# JIAHAO HUO

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## EDUCATION

**Tongji University, Shanghai, China** — Expected Graduation Date: June 2025
*Bachelor in Data Science* — ***Senior*** | *GPA:**90.6**/100 (2024/1/18)*

**Technical University of Munich, Munich, Germany** — 2024/10/1-2025/4/1
*School of Computation, Information and Technology(CIT)* — *Exchange Student*

## SKILLS

**Programming Languages**: Python•C++•Matlab•SQL•Markdown
**Libraries,Frameworks and Tools**: PyTorch•Transformers•vLLM•Diffusers•Plotly•Flask•Git•MySQL•Latex
**Mathematics**: Mathematical Analysis•Advanced Algebra•Stochastic Process•Game Theory
**Spoken Languages**: English(99/120 for TOEFL), Chinese, Japanese(N4 level), Germany(Beginner)

## RESEARCH EXPERIENCE

**Meta Technology of Taobao & Tmall Group** — June 2025 – present
*MLE Intern; Mentor:Chengfei Lv* — *Alibaba Group*

- Efficient Audio-langauge Model for **Edge-side Speech Synthesis**.
- Leveraging LLMs for large-scale codebase understanding, while overcoming **context window limitations**. (Under Exploration)

**Institute for Advanced Algorithms Research** — April 2025 – present
*Core Dev.; Advisor:Zhiyu Li* — *MemTensor (Shanghai) Technology Co., Ltd.*

- Developing **open source agentic memory** management system
- Enhances **compatiblility with LLM frameworks** like Ollama, Transformers, vLLM and MCP.
- **Evaluating system performance** across various competitors like Mem0 and Zep-cloud.

**The Hong Kong University of Science and Technology (Guangzhou)** — February 2024 – present
*Research Intern; Advisor:Xuming Hu* — *Computer Science and Engineering*

- Interpretation of **cross-modality** ability of multimodal models.
- Mechanism of **multilingual capacity** of large language models (LLMs)
- Dynamics of **cross-lingual knowledge transfer** in LLMs

**Squirrel AI Learning** — September 2024 – April 2025
*Research Intern; Advisor:Shen Wang* — *AI For Eduacation*

- Improving Multimodal Large Language Models for **Mathematics Problem Solving**.
- Multimodal Large Language Models as agents for **realworld error detection** in exams.

**Tongji University** — June 2023 – March 2024
*Research Intern; Advisor:Zhihua Wei* — *Computer Science and Technology*

- Constructed an random-forest addiction prediction model based on gastrointestinal microbiota abundance
- Utilized **text-to-image diffusion models** for the generation of pixel-wise construction datasets, **with an associated paper currently in progress**

## RECENT AWARDS

**National Second** Prize in the Contemporary Undergraduate Mathematical Contest in Modeling. — September 2023
**First Prize in Shanghai Region** of The Chinese Mathematics Competitions. — October 2022
Undergraduate Scholarship of Tongji University — November 2022

## PUBLICATION

- MathAgent: Leveraging a Mixture-of-Math-Agent Framework for Real-World Multimodal Mathematical Error Detection **(ACL'25 Industry Oral)** Co-author 2025.03

- **MMUnlearner: Reformulating Multimodal Machine Unlearning in the Era of Multimodal Large Language Models (ACL'25 Findings)** **First Author** 2025.02

- EssayJudge: A Multi-Granular Benchmark for Assessing Automated Essay Scoring Capabilities of Multimodal Large Language Models **(ACL'25 Findings)** Co-author 2025.02

- Explainable and Interpretable Multimodal Large Language Models: A Comprehensive Survey (TPAMI Submitted) First Co-author 2024.12

- Miner: Mining the underlying pattern of modality-specific neurons in multimodal large language models (Under Review) Co-author 2024.10

- **MMNeuron: Discovering Neuron-Level Domain-Specific Interpretation in Multimodal Large Language Model (EMNLP 2024 Main)** **First Author** 2024.06

- Synthesizing High-quality Construction Segmentation Datasets through Pre-trained Diffusion Model (ICIC2024 Oral) First Author 2024.04

## PERSONAL PROJECTS

**Open Source Operation System for LLM-based Agent Memory Management** (MemoryOS)

- Enhance AI assistants and agents with an intelligent memory layer, enabling personalized AI interactions.
- Compatible with popular LLM framework and Agent Protocol (such as Ollama, OpenAI, vLLM, MCP, etc.)
- Everything is a memory: memorize multimodal context including images, videos and audios.

**Redefining Multimodal Machine Unlearning for Selective Visual Knowledge Erasure in MLLMs** (ACL 2025 Findings)

- Reformulated multimodal machine unlearning to **erase entity-specific visual patterns** while preserving textual knowledge in language model backbones.
- Developed **MMUnlearner**, a geometry-constrained gradient ascent method that optimizes MLLM weights via concept-aware saliency maps to protect non-target knowledge during unlearning.
- Demonstrated state-of-the-art performance over GA and NPO baselines across metrics for MLLM Unlearning.

**Multimodal Error Detection via Agent-Driven Toolkit in Mathematical Problem-Solving** (ACL2025 Industry Oral)

- Designed a **Mixture-of-Math-Agent framework** with three specialized agents for multimodal error detection, enabling API-driven dynamic routing of image/text analysis and error reasoning workflows.
- Developed **MathToolKits** integrating OCR, symbolic computation, and diagram parsing libraries, optimizing API call efficiency by 40% through automated tool debugging and latency-aware scheduling.
- Deployed the framework in production with 98% API success rate, achieving 89.3% student satisfaction across 1M+ K-12 users and reducing manual grading costs by $2.1M annually.

**Exploring Neurons Specific to Different Vision Domains in Large Vision Language Models** (EMNLP'24, Main)

- Discovering neurons that are sensitive to specific image domains.
- Analyzing the distribution of domain-specific neurons(DSN), as well as their influence on model performance.
- Exploring post-projection visual embeddings through logit lens.

**Construction Sites Dataset Generation Based on Diffusion Models** (ICIC'24, Oral)

- Applying current **text-to-image diffusion models** for generating images with corresponding pixel-wise annotations
- Employing **prompt engineering** techniques to synthesize a comprehensive dataset of construction scenarios
- Conducting **quantitative experiments** to validate the effectiveness of the employed methods
- Authoring a research paper based on the findings and insights gained from this project