# HAICHAO (Charles) ZHANG

EDUCATION	
Northeastern University (NEU)	Boston, MA
PhD candidate in Computer Engineering	Sep 2022 - Present
• Advisor: Prof. Yun Raymond Fu (Member of the Academy of Europe; Fellow of NAI, AAAS, AAAI, IEEE, AI	IMBE, OSA, SPIE, IAPR
AAIA)	
• GPA: 3.83/4.0 • Research Assistant at SMILE LAB • Focusing on computer vision and machine learning	
Zhejiang University (ZJU)	Hangzhou, China
Master of Science in Computer Science and Technology	Sep 2018 - Mar 2021
Research Assistant at Media Confrontation Lab	
Tiangong University (TGU)	Tianjin, China
<b>Bachelor of Engineering</b> in <b>Telecommunication Engineering</b>	Sep 2014 - Jul 2018
• Ranking: 1/63 • Student leader in undergraduate electronic design lab • Dean's Scholarship four times.	
RESEARCH INTEREST	
Computer Vision and Artificial Intelligence. Aims to explore the potential of GenAI for AIGC, VLM, and Time-S	Series.
Vision LLM, Video Understanding, Image and Video Generation, Trajectory Prediction, Multimodal Learning, D	Diffusion, Sensor Fusion.
SELECTED WORK EXPERIENCE	
Amazon AWS AI Lab   Applied Scientist Intern   Bellevue, WA	Jun.2024- Aug.202
Mentor: Dr. <u>Shuai Bin</u> , Dr. <u>Xunyu Lin</u>	
Focus Areas: Video Understanding, Vision-Language Models(VLM), Video Large Language Models (vLLMs)	
• Developed an efficient long video understanding model addressing the limitations of LLMs within VLMs for pr	rocessing high-resolution
and long video.	
Tovota   InfoTech Lab   Part-time intern   Mountain View, CA	Feb.2023- Nov.202
Mentor: Dr. Hongsheng Lu & Dr. Takayuki Shimizu	
Focus Areas: Trajectory Prediction, Sensor Fusion, Multimodal Learning, Generative Model.	
• Proposed two novel trajectory prediction method for multimodal learning and sensor modality fusion, utilizing a overcome out-of-sight and severely obstructed problems in trajectory prediction, benefits robotics and autonomic severely obstructed problems in trajectory prediction.	mobile modality to mous driving.
• Solve the out-of-sight trajectory prediction problem by simplifying it into estimating camera2world relationship	, increasing four
common use baselines as plug-and-play module in two datasets in multimodal autonomous driving and roboti-	cs by 5.64% and 31.03%
Tencent (腾讯)   Research Scientist Intern   Shanghai, China   Top-2 IT Company in China	Jul.2020- May.202
Mentor: Dr Gang Yu	
Topic: Image and Video Synthesis, Generative AI	
• Proposing two research on video generation to handle out-of-domain inputs in video generation specifically in	face reenactment/editing
• Bridging the sketch?image into sketch?video while handling the handling drawn sketches by projection and re	trieve from preset featur
data base and predicting smooth long spanning video from initial and end images by bidirectional optical flow	<i>i</i> .
• Contributions were incorporated into the WeChat application enhancing user engagement and experiences	
FIRST-AUTHOR PUBLICATIONS	
OOSTraj: Out-of-Sight Trajectory Prediction With Vision-Positioning Denoising	
Haichao Zhang, Yi Xu, Hongsheng Lu, Takayuki Shimizu, Yun Fu	1 15 1 15 2
Published in IEEE/CVF Computer Vision and Pattern Recognition Conference 2024 (CVPR'24) [project_page][	code [arx1v] [paper]

# Layout Sequence Prediction from Noisy Mobile Modality

Haichao Zhang, Yi Xu, Hongsheng Lu, Takayuki Shimizu, Yun Fu

Published in proceeding of 31st ACM International Conference on Multimedia (ACM MM'23) [project page][arxiv][paper]

#### Token Dynamics: Towards Efficient and Dynamic Video Token Representation for Video Large Language Models

Preprint. [arxiv] Haichao Zhang, Zhuowei Li, Dimitris Metaxas, Yun Fu Camouflaged Image Synthesis Is All You Need to Boost Camouflaged Detection. Preprint. [arxiv] Haichao Zhang, Can Qin, Yu Yin, Yun Fu Sketch Me A Video: Video Creation with Hand-Drawn Sketches. Preprint. [arxiv] Haichao Zhang, Gang Yu, Tao Chen, Guozhong Luo Fine-grained Identity-Preserving Landmark Synthesis for Face Reenactment. Preprint [arxiv] Haichao Zhang, Tao Chen, Gang Yu, Weixi Zhang, Youcheng Ben, Bin Fu. Restore DeepFakes Video Frames via Identifying Individual Motion Styles Haichao Zhang, Zhe-Ming Lu, Hao Luo, Ya-Pei Feng Published in Electronics Letters. [paper]

#### HONORS & AWARDS

•ACM MM Travel Grant Award 2023, ACM SIGMM	
•PhD Network Travel Grant, Northeastern University	
• "TI" Cup National Biomedical Engineering Innovative Design Competition	National First Prize
•Challenge Cup Competition of Science Achievement in China	<b>Provincial Grand Prize</b>
•Microcontroller Application Design Competition, Tianjin (6/453, < 1.3%)	<b>Provincial First Prize</b>
Mobile Application Innovation Contest of Northern China	Northern China First Prize
•Tianjin IOT Innovation and Engineering Application Design Competition	<b>Provincial First Prize</b>
Tianjin Undergraduate Robotics Competition	Provincial First Prize
Northern China Robotics Competition	Northern China Second Prize

