

# HAORUO ZHANG

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## EDUCATION

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Nanyang Technological University 01/2025 - Present  
PhD in MAE, Supervisor: Prof. Chen Lv Singapore  
• Intended research areas: LLM and robotics, human-machine collaboration, human-machine interaction

University of California, San Diego 09/2022 - 06/2024  
Master of Science CA, USA  
• **Weighted Average Score:** 3.461/4.0  
• **Major:** Computer Science  
• **Selected Courses (A/A+):** ML: Learning Algorithms, Unsupervised Learning, Neural Networks & Pattern Recognition, Statistical NLP, LLM AI & HCI, Advanced Computer Vision, Intro to Embedded Computing, Intro to Robotics, Application of Specific Processors, Parallel Computer Architecture

University of California, Berkeley 09/2018 - 05/2022  
Bachelor of Arts CA, USA  
• **Major:** Computer Science  
• **Weighted Average Score:** 3.621/4.0  
• Dean's Honor List - College of Letters & Science (Top 10%) Spring 2021  
• **Selected Courses (A/A+):** Principles & Techniques of Data Science, Issues in Cognition, Intro to CS Theory, Artificial Intelligence, Database Systems, Data Structures

## RESEARCH INTEREST

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Artificial Intelligence, Large Language Model, Robotics, Computer Vision, HCI

## PUBLICATIONS

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TBD

## RESEARCH EXPERIENCE

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University of Science and Technology Beijing 07/2024 - 01/2025  
Research Assistant, Supervisor: Prof. Wei He Beijing, China  
*Project: Reviewing LLM-powered Robotic Control & Advancements in Material Autonomous Laboratory*  
• Systematically reviewed the history of LLM and its applications as scientific/robotic foundational models, as well as the development of autonomous experiment system / self-driven labs.  
• Identified the key stages in material science research loop (candidate prediction, experiment plan, execution, evaluation, feedback & optimization) and discussed LLM's current/potential roles in each stages  
• Analyzed the current available self-driven lab systems' (such as A-lab from BAIR, UC Berkeley) prospect to serve in industrial level manufacture environments in system engineering's perspective.  
• Manuscript is still being finalized

University of California, San Diego 06/2023 - 06/2024  
Student Researcher, Supervisor: Prof. Sorin Lerner CA, USA  
*Project: Crammer: Retrieval Augmented Generation for Lecture Transcripts*

- Designed and developed an LLM powered RAG system to intelligently query and summarize relevant concepts from large corpus of online lecture transcripts
- Used OpenAI's Whisper to transcribe local video, and Qdrant, a vector database, to embed transcripts for query
- User queries were put into Qdrant to search for relevant transcripts, which were then feed to OpenAI's GPT-3.5-turbo-0125 for information extraction, reorganization and generation

Student Researcher, Supervisor: Prof. Ndapa Nakashole

*Reproduction Report: Knowledge-Aware Code Generation with Large Language Models*

- Reproduced the published paper KareCoder to evaluate GPT-3.5-turbo-0125's capability of solving competition coding problems
- In KareCoder's framework, the LLM plays two roles: the prompt engineer who generates knowledge-aware prompts upon receiving the problem, the example input/out, and selected portion of built-in knowledge library based on problem categories; and the coder who generates Python code based on the prompt
- Reproduction result showed reasonable performance fluctuation in Pass@k metrics compared to the original work

Student Researcher, Supervisor: Prof. Manmohan Chandraker

*Mini Group Project: Storyboards with Diffusion Models*

- Explored the possibility of generating coherent image sequences with diffusion models using prompt engineering and keyframe interpolation
- With a few prompts describing scenes and actions like a script, Stable Diffusion 2 was used to generate high quality key frames. Hard prompt engineering techniques were used to maintain consistent environments and image styles
- Then, a modified OpenAI unCLIP model, Karlo, was used to generate intermediate frames by interpolating keyframes' CLIP embeddings

Tsinghua University

07/2023 - 10/2023

Research Assistant, Supervisor: Prof. Shuguang Li

Beijing, China

*Project: Aggregation Swarm Robots Inspired by Emergent Properties*

- Independently applied swarm robots and reinforcement learning to explore the aggregation process of Dictyostelium discoideum (an amoeboid cellular slime mold)
- Simulated and built swarm robots, and filmed Dicty's aggregation with dark field microscopy
- Analyzed various features that describe the aggregation behavior in both worlds with OpenCV and explored potential similarities and differences between swarm robots and amoebas

Xi'an Jiaotong University

03/2023 - 08/2023

Research Assistant, Supervisor: Prof. Pengju Ren

Xi'an, China

*Project: LAMMA: A Latency-Aware Design Space Exploration Framework for Multi-CNN on Multi-Core Accelerator*

- Proposed a design framework that dynamically allocates computation nodes among multiple CNN inference tasks in run-time
- Constructed innovative methods to support task flow interrupt, which can reallocate occupied computing resources to tasks with higher priority, contributing to the higher probability of meeting real-time deadlines

*Boran Zhao, Haiming Zhai, Haoruo Zhang, Wenzhe Zhao, "LAMMA: A Latency-Aware Design Space Exploration Framework for Multi-CNN on Multi-Core Accelerator"*

Carnegie Mellon University

06/2021 - 12/2021

Research Assistant, Supervisor: Prof. Min Xu

PA, USA

*Project: Developing Saliency Detection DNNs for Cryo Tomography*

- Developed an unsupervised saliency detection network for cryoET tomographs utilizing modified convolutional U-net, 3DAttention, and other various techniques
- Concentrated on testing different methods of image processing techniques with OpenCV and NumPy, and prototyping U-net based architectures with PyTorch

Xi'an Jiaotong University

06/2020 - 09/2020

Research Assistant, Supervisor: Prof. Buyue Qian

Xi'an, China

*Project: Analyzing Multi-modal Electronic Health Records*

- Engaged in exploratory research on predicting patients' prognosis based on patients' health record
- Effectively cleaned, filtered, and normalized the patients' medical records, and analyzed the various modalities (vital signs, notes, interventions, and etc.)
- Independently researched Deep Representation Learning approaches and applied creative methods to optimize the results

## PROFESSIONAL EXPERIENCE

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University of Science and Technology Beijing

08/2024 - 01/2025

Research Assistant, PI: Prof. Wei He, Prof. Xinbo Yu

Beijing, China

- Worked as the co-advisor for undergrad/graduate students in research group. Responsibility included organizing weekly meetings, supervising/consulting students' research projects, providing academic reading & writing training, and conducting graduate level English training.

Inspur Group

06/2019 - 08/2019

Research Assistant Intern, Department of Cloud Computing

Beijing, China

- Conducted in-depth research on building a recommendation system for online shopping platforms and compiled related survey reports for weekly meeting with other team members
- Independently modeled and analyzed the systems in the simulation environment with (un)supervised learning, data augmentation, feature extraction, and scalable deployment of neural networks on distributed servers
- Effectively collaborated with other departments to bring out the best of everyone's strengths and conduct accurate information flow synthesis

## SKILLS

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- **Programming Languages:** Python, MySQL, Java, C, Go
- **Systems & Tools:** Windows, Debian-based Linux, Git, ROS, Docker, Jupyter Notebook, LaTeX
- **Languages:** Chinese (native), English (proficient), Japanese (fluent)