

# Hai Zhou

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**Research Interests:** Executable and Verifiable Reasoning; Computer-Use Agents; Multimodal Grounding

## EDUCATION

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**University College London** Sep 2025 – Sep 2026  
M.Sc. Integrated Machine Learning Systems London, UK  
Current weighted average: 78.06/100 (Distinction-level); final classification pending.  
*Selected marks: Applied Machine Learning Systems I/II (84/85); Deep Learning for NLP (85).*

**Nanjing University** Sep 2021 – Jul 2025  
B.Eng. Microelectronic Science and Engineering Nanjing, China  
GPA: 4.36/5.0; average score: 87.2/100.  
Undergraduate thesis: VO<sub>2</sub>-based terahertz reconfigurable leaky-wave antenna (93/100).

## RESEARCH EXPERIENCE

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**Auditable Compositional Question Answering over UK Public Procurement** May 2026 – Present  
*M.Sc. Thesis (manuscript in preparation); supervised by Prof. Miguel Rodrigues* University College London

- **Data and benchmark:** Transformed 166,277 UK procurement OCDS releases into a typed knowledge graph of more than 2 million edges, enforcing explicit rules for organisation identity, monetary additivity and record-level provenance; built a 12,828-question executable benchmark that spans retrieval, aggregation, comparison, multi-hop composition and typed abstention, with 99.88% agreement between two independently implemented oracles.
- **System and training:** Developed a grammar-constrained LLM planner whose typed programs are compiled, grounded, executed and verified by deterministic components that produce every final answer; fine-tuned Qwen3-8B and Llama-3.1-8B LoRA students exclusively on execution-verified traces.
- **Validation and transfer:** Achieved 85.65% strict accuracy on a sealed 2,285-question procurement test and 78.31% on the 922-question PACS compositional challenge set, surpassing by 15.9 and 28.0 points the cloud teacher that generated the training data; transferred the architecture to WikiTableQuestions with all 17 operators unchanged plus one table-specific extension, reaching 51.80% on the official test under gold-program supervision.

**Multimodal Document Reranking with Vision-Language Models** Jan 2026 – Mar 2026  
*Research Project* University College London

- Raised ColQwen2's Macro Recall@1 on MMDocIR from 0.648 to 0.695 with a retriever-agnostic vision-language reranker that jointly reasons over text, tables, charts and page layout; built 7,200 rationale-supervised examples and fine-tuned Qwen2.5-VL-7B through a two-stage SFT-RL pipeline.

## SELECTED RESEARCH PROJECTS

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**GUI Element Localisation with Vision-Language Models** Sep 2025 – Nov 2025  
*Course Research Project* University College London

- Built a DOM-independent, pure-vision GUI grounding pipeline that maps natural-language element queries and screenshots directly to click coordinates across desktop, web and mobile, a core grounding primitive for computer-use agents; created 30× denser supervision by pairing each screenshot with 30 element queries, and LoRA-tuned Qwen2.5-VL-3B to 84.9% point-in-bounding-box accuracy on ScreenSpot, over 93% on text elements.

**KG-Grounded Preference Optimisation for Multi-Hop Question Answering** Apr 2026 – Jul 2026  
*Course Research Project, Deep Learning for NLP* University College London

- Constructed 387 preference pairs without human annotation by fusing R-GCN structural plausibility with NLI entailment, then LoRA-tuned Qwen2-0.5B with a reference-free DPO objective, requiring no KG access at inference; showed that structural and textual grounding metrics diverge in entity-centric multi-hop KGQA.

## TECHNICAL SKILLS

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**Programming and Systems:** Python, SQL, JavaScript/TypeScript, Linux, Git, Docker, Pandas, Parquet.  
**ML and LLM Systems:** PyTorch, Transformers, PEFT/LoRA, TRL, vLLM, SFT, preference optimisation, constrained decoding, vision-language models, knowledge graphs.

## HONOURS & AWARDS

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**National Second Prize**, Chinese Collegiate Computing Competition 2023  
**Honorable Mention**, Mathematical Contest in Modeling (MCM) 2024  
**Provincial Innovation & Entrepreneurship Training Grant** 2023 – 2025  
**Renmin Scholarship**, Nanjing University (three consecutive years) 2022 – 2024

## LEADERSHIP & SERVICE

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**Captain, Electronics Debate Team**, Nanjing University; 2024 School Cup champions 2022 – 2024