Haofei Hou

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EDUCATION

Peking University **Sept 2024 – Present**
School of Mechanics and Engineering Science, Mechanical Engineering *Beijing*

Huazhong University of Science and Technology **Sept 2020 – Jun 2024**
*School of Software Engineering, Software Engineering - **93.87** - **(1/120)*** *Wuhan, Hubei*

RESEARCH INTERESTS

My academic work centers on nature language processing and robotics, especially the structural representation of complex human instructions and its applications. I am interested in the planning and execution of lab automation with structured knowledge and instructions, and in integrating them with vision-language-action models.

PUBLICATIONS

BioPIE: A Biomedical Protocol Information Extraction Dataset for High-Reasoning-Complexity Experiment Question Answer **01 2026**
- **Haofei Hou***, Shunyi Zhao*, Fanxu Meng*, Kairui Yang, Lecheng Ruan, Qining Wang (Equal contribution*).
- We introduce Biomedical Protocol Information Extraction Dataset (BioPIE), a dataset that provides procedure-centric KGs of experimental entities, actions, and relations that supports reasoning over biomedical experiments.
- We evaluate information extraction methods on BioPIE, and implement a QA system that leverages BioPIE, showcasing performance gains. *Under submission to ACL'26*

Human-Inspired Linear Temporal Logic Translation via Explore-Constrained Reinforcement Learning **11 2025**
- Fanxu Meng*, **Haofei Hou***, Kairui Yang, Mengchen Cai, Lecheng Ruan, Qining Wang (Equal contribution*).
- We proposed an framework for translating natural language instructions into LTL specifications by integrating constraints extracted from parallel corpora. *Under submission to IJRR*

Expert-level protocol translation for self-driving labs **09 2024**
- Yu-Zhe Shi*, Fanxu Meng*, **Haofei Hou***, Zhangqian Bi, Qiao Xu, Lecheng Ruan, Qining Wang (Equal contribution*).
- We automate the protocol translation process through a three-stage workflow.
- We incrementally construct Protocol Dependence Graphs (PDGs) that approach structured in the syntax level, completed in the semantics level, and linked in the execution level. *NeurIPS'24*

AutoDSL: Automated domain-specific language design for structural representation of procedures with constraints **05 2024**
- Yu-Zhe Shi*, **Haofei Hou***, Zhangqian Bi, Fanxu Meng, Lecheng Ruan, Qining Wang (Equal contribution*).
- We automate DSL-based action constraint design across protocols from various domains
- Constraints include syntactic constraints and abstracts semantic constraints.
- Quantitative and qualitative analyses of the DSLs highlights its potential as an auxiliary module for language models, aiming to improve procedural planning and execution. *ACL'24*

PROJECTS

A Marker-Free Motion Capture System Built on Unsynchronized Cameras **09 2025**
- **Haofei Hou***, Shunyi Zhao*, Zuxin Fan, Wei Jin, Lecheng Ruan, Qining Wang (Equal contribution*).
- We propose a marker-free MoCap system that is built on unsynchronized cameras. Our system introduces two crucial components: multi-view temporal post-processing and temporal augmentation training . *ICIRA'25*

Prosthetic Control by Learning: A Multi-Agent Cooperative Game Framework **04 2025**
- **Haofei Hou***, Wenduo Zhu*, Lecheng Ruan, Qining Wang (Equal contribution*).
- We develop a model-free reinforcement learning framework that enables the prosthesis to adapt to diverse human movement patterns through cooperative policy learning. *ICORR'25*

Abductive task abstractions in physical problem-solving | CoCoSci, Meta-RL, Web **10 2022**
- Web-based game development: Built an interactive web-based problem-solving game environment (ProbSol) for studying task abstraction under controlled goals and constraints.
- Human behavioral experiments: Designed and conducted human-subject experiments.
- Maskable MetaQ Learning: Proposed a maskable MetaQ learning framework and demonstrated that gradient-based RL (MetaQ, PPO) fails to generate task abstraction, in contrast to human behavior and imitation learning agents.

TECHNICAL SKILLS

Languages: Python, Numpy, Java, C, SQL **Technologies/Frameworks:** Figma, Pytorch, Linux

CERTIFICATIONS

National Olympiad in Informatics in Provinces (NOIP) **12 2017**
First Prize in Shandong Province

Undergraduate National Scholarship Honors **12 2021**