# Can Zhao

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## Education

**MS in Engineering Mechanics**, Shanghai Jiao Tong University Sept. 2022 – Mar. 2025 (Expected)

- GPA: 3.87/4.0 The MPI Lab (Manipulation, Perception and Intelligence Laboratory) Member
- Related Modules: Physical interaction, tactile perception, force sensing, modeling and estimation of soft objects, deep learning, etc.

**BE in Engineering Mechanics**, Sichuan University Sept. 2018 - Jul. 2022

- GPA: 3.93/4.0 Ranking: 1/40
- Related Modules: Elasticity theory, finite element anlysis, biomechanics, computational mechanics, machine learning, etc.
- Related Courses and Grades (/100): Elactic mechanics (98), Computer modeling and simulation (96), Mechanics in designs (97), Biomechanics in combination with medical and engineering (97), Graduation practice (96), Graduation thesis (92), etc.

## Research Project

**In-situ Mechanical Calibration of Sensing Elastomers for Vision-based Tactile Sensors**, Shanghai Jiao Tong University

*-- Published 1 conference paper, 1 journal paper under review and 1 patent under examination* Mar. 2022 - Present

- Proposed an in-situ indentation method to obtain the time-varying material parameters of soft elastomers without disassembly
- Validated the performance of the proposed method via simulation and experiment with the rigorous contact mechanics theory, standardized experimental procedures, and specially customized calibration blocks
- Constructed a benchmark indentation dataset covering 8 typical indenter types and 600 parameters of soft objects using Abaqus, and proposed a deep learning model based on Transformer to estimate the mechanical parameters of soft objects (in progress)

**Theory and Method of 3D Contact Force Reconstruction for Vision-based Tactile Sensors**, Shanghai Jiao Tong University

*-- Undergraduate thesis (completed), 1 journal paper under review* Oct. 2021 - Present

- Proposed a comprehensive theoretical framework of 3D distributed contact force perception for vision-based tactile sensors
- Proposed an algorithm for 3D contact force reconstruction by introducing a multi-layer eight-node hexahedral inverse finite mesh
- Constructed a force distribution benchmark and verified the reconstruction results from accuracy, fidelity, and noise resistance
- Provided feedback for human-computer interaction, and performed perception and manipulation of soft objects using the high-precision reconstruction of the 3D contact force distribution of the vision-based tactile sensor (in progress)

**Finite Element Analysis of the Actual Mechanical Behavior of Pacemaker Leads**, Sichuan University Jun. 2020 - Sept. 2020

*-- Leader of the scientific internship project*

- Established the complex geometric model of pacemaker leads (6-layer nested structure) and heart using SolidWorks
- Adjusted the model parameters and calculation methods using Hypermesh, solving divergence problems caused by model complexity
- Analyzed the mechanical behavior of pacemaker leads under different work conditions using Abaqus for their design and optimization

**Risk Assessment of Kidney Transplantation Based on Cox Regression Model**, Sichuan University Nov. 2019 – Dec. 2020

*-- Leader of the College Students' Innovation and Entrepreneurship Training Program*

- Selected Cox regression method from various survival analysis methods based on the intricate nature of kidney transplantation data
- Performed Cox regression analysis on the extensive patient data sourced from West China Medical Center) employing SPSS
- Established a robust risk assessment scheme tailored for kidney transplantation and wrote a final report for clinical reference

## Publication

**C. Zhao**, J. Ren, H. Yu and D. Ma, "In-situ Mechanical Calibration for Vision-based Tactile Sensors," 2023 IEEE International Conference on Robotics and Automation (**ICRA**), 2023. doi: 10.1109/ICRA48891.2023.10161153.

**C. Zhao**, J. Ren, C. Sun, J. Liu, H. Yu and D. Ma, "In-situ Mechanical Calibration of Sensing Elastomers for Vision-based Tactile Sensors," submitted to IEEE Transactions on Haptics (**ToH**), currently under review.

D. Ma and **C. Zhao.** 基于压痕的视触觉传感器力学参数原位标定方法 (in Chinese). Application number: 2022113978708, Application date: 20221109, currently under substantive examination.

## Award

**Honors**

- China International College Students' "Internet+" Innovation and Entrepreneurship Competition (Golden Prize, Top 0.01%) Nov. 2023
- Outstanding Graduate in Sichuan Province (Top 3%) Mar. 2022
- China National Undergraduate Mechanics Competition (Third Prize, Top 5%) Aug. 2021
- China National Undergraduate Mathematics Competition in Sichuan Province (First Prize, Top 8%) Aug. 2020
- Outstanding Student (Leader) at Sichuan University (Top 10%) Nov. 2019/2020/2021

**Scholarships**

- China Optics Valley Scholarship (Optoelectronics Information Award) Nov. 2023
- First Class Scholarship at Shanghai Jiao Tong University Nov. 2022/2023
- Sichuan University-Jiangsu Wujiang Hi-Tech Industrial Park Scholarship (Science and Technology Innovation) Dec. 2021
- China National Scholarship (Top 0.2%), Cheung Kong Power Scholarship Dec. 2020

## Teaching Experience

**Teaching assistant**, Theoretical Mechanics (Sophomore) Sept. 2022 - Jan. 2023

- Scored homework and quizzes, organized standard answers, and summarized problem-solving experiences
- Provided students with individual Q&A sessions and detailed explanations of homework errors
- Conducted review and exercise classes to reinforce key concepts
- Awarded the title of Outstanding Teaching Assistant (Top 1%)

## Conference Attended

National Academic Forum in Mechanics, Hefei, China Nov. 2023

(Oral: Dense 3D Contact Force Distribution Estimation Using iFEM2.0 and Vision-based Tactile Sensors)

IEEE International Conference on Robotics and Automation (ICRA), London, United Kingdom May. 2023

(Poster: In-situ Mechanical Calibration for Vision-based Tactile Sensors)

## Research Skill

- **Python**: Machine learning, deep learning (PyTorch), computer vision (OpenCV, OpenGL) and data analysis
- **MATLAB**: 2D and 3D finite element implementation with implicit and explicit solvers, dynamics simulation of mechanical structures
- **Mechanical analysis software**: Abaqus and its secondary development using Python scripts, Ansys and HyperMesh
- **Auxiliary skills**: Linux, Git, LaTeX, Solidworks, AutoCAD and Adobe Suites

## Reference

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