Hui Li

Department of Computer Science, The University of Alabama
Phone: +1-773-495-6247
Email: hli98@crimson.ua.edu
Website: https://marsenrage.github.io
Google Scholar: https://scholar.google.com/citations?user=hgdrfuYAAAAJ&hl=en

EDUCATION

The University of Alabama, AL, United States Aug. 2025 (Expected)
Ph.D. in Computer Science, GPA 3.67/4.00
Advisor: Dr. Hongsheng He

Wichita State University, KS, United States Sep. 2014 – July 2017
M.S. in Computer Science
Advisor: Dr. Hongsheng He

Illinois Institute of Technology, IL, United States Sep. 2008 – July 2011
M.S. in Electrical Engineering
Advisor: Dr. Kui Ren

Hebei University of Science and Technology, China Sep. 2004 – July 2008
B.S. in Electrical Engineering

RESEARCH INTERESTS

Intelligent robots, autonomous systems, reinforcement learning, dexterous manipulation, motion planning, bimanual control.

AWARDS

1. **Travel Award** at IEEE International Conference on Robotics and Automation (ICRA), 2020, 2021, and 2025.
2. **Travel Award** at 22nd IEEE International Conference on Humanoid Robots, 2023.
3. **NSF I-Corps Grant**, 2022.
4. **Outstanding Research Output** at Wichita State University, 2022.
5. **Shocker Innovation Award** at Wichita State University, 2021.
6. **Excellence Ph.D. Award** at Wichita State University, 2019.
7. **Travel Award** at IEEE International Conference on Robotics and Biomimetics, 2019.
8. **Travel Award** at International Conference on Social Robotics, ICSR 2018 and 2024.

PROFESSIONAL EXPERIENCE

Graduate Research Assistant (The University of Alabama) May 2023 – Present

Topic: Task-Oriented Dexterous Grasping via Contextual Reward Machine

- Designed a contextual reward machine for subtask optimization and developed the **DexMobile platform**, a bimanual mobile manipulator with integrated sensors and force feedback. Implemented a ROS2 control system, a digital twin in PyBullet, and a multistage reinforcement learning framework enabling sim-to-real transfer.

Topic: Knowledge Augmentation and Task Planning in Large Language Models

- Proposed an innovative dexterous grasping method utilizing large language models (LLMs) for understanding objects, common sense, and reasoning. Designed prompts for object feature completion and motion planning, and implemented a High-Level Robot Control Library in Python to translate LLM-generated code into executable low-level robot control commands.

Topic: Grasp Intention Interpretation in Object Handover

- Developed a grasp adaptation algorithm enabling robots to recognize and adjust to human grasping habits in collaborative handovers. Implemented a PyTorch-based grasp recognition model and a reinforcement learning framework in Gym and Pybullet for human-robot handover tasks.

Graduate Research Assistant (Wichita State University) Aug. 2020 – May 2023

Topic: Learning Task-Oriented Dexterous Grasping from Human Knowledge

- Implemented a task-oriented dexterous grasping system that learns from human experience and adapts to grasp context. Established a task-object grasp dataset, created corresponding 3D object models, and developed a PyTorch-based deep learning network and reinforcement learning model in the Magichand simulation environment to predict and execute grasp strategies.

Topic: Magichand: Context-Aware Dexterous Grasping System

- Designed the **Magichand platform**, a context-aware dexterous grasping system that gathers object data to generate grasp strategies. Developed the platform with a Sawyer robot, AR10 hand, and integrated sensors, implemented a ROS-based control system, built a digital twin in PyBullet and Gym, and developed algorithms for object reconstruction, material analysis, and grasp execution.

Topic: In-Hand Perception of Object Characteristics for Dexterous Manipulation.

- Proposed an efficient method to recognize key object characteristics for dexterous grasping, including fragility, rigidity, and texture. Established a material recognition dataset, developed an MLP neural network using Keras and scikit-learn to map object features to grasp strategies, and validated the approach through real-robot grasping tasks.

PUBLICATIONS

Peer-Reviewed Conference (C) Papers

C13 Yun Chen, Xinyu Zhang, **Hui Li**, Hongsheng He, Qiang Zhang. Towards Neuro-robotic Interface for Finger Joint Angle Estimation: A Multi-Stage CNN-LSTM Network with Transfer Learning. *IEEE International Conference on Robotics and Automation* (**ICRA 2025**).

C12 **Hui Li**, Akhlak Uz Zaman, Hongsheng He. Grasp Intention Interpretation in Object Handover for Human-Robot Teaming. *International Conference on Social Robotics* (**ICSR 2024**).

C11 Akhlak Uz Zaman, **Hui Li**, Fujian Yan, Yinlong Zhang, Hongsheng He. Omnisurface: Common Reality for Intuitive Human-Robot Collaboration. *International Conference on Social Robotics* (**ICSR 2024**).

