# Lei Wu

(+65) 89417009 e1010615@u.nus.edu website: https://leiwu.netlify.app/

## 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

**Instruct the Robot's Motion Based on Simple Language Instructions** 08/2022-Now

- In this work, we try to instruct the robot with some easy order(such as pull, pick) to perform a diverse range of tasks in a large variety of environments in the physical world at the human level
- April tags localization and sample-efficient, generalizable, compositional, and incremental robot learning are used in this project.
- 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$^{th}$ 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

# Personal Statement

Personally, I have a great passion for research, and my undergraduate and graduate years have been fruitful.

As an undergraduate, I joined the robot team of Wuhan University as a freshman and achieved third place in the 18th National Robot Contest for College Students. In my junior year, out of immense love for bioinspired robots, I craved in-depth guidance, I joined Dr. GUO Zhao's laboratory at Wuhan University and published a conference paper at the 14th International Conference on Intelligent Robotics and Application. After graduation, I decided to work first as a mechanical engineer at Unitree Robotics, where I have been mainly responsible for the research and development of B1 heavy-load quadruped robots. After working for one year, I wanted to further deepen my knowledge in the field of robotics. I applied for and successfully became a graduate student at the National University of Singapore, and joined the laboratory of Professor Gregory Scott Chirikjian, engaged in the research of robot trajectory plan and optimization. During this half-year's research, I have confirmed my love for robotics and scientific research. And I decided to pursue a Ph.D. and try to start a business at an appropriate time in the future.

The HKU Summer Research Programme provides me with a good opportunity. First of all, through this summer program, I can get more guidance from excellent professors from the University of Hong Kong. And I will complete a valuable scientific research project within 10 weeks to further improve my ability to find and solve problems. Secondly, through the ten-week study and life in Hong Kong, I can better understand the study and living environment in Hong Kong. Due to the University of Hong Kong's outstanding academic achievements, excellent geographical location, and unique regional culture, I have always wanted to complete my Ph.D. degree in Hongkong, especially at the University of Hong Kong. Therefore, through this summer activity, I can have a good experience of studying and living in Hong Kong. Finally, I want to get to know more friends who are interested in robotics, control theory, and other fields, so that we can exchange ideas and make progress together.

## Summer research interest

Since I am very interested in robotics, and I also focused on the motion planning and control of robotic arms during my graduate study, I want to join the relevant laboratory in the department of electrical and electronics engineering at the University of Hong Kong (HKU) Summer Research Programme for research and learning. In particular, professor Kazuhiro Kosuge's Labrotory. Since I am very interested in the field of development and application of robotics to problems in real environments, which is what I am studying now. In conclusion, I hope I can join the department of electrical and electronics engineering to focus on motion planning or human-robot interaction.