Wuao Liu

+86-17326090984 wuaoliu52@gmail.com https://github.com/Wuao652

EDUCATION

University of Massachusetts Amherst — Amherst, MA
Ph.D. in Computer Science, advised by Prof. Grant Van Horn — Aug. 2024 – Apr. 2029 (Expected)

University of Michigan, Ann Arbor — Ann Arbor, MI
M.S. in Robotics, advised by Prof. Jason Corso — Aug. 2021 – Apr. 2023

Zhejiang University (ZJU) — Hangzhou, China
B.Eng in Automation — Sept. 2017 – Jun. 2021

RESEARCH INTERESTS

Audio and Video Understanding; Large Language Models (LLMs); Machine Learning Applications on Robotics, Biodiversity and Conservation Problems.

EMPLOYMENT

Research Associate I at University of Michigan — Ann Arbor, MI
Host: Prof. Jason Corso — Jul. 2023 – Apr. 2024

Machine Learning Engineer Intern at Tencent AI Lab — Shenzhen, China
Host: Dr. Peilin Zhao, Prof. Mingyang Sun — Jul. 2021 – Aug. 2021

PUBLICATIONS

1. **Liu, W.**, Li, Y., Qian, S., McConachie, D., Burchfiel, B., Corso, J. (2024). Enhancing Robotic Task Awareness through Progress Detection. Under Review for IROS.
2. Bellos, F., Li, Y., **Liu, W.**, Corso, J. (2024). Can Large Language Models Reason about Goal-Oriented Tasks? In Proceedings of the EACL 2024, Workshop on the Scaling Behavior of Large Language Models.
3. Sun, M., Zhao, P., **Liu, W.** (2021). A Charging Scheduling Method, System, Equipment and Storage Medium. Chinese Patent CN202111203690.7.

RESEARCH EXPERIENCE

Learning Representations from Text and Visual Data in Augmented Reality — Ann Arbor, MI
Student Researcher | Advisor: Prof. Jason Corso — Sept. 2022 – Apr. 2024

- Developed an augmented reality (AR) assistant on a Microsoft HoloLens2 headset to guide users in performing complex, sequential tasks.
- Created an egocentric video dataset centered on human cooking activities, collected 242 videos following five distinct recipes, and annotated the videos with bounding boxes and temporal action boundaries.
- Implemented an object detection pipeline utilizing Faster-RCNN, achieving a mean Average Precision (mAP) of 93.696 on detecting 9 kitchen objects.
- Developed an advanced automatic speech recognition (ASR) pipeline based on OpenAI Whisper, enhancing user interaction and system accessibility.
- Pioneered research in zero-shot cooking step recognition by integrating LLMs such as GPT3.5-Turbo and LLaVa, pushing the boundaries of conventional methods.

Evaluation of LLMs on Goal-Oriented Tasks — Ann Arbor, MI
Summer Intern | Advisor: Prof. Jason Corso — May. 2023 – Aug. 2023

- Conducted a comprehensive study on the capabilities of LLMs, including GPT-3.5-Turbo, GPT-4, and LLaMa-2-13b, in understanding sequential actions and their ultimate goal.
- Designed prompt strategies such as zero-shot, few-shot, and two-stage hierarchical prompting. Proposed metrics to evaluate the accuracy of stepwise transition and task viability.
- Adapted instructional video datasets for evaluation by permuting the order of actions and conducted user study using MTurk.

Neural Radiance Field (NeRF) for Autonomous Driving Ann Arbor, MI

Summer Intern | Advisor: Prof. Katherine Skinner May. 2022 – Aug. 2022

- Developed an open-source tool to collect RGB-D images in the CARLA simulator and visualize the corresponding camera poses for NeRF model training.
- Implemented a scene-specific NeRF and achieved a PSNR of 28.29 dB for novel view synthesis in urban autonomous driving scenarios.
- Gained hands-on experience with multi-camera calibration using the Kalibr toolbox and worked with various types of cameras, such as monochrome, event, RGB-D, and thermal cameras.

HONORS

- CS Ph.D. Fellowship of University of Massachusetts Amherst 2024
- Outstanding Graduate Student (Top 1%), Zhejiang University 2021
- Outstanding Undergraduate Thesis (4 / 152), Zhejiang University 2021
- The ZJU-Chunzhen International Exchange Program Scholarship ($5,000) 2020
- Second-Class Scholarship for Academic Excellence (Top 10%), Zhejiang University 2019
- Zhejiang Province Government Scholarship (Top 3%) 2018

SKILLS

- **Programming Languages**: Python, C++, C, MATLAB, LaTeX, SQL
- **Tools**: Linux, ROS, LCM, ZeroMQ, Git, Docker, Gazebo
- **Packages**: PyTorch, NumPy, OpenCV, CVXPY, PyBullet, GTSAM