

# Shengzhi Wang

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## Research Interests

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legged robot locomotion, legged manipulation, whole-body control and teleoperation of legged manipulator system, and cooperation control.

## Education

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**The Chinese University of Hong Kong** Jan. 2023 – Present  
*Doctor of Philosophy in Mechanical and Automation Engineering* Hong Kong, China

**Technical University of Munich** Oct. 2018 – Feb. 2021  
*Master of Science in Electrical Engineering and Information Technology* Munich, Germany

- Passed with distinction.

**University of Duisburg-Essen** Apr. 2016 – Sept. 2018  
*Bachelor of Science in Electrical Engineering and Information Technology* Duisburg, Germany

- Double Degree Program.

**China University of Mining and Technology** Sept. 2013 – Jul. 2015  
*Bachelor of Science in Electrical Engineering* Xuzhou, China

- Double Degree Program.

## Research Experience

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**Research Assistant** Jul. 2021 – Dec. 2022  
*Multi-scale Medical Robotics Center* Hong Kong

- Quadrupedal robots control and legged robots locomotion

**Master Thesis Research** Apr. 2020 – Nov. 2020  
*German Aerospace Center (DLR)* Wessling, Germany

**Goal: Enhance the robustness of the DCM-based walking algorithm for humanoid robots**

- Development of an online learning framework based on Iterative Learning Control (ILC)
- Utilization of novel methods to adapt the ILC to the DCM-based walking algorithm
- Proof of the stability of ILC applied to DCM-based walking

**Research Intern** Aug. 2019 – Dec. 2019  
*Institute for Cognitive Systems, Technical University of Munich* Munich, Germany

**Goal: Enable the robot to recognize itself in the mirror and detect novelty region on its face**

- Design of deep auto-encoders to learn the appearance representation of the face
- Exploiting of the prediction error to learn the visual novelty detection

## Projects

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### Tic-Tac-Toe Robot

Nov. 2019 – Feb. 2020

**Goal: Program the Universal Robot UR10 to play tic-tac-toe against a human player**

- Modeling of the kinematics and dynamics of UR10
- Design of the controllers for different drawing tasks based on adaptive control

### 4-DoF Robot Arm Low Level Design

Jun. 2019 – Jul. 2019

**Goal: Enable the robot arm to be controlled and to repeat the movement taught by humans**

- Generating of PWM signals from microcontroller to control the servo motors
- Programming on SRAM to store and reuse the duty cycles

### Penalty-Kick of Humanoid Robot Nao

Apr. 2019 – Jun. 2019

**Goal: Enable the robot to score penalty goals against a goalkeeper in RoboCup**

- Leader of the team to learn the scoring policy by the method of reinforcement learning

## Publications

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- **S. Wang**, X. Chu, and K. Au, “Towards Exact Interaction Force Control for Underactuated Quadrupedal Systems with Orthogonal Projection and Quadratic Programming,” *2023 IEEE International Conference on Robotics and Automation (ICRA)*.
- Y. Tang, J. An, X. Chu, **S. Wang**, C. Wong, and K. Au, “Towards Safe Landing of Falling Quadruped Robots Using a 3-DoF Morphable Inertial Tail,” *2023 IEEE International Conference on Robotics and Automation (ICRA)*.
- **S. Wang**, G. Mesesan, J. Engelsberger, D. Lee, and C. Ott, “Online Virtual Repellent Point Adaptation for Biped Walking using Iterative Learning Control,” *2020 IEEE-RAS International Conference on Humanoid Robots*.
- M. Hoffmann, **S. Wang**, V. Outrata, E. Alzueta, and P. Lanillos, “Robot in the mirror: toward an embodied computational model of mirror self-recognition,” *KI - Künstliche Intelligenz* (2021), doi: 10.1007/s13218-020-00701-7.

## Awards

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- First price of the Robothon 2020 at Munich School of Robotics and Machine Intelligence, in Mar. 2020
- Scholarship from China University of Mining and Technology, in Nov. 2014

## Skills

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### Technical Skills

- **C/C++**: proficiently used in the tic-tac-toe robot, the 4-DoF robot arm low level design project, and during the period as Research Assistant.
- **ROS, Gazebo**: proficiently used in research intern for the robot novelty detection project and during the period as Research Assistant.
- **Assembler**: proficiently used in 4-DoF robot arm low level design project.
- **Python**: 2 years of experience in a variety of student projects.
- **Matlab**: 7 years of experience in a variety of student projects.
- **Simulink**: 1 year proficiency in various student projects.

### Languages

- **Chinese:** Native
- **Cantonese:** Native

- **English:** Proficient
- **German:** Proficient with C1 level