Xinghao Chen

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Education

University of Washington, M.S. in Electrical & Computer Engineering — Sep 2024 – Jan 2026 (expected)

- GPA: 3.9/4.0
- Relevant coursework: Computer Vision; Large Language Models; Virtual Reality Technologies

Henan University, B.E. in Automation — Sep 2020 – Jun 2024

Publications & Preprints

AirV2X: Unified Air–Ground Vehicle-to-Everything Collaboration. Jun 2025
arXiv:2506.19283, 2025.

- **Context:** Infrastructure-centric V2X is costly and leaves rural/suburban *coverage gaps*. AirV2X explores UAVs as flexible complements/alternatives to RSUs to reduce occlusion and cost.
- **Data:** *AirV2X-Perception* provides 6.73 hours of drone-assisted driving across urban/suburban/rural scenes and diverse weather/lighting, enabling standardized V2D evaluation.
- **Toolkit:** Reproducible scripts, baselines, and configs for UAV-supported perception and air–ground collaboration.
- **My role:** designed challenging scenarios (adverse weather/traffic) and generated part of the data; fixed memory leaks and improved robustness/efficiency; co-built tools and baseline evaluation pipelines.
- Paper: arXiv | Repo: taco-group/AirV2X-Perception

Research Experience

Remote Research Assistant, TACO Group, Texas A&M University — Jan 2025 – Present

- **AirV2X (dataset & tooling):** scenario design (difficult weather/traffic); partial data generation; bug fixes (e.g., memory leaks) for efficiency and robustness; reproducible benchmarking scripts/configs for standardized V2D evaluation; assisted public-release documentation.
- **Video generation for rare driving scenarios:** prototyped a ControlNet pipeline for CogVideo; transitioned to Cosmos Transfer–guided generation using CARLA logs/outputs as conditions; built digital twins of real objects as CARLA assets for fidelity and control.
- **Neural scene reconstruction & view enhancement:** reconstructed driving scenes with 3D Gaussian Splatting; applied image diffusion to iteratively repair/upgrade novel views with incremental retraining; devised an efficient novel-view selection strategy to accelerate improvements on unseen viewpoints.

Research Assistant, Applied Physics Laboratory, University of Washington — Dec 2024 – Jun 2025

- **CoastalSeg (coastal erosion monitoring):** production-style pipeline: ViT-H-14 image-quality filter → DeepLabV3+ semantic segmentation → perspective rectification → temporal change detection.
- Automated data ingestion/validation and stakeholder-facing visualizations; internal mIoU ≈ 0.93 on project-specific splits (documentation available upon request).
- Repo: cxh42/CostalSeg

Ongoing Project

RL-based Image Restoration Agent with Multi-metric NR-IQA Rewards — Sep 2025 – Present

- **Baseline (JarvisIR):** a VLM analyzes degraded images, produces chain-of-thought plans, and invokes expert tools (e.g., denoise → dehaze → deartifact); Stage 1 uses CleanBench-Synthetic for SFT with distilled plans.
- **Our approach (GRPO):** replace MRRHF ranking with policy optimization. For each input, sample multiple plans, execute them, fuse multiple NR-IQA metrics into a scalar reward with cost/risk penalties, and update via group-mean/top-k advantage to maximize $E[\text{quality gain} - \text{cost}]$.
- **Planned innovations:** stochastic weighting of NR-IQA metrics with risk penalties to resist gaming; lower-tail (e.g., 10% quantile) risk-aware objective for worst-case control; toolset evolution without retraining.

Awards & Competitions

Top 3 University of Washington LLM 2025 Semantic Retrieval Competition Feb 2025

Skills

ML/AI: PyTorch; Diffusion/ControlNet; LLM/RAG; RL(PPO/GRPO); CV(segmentation, detection, restoration)
Simulation/3D/XR: Unity; UE Engine; CARLA; 3D Gaussian Splatting
Programming/Tools: Python; C; Java; MATLAB; Git; Docker; FAISS/Pinecone; Gradio/Streamlit

Research Interests

- LLMs & Generative AI: world models; diffusion/video/3D generation; controllable generation
- Agentic Systems & Evaluation: tool-use agents; multi-metric rewards; quality–cost trade-offs
- Computer Vision / 3D: restoration under mixed degradations; 3DGS/NeRF; XR/VR viewers; digital twins