C10 **Hui Li**, Dang Tran, Xinyu Zhang, Hongsheng He. Knowledge Augmentation and Task Planning in Large Language Models for Dexterous Grasping. *IEEE-RAS 22nd International Conference on Humanoid Robots* (**Humanoids 2023**).

C9 Dang Tran, **Hui Li**, Hongsheng He. AI planning from natural-language instructions for trustworthy human-robot communication. *International Conference on Social Robotics* (**ICSR 2023**).

C8 **Hui Li**, Yinlong Zhang, Yanan Li, Hongsheng He. Learning task-oriented dexterous grasping from human knowledge. *IEEE International Conference on Robotics and Automation* (**ICRA 2021**).

C7 **Hui Li**, Jindong Tan, Hongsheng He. Magichand: Context-aware dexterous grasping using an anthropomorphic robotic hand. *IEEE International Conference on Robotics and Automation* (**ICRA 2020**).

C6 Achyutha Bharath Rao, **Hui Li**, Hongsheng He. Object recall from natural-language descriptions for autonomous robotic grasping. *IEEE International Conference on Robotics and Biomimetics* (**ROBIO 2019**).

C5 **Hui Li**, Yimesker Yihun, Hongsheng He. Magichand: In-hand perception of object characteristics for dexterous manipulation. *International Conference on Social Robotics* (**ICSR 2018**).

Manuscripts Under Review/Revision (M)

M4 **Hui Li**, Fujian Yan, and Hongsheng He. "Task-Oriented Dexterous Grasping using Reinforcement Learning with Contextual Reward Machine". Submitted to IEEE Transactions on Systems, Man, and Cybernetics: Systems.

M3 Akhlak Uz Zaman, **Hui Li**, Hongsheng He. "Registration and 3D Projection of CAD Models for Human-Robot Teaming in Automated Manufacturing". Submitted to IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2025).

M2 Fujian Yan, **Hui Li**, Hongsheng He. "Volumetric Reconstruction From Limited Views for Task-Oriented Grasping". Submitted to IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2025).

M1 Akhlak Uz Zaman, **Hui Li**, Hongsheng He. "An Intuitive Collaboration Interface for Human-Robot Teaming". Submitted to IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2025).

CONTRIBUTIONS TO RESEARCH GRANTS

1. **NSF Award 2420355:** Context-Aware Task-Oriented Dexterous Robotic Manipulation ($599,638), led by Principal Investigator Hongsheng He.
   Contributions: Led core research activities, produced key results, and contributed to grant writing.

2. **NSF Award 2211149:** A Smart Context-Aware Multi-Fingered System for Dexterous Grasping ($50,000), led by Principal Investigator Hongsheng He.
   Contributions: Served as the Entrepreneurial Lead, conducted market research, developed the product prototype, and contributed to grant writing.

CONTRIBUTED CONFERENCE TALKS

1. Grasp Intention Interpretation in Object Handover — Sep. 2024
   16th International Conference on Social Robotics

2. Knowledge Augmentation and Task Planning via LLM — Nov. 2023
   IEEE-RAS 22nd International Conference on Humanoid Robots

3. Learning Task-Oriented Dexterous Grasping from Human Knowledge June 2021
2021 IEEE International Conference on Robotics and Automation

4. Context-Aware Dexterous Grasping with a Human-like Robotic Hand May 2020
2020 IEEE International Conference on Robotics and Automation

5. In-Hand Perception of Object Characteristics November 2018
10th International Conference on Social Robotics

TEACHING EXPERIENCE

Graduate Teaching Assistant (Wichita State University)

- Advanced AI in Robotics, Spring 2019
- AI in Robotics, Fall 2018
- Programming Languages, Spring 2018

MENTORING

- **Dang Tran** (2021–2023): Undergraduate at Wichita State University → Ph.D. student at The University of Alabama
- **Liqiao Zhu** (2021): M.S. at Wichita State University → Reliability Engineer at Antwork Technology
- **Bharath Rao** (2020): M.S. at Wichita State University → Senior Engineer at Spirit AeroSystems

EXTERNAL PAPER REVIEWER

1. IEEE Transactions on Artificial Intelligence, 2021 – Present
2. International Conference on Social Robotics, 2019 – Present
3. IEEE International Conference on Robotics and Automation, 2022
4. IEEE/RSJ International Conference on Intelligent Robots and Systems, 2022

REFERENCE

- Dr. Hongsheng He (doctoral advisor)
Associate Professor
College of Engineering, The University of Alabama
Email: hongsheng.he@ua.edu
- Dr. Abu Asaduzzaman
Professor and Associate Chair
College of Engineering, Wichita State University
Email: abu.asaduzzaman@wichita.edu
- Dr. Lina Pu
Assistant Professor
College of Engineering, The University of Alabama
Email: lina.pu@ua.edu
- Dr. Xiaoyan Hong
Associate Professor
College of Engineering, The University of Alabama
Email: hxy@cs.ua.edu

Additional references available upon request.