Xi Huang

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Short Bio

Roboticist specializing in enabling robots to interact with dynamic, cluttered environments. Skilled in developing **machine learning–driven algorithms** for robot **motion planning and manipulation** informed by sensor perception, **computer vision** and **3D scene understanding**. Proven ability to deploy state-of-the-art methods to real-world robotic systems. Active contributor to open-source robotics projects.

Research interests:
Motion planning, Robot Manipulation, Scene Understanding, Multi-Robot Systems, Optimization, Embodiment Transfer

Skills

Programming: C++, Python, ROS, PyBullet, Mujoco, IssacSim, Gazebo, MATLAB

Machine Learning

- **Frameworks**: PyTorch, TensorFlow, PyTorch-Lightning, scikit-learn, WandB, Hydra, Gym, Slurm
- **Expertise**: Reinforcement Learning, Imitation Learning, 3D Scene Understanding (NeRFs, Gaussian Splatting), Sequential Models, Vision-Language Models

Optimization & Control: Bayesian Methods, Convex Optimization, Model Predictive Control (MPC), Force-based Manipulation, Learning-based Control

Education

Karlsruhe Institute of Technology, Ph.D. Candidate in Computer Science　　　02/2019 – Present

- Designed algorithms using **imitation learning**, **reinforcement learning** and **NeRFs** for robot motion planning and manipulation, validated on diverse real-world embodiments
- Built a comprehensive **framework for machine learning research on robotics**, integrating simulation, data management, model training, and real-world deployment.
- Contributed publications to top-tier peer-reviewed robotics conferences (IROS, ICRA) and journals (RAL, RAS)
- **Led three industrial/research projects** focusing on real-time motion generation and robot safety
- **Dissertation**: Online Motion Planning for Robot Manipulators in Dynamic Environments
(Defense anticipated: late 2025, advised by Torsten Kröger and Tamim Asfour)

Karlsruhe Institute of Technology, M.Sc. in Mechanical Engineering　　　10/2015 – 11/2018

- Specialized in **robotics** and **control theory**
- Thesis: Force-Based Process Control for Automated Grinding with an Industrial Robot

South China University of Technology, B.Sc. in Vehicle Engineering　　　09/2010 – 06/2014

- Specialized in **electronic vehicles** and **driving dynamics**
- Thesis: Modeling and Simulation of Driving Cycles for Fuel-Cell Vehicle Optimization

Experience

Robotics Researcher, Stogl Robotics, Part-time – Karlsruhe, Germany　　　01/2023 – Present

- Developed robot motion planning and manipulation pipeline for a mobile manipulator, incl. algorithms, visualization and control
- Extended ROS2 control interfaces for efficient real-world deployment

Control Algorithm Intern, IAV – Gifhorn, Germany   08/2017 - 01/2018

- Data processing and feature extraction, finding latent representation of data regarding vehicle dynamics
- Designed, implemented control algorithms for the latent model grounded on data, and validated on real systems

Research Assistant, KIT – Karlsruhe, Germany   12/2015 – 10/2018

- Institute of Robotics (IAR): Applied machine learning to recognize and classify human action, enabling seamless human-robot interaction for tasks such as object handovers.
- Institute of Fluid Mechanics (ISTM): Developed numerical optimization methods for turbulence modeling, enhancing the accuracy of computational fluid dynamics simulations.

Publications

X-IL: Exploring the Design Space of Imitation Learning Policies   Under review

Xiaogang Jia, *Xi Huang*, Atalay Donat, Xuan Zhao, Denis Blessing, Hongyi Zhou,   [preprint](#)
Han A. Wang, Qian Wang, Rudolf Lioutikov, Gerhard Neumann

Towards Fusing Point Cloud and Visual Representations for Imitation Learning   Under review

Atalay Donat, Xiaogang Jia, *Xi Huang*, Aleksandar Taranovic, Denis Blessing, Ge Li,   [preprint](#)
Hongyi Zhou, Rudolf Lioutikov, Gerhard Neumann

MoRe-ERL: Learning Motion Residuals using Episodic Reinforcement Learning   Under review

Xi Huang, Hongyi Zhou, Ge Li, Yucheng Tang, Björn Hein, Tamim Asfour and Rudolf Lioutikov

ETA-IK: Execution-Time-Aware Inverse Kinematics for Dual-Arm Systems   Under review

Xi Huang, Yucheng Tang, Ilshat Mamaev, and Björn Hein   [preprint](#)

dGrasp: NeRF-Informed Implicit Grasp Policies with Supervised Optimization Slopes   RAS

Gergely Sóti, *Xi Huang*, Björn Hein   [preprint](#)

Planning with Learned Subgoals Selected by Temporal Information   ICRA 2024

Xi Huang, Gergely Sóti, Christoph Ledermann, Björn Hein and Torsten Kröger   [preprint](#)

6-DoF Grasp Pose Evaluation and Optimization via Transfer Learning from NeRFs   ICRA 2024

Gergely Sóti, *Xi Huang*, Björn Hein   [preprint](#)

Train What You Know: Precise Pick-and-Place with Transporter Networks   ICRA 2023

Gergely Sóti, *Xi Huang*, Björn Hein   [preprint](#)

HIRO: Heuristics Informed Robot Online Path Planning using Pre-computed   IROS 2022
Deterministic Roadmaps   [preprint](#)

Xi Huang, Gergely Sóti, Christoph Ledermann, Björn Hein and Torsten Kröger

Open-source Projects

Real-Time Time-Optimal Trajectory Parameterization   [repository](#)

- A real-time-capable algorithm that can handle a **discrete set of path waypoints** and reliably generate trajectories within hard real-time constraints **less than 1 ms** and hard kinematic constraints regarding joint velocity and acceleration