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Xinhao Xiang

Research Interests

- **Computer Vision**
  3D Object Detection, Point Cloud Perception, Segmentation.
- **AI Robotics**
  Swarm Intelligence, Path Planning.

Education

2021-Present **University of California, Davis**,
M.S. (obtained) and Ph.D. (started from 2022) in Computer Science
Advisor: Dr. Jiawei Zhang.

2017-2021 **Southern University of Science and Technology (SUSTech)**,
B.E. in Computer Science and Technology
Thesis: Collaborative Multitarget Searching of Robotic Swarms Based on PF and BSO Algorithm.

Skills Summary

- **ML ops level**: CUDA programming, C++, C • **Open Datasets**: KITTI, Waymo Open, COCO
- **ML framework level**: Pytorch, MMEngine, Tensorflow, Bitsandbytes
- **ML application level**: MMDetection(3d), Detectron2, OpenPCDet, Lingvo, Carla, Webots
- **Env**: Bazel, Linux, Shells, Docker, Google Clouds, Jupyter, GPU management
- **Robotics**: Raspberry Pi, E-Puck, TutleBot • **Others**: SQL, Java, MATLAB, Node.JS, Scikit-learn

Research Experience

Sum 23 - now **Graduate Student Researcher**, *(Mentor: Dr. Jiawei Zhang)* *UC Davis*
Exploring efficient optimization strategies in general training and fine-tuning framework for various Computer Vision tasks.

Spr 23 - Sum 23 **Graduate Student Researcher**, *(Mentor: Dr. Jiawei Zhang)* *UC Davis*
Structured 3D Object Detection as a denoising diffusion process from noisy 3D boxes to target boxes. Our novel feature align strategy contributes to robust LiDAR-Camera fusion, demonstrating our model's great adaptability in various detecting circumstances. The research paper is under review.

2022 **Graduate Student Researcher**, *(Mentor: Dr. Jiawei Zhang)* *UC Davis*
Proposed a hierarchical architecture by extending ViT models to embed both Images and Point Clouds, fused via a mixViT for efficient 3D Object Detection. The research paper is under review.

Fall 19 - Sum 21 **Undergrad Student Researcher**, *(Mentors: Dr. Yuhui Shi, Dr. Jian Yang)* *SUSTech*
Proposed three strategies of collaborative motion and multi-target searching for swarm intelligent robots under decentralized topology architecture with limited sense of perception and info-communication ability; We established the simulation playground in MATLAB and Webots, and a real experiment platform using E-Puck and TurtleBot. Two research papers and a thesis are published.

Sum 20 - Fall 20 **UCInspire Research Intern**, *(Mentors: Dr. Fadi J. Kurdahi, Dr. Minjun Seo)* *UC Irvine*
Employed the Carla simulator to perform real-time vehicle driving simulation. Collected and extracted various sensors' data. Proposed a new strategy to detect outlier situations for this settings.

Sum 19 **EUR Research Program**, *(Mentor: Dr. Saleem M. Yamani)* *UC Irvine*
Built a SMART sensor Car Kit (PiCar-S) using the Raspberry Pi to design better movement strategies for obstacle avoidance, line following, and light following. The car won the 3rd in the final.

Publication

[1] **Xinhao Xiang**, Jiawei Zhang, "FusionViT: Hierarchical 3D Object Detection via Lidar and Camera Vision Transformer Fusion", *under review in ICLR'24*

[2] **Xinhao Xiang**, Simon Dräger, Jiawei Zhang, "3DifFusionDet: Diffusion Model for 3D Object Detection with Robust LiDAR-Camera Fusion", *under review in AAAI'24*

[3] Jian Yang[1], Donghui Zhao[1], **Xinhao Xiang**[1], and Yuhui Shi, "Robotic Brain Storm Optimization: A Multi-target Collaborative Searching Paradigm for Swarm Robotics", Advances in Swarm Intelligence, *ICSI'21*, Lecture Notes in Computer Science, vol. 12690, Springer, Cham.

[4] Jian Yang[1], Ruilin Xiong[1], **Xinhao Xiang**[1], and Yuhui Shi, "Exploration Enhanced RPSO for Collaborative Multitarget Searching of Robotic Swarms", *Complexity*, vol. 2020, 2020.