Linfang Zheng

POSTDOCTORAL FELLOW · THE UNIVERSITY OF HONG KONG

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Profile

"Postdoctoral researcher in computer vision with expertise in pose estimation, depth completion, and real-world 3D scene understanding for robotic and autonomous systems."

Education

Ph.D. in University of Birmingham (UoB)
Birmingham, UK

SCHOOL OF COMPUTER SCIENCE
Jan. 2020 - Dec. 2024

- Thesis title: Visual 6D Object Pose Estimation and Tracking

MSc. in Harbin Institute of Technology (HIT)
Harbin, China

INTEGRATED CIRCUIT ENGINEERING
Sep. 2015 - Jul. 2017

- Dissertation title: Design and Implementation of a High-Precision Multi-Channel Lidar Measurement and Control System
- Outstanding Master's Graduate, Outstanding Master Thesis (Silver Award)

BSc. in Harbin Institute of Technology (HIT)
Harbin, China

ELECTRONIC INFORMATION SCIENCE AND TECHNOLOGY
Sep. 2011 - Jul. 2015

- Direct Admission to Post Graduate School

Employment

The University of Hong Kong (HKU)
Hong Kong, China

POSTDOCTORAL FELLOW
Jan. 2025 - PRESENT

- Leading research projects and mentoring students in robotic manipulation and vision-based perception for robotics.

Southern University of Science and Technology (SUSTech)
Shenzhen, China

RESEARCH ASSISTANT
Mar. 2019 - Jan. 2020

- Assisted in project and research work including embedded software and hardware design, algorithm implementation, and project proposal writing.

DJI Co. Ltd.
Shenzhen, China

EMBEDDED HARDWARE ENGINEER
Jul. 2017 - Mar. 2019

- Worked on embedded hardware design and component evaluation, contributing to cost optimization and supply chain stability.

DJI Co. Ltd. (Internship)
Shenzhen, China

EMBEDDED HARDWARE ENGINEER
Jul. 2016 - Sep. 2016

- Supported Robomasters competition field hardware circuit-related tasks and summer camp activities.

Research Experience

"I study machine learning approaches for 3D vision and robotics, with an emphasis on understanding and interacting with complex environments through geometry-aware perception and scene-level reasoning"

Depth Completion for Transparent and Specular Surfaces
HKU, China

DEPTH COMPLETION · TRANSPARENT OBJECT PERCEPTION · REAL-WORLD ROBOTICS
Dec. 2024 - May 2025

- Co-led the development of a depth completion framework for robotic manipulation, addressing transparent and specular surfaces using affine-invariant priors and vision foundation models (**under review**).
- Submitted to the 2025 Conference on Robot Learning (**CoRL 2025**).

Structured Spatial Understanding for Vision-Language-Guided Robotic Manipulation
HKU, China

ROBOTIC MANIPULATION · SPATIAL UNDERSTANDING · VISION-BASED CONTROL · CROSS-EMBODIMENT · FEW DEMONSTRATION
Dec. 2024 - May 2025

- Leading the development of a modular framework for vision-language-conditioned robotic manipulation, focusing on spatial reasoning and cross-embodiment generalization (**under review**).
- Submitted to the 2025 Conference on Robot Learning (**CoRL 2025**).

Video Generation Guided Robotic Manipulation
ROBOTICS · VISION-BASED CONTROL · MANIPULATION · CROSS-EMBODIMENT

HKU, China

Dec. 2024 - May 2025

- Supervised the development of a closed-loop vision-based manipulation framework combining generative video prediction and task-agnostic pose estimation for scalable robot control (**under review**).
- Submitted to the 2025 Conference on Robot Learning (**CoRL 2025**).

Hand-Object Pose Estimation
COMPUTER VISION · 6D OBJECT POSE · HAND POSE · GENERALIZABILITY · TRANSFORMER

UoB, UK

Dec. 2023 - Aug. 2024

- Co-authored a study introducing superquadric-based representations to improve generalization in hand-object action recognition and object reconstruction.
- Accepted to the Thirty-Ninth AAAI Conference on Artificial Intelligence (AAAI-25) (**AAAI 2025**) (co-author).

