

# Guangzhao (Alex) He

alexhe2000@zju.edu.cn, www.guangzhaohe.com

## Education

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### Zhejiang University

Chu Kochen Honors College

B.Sc. Computer Science and Technology

GPA: 3.99/4.0

Hangzhou, China

Aug. 2021 — Expected Jun. 2025

## Research Experience

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### Category-agnostic Neural Rigging Representation

Jul. 2024 — Present

Research Intern with **Prof. Jiajun Wu** at *Stanford Vision and Learning Lab, Stanford University*

- Proposed a category-agnostic neural rigging representation using embedded anisotropic blobs, which supports interactive pose editing of any object category, trained end-to-end in data-driven manner.
- Developed an architecture that makes feed-forward blobs prediction and re-posed shape reconstruction in an auto-encoding fashion.
- Explored diverse latent representations (vector sets, voxel grids, triplanes) and decoding architectures (Transformer, ViT, U-Net).

### Generalizable Non-rigid 4D Registration via Deformation Graph Estimation

Dec. 2023 — May 2024

Research Assistant with **Prof. Xiaowei Zhou** at *State Key Lab of CAG&CG, Zhejiang University*

- Designed and implemented a fast, accurate, and generalizable architecture for non-rigid point sequence registration, achieving over 5 FPS, 4x faster than previous methods, while doubling accuracy.
- Introduced a novel approach for predicting deformation graphs using a custom spatio-temporal Transformer in a feed-forward manner.
- Enabled arbitrary-long sequential registration with overlapping window technique.
- Improved temporal consistency and accuracy by employing a coarse-to-fine strategy and a two-stage training process.

### Real-Time Novel View Synthesis for Dynamic Scenes

Mar. 2023 — Nov. 2023

Research Assistant with **Prof. Xiaowei Zhou** at *State Key Lab of CAG&CG, Zhejiang University*

- Implemented a novel, differentiable point-based rendering engine (4k4d) that cleverly supports PyTorch differentiation through OpenGL depth peeling, achieving fast rasterization with 80+ FPS under 4k resolution on a single RTX 4090.
- Explored both 3DGS-based and point-based representations with addition of SDF (Signed Distance Function) to improve robustness to initialization and mesh extraction quality.
- Augmented real-time dynamic scene rendering pipeline MLP-Maps with both Nerf-Acc and point-based efficient sampling to achieve 2x improvement in rendering speed without compromising quality.
- Conducted extensive experiments for dynamic novel view synthesis on multiple methods including 4k4d, 3DGS, MLP-Maps, E-NeRF, IBRNet, Tri-plane and HyperReel, and under multiple datasets including NHR, ZJU-MoCap, DNA-Rendering and DyNeRF.

### Universal Framework for Neural Volumetric Video (EasyVolCap)

Mar. 2023 — Jul. 2023

Research Assistant with **Prof. Xiaowei Zhou** at *State Key Lab of CAG&CG, Zhejiang University*

- Proposed a universal framework for neural volumetric video researches, including a powerful configuration system, common network backbones, multiple rendering backends and a streaming visualizer.
- Implemented multiple works based on the framework, including Instant-NGP, D-NeRF, E-NeRF and K-Planes.

### Real-Time Welding Joint Detection with Semantic Segmentation

Jan. 2023 — Feb. 2023

Research Intern with **Prof. Kevin Han** at *Construction Automation and Robotics Lab, NC State University*

- Collected and labeled a high quality welding joint segmentation dataset with 2k images.
- Conducted experiments on 10+ methods with the custom dataset before landing on PIDNet for best balance between performance and efficiency.
- Distilled PIDNet to a smaller model and achieved 680+ FPS segmentation with little-to-none accuracy loss for welding joint detection.

## Publications

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### Category-Agnostic Neural Object Rigging

Guangzhao He, Chen Geng, Shangzhe Wu and Jiajun Wu

*Under Review of CVPR 2025*

## SuperGraph: Generalizable Deformation Graph Estimation for Sequential Non-rigid Registration

Guangzhao He, Yuxi Xiao, Sida Peng, Zhen Xu and Xiaowei Zhou

*Under Review of CVPR 2025*

## 4k4d: Real-time 4d view synthesis at 4k resolution

Zhen Xu, Sida Peng, Haotong Lin, **Guangzhao He**, Jiaming Sun, Yujun Shen, Hujun Bao, and Xiaowei Zhou

*CVPR 2024*

## EasyVolcap: Accelerating Neural Volumetric Video Research

Zhen Xu, Sida Peng, Haotong Lin, Zhen Xu, Tao Xie, Sida Peng, Haotong Lin, Qing Shuai, Zhiyuan Yu, **Guangzhao He**, Jiaming Sun, Hujun Bao, and Xiaowei Zhou

*SIGGRAPH Asia 2023 TC*

## Awards

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**Top 10 Outstanding Students at Chu Kochen Honors College, Zhejiang University** Dec. 2024

Awarded for academic and innovative outstanding, top 0.5%.

**National Student Research Innovation Competition** Oct. 2024

Awarded grand prize to top 2 contestants nation-wide for excellence in research and innovation.

**National Student Research Training Program** Mar. 2023 — May 2024

Funded for research on temporal-consistent video editing models, top 1%.

**Zhejiang Provincial Government Scholarship** Nov. 2022

Awarded for academic and innovative outstanding, top 5%.

**Zhejiang University Scholarship** Oct. 2022, 2023

Awarded for academic and innovative outstanding, top 10%.

**Academic Excellence Award, Zhejiang University** Oct. 2022, 2023, 2024

Awarded for academic outstanding, top 15%.

## Project Experience

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**RV32I CPU.** Designed and implemented a 5-stage pipelined RISC-V CPU with RV32I instruction set support and partial RV32F support, featuring a custom ALU for floating-point operations, using Vivado, Verilog, and FPGA.

**C Compiler for RISC-V64.** Developed a 15k-line C compiler for RISC-V64 platforms, supporting essential C syntax and grammar, with features including lexical and semantic analysis, optimized intermediate representation, and efficient assembly code generation using the maximal munch algorithm and graph coloring.

**Linux for RISC-V64.** Built a Linux-like operating system for RISC-V64 devices using C and RV64 assembly, featuring thread scheduling, virtual memory management, exception handling, and user-mode program execution, integrated with a forking mechanism and compatibility with code generated by the custom C compiler.

**MiniSQL Database Management System.** Created a 20k-line MiniSQL DBMS in C++ with a Buffer Pool Manager using bitmap and LRU policies, a Record Manager with table heap support, and an Index Manager implemented with a B+ Tree structure.

## Skills

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- **Language:** TOEFL 109, GRE 323, IELTS 7.5
- **Programming:** Python, C++, C, Java, MATLAB, Dart, HTML,  $\LaTeX$
- **Research Tools:** PyTorch, NumPy, OpenGL, OpenCV
- **Signed Music Producer:** produced 40+ singles with 2+ million plays