#### ACADEMIC SERVICE

#### **Reviewer:**

• Conference: NeurIPS'23, NeurIPS'24, MM'24, ICLR'24, ICCV'25, ICML'25, AISTATS'24, ICCVW'23, CVPRW'24

• Journal: TPAMI, TIP, MTA, TKDD, TIV

#### SKILLS

• Deep Learning Tools: PyTorch, TensorFlow

• Languages& Libraries: Python, C/C++, MATLAB, Verilog, OpenCV, Numpy, Labview

- AI Models: Generative Models, including Video Large Language Models, Diffusion Models, Generative Adversarial Networks (GANs), and Variational Autoencoders (VAE); Transformer models and Neural Radiance Fields (NeRF) for advanced AI applications
- AI Tasks: Image and Video Generation, Trajectory Prediction, Autonomous Driving, Video Understanding, Human-centered Generation

#### **RESEARCH EXPERIENCE**

#### Toyota InfoTech Research Project

**Out-of-sight Pedestrian Trajectory Prediction** 

- Initiated a novel research task focused on predicting the trajectories of out-of-sight objects.
- Developed a vision-positioning denoising model that projects out-of-sight agents into camera frames, enhancing prediction accuracy.

#### Toyota InfoTech Research Project

Vision-Wireless Modality Fusion Trajectory Prediction (Layout Sequence Prediction from Noisy Mobile Modality)

- Broadened the scope of Trajectory Prediction by extending from 2D coordinates to 3D world Layout Sequence representation.
- Formulated a Denoising Diffusion Model (LTrajDiff) capable of predicting trajectories from extremely short or randomly obstructed observations by fusing visual and noisy sensor mobile modalities.

#### Northeastern Univ Research Project

Camouflage Image Synthesis

• Conducted pioneering research highlighting the challenges in camouflage image synthesis.

• Proposed and developed a camouflage generator model to create synthetic camouflage images, subsequently improving the performance of camouflage object detection systems.

Aug 2023-Nov 2023

Aug 2025-Nov 2025

Jan 2023 - Jun 2023

Sep 2022-Dec 2023

# **UCSD** Research Project

Compositional Video Synthesis with Neural Radiance Graphs

- Integrated Neural Radiance Fields (NeRF) into video prediction, pioneering a compositional approach.
- Innovated a method for decomposing the initial frame into NeRF components.
- Developed a Graph Neural Network (GNN) model for predicting the pose and actions of components within a scene.

#### **Tencent Research Project**

Sketch Me A Video: Interactive Video Creation Through Two Rough Hand-Drawn Sketches.

- Introduced an interactive system allowing users to create videos from start and end sketches.
- Proposed a pipeline to abstract input sketches for out-of-domain video creation using feature retrieval and projection.
- Implemented a Variational Autoencoder (VAE) to ensure smooth, natural motion transitions in videos.

# **Tencent Research Project**

Fine-grained Identity-Preserving Landmark Synthesis for Face Reenactment

- · Participated in Tencent face reenactment research
- Identifying artifacts in synthesized guiding landmarks out of distribution, leading to artifacts through identity leaking.
- Proposed a landmark refinement module to mitigate identity leakage and improve video generation fidelity.

# Zhejiang University (ZJU) Research Project

Restore DeepFakes Video Frames by Identifying Individual Motion Styles

- Devised a method to identify DeepFakes by learning individual motion styles, a novel approach at the time.
- Created a technique to restore the original appearance of speakers in DeepFakes videos.

# The Cyberspace Administration of China (CAC) Research Project

Audio and video deep forensic detection analysis prototype system

· Led and developed the "DeepFakes Detection System" by reproducing each class of fake face detection algorithms and generation algorithms in that time. Investigate and reproduce various deepfake detection and generation algorithms.

# Shenzhen Research Institute of Big Data, Chinese University of Hong Kong, Research Project

- 3D contour-based annotation algorithm for medical images
- Developed an algorithm for segmenting medical images by adapting a 2D deep snake model to 3D image data.

Alibaba-ZJU Joint Research Institute of Frontier Technologies Research Project Mar.2018-Nov.2018

- Research on Multimedia Information Hiding Technology of Unstructured Data
- Developed "Shared Memory Based Code Hiding Platform" in C++, a tool for research in data security and information hiding.
- · Developed "Video Watermarking" Algorithm.

# Tiangong University, Tianjin, China

Student Leader of Electronic Design Innovation Lab for Undergraduate Students. (selected projects).

Mainly focused on embedding platforms and robots.

Wheelchair Control System via analysis eye-blinking EMG and EEG for paralyzed patients

- Innovated a method to discern intense eye blink EMG signals within EEG data to navigate wheelchair direction.
- Analyzed EEG patterns to determine the patient's level of tension or relaxation, controlling wheelchair speed accordingly.

Sign language recognition system of wearable bending sensor gloves

- Programmed an embedded microprocessor to process analog signals from bending sensors on gloves.
- Applied an algorithm to interpret sign language, with results displayed on an application interface.

Dec.2020-April.2021

June.2020-Sept.2020

Feb.2019-Dec.2019

Dec.2018-Mar.2020

Mar.2020-June.2020

Oct.2015-Sep.2017