

Zhongtao(Tony) Guan

Personal Website | +1-617-784-6900 | zhtguan@mit.edu |  LinkedIn |  Github

EDUCATION AND RESEARCH EXPERIENCE


- **ShanghaiTech University** Sep. 2021 - Present
Bachelor of Engineering, Electronic Information Engineering Shanghai, China
 - GPA: 3.80/4.00; Ranking 3/56
 - Core courses: Introduction to Control, Signals and Systems, Electromagnetic, Power Electronics
 - Scholarship: Undergrad. National Exchange Scholarship; International Conference Scholarship
- **Massachusetts Institute of Technology** Feb. 2024 - May, 2024
Special Student Program in EECS Cambridge, Massachusetts, U.S.
 - GPA: 5.00/5.00
 - Core courses: Underactuated Robotics, Nonlinear Control
- **Massachusetts Institute of Technology** July. 2024 - Present
Undergraduate Visiting Student in EECS Cambridge, Massachusetts, U.S.
 - Advisor: Kevin Chen

PUBLICATIONS

C=CONFERENCE, J=JOURNAL, 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 submitted for publication in *Nature Machine Intelligence*.
- [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.
- [C.3] Jiayu Yang, Yu Liu, Kang Yue, **Zhongtao Guan**, et al. **Closed-Form Solutions of Mutual Inductance and Load for LCC-S Wireless Power Transfer Systems**. In *3rd IEEE International Conference on Industrial Electronics for Sustainable Energy Systems*, 2023.
- [C.4] Mengzhao Duan, Yu Liu, Ze Liu, Xinchun Zou and **Zhongtao Guan**. **A Group of Single-Ended Time-Domain Line Fault Location Methods Using Breaker Operation Information**. In *IEEE Power and Energy Society General Meeting (PESGM)*, 2023.

PROJECTS

- **Implicit Regularization and Dynamic Gain Control** Sep. 2023- Jan. 2024
Advisor: Prof. Jiahao Chen 
 - * Presented a Bezier Curve-based nonlinear controller for improved tracking, efficiency, and disturbance rejection.
 - * Proposed an open-source package for simulation and hardware deployment.
 - * Proposed feasibility criteria using Sturms theorem, and Multi-Objective Optimization for fine tuning.
 - * Proposed online numerical realization on embedded system using Brent's Method.
 - * Proposed online control-point adapting using implicit regularization, sum-of-square.
 - * This work is prepared for IEEE Transactions on Power Electronics Letter.
- **Sensor Autonomy for Insect-Scale Robots (Ongoing)** July. 2024- Present
Advisor: Prof. Kevin Chen
 - * Presented sensing-autonomy on insect scale robots.
 - * Presented PCB fabrication and components selection under 200-mg weight.
- **Hybrid Locomotion at Insect Scale** Jan. 2024- Sep. 2024
Advisor: Prof. Kevin Chen
 - * Presented a sub-gram flapping-wing passive hopper at insect scale using soft actuator.
 - * Demonstrated capabilities in overcoming obstacles, navigating challenging terrains, and exhibiting high agility.
 - * Trajectory optimization and online NLMPC are used for complex task such as fast dynamic between slopes.
 - * Contributed to controller design, experiments and data analysis.
 - * This work is submitted to a journal: [S.1].

◦

A Backdrivable Leg Design Using Linear Actuators

Aug. 2023 - Jan. 2024

Advisor: Prof. Jiahao Chen



- * Developed a backdrivable 2-DoF leg prototype for walking and jumping.
- * Contributed to the design of electronic components, including a highly integrated AC motor drive.
- * Reduced the number of joint encoders through optimized mechanical design and electrical integration.
- * Built a simulation environment using the Webots simulator for closed-loop chain dynamics.
- * Acted as the project leader; responsible for mechatronics design and simulation.
- * This work has been accepted as a conference paper: [C.1].

◦

Fault Location of Power Systems

Jun. 2022 - Jan. 2023

Advisor: Prof. Yu Liu

- * Proposed methods for fault location on hybrid or purely overhead line power system.
- * Utilized fully distributed line model for accurate locating, while modified Eriksson method for analytical method.
- * Introduced breaker operation information for fault location of pure overhead-line power system.
- * Contributed to idea, methodology, experiments for [C.2]; proof reading and discussion for [C.4].
- * These works are accepted as conference papers [C.2], [C.4].

◦

Design and Control of Inverter

Jan. 2023 - Aug. 2023

Advisor: Prof. Yu Liu

- * Proposed analytical solutions of mutual inductance and load resistance for the LCC-S WPT system, without communication from the secondary side.
- * Designed and controlled a three-phase inverter for grid-connected photovoltaic systems.
- * This work is accepted as a conference paper: [C.3]

AWARDS

• Outstanding Teaching Assistant

2023

ShanghaiTech University, school of information and technology

- Acted as head TA Electric Circuit.
- Coordinated the workload of TAs, Recorded the class, lectured discussion/review session, graded homework.

• RoboMaster University Championship

2022

RoboMaster

- Won 2nd Prize in Shanghai division, 3rd in national division
- Acted as group leader; contributed to mechanical design.

• National Undergraduate Electronic Design Contest

2023

Shanghai Municipal Education Commission

- Won 2nd Prize in Shanghai division
- Acted as group leader; contributed to inverter design and control.
- Included knowledge of device selection, embedded system, SVPWM and PLL.

SKILLS AND OTHERS

- **Programming Languages:** Python, C/C++, Julia, Matlab
- **Toolkit:** Simulink, Altium Designer, KiCAD, Solidworks, L^AT_EX
- **Teaching:** Electric Circuit, Introduction to Control Project
- **Research:** Control Theory and its Application, Sensing, and Mechatronic Design

REFERENCES

- **Research Supervisor:** [Kevin Chen](#), Associate Professor Without Tenure, MIT, Contact: [Email](#)
- **Research Supervisor:** [Jiahao Chen](#), Assistant Professor, ShanghaiTech, Contact: [Email](#)
- **Research Supervisor:** [Yu Liu](#), Associate Professor, ShanghaiTech, Contact: [Email](#)