Kaihua Chen

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Education

Carnegie Mellon University - School of Computer Science — Pittsburgh, PA
*Master of Science in Computer Vision - GPA: **4.17/4.00*** — *Dec 2024*
Courses: Machine Learning, 3D Vision, Generative Models, Visual Learning, Math for Robotics

China Agricultural University — Beijing, China
*Bachelor of Engineering in Computer Science (Minor: Mathematics) - GPA: **3.90/4.00*** — *Jul 2023*

Research Experience

Carnegie Mellon University — Pittsburgh, PA
Research Associate @Deva's Lab, advised by Prof. Deva Ramanan — *Jan 2024 - Present*
Dynamic Novel View Synthesis from Monocular Video | Paper
- Designed video diffusion model to synthesize dynamic scenes from any novel camera trajectories, by inpainting and deblurring MegaSAM point cloud renders, pretrained and test-time finetuned on self-supervised data

Diffusion Priors for Video Amodal Segmentation | Paper1 | Paper2
- Developed video diffusion model to synthesize wholes of partially or fully occluded objects, enabling user-interactive amodal segmentation and content completion in videos
- Established TAO-Amodal Masks benchmark by evaluating baselines, including fine-tuned amodal segmentors, self-supervised completion algorithms, and ViT regression models

University of Toronto — Toronto, ON, Canada
ML Research Intern @Lin Brain Lab — *Jul 2022 - Oct 2022*
Correlating Human Neural Activity and Behaviors by Machine Learning | Report | Abstract
- Investigated correlations between fMRI brain imaging, EEG signals, natural stimuli, and subjective feelings, employing a spherical convolution-based UNet and LSTM autoencoder pretrained on HCP emotion tasks

China Agricultural University — Beijing, China
Undergraduate Researcher @Department of Computer Science — *Apr 2021 - Mar 2022*
AI-Powered Facial Behavior Analysis | Report | Paper
- Innovated a Graph-Temporal Convolutional Network (GTCN) for real-time drowsiness detection based on facial keypoints recognized by OpenPose, achieving a 2.6% accuracy improvement on YawDD compared with SOTA
- Integrated drowsiness and emotion recognition system on Raspberry Pi, resulting in software copyright and patent

Academic Projects

Zero-shot Monocular Metric Depth Estimation (CMU 16-825 Course Project) | Paper — *Jan 2024 - May 2024*
- Developed a zero-shot adaptation method for MMDE using generative painting and human mesh recovery, achieving strong generalization in unseen scenes

Robust 3D Surface Reconstruction (CMU 16-811 Course Project) | Github | Report — *Oct 2023 – Dec 2023*
- Implemented Poisson Surface Reconstruction in Python, introducing a random adaptive resampling technique to address highly non-uniform point clouds

Intelligent Bitcoin and Gold Trading Strategy (2022 MCM Finalist Award) | Paper — *Feb 2022*
- Devised a trading strategy based on temporal deep learning prediction and greedy Markov decision process, achieving 30x return in simulated trading

IoT System for Greenhouse Environment Monitoring — *Apr 2020 - Mar 2021*
- Constructed an Arduino UNO-based IoT system featuring a PyQt GUI, enabling data collection, wireless transmission, and remote control, and obtained software copyright

Publications

[1] **Kaihua Chen***, Tarasha Khurana*, Deva Ramanan, "Reconstruct, Inpaint, Finetune: Dynamic Novel-view Synthesis from Monocular Videos," in *arXiv*, 2025. Submitted | Link

[2] **Kaihua Chen**, Deva Ramanan, Tarasha Khurana, "Using Diffusion Priors for Video Amodal Segmentation," in *CVPR*, 2025. Published | Link

[3] Cheng-Yen Hsieh, **Kaihua Chen**, Achal Dave, Tarasha Khurana, Deva Ramanan, "TAO-Amodal: A Benchmark for Tracking Any Object Amodally," in *arXiv*, 2024. Submitted | Link

[4] Yizhou Zhao, Hengwei Bian, **Kaihua Chen**, et al., "Metric from Human: Zero-shot Monocular Metric Depth Estimation via Test-time Adaptation," in *NeurIPS*, 2024. Published | Link

Skills

Programming Languages: Python (Proficient); C/C++, Java, MATLAB, SQL (Familiar)
Frameworks and Tools: PyTorch, Diffusers, TensorFlow, Scikit-learn, NumPy, Matplotlib, OpenCV, Open3D, Git
Environments and Platforms: Linux, Windows, Arduino, Raspberry Pi