Zhongtao (Tony) Guan

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Education

ShanghaiTech University *Expected: July.2025*

Bachelor of Engineering, Electronic Information Engineering Shanghai, China

- GPA: 3.80/4.00
- Core courses: Introduction to Control; Signals and Systems; Electromagnetic; Power Electronics
- Scholarship: Undergraduate National Exchange Scholarship; International Conference Scholarship

Massachusetts Institute of Technology *Feb. 2024 - Dec. 2024*

Exchange Student in Electrical Engineering & Computer Science Cambridge, MA, U.S.

- GPA: 5.00/5.00
- Courses: Underactuated Robotics; Nonlinear Control; Undergraduate Research Program

Selected Publications

C=Conference, S=In Submission, +=equal contribution

[S.1] Yi-Hsuan Hsiao^{+}, Songnan Bai^{+}, **Zhongtao Guan**$^{+}$, et al. **Hybrid locomotion at the insect scale combined flying and jumping for enhanced efficiency and efficacy**. Manuscript under review at *Science Advances*, .

[C.1] **Zhongtao Guan**, et al. **Preliminary Result of Cury: A Backdrivable Leg Design using Linear Actuators**. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2024.*

[C.2] **Zhongtao Guan**, et al. **Accurate Single-Ended Fault Location for Cable-OHL Hybrid Transmission Lines**. In *Power and Energy Society General Meeting (PESGM), 2023.*

Research Experience

Sensor Autonomy For Sub-Gram Flapping-Wing Robots (Ongoing), *Advisor: Prof. Kevin Chen* *July. 2024-Present*

- Designed sensory suite, including IMU, distance sensor, and optical flow camera for on-board state estimation.
- Developed fabrication methods to integrate miniature sensors on a 1 cm $\times$ 1 cm board under 0.2 g.
- Presented 2-second hovering using altitude feedback from IMU and off-board controller.

Sub-Gram Hopper with Passive Leg and Flapping-Wing [S.1], *Advisor: Prof. Kevin Chen* *Jan. 2024 - Sept. 2024*

- Showcased robots' capabilities in overcoming obstacles, navigating various terrains, and performing somersaults.
- Constructed high-fidelity simulation environments in MoJoCo and Simscape to mimic fast dynamics of the robot.
- Performed trajectory optimization and NLMPC for complex tasks, e.g. jumping between slopes in a narrow space.

Bezier-Curve Based Dynamic Gain and Implicit Regularization, *Advisor: Prof. Jiahao Chen* *Sep. 2023 - Jan. 2024*

- Designed nonlinear feedback controller using Bezier curve.
- Presented online curve adaptation strategies to handle environmental disturbances and model uncertainty.
- Built a Python package for simulation, multi-objective optimization tuning, and hardware deployment.

A 2-DoF Backdrivable Leg Prototype Design [C.1], *Advisor: Prof. Jiahao Chen* *Aug. 2023 - Jan. 2024*

- Designed linear actuators integrating high torque-density AC motors, 12-phase motor drives, and ball screws.
- Developed robot joints using nonlinear four-bar linkages, optimized torque requirements from human gait data.
- Showcased robot's backdrivability and minimal clearance for energy recovery, and control without joint encoders.

Singled-ended Fault Location For Hybrid Transmission Line [C.2], *Advisor: Prof. Yu Liu* *Jun. 2022 - Jan. 2023*

- Refined classical Eriksson method for the analytical locate results on hybrid-transmission line.
- Utilized fully-distributed line models and pseudo solution identification strategies for better accuracy.
- Demonstrated fault location error < 1% for both high and low fault resistance cases.

Awards

- **Outstanding Teaching Assistant (2023),** 4.9/5.0, evaluated by 62 students
- **National Undergraduate Electronic Design Contest (2023),** Won 2nd Prize in Shanghai division
- **RoboMaster University Championship (2022),** Won 2nd Prize (Shanghai) and 3rd Prize (national)
- **ShanghaiTech Excellence Scholarship(2022,2023),** Top 1%-3% for academic performance

Skills and Others

- **Programming Languages:** Python, C/C++, Julia, Matlab
- **Toolkit:** Simulink, Altuim Designer, KiCAD, Solidworks, MuJoCo, SimScape, Webots, Vicon, Git, Speedgoat
- **Teaching:** Electric Circuit, Introduction to Control Project