Yuzhen Song

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Research Interests: Humanoid Robotics; Dexterous Manipulation; Robot Learning.

EDUCATION

Southern University of Science and Technology — **Shenzhen, China**
B.Eng. in Robotics Engineering — Aug 2023 – Expected Jun 2027

- **Overall GPA: 3.87**/4.0 (Weighted Avg: **93.03**/100) **Major GPA: 3.94**/4.0
- **Core Courses:** Robot Operating System (100), Mechanics of Materials M (100), Mechatronic Systems (98), Robot Modeling and Control (97), Mechanical Design (97), Finite Element Theory (97), Intro to C Programming (97), Signals and Systems (95), Sensing Technology (95), Linear Algebra (94), Machine Learning for Eng. (93), Robotic Actuation System (93), Computer Vision (90), Fundamentals of Control Eng. (90)
- **Leadership:** President of Robotics Club & Student Organizations Council (SOC)

University of California, Berkeley — **Berkeley, CA, USA**
Visiting Student — Jul 2026 – Dec 2026

- **Core Course:** Robotic Locomotion

PUBLICATION

- J. Cao*, Y. Chen*, **Y. Song**, M. Tomizuka, C. Li, T. Tian, "**TEXEDO: Test Time Scaling for Controller-Aware Language-Conditioned Humanoid Motion Generation**," ***Conference on Robot Learning (CoRL)***, 2026. **Accepted.** Also presented at the WCBM and RoboData workshops at RSS 2026.

RESEARCH EXPERIENCES

FAR-HOI: From Fine-Grained Human–Object Interaction Generation to Agentic Dexterous Humanoid Manipulation — **Berkeley, CA, USA**
University of California, Berkeley — Aug 2026 – Present
Visiting Undergraduate Researcher; Advisor: Prof. Masayoshi Tomizuka

- Independently ran a **real-world human–object interaction demo** on a Unitree G1 equipped with Wuji Hand 2.2 dexterous hands, executing retargeted arm and hand motions in sync.
- Compared motions generated by **nine human–object interaction baselines** and selected HOiDiNi as the motion generation framework for FAR-HOI.
- Reconstructed an articulated object to match the dimensions of its scanned ARCTIC mesh, configured gravity and hinge friction for sim-to-real experiments, and released the model in ARCTIC-Models.

TEXEDO – Test-Time Scaling for Controller-Aware Humanoid Motion Generation Website
University of California, Berkeley — Apr 2026 – Sep 2026
Undergraduate Researcher; Advisor: Prof. Masayoshi Tomizuka

- Integrated the **Kimodo baseline** into MuJoCo using mjlab. Remapped quaternion components, resampled motion trajectories from 50 to 30 fps, and matched the Isaac Lab log format for comparison with TEXEDO.
- Compared TEXEDO and Kimodo on the same simulated motion using body-region MPJPE, velocity error, and acceleration error. Resolved memory issues by computing metrics online and saving each step's data to JSON.
- Evaluated TEXEDO-generated motions in **real-world experiments** on a Unitree G1 humanoid robot.
- Designed a **Gemini-based video evaluator** for semantic alignment. It breaks each instruction into checks for action, body part, quantity, and motion attributes, then scores how closely the simulated G1 motion matches the instruction. Compared its scores with manual ratings on a random sample of prompts.

Simulation of an Underactuated Metamorphic Palm for a Three-Fingered Hand — **Shenzhen, China**
Southern University of Science and Technology — Jun 2025 – Oct 2025
Undergraduate Researcher; Advisors: Prof. Jiansheng Dai, Prof. Zhao Tang

- Built Isaac Sim and Webots environments for an underactuated metamorphic palm with a **closed-loop five-link mechanism**. Added loop-closure constraints to the URDF models for preliminary RL experiments.
- Simplified meshes while preserving geometry at contact regions, resolving GPU memory failures and enabling simulation on an 8 GB GPU.
- Investigated instability during palm reconfiguration by analyzing joint constraints and tuning damping, stiffness, and friction, identifying limitations in simulation fidelity.