Category-level 6D Object Pose Refinement
COMPUTER VISION · 6D OBJECT POSE · CATEGORY-LEVEL · REFINEMENT · GRAPH CONVOLUTION

UoB, UK & SUSTech, China

Mar. 2023 - Mar. 2024

- Tackled the underexplored challenge of geometric discrepancies among category-level objects in 6D pose refinement.
- Proposed a 3D graph convolution-based framework with learnable affine transformations, improving generalization and outperforming baselines using only 4% of training data (+10.5% on $10°2$cm metric).
- Accepted to IEEE/CVF Conference on Computer Vision and Pattern Recognition (**CVPR 2024**) (first author).

Multi-Resolution Planar Region Extraction for Uneven Terrains
ROBOTICS · COMPUTER VISION · SEGMENTATION · PLANE EXTRACTION · LOCOMOTION

SUSTech, China

Nov. 2022 - Sep. 2023

- Collaboratively Introduced a multi-resolution planer region extraction strategy for uneven terrains from point cloud data.
- Contributed to designing deep learning-based plane segmentation.
- Accepted to IEEE International Conference on Robotics and Automation (**ICRA 2024**) (co-author).

Category-level Object Pose Estimation
COMPUTER VISION · 6D OBJECT POSE · CATEGORY-LEVEL · GRAPH CONVOLUTION · BACKBONE · COMPLEX-SHAPED OBJECT

UoB, UK & SUSTech, China

Mar. 2022 - May 2023

- Proposed the HS-layer, a novel 3D graph convolution module for hybrid-scope feature extraction from point clouds, encoding scale and translation while being robust to outliers.
- Integrated HS-layer into a category-level pose estimation framework, achieving strong improvements on complex-shaped objects (+14.5% on $5°2$cm metric).
- Accepted to IEEE/CVF Conference on Computer Vision and Pattern Recognition (**CVPR 2023**) (first author).

3D Joint Gaze Estimation
COMPUTER VISION · 3D JOINT GAZE ESTIMATION

UoB, UK

Jan. 2022 - Apr. 2023

- This research addressed the previously unexplored problem of integrating a depth prior and a 3D joint field-of-view probability map to estimate attention targets in a scene.
- I collaboratively introduced the cutting-edge depth-aware joint attention estimation framework, surpassing current benchmarks.
- Accepted to IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshop (**CVPR Workshop 2023**) (co-author).

Instance-level 6D Object Pose Tracking
COMPUTER VISION · 6D OBJECT POSE · TRACKING · SEVERE OCCLUSION · TEXTURELESS OBJECT · GRU · AUTO-ENCODER

UoB, UK & SUSTech, China

Feb. 2020 - Mar. 2022

- Proposed the first neural network-based prior pose generation method for instance-level 6D object pose tracking, leveraging pose history to improve robustness in challenging scenarios like textureless and occluded objects.
- Developed a real-time, temporally-primed architecture for pose estimation, significantly improving accuracy and robustness on benchmark datasets without sacrificing real-time performance.
- Accepted to IEEE International Conference on Robotics and Automation (**ICRA 2022**) (first author).

Instance-level Object Pose Estimation and Refinement
COMPUTER VISION · 6D OBJECT POSE · ESTIMATION · REFINEMENT · TRANSFORMER

UoB, UK

Aug. 2021 - Mar. 2022

- Collaboratively introduced a Transformer-based network, leveraging global feature correlation to enhance object pose estimation performance.
- Accepted to European Conference on Computer Vision Workshop (**ECCV Workshop 2022**) (co-author).

Optimal Control Inspired Q-Learning for Switched Linear Systems
OPTIMAL CONTROL · REINFORCEMENT LEARNING · Q-LEARNING · SWITCHED LINEAR SYSTEM

SUSTech, China

May 2019 - Dec. 2019

- Collaboratively proposed an algorithm with a carefully designed parametric approximator that respects the analytical structure of the exact Q-function, paired with an associate parameter training algorithm.
- Accepted to American Control Conference (**ACC 2020**) (co-author).

