




# Guowei Shi

 [mysite.me](https://mysite.me)

 [pchatter@andrew.cmu.edu](mailto:pchatter@andrew.cmu.edu)

 [yourgithub](https://yourgithub)

## EDUCATION

---

### Southern University of Science and Technology (SUSTech)

*Master of Engineering in Intelligent Manufacturing and Robotics*

GPA: 3.87 / 4.0

Shenzhen, Guangdong, China

Aug. 2022 - July 2025 (*expected*)

Advisor: Zhenzhong Jia

### Southern University of Science and Technology (SUSTech)

*Bachelor of Engineering in Robotics Engineering*

GPA: 3.79 / 4.0, Ranking: 4 / 73

Shenzhen, Guangdong, China

Aug. 2018 - July 2022

Advisor: Wei Zhang

## PUBLICATIONS

---

(\* indicates equal contribution)

### JOURNALS:

[1] Foot Vision: A Vision-Based Multi-Functional Sensorized Foot for Quadruped Robots

Authors: **G. Shi\***, C. Yao\*, X. Liu, Y. Zhao, Z. Zhu and Z. Jia

In: **IEEE Robotics and Automation Letters (RA-L)**, 2024 [\[PDF\]](#) [\[Video\]](#) [\[IEEE Spectrum\]](#)

[2] STAF: Interaction-Based Design and Evaluation of Sensorized Terrain-Adaptive Foot for Legged Robot

Traversing on Soft Slopes

Authors: C. Yao, **G. Shi**, P. Xu, S. Lyu, Z. Qiang, Z. Zhu, L. Ding and Z. Jia

In: **IEEE/ASME Transactions on Mechatronics (TMECH)**, 2024 [\[PDF\]](#)

[3] TAIL: A Terrain-Aware Multi-Modal SLAM Dataset for Robot Locomotion in Deformable Granular Environments

Authors: C. Yao\*, Y. Ge\*, **G. Shi\***, Z. Wang\*, N. Yang, Z. Zhu, H. Wei, Y. Zhao, J. Wu and Z. Jia

In: **IEEE Robotics and Automation Letters (RA-L)**, 2024 [\[PDF\]](#) [\[Website\]](#)

### CONFERENCES:

[4] Adaptive Planar Foot with Compliant Ankle Joint and Multi-modal Sensing for Quadruped Robots

Authors: **G. Shi\***, C. Yao\*, W. Wang, Z. Zhu and Z. Jia

In: **IEEE International Conference on Robotics and Biomimetics (ROBIO)**, 2022 [\[PDF\]](#)

[5] Predict the Physics-Informed Terrain Properties Over Deformable Soils using Sensorized Foot for Quadruped Robots

Authors: C. Yao\*, **G. Shi\***, Y. Ge, Z. Zhu and Z. Jia

In: **IEEE International Conference on Advanced Robotics and Mechatronics (ICARM)**, 2023 [\[PDF\]](#)

[6] Are We Ready for Planetary Exploration Robots? The TAIL-Plus Dataset for SLAM in Granular Environments

Authors: Z. Wang\*, C. Yao\*, Y. Ge\*, **G. Shi\***, N. Yang, Z. Zhu, H. Wei, Y. Zhao, J. Wu and Z. Jia

In: **IEEE International Conference on Robotics and Automation Workshop on Field Robotics**, 2024 [\[PDF\]](#)

[7] Height Control and Optimal Torque Planning for Jumping With Wheeled-Bipedal Robots

Author: Y. Zhuang, Y. Xu, B. Huang, M. Chao, **G. Shi**, X. Yang, K. Zhang, C. Fu

In: **IEEE International Conference on Advanced Robotics and Mechatronics (ICARM)**, 2021 [\[PDF\]](#) [\[Video\]](#)

## RESEARCH EXPERIENCES

---

### ROMA Lab, SUSTech

*Graduate Student Researcher*

Advisor: Zhenzhong Jia

Aug. 2022 - present

#### 1. Vision-based Multi-Functional Sensorized Feet for Quadruped Robots [\[1\]](#)

- Proposed the **Foot Vision** design. To the best of my knowledge, this is the first vision-based sensorized foot to be integrated into a dynamic legged robot, capable of simultaneously sensing contact forces and torques, estimating contact surface inclination, and perceiving foot-terrain interaction using only one camera.
- Proposed a real-time visual force learning method for foot pose estimation and 6D contact force perception based on foot-terrain interaction mechanics.
- Validated that Foot Vision significantly enhances the capability of contact perception for dynamic quadruped locomotion in diverse environments through extensive experiments.

## 2. Terrain-Adaptive Planar Feet for Quadruped Robots [2, 4, 5]

- Designed a multi-modal sensorized planar foot with IMUs, joint encoders and F/T sensors for quadruped robots to accurately estimate the local inclination and contact forces.
- Optimized the studs beneath robot's foot sole based on foot-terrain interaction mechanics and designed a single-foot testbed to validate the outstanding traction performance of the optimized sensorized foot.
- Validated that the planar foot with optimized studs significantly enhances the motility of quadruped locomotion on the granular slope through extensive experiments.

## 3. Perception and Control for Legged Locomotion in Harsh Environment [3, 6]

- Designed a sensor suite consisting of RGBD cameras, a Lidar, IMUs and a global positioning system for mobile robots.
- Collected a comprehensive multi-modal SLAM dataset for robot locomotion on the deformable granular terrain.
- Developed a controller for quadruped robots to achieve robust locomotion using model predictive control (MPC) and whole body control (WBC).
- Developed a terrain aware controller, which integrated terrain information into the whole body controller, to improve the performance of quadruped locomotion on deformable terrains.

**CLEAR Lab, SUSTech**

*Undergraduate Student Researcher*

**Advisors: Wei Zhang**

*July 2019 - July 2022*

### 1. Xiaotian-Hybrid: A Novel Wheeled-Quadruped Platform

- Contributed to the design and manufacture of the wheeled-quadruped robot Xiaotian-Hybrid. [\[PDF\]](#)

### 2. Mini-Nezha: A Novel Wheeled-Bipedal Robot [7]

- Contributed to the design and the development of a balance controller for the wheeled-bipedal robot.

**Tsinghua University**

*Research Intern*

**Advisor: Wenzeng Zhang**

*June 2021 - Aug. 2021*

### 1. A Novel Multi-Modal Grasping Robot Hand

- Designed a multi-modal gripper using the dorsums of fingers to implement parallel grasping and the phalanges to implement self-adaptive grasping.

## HONORS & AWARDS

---

- Chinese National Encouragement Scholarship, 2020
- Southern University of Science and Technology Outstanding Graduate, 2022
- SUSTech Department of Mechanical and Energy Engineering Outstanding Postgraduate Student, 2023
- SUSTech Zhicheng College Scholarship, 2019-2021

## SELECTED COURSES

---

Matrix Analysis (A+)	Advanced Robotics Control (A)	Advanced Kinematics and Dynamics of Mechanisms (A)
Soft Robotics (A)	Robot Modeling and Control (A)	Machine Learning for Engineering (A)
Walking Robot (A)	Modern Control and Estimation (A-)	Collaborative Robot Learning (A)

## SKILLS

---

<b>Programming</b>	Python, C/C++, Java
<b>Software</b>	SOLIDWORKS, MATLAB, MuJoCo, PyBullet, Gazebo, Webots
<b>Robot platform</b>	Unitree A1 & Go1
<b>Others</b>	Linux, ROS, Pinocchio, Eigen, OSQP, qpOASES, CasADi, OpenCV, PyTorch