Peisen Huang. "Large-Stroke Piezo-Actuated Planar Motor for Nanopositioning Applications." *Precision Engineering*, 2015.

## Honors & Awards

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|------|---|------------------------|
| 2020 | Arduino Blog Featuring Omnidirectional Balancing Unicycle Robot (OmBURO)                  | <i>Somerville, USA</i> |
| 2019 | IROS Best Paper Award on Safety, Security, and Rescue Robotics in memory of Motohiro Kiso | <i>Macau, China</i>    |
| 2015 | National Distinguished Student Scholarship (top 0.2% nationwide)                          | <i>Beijing, China</i>  |
| 2015 | SJTU Distinguished Academic Achievement Award   | <i>Shanghai, China</i> |

## Teaching Experience

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### University of California, Los Angeles (UCLA)

*Los Angeles, USA*

#### TEACHING FELLOW

*Apr. 2017 - Dec. 2022*

- MAE C163A/C263A: Kinematics of Robotic Systems (Fall 2022, Fall 2021, Fall 2020, Fall 2019, Fall 2018, Fall 2017)
- PSYCH 20A/B: Advanced Topics in MATLAB Programming for Behavioral Sciences (Spring 2021, Summer 2019)
- LS 30A/B: Mathematics for Life Scientists (Winter 2021, Spring 2020, Winter 2020, Spring 2019, Winter 2019)
- MAE 171A: Dynamic Systems Control (Spring 2018, Spring 2017)
- MAE 166C: Design of Composite Structures (Winter 2018)

### Shanghai Jiao Tong University (SJTU)

*Shanghai, China*

#### TEACHING ASSISTANT

*Feb. 2015 - Jan. 2016*

- VM320: Fluid Mechanics (Fall 2015)
- VM240: Introduction to Dynamics and Vibrations (Spring 2015)

## Academic Service

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### Robotics & Mechanisms Laboratory (RoMeLa), UCLA

*Los Angeles, USA*

#### PAPER REVIEWER

*July 2018 - Present*

- IEEE RA-L, Access, ICRA, IROS, UR
- ASME Journal of Mechanisms and Robotics

## Skills

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|--------------------|--|
| <b>Programming</b> | MATLAB, Python, LabVIEW                                    |
| <b>Software</b>    | SolidWorks, Mathematica, LaTeX, Microsoft Office           |
| <b>Languages</b>   | English (fluent), Mandarin (native), Shanghainese (native) |
| <b>Hobbies</b>     | Robot, Basketball, Soccer, Dota, Movie, Music              |