europass

# 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 engineering undergrad) | **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

[ 01/2026 – 02/2026 ] **Visiting Student**

***Distributed Collaborative Vision and Exponential Robotics Laboratory, AIR, Tsinghua University*** https://github.com/AIR-DISCOVER

**City:** Beijing | **Country:** China | **Field(s) of study:** embodied AI(robotic hand-over tasks; sim2real of garment folding)

## WORK EXPERIENCE

***3DV Lab, ZJU CAD&CG State Key Laboratory,Zhejiang University*** https://github.com/zju3dv

**City:** Hangzhou | **Country:** China

[ 01/10/2025 – Current ] **Research Assistant**

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

***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**

- Tactile sensing

- sensor arrangement optimization and stress field reconstruction, data processing and simulation; advised by **Prof. Gaofeng Li**

## 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 Asia and Pacific Mathematical Contest in Modeling (APMCM)**

**National First Prize** (motion planning framework for Unitree G1 humanoid robot dance performance, top 2%)

**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

## 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 adversarail 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 STATEMENT

**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