Kai Zhao

Software Engineer | AI Research
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Education

Technical University of Darmstadt & Goethe University Frankfurt   04/2022 - Present
Msc. Medical Technology | Specialization in AI and Software Development

Technical University of Darmstadt, Germany   04/2021 - 03/2022
Pre-Master's Studies in Electrical and Information Technology

Technical University of Dresden, Germany   10/2020 – 03/2021
DSH Preparation Program

Beijing University of Chinese Medicine, China   09/2017 – 06/2020
Master of Medicine in Chinese Medicine

Hefei University of Technology, China   09/2009 – 06/2013
Bachelor of Engineering in Automation

Academic Preparation Period   06/2014 – 06/2017
Prepared for national postgraduate entrance examination

Work Experience

Working Student in Data Analysis   02/2024 – 07/2024
Rosenpark Research GmbH, Darmstadt, Germany

- Develop and implement data analysis pipelines for medical datasets using Python

- Apply statistical analysis and machine learning techniques for healthcare data evaluation

- Collaborate with research team to optimize data processing workflows

Teaching Assistant in C++ Programming   04/2023 – 07/2023
Department of Mathematics, Technical University of Darmstadt, Germany

- Led programming exercises for "Introduction to Programming II (C++)" course

- Provided code reviews and evaluated student submissions

UX Research Working Student   11/2022 – 02/2023
Custom Interactions GmbH, Darmstadt, Germany

- Conducted user research for Emergency Room Monitoring Systems

- Contributed to frontend development and UI optimization using JavaScript

- Collaborated in agile development team for healthcare software solutions

Editorial Research Intern in Scientific Journal   08/2020 – 09/2020
World Science and Technology, Beijing, China

- Evaluated scientific manuscripts in medical informatics and digital healthcare

- Performed quality assessment of data analysis methodologies in research papers

- Collaborated with senior editors on manuscript review processes

Clinical Data Research Assistant   09/2018 – 01/2020
National Chinese Medicine Department, BUCM, Beijing, China

- Designed and maintained PostgreSQL databases for patient prescriptions and clinical outcomes

- Applied machine learning techniques to analyze prescription data using Python and scikit-learn

- Implemented data collection protocols and organized clinical workflows for efficient data capture

Engineering Intern   07/2013 – 12/2013
Hefei Hengda Jianghai Pump Co., Ltd., China

- Participated in automation process optimization for pump electromotor production

- Assisted in implementing digital inventory management system

Publications

[1] Study and Implementation on Knowledge Graph of Guizhi Decoction Associated Formulas Based on Neo4j. **Zhao Kai**, Shi Na, Sa Zhen, Wang Huaxing, Xu Xiaoying. World Chinese Medicine, 2019, 14(10): 2636-2639+2646. (**Included in CNKI Academic Abstracts (2023.09-10) as high-ranking PCSI articles, highly cited articles, and highly downloaded articles.**)

[2] Text mining and analysis of treatise on febrile diseases based on natural language processing. **Zhao Kai**, Shi Na, Sa Zhen, Wang Huaxing, Lu Chunhua, Xu Xiaoying. World J Tradit Chin Med, 2020, 6: 67-73.

[3] Mechanisms of Dachaihu Decoction in Treatment of Type 2 Diabetes Based on Network Pharmacology. **Zhao Kai**, Xu Xiaoying. Modernization of Traditional Chinese Medicine and Materia Materia-World Science and Technology, 2020, 22(09): 3225-3234.

[4] Systematic Pharmacological Study on Dahuang Huanglian Xiexin Decoction on Helicobacter Pylori Infection. Lu Chunhua, **Zhao Kai**, Sa Zhen, Wang Huaxing, Xun Caimeng, Gao Xue, Liu Yansong, Lu Tao. World Chinese Medicine, 2020, 15(12): 1699-1704.

Research Projects

LLM-Enhanced Natural Language Inference for Biomedicine application   12/2024 – Present
Master's Thesis under the Department of Computer Science, Technical University of Darmstadt

- Developing novel multi-agent frameworks to optimize LLMs for biomedical semantic reasoning

- Implementing cost-efficient methods for medical knowledge extraction and inference

- Designing advanced prompt engineering strategies for improved model performance

Medical AI-Agents QA System   10/2024 – 11/2024

- Implemented domain-specific LLM fine-tuning using LoRA and PEFT frameworks

- Developed RAG with FAISS vector database and Sentence Transformer, multi-agent system using LangChain and Hugging Face Transformers

- Architected

- Github: https://github.com/zkManuel0123/TinyLlama-medical-qa-system

Semi-Automatic Tool for Annotating Large-Scale 3D Assets `10/2023 – 09/2024`

One year Project in the department of Computer Science, Technical University of Darmstadt

- Developed a semi-automatic tool for annotating large-scale 3D assets from RGB videos

- Integrated state-of-the-art models (NeRF, SA3D, SAM2) for 3D reconstruction and mesh generation

- Implemented user interface for efficient annotation workflow management to reduce manual annotation

Immunological Response Analysis in Temperature Variation Study `09/2018 – 05/2020`

Scientific Research Fund Project, Beijing University of Chinese Medicine

- Conducted comprehensive research combining immunological experiments and bioinformatics analysis

- Applied network pharmacology methods to analyze drug-target interactions using Python, R, SAS

- Developed data analysis pipeline for processing multi-source experimental data

- Implemented statistical modeling and visualization for complex biological datasets using Cytoscape

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Professional Development

The Web Developer Bootcamp (Udemy, 2024)

- Full-stack development with HTML5, CSS3, JavaScript, Node.js, Express.js, React, MongoDB

- Implemented responsive design and REST APIs using modern frameworks

- Verify Link: udemy.com/certificate/UC-e4b84898-b758-4216-b73a-75eebb6ba459/

AI-Agents: Automation & Business with LangChain & LLM Apps (Udemy, 2024)

- Built AI automation systems using LangChain, LangGraph, AutoGen, and various LLMs

- Implemented RAG systems and custom AI agents for business automation

- Verify Link: udemy.com/certificate/UC-e4b84898-b758-4216-b73a-75eebb6ba459/

Multi-Agent Systems (CrewAI, 2024)

- Developed collaborative AI agent architectures using CrewAI framework

- Designed automated solutions for complex task processing

- Verify Link: learn.deeplearning.ai/accomplishments/344b35c5-e0e0-4cfe-9a77-7f1fb74dfd02?usp=sharing

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Language Skills

English (TOEFL iBT 89) | German (DSH-2)