



Zhenghe Guo

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Gender: Male **Date of birth**: 28/09/2004

EDUCATION AND TRAINING

[31/08/2023 – Current]

Undergraduate Student

Zhejiang University

City: Hangzhou | **Country**: China | **Field(s) of study**: Major: Agricultural Engineering, Minor: Advanced Class in Engineering Education (ACEE), Chu KoChen Honors College (Top 50 selected from all engineering undergraduates each year) | **Final grade**: 3.90/4.30

[29/06/2025 – 19/07/2025]

Visiting Student

National University of Singapore

City: Singapore | **Country**: Singapore | **Field(s) of study**: Department of Statistics and Data Science(Global Science Summer Program (GSSP)) | **Final grade**: 4.00/4.00

WORK EXPERIENCE

3DV Lab, ZJU CAD&CG State Key Laboratory, Zhejiang University

City: Hangzhou | **Country**: China

[01/10/2025 – Current]

Research Assistant

- 3D Graphless Navigation research; advised by **Prof. Sida Peng**

Shanghai Zeno Future Technology Co., Ltd. Hangzhou Branch

City: Hangzhou | **Country**: China

[01/11/2025 – Current]

Robotics Software Engineer(intern)

- Trajectory Planning for Strawberry Picking Robots

Robotic Micro/Nano Manipulation Lab, Zhejiang University

City: Hangzhou | **Country**: China

[01/02/2025 – Current]

Research Assistant

- model design, simulation, and robot kinematics of 3D Autonomous Navigation of Magnetic-Controlled Zebrafish Robot in College of Biosystems Engineering and Food Science, Zhejiang University; advised by **Prof. Mingchuan Zhou**

Agile Robotic Tele-systems(ARTs) Lab, College of Control Science and Engineering, Zhejiang University

City: Hangzhou | **Country**: China

[22/10/2024 – Current]

Research Assistant

- Stress Data Collection and Sensor Design for Orthodontic Periodontal Membrane

- tooth force model and point arrangement design, data processing and simulation;
advised by **Prof. Gaofeng Li**

College of Civil Engineering and Architecture, Zhejiang University

City: Hangzhou | **Country:** China

[01/11/2024 – 01/02/2025]

Research Assistant

- Mechanics Analysis of Shell Structures
- Finite element solving and numerical optimization , implemented in MATLAB

HONOURS AND AWARDS

2025 The 3rd Quantum Information Technology and Application Innovation Contest

Awarding institution: China Academy of Information and Communications Technology(CAICT)

National First Prize,Runner-Up (Mathematical Modeling Innovation Contest Based on Coherent Optical Quantum Computers)

– Project: “Coherent Ising Machine-based Decoding Optimization for LDPC Codes in Wireless Communication Networks”

2025 “DigitalCup” Undergraduate Mathematical Contest in Modeling

(Mathematics Group),**National First Prize** & (Non-Mathematics Group),**National First Prize**

Scholarships

Xiangyang Scholarship, First-Class(Highest price money, ONLY 1 SLOT EACH YEAR)

Keyue Zhongkai Scholarship

Second and Third-Class Scholarship of Zhejiang University

The 16th National Undergraduate Mathematics Competition

(Non-Mathematics A Category) **Second Prize**

Zhongkong Cup Robotics Competition, Second Prize

The 15th MathorCup Undergraduate Mathematical Contest in Modeling

Third Prize(Regional Division),Paper: “Short-haul Transportation Volume Forecasting and Scheduling Optimization Model Based on XGBoost and Proportional Mapping”

The 27th HuaDong Cup Undergraduate Mathematical Contest in Modeling

National Third Prize, Paper: “Ski Jumping Motion’s Three-Stage Coupling Modeling and Optimization: In-run Dynamics, Flight Control, and Landing Buffer”

2025 China International College Students’ Innovation Contest

Bronze Medal, project: AeroBase CloudSense – A Low-Altitude Detection System Based on Integrated Remote Sensing

Model Students Awarding institution: Zhejiang University

Innovation and Entrepreneurship Model Student(twice);**Academic Excellence Model Student**(twice); two other Model Student Honors

2025 Asia and Pacific Mathematical Contest in Modeling (APMCM)

Ongoing (motion planning framework for Unitree G1 humanoid robot dance performance)

PUBLICATIONS

[2025] **Rate Maximization for UAV-assisted ISAC System with Fluid Antennas**

Reference: doi: 10.1109/ICCCWorkshops67136.2025.11148178.

