

# Xinghao Chen

Email: xhc42@outlook.com | Phone: 2065359185 | Web Page: cxh42.github.io

## Education

**University of Washington - Seattle | M.S. Electrical & Computer Engineering** (Expected) September 2024 – March 2026

- Related Course: Computer Vision, Large Language Model, AR/VR Development, Web Development

**Henan University | B.E. Computer Engineering (Automation)** September 2020 – June 2024

- Related Course: Data Structure & Algorithms, Linear Algebra, Signal Processing, Embedding System, Linux Development

## Research Experience

**University of Washington Applied Physics Laboratory** December 2024 - Present

### Coastal Erosion Intelligent Monitoring and Early Warning System Development

- Designed and implemented a BEiT-based image classification model to effectively screen user-uploaded coastal images, improving downstream task data quality
- Trained a Visual Transformer-based Feature Pyramid Network utilizing encoder-decoder architecture for multi-scale image segmentation
- Applied perspective correction algorithms to convert coastline images to standardized overhead views, eliminating perspective variations that affect analysis results
- Built a temporal change detection system integrating historical satellite data with ground-collected images for precise quantification and visualization of coastal erosion trends
- Developed community-oriented early warning services and visualization platforms that automatically generate risk assessment reports and protection recommendations based on erosion prediction models

**Texas A&M University TACO Research Group** December 2024 - Present

### Autonomous Driving Rare Scenario Video Generation and Model Robustness Enhancement Research

- Conducting research on generative AI-based synthetic data to address the scarcity of training data for autonomous driving systems in rare scenarios, aiming to enhance model robustness and performance in extreme situations
- Building digital twins or digital relatives of existing large driving datasets in simulators like CARLA and MetaDrive to create precise mappings between real driving data and virtual environments, establishing simulation-to-reality paired video datasets
- Integrating multimodal information sources (depth maps, semantic segmentation maps, bird's-eye views, text descriptions) as generation conditions to enhance the realism and contextual diversity of synthetic videos
- Exploring LoRA and ControlNet applications in stable video diffusion models and investigating composite video generation models for driving scenario synthesis, focusing on generating physically plausible and visually realistic rare driving situation videos with cross-frame semantic consistency

## Competition Experience

**University of Washington LLM 2025 Semantic Retrieval Competition | 2nd Place** February 2025

- Challenge: Retrieve the ten most relevant documents from a corpus based on user query statements, with scores calculated by average precision
- Implementation: Fine-tuned a pre-trained 1.5B parameter sentence transformer model, computing cosine similarity between model-generated embeddings of query statements and corpus documents, ranking the top ten documents in descending order. Outperformed OpenAI's text-embedding-3-large model and all current larger models

## Project Experience

**Stable Diffusion Model-Based Black and White Line Art Colorization Workflow** December 2024

- Developed an end-to-end line art automatic colorization workflow, combining artistic style transfer and detail preservation techniques to provide a creative assistance tool for comic and illustration artists
- Implemented LoRA-based efficient model fine-tuning methods using a small dataset of approximately 20 images to preserve specific character features or image styles
- Designed multiple ControlNet constraint methods, integrating Canny edge detection and OpenPose skeleton guidance to ensure consistency between generated images and the overall contours and limb structures of original line art images

## Personal Skills

**Programming Skills:** Python, C, Java, HTML, JavaScript, PHP, PyTorch, Tensorflow, SQL, MATLAB, Git

**Language Skills:** English (Professional), Chinese (Native)