

Tianyu Tu

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Education

Stanford University

M.S. in Mechanical Engineering

Expected June 2026

GPA: 4.0/4.0

Shanghai Jiao Tong University (SJTU), Shanghai, China

B.E. in Mechanical Engineering

June 2024

GPA: 3.9/4.0

- Tsien Hsue-shen Honor Program (Ranking: 5/234); Zhiyuan Honor's Degree

Publication & Working Paper

[1] Xing, C., Li, H., Wei, Y. L., Ren, T. A., **Tu, T.**, Lin, Y., Schumann E., Zheng, W. S., Cutkosky, M. R. (2025). TacCap: A Wearable FBG-Based Tactile Sensor for Seamless Human-to-Robot Skill Transfer. In *2025 IEEE International Conference on Intelligent Robots and Systems (IROS)*. arxiv.org/html/2503.01789v1 [🔗](#) Contribution: Data Transferrability and Mechanical Structural Design Validation via Data Collection, Data Analysis and Simulation Analysis

[2] Li, H., **Tu, T.**, Chang, Z., Zhong, M., Jung, J., Chung, C., Iaccarino, G., Song, S., Cutkosky, M. R. (2025) Fiber Bragg Grating Whisker Sensor for Passive Hydrodynamic Perception on Underwater Robots. Manuscript to submit in Jan. 2026

Research

Whisker-shaped Underwater Fiber-Bragg-Grating (FBG) Tactile Sensor^[2]

Dec. 2024 – present

Department of Mechanical Engineering, Stanford University

Prof. Mark Cutkosky

- Develop a novel, animal-whisker-inspired tactile sensing modality, integrating FBG optical strain sensors with compliant beams for underwater flow detection
- Design, iterate and analyze bio-inspired robotic imitation learning experiments, improving sensor robustness and signal accountability. Design experiments to prove extended applications in underwater robotic manipulation
- Identified and isolated signal-relevant vibration modes in noisy aquatic environment, achieving more than 8 times improvement in signal-to-noise ratio through experimental design
- Designed and built an embedded experimental platform with stepper-motor actuation and real-time data collection, enabling controlled deflection tests and reliable sensor characterization

TacCap: Wearable FBG-Based Tactile Sensor for Learning Skill Transfer^[1]

Dec. 2024 – Mar. 2025

Department of Mechanical Engineering, Stanford University

Prof. Mark Cutkosky

- Developed wearable fiber-optic tactile glove to capture human manipulation skills for robot learning
- Analyzed transferability gap between human-demonstration and robot-teleoperation data, providing quantitative insights into domain adaptation challenges for tactile-based skill transfer

Large-range Mapping Technique Based on Active-vision System

Dec. 2023 – June 2024

B.E. Thesis Project, Shanghai Jiao Tong University

Prof. Wei Dong

- Coordinated dual rotorcraft robots' viewpoints via active-vision framework for optimized realtime obstacle mapping
- Developed a large-range real-time mapping technique using grid mapping, YOLOv5, and DBSCAN
- Implemented automatic RGB-D camera parameter adaptation during dynamic flights, built collaborative triangulation for distant obstacle mapping, and validated accuracy in real and simulated environments

Corrugation Removal in Calendering of LIB Electrode Sheets

Sept. 2022 – Sept. 2023

Institute of Thin Plate Structure Manufacturing, SJTU

Prof. Linfa Peng, Zhutian Xu

- Analyzed calendering force effects on electrode sheets via Abaqus simulations and literature review
- Developed three innovative corrugation mitigation methods inspired by belt gearing and hydraulics
- Designed a multi-stage calendering apparatus to optimize collector rolling and reduce breakage risk

Honors & Awards

Championed the Gold Medal in Choir Performance in the World Choir Games. Served as **tenor section leader** (2024)
Shanghai Scholarship: Top 2% of (about 400,000) Shanghai undergraduate students (2023)
Meritorious Winner in Mathematical Contest in Modeling: Top 10% worldwide (2022)

Work Experience & Selected Projects

Multi-model-sensing driven Robot Teleoperation

June 2025 – Sept. 2025

Summer Internship at the Robotics Company Mundane Inc.

Palo Alto, CA

- Designed full-stack robotic tele-operation system through iterative cross-functional collaboration, balancing product requirements with technical feasibility across mechanical, software, and controls domains
- Architected layered safety framework integrating hardware abstraction (LAN, RS232, CAN), behavior modeling, and low-latency communication protocols to ensure robust real-time performance
- Developed and deployed mechatronics system from hardware integration (soldering, impedance control) through network layers (UDP, WebRTC) to high-level software architecture (state machines, behavior trees)

Gesture Visual Perception and Image Transmission System

Oct. 2023 – Jan. 2024

Embedded System Design, Shanghai Jiao Tong University

- Implemented an end-to-end embedded architecture, leveraging ESP32-CAM as edge sensor for real-time data capture, UDP protocol for low-latency transmission, and NVIDIA TX2 for model inference
- Trained and deployed a YOLOv5 gesture-recognition model, gaining hands-on experience in bridging perception algorithms with embedded hardware systems

Vision-guided Smart Car

Dec. 2022 – Apr. 2023

- Designed vision pipeline using Sobel-based lane boundary detection and non-uniform centerline sampling to compute lateral offset, achieving lightweight yet reliable perception without deep learning
- Integrated perception output with PD steering control and speed regulation; added fallback bang-bang control for steep slopes and automatic mode switching based on IMU data to improve robustness

Mechanical Design for a Ski-Teaching Robot and a Jumping Robot

Feb. 2022 – Jan. 2023

Design and Manufacture, Shanghai Jiao Tong University

- Ski-Teaching Robot:** Conducted motion analysis to design a robot that mimics skiing techniques; engineered a mechanism with linkages and planetary gears for accurate arm movement replication
- Jumping Robot:** Developed a jumping mechanism using a silicone gel bowl to enhance takeoff dynamics; validated its performance through calculations, finite element analysis, and testing

Teaching & Services

Grader and Course Assistant for Professor Stephen Boyd

Sept. 2025 – present

ENGR108: Introduction to Matrix Methods, EE364A: Convex Optimization I

EE Dept., Stanford

- Provide weekly feedback evaluation for 85 undergraduate students in linear algebra, matrix computations, etc.

Course Support Assistant | Music Theory & Solfeggio

Feb. 2022 – June 2022

Department of Humanities, Shanghai Jiao Tong University

Prof. Qin Zhang

- Managed course recordings and online resources via Canvas. Supported course organization for a class of 20 students

Academic Peer Tutor

Oct. 2021 – Jan. 2022

Department of Mechanical Engineering, Shanghai Jiao Tong University

- Led weekly tutoring (2+ hours) in Physics, Maths and Mechanics in sessions resembling office hours

Skills

Programming Skills and Environments: C/C++, MATLAB, Julia, Python, ROS 1&2, Linux Ubuntu

Engineering Software: SolidWorks, Siemens NX, LabVIEW, COMSOL, Abaqus, ANSYS

Languages: English (TOEFL 109), Spanish (A1), Mandarin (native), Cantonese (native)