TIANHAO GU

Email: tianhao.gu@tum.de | Mobile: +49 177-7040-156 | Software Developer, AI Engineer

EDUCATION

Technical University of Munich   Oct 2021 - Jan 2025

Bachelor of Science in Computer Science

4.0 GPA *in Machine Learning Modules: Linear Algebra, Discrete Math, Mathematical Analysis, Probability & Statistics*

Technical University of Munich   Feb 2025 - Present

Master of Science in Computer Science, Spring 2025 Exchange, NTU, Taiwan – Academic Research in Machine Learning

PROFESSIONAL EXPERIENCE

TUfast Racing Team | *Automotive Engineer, Autonomous Systems Dept. Munich*   Oct 2024 - Present

- Led a 3-member subteam to develop and integrate enhanced PID and Pure Pursuit controllers atop the old classic Stanley controller, optimizing trajectory tracking algorithms and reducing latency by 60% during dynamic laps and obstacle avoidance simulations.
- Refactored the old autonomous driving codebase on GitLab for modularity and maintainability; cleaned up legacy logic, adjusted SLAM hyperparameters, and wrote detailed technical documentation using YouTrack to streamline onboarding and future development.
- Replaced the legacy C++ simulator with the CARLA simulator in Python to enable more complex, diverse, and realistic test scenarios
- Collaborated with mapping and perception teams to ensure seamless ROS node integration for sensor fusion, SLAM-based localization, and planning, and successfully solved control-related failures observed during the FSG 2024 competition.

Technical University of Munich | *6-time Honored Teaching Assistant, CS Dept. Garching*   Oct 2022 - Jun 2024

- Delivered weekly tutorials for over 200 students in programming, mathematics, and distributed systems across 4 semesters; created comprehensive teaching materials to support student understanding, resulting in 80 %+ pass rates and 98 %+ positive feedback.
- Drew on extensive teaching experience to **co-found** Lingtu.de, a legally registered EdTech company in Munich offering language and programming courses, as well as career training for international students in collaboration with experienced German HR; helped over 70 learners achieve their goals and generated over 10,000 euros in annual revenue with over 10 employers.

PROJECTS

Effectiveness of Search-Based Testing on a Deep Reinforcement-Learned Controller   May 2024 - Oct 2024

- Conducted the first empirical validation of metaheuristic search algorithms (e.g., genetic algorithms) for robustness testing in decentralized DRL-based control systems, achieving over 500% improvement in efficiency compared to traditional random testing.
- Investigated decentralized DRL for controlling drone swarms in complex environments, addressing scalability limits of centralized control, and analyzing the cost of DRL training using OpenAI Gym.
- Collaborated with a research group at the University of Southern California to integrate their decentralized drone controller into the OpenSBT testing framework developed by our chair, enabling structured evaluation and reproducibility of their research results.

Unbiased Browsing Engine with Generative AI   Nov 2023 - Feb 2024

- Led a 3-member team to develop an unbiased web search engine powered by large language models, focusing on identifying and mitigating ideological bias in AI-generated content.
- Designed and tested filtering and re-ranking mechanisms through prompt engineering and data preprocessing, ensuring more balanced responses on politically sensitive and gender-related topics, and enhancing the fairness and pluralism of generative AI in search scenarios.

Full Stack Flight Search Engine   May 2022 - Sep 2022

- Led a 5-member team in building a full-stack flight search engine using Agile development methodologies, including SCRUM, Use Case Graphs, OOP Class Diagrams, and Pattern-Oriented Engineering, applying principles learned in software engineering coursework.
- Developed a responsive frontend with React, HTML, and CSS, and a robust backend with Java and Spring Boot; integrated Lufthansa's official API to provide real-time flight data and search functionality.

SKILLS, CERTIFICATIONS & SOCIAL ACTIVITIES

Languages: German (DSD C1), English (Fluent), Chinese (Native)

Tech Stack: Java, C, C++, Python, Machine Learning, Software Testing, AI, React, Scrum, UX, SAP-Lifecycle, Autonomous Driving

Certifications: SAP Professional Certificate by SAP, Neural Networks and Deep Learning by Coursera, UX Design by Google

Social Activities: UEFA EURO 2024, DialogDirekt Berlin (NGO Fundraising), ISPO Munich, EC 2022, Drinktec, Go Asia Germany