Honors & Awards

2023	**Best Paper Award**, CVPR Workshop on GAZE 2023	*Vancouver, Canada*
2017	**Outstanding Master's Graduate**, Harbin Institute of Technology	*Harbin, China*
2017	**Silver Award for Outstanding Master's Thesis**, Harbin Institute of Technology	*Harbin, China*
2017	**First Prize Scholarship**, Harbin Institute of Technology (2011 - 2017)	*Harbin, China*
2014	**Second Prize**, HIT Technology Innovation and Entrepreneurship Training Program	*Harbin, China*
2014	**Second Prize**, HIT First Physics Academic Competition	*Harbin, China*
2014	**Second Prize Scholarship**, People's Daily (People.cn)	*Harbin, China*

Skills

Programming	Python, C, Matlab, Verilog
Deep Learning	PyTorch, TensorFlow
Hardware Design	Embedded Hardware Design, Integrated Circuit Design, FPGA
Software Design	Embedded Software Design
Languages	English, Mandarin (Mother Language)

Peer-Review Activity

Conference

NuerIPS, CVPR, ECCV, ICCV, ICRA, IROS, CASE, AAAI

Publications

2025 Tze Ho Elden Tse, Runyang Feng, Linfang Zheng, Jiho Park, Yixing Gao, Jihie Kim, Aleš Leonardis, Hyung Jin Chang
Collaborative Learning for 3D Hand-Object Reconstruction and Compositional Action Recognition from Egocentric RGB Videos Using Superquadrics,
*The Thirty-Ninth AAAI Conference on Artificial Intelligence (**AAAI 2025**) February, 2025.*

2024 Linfang Zheng, Tze Ho Elden Tse, Chen Wang, Yinghan Sun, Hua Chen, Aleš Leonardis, Wei Zhang,
GeoReF: Geometric Alignment Across Shape Variation for Category-level Object Pose Refinement,
*IEEE Proc. Computer Vision and Pattern Recognition (**CVPR**), June, 2024.*

2024 Yinghan Sun, Linfang Zheng, Hua Chen, Wei Zhang,
Multi-Resolution Planar Region Extraction for Uneven Terrains,
*IEEE International Conference on Robotics and Automation (**ICRA**), May, 2024*

2023 Linfang Zheng, Chen Wang, Yinghan Sun, Esha Dasgupta, Hua Chen, Aleš Leonardis, Wei Zhang, Hyung Jin Chang,
HS-Pose: Hybrid Scope Feature Extraction for Category-level Object Pose Estimation,
*IEEE Proc. Computer Vision and Pattern Recognition (**CVPR**), June, 2023.*

2023 Nora Horanyi, Linfang Zheng, Eunji Chong, Aleš Leonardis, Hyung Jin Chang
Where Are They Looking in the 3D Space?
*IEEE Proc. Computer Vision and Pattern Recognition Workshop (**CVPR Workshop**), June, 2023. [Best Paper Award]*

2022 Linfang Zheng, Aleš Leonardis, Tze Ho Elden Tse, Nora Horanyi, Wei Zhang, Hua Chen, Hyung Jin Chang,
TP-AE: Temporally Primed 6D Object Pose Tracking with Auto-Encoders,
*IEEE International Conference on Robotics and Automation (**ICRA**), May, 2022*

2022 Zhongqun Zhang, Wei Chen, Linfang Zheng, Aleš Leonardis, Hyung Jin Chang,
Trans6D: Transformer-Based 6D Object Pose Estimation and Refinement,
***ECCV Workshop**, 7th International Workshop on Recovering 6D Object Pose, October, 2022*

2020 Hua Chen, Linfang Zheng, Wei Zhang
Optimal Control Inspired Q-Learning for Switched Linear Systems
*American Control Conference (**ACC**), July, 2020*