CHEN Liheng

EDUCATION

Hong Kong University of Science and Technology   **Aug. 2025 – Jun. 2027(expected)**

Master of Philosophy in Individualized Interdisciplinary Program (Computer Vision and Computer Graphics)

Supervisors: Hongbo Fu & Anyi Rao

Beijing Normal University   **Sep. 2021 – Jun. 2025**

Major: Artificial Intelligence

Core Courses: Calculus (95), Fundamental Physics (90), Linux Operating System (93), Database and Data Principles (91)

Awards: First Prize Scholarship for the Competition, 2024 COMAP MCM F Prize

PUBLICATION

Li-Heng Chen, Zi-Xin Zou, Chang Liu, Tianjiao Jing, Yan-Pei Cao, Shi-Sheng Huang, Hongbo Fu and Hua Huang (2025). *GCRayDiffusion: Pose-Free Surface Reconstruction via Geometric Consistent Ray Diffusion.* Accepted by International Conference on Computer Vision 2025. arXiv: https://arxiv.org/abs/2503.22349

Huang, S., Chen, G., **Chen, L**., & Huang, H. (2024). *NeuralIndicator: Implicit Surface Reconstruction from Neural Indicator Priors.* Proceedings of the 41st International Conference on Machine Learning

PROFESSIONAL EXPERIENCE

Vast.AI   **Aug. 2024 – Present**

Algorithm Researcher Intern, Department of Technology and Engineering

- Developed a 3D reconstruction and camera pose estimation pipeline, using Dinov2 for accurate image feature extraction and 7D ray generation with Plücker coordinates, achieving over 90% accuracy for camera pose estimation on the Objaverse dataset
- Constructed a triplane network with MLP-based geometric feature analysis to generate Signed Distance Functions (SDF)
- Integrated SDF as a conditioning factor for the denoising process, using ray-calculated surface points as query points to significantly enhance the accuracy and fidelity of both 3D object shapes and camera pose estimation

ABB (China)   **Jul. 2024**

Algorithm Engineer Intern, Department of Digital Systems

- Fine-tuned YOLOv8 parameters to develop a surveillance video integration program for detecting indoor population changes, and configured 5 modes to provide air conditioning strategies based on population density
- Developed interfaces and standardized the database format for integration with the company's industrial software Zee600
- Optimized data updates, real-time writing, and data structure for the smart screen system, eliminating 80% of the manual steps and enabling staff to access real-time data from four modules with a single IP address modification

Xiamen Area of China (Fujian) Pilot Free Trade Zone Port Power Supply & Tech. Co., LTD.   **Jan. 2024 – Feb. 2024**

System Engineering Intern, Department of Communications

- Contributed to the usability optimization of the EAM system by resolving attribute conflicts in equipment inventory management and implementing automated equipment model selection, significantly reducing user workload
- Contributed to the blueprint design of the project management system for Harbour Electric. Designed the data structure for project information tables, laying the groundwork for subsequent development
- Engaged in testing projects for the Geographic Information System for the power information in the Harbour region,

optimizing various system functionalities

ACADEMIC EXPERIENCE

Pose-Free 3D Surface Reconstruction   **Aug. 2024 – Mar. 2025**

First Author (under the supervision of Professor Huang Shi-Sheng and Dr. Zi-Xin Zou)

- Developed a pose-free surface reconstruction framework that integrates triplane-based signed distance field (SDF) learning with geometric priors from a novel diffusion model
- Proposed GCRayDiffusion, a geometric consistent ray diffusion model that estimates camera poses by representing them as neural ray bundles and denoising their distributions with 3D geometric constraints
- Incorporated explicit on-surface sampling points from the neural rays into the SDF learning process, enabling simultaneous optimization of camera pose and surface reconstruction
- Conducted extensive experiments on Objaverse, Co3D and Google Scanned Object datasets, demonstrating superior accuracy and generalization over prior methods under sparse view settings

Unsupervised Point Cloud-based 3D Model Reconstruction   **May. 2023 – Apr. 2024**

Research Assistant **(under the supervision of Professor Huang Shisheng)**

- Applied an unsupervised learning model for 3D reconstruction, integrating global shape priors and smooth indicator functions constrained by gradient domains
- Proposed a differentiable generation module to generate differentiable smooth indicator functions from a set of oriented points and developed a joint learning framework named NeuralIndicator
- Conducted extensive evaluations on various public synthetic and real-scan point cloud datasets, demonstrating significant advantages of our approach in surface reconstruction, even for input point clouds with complex topology structures and incompleteness or noise

The Power of Momentum: How to Win the Match with Data (2024 MCM Problem C)   **Feb. 2024**

Team Leader

- Developed a model based on IG-LSTM to measure player momentum, and conducted Correlation Analysis and Stochastic Simulation to assess the impact of momentum swings on match flow
- Utilized an information entropy-based decision tree to extract key features driving momentum swings, and designed an ANN-driven Momentum Swing Prediction Model (MSPM) to forecast match dynamics
- Optimized the model's accuracy and generalizability by incorporating new features, fine-tuning the parameters, and testing it across various tournaments and sports, securing the F prize

Construction of a Speckle Pattern Model with Paddy Field Characteristics   **May 2022 – May 2023**

Research Assistant **(under the supervision of Professor Cai Yongqiang)**

- Utilized OpenCV to perform grayscale conversion, smoothing filtering, and edge enhancement on images, followed by region segmentation and extraction of morphological and textural features
- Extracted object edges using Sobel and Canny algorithms, and enhance effectiveness through subsequent optimization using morphological operations, Hough transform, and other optimizations
- Conducted statistical analysis on image features and boundaries to derive characteristic parameters, and enhanced the conformity between models and actual field shapes by model optimization and reaction-diffusion equation optimization

ADDITIONAL INFORMATION

Languages: Mandarin Chinese (native), English (proficient)

Programming Skills: C/C++, Python, SQL

Hobbies: Piano, Sports (basketball, swimming, cycling, fitness, etc.)