

Zihan Guo

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[Linkedin Page](#) | [Online Portfolio](#) | [Youtube Channel](#) | [Github Page](#)

EDUCATION

Columbia University, *School of Engineering and Applied Science* New York, NY, US

MS in Mechanical Engineering (Robotics and Control), **GPA: 3.7/4.0** Sep 2022 - Jan 2024

- **Main Courses:** MS Proj(A), Robot Learning(A), Robotics Studio(A), Modern Control(A-), Artificial Intelligence(A-), Data Science(A-), Evolutionary Algorithm(A-)

Sun Yat-sen University (SYSU), *School of Aeronautics and Astronautics* Shenzhen, Guangdong, China

BE in Theoretical and Applied Mechanics, **GPA: 3.4/4.0 (Top 40%)** Sep 2018 - Jul 2022

- **Main Courses:** Linear Algebra (90), Fortran (94), Elasticity (91), Fluid Mechanics (90), Rocket Dynamics (89)
- SYSU 2022 Outstanding Undergraduate Thesis (7/140)
- National First Prize: IAF-CSA Space University CubeSat Challenge

PUBLICATION & PATENT

Rapid grasping of fabric using bionic soft grippers with elastic instability, Z Xiong, **Z Guo**, L Yuan, Y Su, Y Liu, H Lipson - *arXiv:2301.09688 (IROS 2023, Accepted)* [\[pdf\]](#)

A deployable cable-net antenna for satellite, G Xun, **Z Guo**, L Long, J Jiang, Z Wu - CN202120252012.9 [\[link\]](#)

RESEARCH EXPERIENCE

Creative Machines Lab, *Columbia University* New York, NY, US

Research Assistant, Mentored by Prof. [Hod Lipson](#) Oct 2022 – present

- Researched on bi-stable structures that can be used as actuators or end-effectors for robots
- Designed a soft gripper based on a novel bi-stable structure using *SolidWorks* after studying several pertinent papers
- Developed a robotic arm platform using *Arduino* and implemented an control system to conduct gripping experiments
- Innovated and developed a robot fish using a bi-stable carbon fiber structure, enhancing its performance by 10%

Tensegrity Robots Lab, *Sun Yat-sen University* Shenzhen, Guangdong, China

Research Assistant, Mentored by Prof. [Zhigang Wu](#) Dec 2021 - Jun 2022

- Worked on a cable-driven robotic arm for in-space docking and object capturing with an attribute to avoid rigid collisions
- Created the kinematic model of the entire arm and developed a forward kinematics simulator in MATLAB
- Developed a control system using *Arduino* and performed multiple control-driven experiments

SYSU UAV Association, *Sun Yat-sen University* Shenzhen, Guangdong, China

Project Leader, Mentored by Prof. [Jianing Wu](#), Funded by school with 150,000RMB Dec 2021 - Jun 2022

- Supervised a team in the design and fabrication of the solar-powered, fixed-wing drone, coordinated teams to design the structure, aerodynamics, and solar-power systems of the drone
- Conducted research on papers and patents pertaining to solar aircraft and solar cell technologies, informing the design and construction process of the drone, and utilized *AutoCAD*, *SolidWorks*, *Xflr 5*, and ANSYS for drone design, with manufacturing processes including 3D printing, laser cutting and soldering
- Successfully developed a solar-powered, fixed-wing drone with a wingspan of 4.7 meters

Advanced Spacecraft Lab, *Sun Yat-sen University* Shenzhen, Guangdong, China

Research Assistant, Mentored by Prof. [Zhigang Wu](#) Jul 2020 - Oct 2021

- Designed the deployment mechanism and built a 3D model of the antenna using *SolidWorks*
- Performed Finite Element Analysis (FEA) using ANSYS, calculated and corrected the error of the cable-net

PROJECTS [\[Website\]](#)

Bipedal Robot, *Columbia University*

Jan 2023 - May 2023

- Conceptualized and built a bipedal robot from scratch, integrating a control system using a Raspberry Pi and IMU
- Utilized the *MuJoCo* for gait simulation, employing hill climber and reinforcement learning algorithms for training, successfully implemented the "sim-to-real" transfer, achieving a walking speed of 11.43 cm/s.

Robot Learning, *Columbia University*

Jan 2023 - May 2023

- Collected state data from a robot arm and constructed a neural network to train the forward model
- Used *PyTorch* for reinforcement learning with DQN and PPO for MPC control of the robot arm

Evolutionary Algorithm, *Columbia University*

Sep 2022 - Dec 2022

- Developed a mass-spring physics simulator in *C++* to create a physics environment for a soft quadruped robot model
- Utilized evolutionary algorithms within the simulator to progressively train and optimize the robot's gait motion

Rocket Trajectory Simulation, *SYSU*

Nov 2020 - Jan 2021

- Utilized numerical algorithms in MATLAB to solve a rocket's trajectory, created a detailed description of flight state
- Wrote a calculation report of 50+ pages to evaluate an accuracy of less than 10 meters

INTERNSHIP EXPERIENCE

SZ DJI Technology Co., Ltd. (DJI)

Shenzhen, Guangdong, China

Education Content Developer

Feb 2022 - Jul 2022

- Created comprehensive STEAM educational resources including Robotics, *Scratch*, *Python*, PID control, servomotor for students
- Trained 1000+ robot teachers and implemented multiple assessments to validate their capabilities

ROWING COMPETITIONS

- *Championship*: 2020 China Rowing Masters Competition "Zhejiang Yongli Cup"-Men's Eight Oct 2020
- *2nd Place*: 2019 China Land Rowing Tournament-Men's One-minute Dash Dec 2019
- *4th Place*: 2019 China Land Rowing Tournament-Team Relay Dec 2019
- *2nd Place*: 2019 Guangdong "Rowing at SYSU", College Student Division-Men's One-minute May 2019
- *4th Place*: 2019 Chinese and Foreign Famous Collegiate Rowing Regatta- Men's Eight Apr 2019

SKILLS

- **Programming**: *Python*, *C++*, MATLAB, *Fortran*
- **Design and Simulation**: *MuJoCo*, *Pybullet*, *SolidWorks*, *AutoCAD*, ANSYS, *Proteus 8*, *Mathcad*, *Xflr 5*
- **Others**: *Raspberry Pi*, *Arduino*, *Ubuntu*, *PyTorch*, *Numpy*, *Pandas*, *Keras*, *ROS*, *Git*, *LaTeX*, *OriginLab*, *Photoshop*