Guangzhao (Alex) He

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Education

Zhejiang University   Hangzhou, China
Chu Kochen Honors College   Aug. 2021 — Expected Jun. 2025
B.Sc. Computer Science and Technology
GPA: 3.99/4.0

Research Experience

Category-agnostic Rigging Representation   Jul. 2024 — Present
*Research Intern with **Prof. Jiajun Wu** at Stanford Vision and Learning Lab, **Stanford University***

- Developed a unified architecture to encode generic objects (e.g., human body, face, animals) into manipulable symbols for motion and deformation modeling without key-point supervision.
- Pioneered an implicit, data-driven approach for object skinning, eliminating artifacts from traditional methods like LBS and DQB.
- Proposed to represent explicit handles as Gaussian symbols.
- Achieved unsupervised identity and pose disentanglement by proposing dual-encoder.
- Enabled identity-preserving pose manipulation by designing model bottleneck while preserving high-frequency details.
- Explored diverse latent representations (vector sets, voxel grids, triplanes) and decoding architectures (Transformer, ViT, StyleGAN).

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

Category-Agnostic Neural Object Rigging
Guangzhao He, Chen Geng, Shangzhe Wu and Jiajun Wu
Under Review, 2024

SuperGraph: Generalizable Deformation Graph Estimation for Sequential Non-rigid Registration
Guangzhao He, Yuxi Xiao, Sida Peng, Zhen Xu and Xiaowei Zhou
Under Review, 2024

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

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

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.

Smart Educational Administration System. Developed and deployed a smart educational administration system with Vue and Flask, featuring course selection, live streaming, real-time chat, and automated grading powered by a locally deployed Vision Language Model for recommendations and content moderation.

Skills

- **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 over 40 singles, and gained over 2 million plays.