Authors: X. Yang, Z. Guo, S. Liang, Z. Yang, C. Zhu and Z. Zhang | **Journal Name:** 2025 IEEE/CIC International Conference on Communications in China (ICCC Workshops) | **Volume, Issue and Pages:** pp. 1-5

PROJECTS

please refer to my personal github account @StyoKuok and personal website for details

CERTIFICATIONS

[Nvidia, 10/07/2024] **CUDA C/C++**

SKILLS

Programming & Software:

C | Tableau (data analysis): Base | Windows, GNU/Linux, MacOS | C++ | R | MATLAB (including toolboxes: Deep Learning, Statistics and Machine Learning and Signal Processing) | Git/Github, Docker, Gitlab | Python (NumPy, Pandas, NLTK, Matplotlib, sklearn, TensorFlow) | Web development experience: React, Angular, JavaScript, TypeScript, HTML, CSS [frontend]

Machine Learning / AI frameworks:

image recognition | computer science | probability theory | Gaussian Processes for Machine Learning Toolbox | Deep Learning, Reinforcement Learning, Regression, SVM, RF, Naive Bayes, Clustering, LASSO | algorithms | statistics | PyTorch, Keras

Robotics

control methods | embedded systems | Artificial Intelligence and Automation in robotics | sensor fusion | kinematics, dynamics | path planning | Robotics Tools: ROS, OpenCV, PyGlet, PyBullet, PyChrono, OpenAI Gym, Docker | Computer Aided Design/ Computer Aided Manufacturing Applications | mechanical engineering | Arduino STM32 RPi | computer vision

Numerical & Scientific Computing

apply statistical analysis techniques | Parallel computing in HPC environment | mathematical modelling | Math - univariate and multivariate calculus, analysis, linear algebra, probability, optimization | Monte Carlo simulation

Soft Skills

Project management and planning | Team collaboration & teamwork | Problem-solving & independent research | Adaptability & continuous learning | Technical report writing & academic paper writing

NETWORKS AND MEMBERSHIPS

[01/10/2023 – 01/07/2024] **Zhejiang University Unmanned Systems Association** Hangzhou

Member(2023.10-2024.7)

Learned theoretical knowledge about UAV dynamics and practiced in real competition and engineering exercises.

[01/10/2023 – 01/08/2024] **Zhejiang University Student Robotics Association** Hangzhou

Member (2023.10-2024.6), Vice President(2024.6-2024.9)

– Practiced designing and coding on wheeled robots, and engaged in frequent discussions with fellow members about tech topics such as compile languages, reinforcement learning for robots and so on.

[01/08/2024 – 01/01/2025]

Zhejiang University ARC Agricultural Robotics Club Hangzhou

Member (2024.8-2025.1)

– Practiced robotics designing and coding skills in designing seeding robots and spraying robots.

Team ZJUDancer (Robocup2025 & 2026), Zhejiang University Hangzhou

Member of Computer Vision Group

– Continuing advances in vision and detection with real legged robots in an adversarial context.

X-LAB, Zhejiang University

Member of Embedded Group

- Practiced arduino, STM32, 51, esp32 coding and real world applications in engineering condition, engaging in cool projects such as previously mentioned "AeroBase".