SELECTED PROJECTS

Simulated Walking with a Four-Handed Robot Code — **Berkeley, CA, USA**
University of California, Berkeley — Sep 2026 – Dec 2026
Project Leader; Course Advisor: Prof. Kazerooni

- Implemented a classical gait that enabled a four-handed robot to walk in simulation.

BEAT – Barometric Elevation and Attitude Tracking for Posture-Independent Wrist Blood Pressure Measurement Code — **Shenzhen, China**
Southern University of Science and Technology — Mar 2026 – Jun 2026
Project Leader; Advisor: Prof. Chengzhi Hu

- Led BEAT development, using barometric sensing to correct for wrist height relative to the heart.
- Programmed two ESP32 boards for ESP-NOW communication and built a desktop UI for live sensor monitoring.
- Designed and analyzed pilot tests across three arm positions ($n = 2$); compensation **reduced systolic MAE by 56.2%**.

SplatSLAM – Indoor Reconstruction with SLAM and 3D Gaussian Splatting Code
Southern University of Science and Technology — Mar 2026 – Jun 2026
Core Team Member; Advisor: Prof. Feng Zheng

- Integrated MASt3R-SLAM with Nerfstudio's 3DGS pipeline to generate point clouds, rendered images, and walkthrough videos from monocular video.
- Analyzed how training iterations affected PSNR, L1 loss, and visual quality, identifying signs of **overfitting and spiky rendering artifacts**.

ROS 2 Mobile Manipulator for Navigation and Grasping Code
Southern University of Science and Technology — Sep 2025 – Dec 2025
Project Leader; Course Advisor: Prof. Wende Ke

- Integrated slam_toolbox, Nav2, and EKF fusion of wheel odometry and IMU data for mapping, localization, and navigation in Gazebo.
- Integrated OpenCV **visual alignment and arm control for object retrieval**, with voice and gesture interfaces using Vosk and MediaPipe.

Image Processing and Motion Planning for Robotic Drawing
Southern University of Science and Technology — Mar 2025 – Jun 2025
Project Leader; Course Advisor: Prof. Chenglong Fu

- Used OpenCV to extract contours and skeletons, generating drawing paths for a six-axis robotic arm.
- Converted paths to joint trajectories using inverse kinematics, verified them in Simulink, and matched the sampling rate to the motor communication rate for **planar drawing on the physical arm**.
- Aligned the pen with **local surface normals** to achieve 3D drawing on cylindrical surfaces in simulation.

Autonomous Rescue Robot (National Competition)
Southern University of Science and Technology — Dec 2024 – Aug 2025
Project Leader; Advisors: Prof. Dong Lu, Yuanjian Huang

- Led the development of a mobile robot integrating YOLOv11 object detection and STM32 motion control for autonomous target tracking and retrieval.
- Won **National Second Prize** and **Provincial First Prize** in the China Undergraduate Engineering Practice and Innovation Ability Competition.

SKILLS

- **Programming:** C/C++, Python, MATLAB
- **Robotics & Simulation:** ROS 2, MuJoCo, Isaac Sim, Isaac Lab, Gazebo, Webots
- **Computer Vision & Visualization:** OpenCV, RViz2
- **Embedded Systems:** STM32, ESP32, Arduino
- **CAD/CAM & CAE:** SolidWorks, AutoCAD, Edgecam, Abaqus

HONORS & AWARDS

- National Second Prize, China Undergraduate Eng. Practice and Innovation Ability Competition — 2025
- Provincial First Prize, Guangdong Undergraduate Eng. Practice and Innovation Ability Competition — 2025
- First-Class Scholarship for Outstanding Students (Top 3%) — 2025
- Second-Class Scholarship for Outstanding Students (Top 8%) — 2024, 2026
- Outstanding Student Award — 2024, 2025, 2026
- Provincial Second Prize, Guangdong Undergraduate Mechanical Innovational Competition — 2024