Ziqi Pang

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"Enhance the Knowledge in *Generative Foundation Models* for *Embodied Perception in Long Videos*"

EDUCATION

University of Illinois Urbana-Champaign (UIUC) *September 2021 - Current*
Doctor of Philosophy in Computer Science Advisor: Prof. Yu-Xiong Wang

University of Illinois Urbana-Champaign (UIUC) *September 2021 - May 2024*
Master of Science in Computer Science Advisor: Prof. Yu-Xiong Wang

Peking University (PKU) *September 2016 - June 2020*
Bachelor of Science in Computer Science, Cum Laude GPA: 3.74/4.00, Top 15%

Carnegie Mellon University (CMU) *May 2019 - September 2019*
Summer Research Assistant Advisor: Prof. Martial Hebert

RESEARCH, WORKING, AND INTERNSHIP EXPERIENCE

University of Illinois Urbana-Champaign, Ph.D. Student *September 2021 - Current*
∘ Video Understanding for Embodied Perception.

(1) Language-instructed video segmentation with unified global-local reasoning (GLUS, in submission).
(2) Improved memory bank for long and challenging video segmentation (RMem - CVPR 2024).
(3) First long-term temporal fusion and data flywheel for mapping (MV-Map - ICCV 2023).
(4) Continuous motion prediction mimicking real-world traffic (Streaming Forecasting - IROS 2023).
(5) End-to-end vision-only 3D MOT, 10% errors than previous ones (PF-Track - CVPR 2023).

∘ Generative Models for Multi-modal Understanding.

(1) Causal GPT transformers can model image tokens in random orders (RandAR, in submission).
(2) Aligning generative diffusion denoising for discriminative visual perception (in submission).
(3) Diffusion-based image generation from graph connections (InstructG2I - NeurIPS 2024).
(4) Transformers from LLMs can encode varied visual modalities (LM4VE - ICLR 2024 Spotlight).

NVIDIA, Research Intern *May 2024 - August 2024*
∘ Online HD Map Prediction. For the autonomous driving group at NVIDIA, we conducted research on building scalable generative pre-training for online high-definition (HD) map predictions..

Toyota Research Institute, Research Intern *May 2022 - December 2022*
∘ 3D tracking and motion forecasting from multiple cameras. End-to-end multi-object tracking (MOT) and motion prediction decrease tracking errors (ID-Switches) by more than 90% on nuScenes compared to previous state-of-the-arts (PF-Track - CVPR 2023).

TuSimple, AI Residency for Perception in Self-driving *June 2020 - August 2021*
∘ LiDAR-based 3D perception for autonomous driving. Public projects:
(1) Sparsity-inspired outdoor 3D detection, first transformer-based 3D detector, widely followed baseline since then (SST - CVPR 2022).
(2) A widely used and robust 3D multi-object tracking framework (SimpleTrack - ECCVW 2022).
(3) Data flywheel and object auto-labeling from single-object tracking (LiDAR-SOT - IROS 2021).

PEER-REVIEWED AND IN-SUBMISSION ARTICLES

RandAR: Decoder-only Autoregressive Visual Generation in Random Orders [RandAR]
*Ziqi Pang**, *Tianyuan Zhang*, *Fujun Luan*, *Yunze Man*, *Hao Tan*, *Kai Zhang*, *Willian T. Freeman*, *Yu-Xiong Wang*
In Submission

GLUS: Global-Local Reasoning Unified into A Single Large Language Model for Video Segmentation [GLUS]
*Lang Lin**, *Xueyang Yu**, *Ziqi Pang**, *Yu-Xiong Wang*
In Submission

Aligning Generative Denoising with Discriminative Objectives Unleashes Diffusion for Visual Perception
*Ziqi Pang**, *Xin Xu**, *Yu-Xiong Wang*
In Submission

InstructG2I: Synthesizing Images from Multimodal Attributed Graphs [InstructG2I]
Bowen Jin, *Ziqi Pang*, *Bingjun Guo*, *Yu-Xiong Wang*, *Jiaxuan You*, *Jiawei Han*
NeurIPS 2024

RMem: Restricted Memory Banks Improve Video Object Segmentation [RMem]
*Junbao Zhou**, *Ziqi Pang**, *Yu-Xiong Wang*
CVPR 2024

Frozen Transformers in Language Models Are Effective Visual Encoder Layers [LM4VE]
Ziqi Pang, *Ziyang Xie**, *Yunze Man**, *Yu-Xiong Wang*
ICLR 2024 (Spotlight)

MV-Map: Offboard HD-Map Generation with Multi-view Consistency [MV-Map]
*Ziyang Xie**, *Ziqi Pang**, *Yu-Xiong Wang*
ICCV 2023

Streaming Motion Forecasting for Autonomous Driving [Streaming Forecasting]
Ziqi Pang, Deva Ramanan, Mengtian Li, Yu-Xiong Wang
IROS 2023

Standing Between Past and Future: Spatio-Temporal Modeling for Multi-Camera 3D Multi-Object Tracking [PF-Track]
Ziqi Pang, Jie Li, Pavel Tokmakov, Dian Chen, Sergey Zagoruyko, Yu-Xiong Wang
CVPR 2023

Embracing Single Stride 3D Object Detector with Sparse Transformer [SST]
Lue Fan, Ziqi Pang, Tianyuan Zhang, Yu-Xiong Wang, Hang Zhao, Feng Wang, Naiyan Wang, Zhaoxiang Zhang
CVPR 2022

SimpleTrack: Understanding and Rethinking 3D Multi-object Tracking [SimpleTrack]
Ziqi Pang, Zhichao Li, Naiyan Wang
ECCV Workshop 2022, Patented 2023

Model-free Vehicle Tracking and State Estimation in Point Cloud Sequences [LiDAR-SOT]
Ziqi Pang, Zhichao Li, Naiyan Wang
IROS 2021

PREPRINTS

Unlocking the Full Potential of Small Data with Diverse Supervision [SmallData]
*Ziqi Pang**, *Zhiyuan Hu**, *Pavel Tokmakov, Yu-Xiong Wang, Martial Hebert*
Arxiv Preprint 2021

Immortal Tracker: Tracklet Never Dies [ImmortalTracker]
Qitai Wang, Yuntao Chen, Ziqi Pang, Naiyan Wang, Zhaoxiang Zhang
Arxiv Preprint 2021

PATENTS

Multiple target tracking method and apparatus, calculating device and storage medium
Ziqi Pang, Zhichao Li, Naiyan Wang
US Patent App. 17/816,239, 2023

SERVICES

Teaching Assistants for **CS 446 (Machine Learning)** and **CS 445 (Computational Photography)** at University of Illinois Urbana-Champaign (UIUC), and **ICS (Introduction to Computer System)** at Peking University (PKU).

Reviewer for CVPR, ICCV, ECCV, NeurIPS, ICLR, ICML, RA-L, ICRA, IROS.

AWARDS AND SCHOLARSHIPS

Outstanding Graduate at Peking University *June 2020*

Peking University Scholarship at Peking University (Top 10%) *September 2018*

Kwuang-hua Scholarship at Peking University (Top 5%) *September 2017*