Hui Li

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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 Sept. 2014 – July 2017
M.S. in Computer Science
Advisor: Dr. Hongsheng He

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

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

RESEARCH INTERESTS

Intelligent robots, task-oriented manipulation, dexterous manipulation, reinforcement learning, motion planning.

TECHNICAL SKILLS

- **Robotics & Simulation:**
  - ROS/ROS2, MoveIt2, ROS2_Control, PyBullet, Gazebo/Ignition, URDF/SDF, Sim-to-Real Transfer, Real-Time Control
- **Artificial Intelligence:**
  - Machine Learning: scikit-learn, Pandas
  - Deep Learning: PyTorch, TensorFlow, Keras, TensorBoard
  - Reinforcement Learning: Stable Baselines3, OpenAI Gym
  - Computer Vision: OpenCV, PCL, Open3D
- **Hardware:**
  - Robotic Arm: UR5e, Sawyer
  - Robotic Hand: AR10 Hand, Schunk SVH, Psyonic Hand
  - Mobile Robot: Husky UGV, Leo Rover
  - Humanoid Robot: Nao
  - Sensors: Zivid One, Realsense D435, SCiO, ErgoGLOVE
  - 3D Printer: Form 4, ELEGOO Saturn
- **Programming:** Python, C++

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. **Ph.D. Excellence 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 (CRM) for complex task decomposition and subtask optimization.
- Developed the **DexMobile platform**, a bimanual mobile manipulator equipped with integrated sensors and force feedback, along with its ROS2-based control system and corresponding digital twin simulation environment.
- Implemented and trained a CRM-based reinforcement learning model for task-oriented grasping and transferred the model to the DexMobile platform.

Key Skills: ROS2, MoveIt2, PyBullet, OpenAI Gym, Stable Baseline3, FoundationPoseROS2, Sim-to-Real Transfer

Topic: Knowledge Augmentation and Task Planning in Large Language Models

- Proposed an innovative dexterous grasping approach that leverages large language models (LLMs) for object understanding by exploiting their embedded commonsense knowledge and reasoning capabilities.
- Designed prompts for object feature completion and motion planning.
- Developed a high-level robot control library to convert LLM-generated motion plans into executable low-level control commands.

Key Skills: Prompt Design, OpenAI, Open3D, Keras

Topic: Grasp Intention Interpretation in Object Handover

- Developed a grasp adaptation algorithm that enables robots to recognize and adapt to individual human grasping habits during collaborative handovers.
- Implemented and trained a grasp intention recognition model and a reinforcement learning model for human-robot handover tasks.

Key Skills: PyBullet, OpenAI Gym, Stable Baseline3, PyTorch

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

Topic: Learning Task-Oriented Dexterous Grasping from Human Knowledge

- Implemented a task-oriented grasping framework that learns grasp knowledge from human experience and deploys grasp strategies adapted to specific task contexts.
- Developed a grasp selection network to predict suitable grasp strategies and a reinforcement learning model to execute them adaptively.
- Established a task-object grasp dataset and constructed corresponding 3D object models to map human experience to appropriate grasp strategies.

Key Skills: PyBullet, OpenAI Gym, Stable Baseline3, PyTorch, ROS2

Topic: MagicHand: Context-Aware Dexterous Grasping System

- Developed the **MagicHand platform**, a context-aware dexterous grasping system that collects relevant information from the environment and generates appropriate grasp strategies based on the perceived context.
- Built a ROS2-based control system and a corresponding simulation environment to support real-world deployment and testing of the MagicHand platform.
- Developed algorithms for context perception, including 3D object reconstruction, material classification, and object feature analysis.
- Designed and trained a deep learning network and a reinforcement learning model to predict and adaptively execute grasp topology.

Key Skills: PyBullet, Gym, Stable Baseline3, PyTorch, Open3D, PCL, ROS

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

- Proposed an efficient method for recognizing key object characteristics relevant to dexterous grasping, including fragility, rigidity, and surface texture.
- Established a material recognition dataset and developed a Multilayer Perceptron (MLP) neural network to map object features to appropriate grasp strategies.
- Validated the proposed method through real-robot grasping experiments, demonstrating effectiveness in adapting to grasping requirements based on object properties.

Key Skills: Keras, ROS, MoveIt

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 — Sept. 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

REFERENCES

- Dr. Hongsheng He (doctoral advisor)
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  Email: hongsheng.he@ua.edu
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  Professor and Associate Chair
  College of Engineering, Wichita State University
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- Dr. Lina Pu
  Assistant Professor
  College of Engineering, The University of Alabama
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  Associate Professor
  College of Engineering, The University of Alabama
  Email: hxy@cs.ua.edu

Additional references available upon request.