LANGUAGE SKILLS

Mother tongue(s): Chinese

Other language(s):

English

LISTENING C2 READING C2 WRITING B2

SPOKEN PRODUCTION B2 SPOKEN INTERACTION B2

Spanish

LISTENING A2 READING A2 WRITING A1

SPOKEN PRODUCTION A1 SPOKEN INTERACTION A1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

RESEARCH INTERESTS AND PERSONAL STATE- MENT

OVERVIEW

I work on **3D perception & autonomous navigation**, with a central interest in **robust decision-making under incomplete sensory information**. My experience spans **tactile sensing, multi-view 3D reconstruction, and closed-loop control systems**, where I build pipelines that operate under real-world constraints—**sparse sensors, occlusions, noise, and computational limits**. My background in **mechanics, kinematics, and trajectory planning** supports my robotics research, and despite major restrictions, I have continuously pursued **computer-science-oriented research** with genuine enthusiasm.

RESEARCH TRAJECTORY & MOTIVATION

My research originates from **hands-on problems rather than theory**. While working on tactile sensing of curved biological surfaces, I encountered the

unavoidable reality of **information loss under sparse sensors**. A Singapore summer school exposed me to **imputation and information-theoretic views of missing data**,

which grew into a broader research question: **How can autonomous systems act reliably when they cannot fully observe the**

world? This mindset now guides my work across sensing, reconstruction, and navigation.

CORE RESEARCH AREAS

1) Information-Constrained Sensing & Reconstruction

Focus: understanding **what information is recoverable under sensing limits**, and how to reconstruct missing states.

Key outputs:

- Sparse sensor placement & stress-field reconstruction (lead + paper finished)
- Fluid antenna channel capacity optimization (published)
- 30-page information-theoretic imputation framework (ready for submission)

2) 3D Reconstruction for Autonomy

Goal: **3D representations that directly support navigation**, not just visualization.

Highlights:

- Multi-view → 3D asset pipeline (COLMAP + 3DGS) for vehicle navigation
- Studying trade-offs between visual fidelity, compute cost, and task success
- Integrating reconstruction into closed-loop autonomy stack

3) Perception-Control Coupling & Sim-to-Real

Focus: linking perception quality to actual **closed-loop robot behavior**.

Projects:

- DreamerV3-based micro-robot navigation → full stack implementation
- RoboCup humanoid vision & localization (real-time deployment)
- Investigating sim-to-real failures and task-aware rendering

TECHNICAL SKILLS & METHODOLOGIES

Perception / 3D — COLMAP, SfM, VO, calibration, 3DGS, NeRF

Learning & Control — DreamerV3, PPO/SAC, closed-loop RL

Information Theory — MI estimation, sensor scheduling, imputation

Systems & Tools — PyTorch, CUDA, ROS, reproducible robotics stacks

FUTURE DIRECTIONS

I aim to build autonomous systems that remain reliable when perception is incomplete.

- **Sim-to-real with minimal real data**
- **Task-aware perception** (optimize for decisions, not pixels)
- **Robust autonomy under degraded sensing**

Interested in collaborations involving **full robotics pipelines, incomplete-data perception, and evaluation via real-world task performance**.

RELEVANT COURSEWORK

Data Science

Fundamentals of Artificial Intelligence(95/100), **Frontiers of Artificial Intelligence**(93/100), **Probability Theory and Mathematical Statistics**(93/100),

Fundamentals of Data Structures, Mathematical Modeling, Information Theory, **Introduction of Data Science with Python and Tableau**(95/100), **Decision Trees for Machine Learning and Data Analysis**(100/100), Network Autonomous Systems, **HPC Comprehensive Practice**(90/100),**Cybernetics**(94/100) etc.;

Mechanical Engineering

Automatic Control principles(94/100), **Control Theory**(94/100), **Theoretical Mechanics**(93/100), **Material Mechanics**(90/100), **Engineering Fluid**

Mechanics & Thermodynamics(92/100)(namely Agricultural Biosystem Transmission Process), etc.;

Currently Learning

Fundamentals of Mechanical Design, Fundamentals of Mechanical Manufacturing, Microcomputer Principles, Robotics Technology and Practice, Biosystems and Bioproduction Robots, etc.

HOBBIES AND INTERESTS

Hobbies

Long-distance running, listening to music, and learning different languages

Social Activities

5 UNESCO course certificates, 1 donation certificate for supporting Education in the Mountainous Region, volunteer in railway station during rush seasons, and more than three years working as a Mental Health Representative