

**Lei Wu**  
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## **EDUCATION**

### ***Wuhan University, Wuhan, China***

09/2017-06/2021

- Bachelor of Engineering in Mechanical Design Manufacturing and Automation
- Courses: (1)Machinery Principle (2)Mechanics of Materials (3)Principle of Automatic Control (4)Industrial Robot (5)Electrical and Electronic Technology (6)Machine Design

### ***National University of Singapore, Singapore***

08/2022-Now

- Master of Science(Mechanical Engineering)
- Courses: (1)Advanced Robotics (2)Linear System (3)Machine Vision (4)Neural Network (5) Autonomous Mobile robotics

## **PUBLICATION AND PATENT**

- ***Design of a 6 DOF Cable-Driven Upper Limb Exoskeleton.*** (14th International Conference on Intelligent Robotics and Applications. ICIRA 2021.Lecture Notes in Computer Science, vol 13013. Springer, Cham.)  
Author: Letian Ai, Tianlin Zhou, **Lei Wu**, Wei Qian, Xiaohui Xiao, Zhao Guo.
- ***Design of Quadruped Robot with Parallel Elastic Actuator (pending)***  
Author: **Lei Wu**, Aidi Xiao, Zhao Guo
- ***A novel Quadruped Robot with Dual Rack Unit (pending)***  
Author: **Lei Wu**, Wei Wang

## **RESEARCH EXPERIENCE**

### ***Learning to Sequence and Blend Robot's Opening-door Skills via Differentiable Optimization***

08/2022-Now

- Encoded sequences of previous-defined skills as quadratic programs(QP), and exploited differentiable optimization layers and a tailored loss formulated from the QP optimality conditions to learn Seamless skill sequences.
- Based on AprilTag to achieve the location of the door handle, and the use of the identification of different ids for different opening actions.
- Via the use of differentiable optimization, our work offers novel perspectives on multitask control.
- Ros and IssacSim software was used for simulation.

### ***Design of Quadruped Robot with Parallel Elastic Actuator***

06/2019-06/2020

- Researched the topic of the parallel elastic actuator
- Proposed a legged robot with novel parallel elastic actuators to improve efficiency and reduce energy consumption, and completed its overall design and modeling independently
- Instructed the team members to learn 3D modeling software as the team leader and successfully built and tested the whole robot

### ***Design of a 6 DOF Cable-Driven Upper Limb Exoskeleton***

06/2019-06/2020

- Realized the lightweight design using carbon fiber and aluminum materials and rebuilt the overall mechanical structure; enhanced the mechanical stability and improved the control accuracy while maintaining a lightweight design
- Built a highly integrated and compact series elastic actuator
- Completed the production of the whole machine and organized members to finish the assembling process
- Conducted the control simulation using Simulink and developed the control program
- Published a paper at a prestigious international conference (Intelligent Robotics and Applications. ICIRA 2021)

## **WORKING EXPERIENCE**

### ***Unitree Robotics***

07/2021-07/2022

Mechanical Engineer

- Took responsibility for the structural design of a new heavy-load quadruped robot
- Conducted force analysis and vibration analysis of key components such as robot legs and motors using the finite element method
- Improved the mechanical structure, and made key components through plastic injection molding
- Deployed the robot into small-scale production

### ***Xiaojie Technology***

09/2019-09/2020

Product management Intern

- Co-founded the company and initiated a project to build an automatic meal vending machine
- Conducted market research and competitive analysis on automatic meal vending machine
- Took responsibility for the system design of the automatic meal vending machine
- Organized team members to build the mechanical structure, and produced a prototype of the machine
- Acquired valuable insights into business solution development

## **EXTRACURRICULAR ACTIVITIES**

### ***The 18<sup>th</sup> National Robot Contest for College Students(ROBOCON)***

09/2017-06/2019

- Took responsibility for the design of docking, lifting, and grabbing mechanisms as the team leader

- Participated in the design and debugging of the jumping quadruped robot, and mastered the method of writing and debugging motor programs
- Managed materials in the team, including maintenance of 3D printers and other equipment, and actively participated in various processes like debugging
- Organized team members to prepare for examinations to balance between study and competition, and participated in inter-university exchanges many times
- Led the team to win third place and awards of Best Design and Best Technology in the final

#### ***Design of a Quadruped Walking Robot with Dual Rack Unit***

06/2019-06/2020

- Led a College Students' Innovative Entrepreneurial Training Project and coordinated with team members, professors, and other related departments
- Independently designed a quadruped robot with a dual rack unit which realized the functions including fast forwarding, steering, obstacle crossing, slope climbing, and other functions
- Applied for a patent for a quadruped walking robot which is under review

#### ***Class Leader***

06/2019-09/2020

- Actively organized class activities and ensured the orderly study life of the class, such as organizing classmates to study online and creating online self-study rooms during the pandemic period
- Led the class to win the honors of Advanced Class of Wuhan University and Advanced Youth League Branch of Wuhan University

#### ***Public Welfare Association of Wuhan University***

09/2017-09/2018

- Organized a book donation activity for children in Chunhui primary school
- Collected more than 1000 books and 200 school supplies

#### **Awards**

- Third place in the final of the 18th National Robot Contest for College Students(ROBOCON) 2019
- Second prize in the Mechanical Innovative Design Competition for College Students 2020
- Wuhan University Dean's List 2019,2020
- Second-class scholarship of Wuhan University 2020
- Third-class scholarship of Wuhan University 2019

#### **SKILLS& INTERESTS**

- Computer Skills: ROS & Gazebo, Isaac Sim, SLAM, C, C++, Python, MatLab, SolidWorks, AutoCAD, Keil, SolidWorks Simulation, Altium Designer, ANSYS
- English Proficiency:  
GRE 325: Verbal 160, Quantitative 165, Writing 3.0
- Interests : Hiking, Reading, Cooking