Yifei Liu

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EDUCATION

Carnegie Mellon University Aug. 2023 - June. 2025
- Master of Science in Robotics. GPA: 4.25/4.0 Pittsburgh, PA

University of California, Irvine Sep. 2019 - Mar. 2023
- Bachelor of Science in Computer Science. Specialization in Intelligent Systems. GPA: 3.93/4.0 Irvine, CA

EXPERIENCES

CMU Robotics Institute AirLab | Graduate Researcher Aug. 2023 - Present
- Develop depth estimation module for online mapping and 3D reconstruction for situational awareness with UAV and UGV in visually-degraded environments; leverage HPC for training and accelerate models on Jetson Orin using TensorRT
- Build a full ML pipeline for outdoor metric depth dataset, including calibration, LiDAR-SLAM, sensor fusion, filtering
- Lead a team and design cross-calibration methods for RGB, thermal, LiDAR to enhance fusion and mapping

NASA Jet Propulsion Laboratory | Robotics Perception Intern May 2024 - Aug. 2024
- Developed a multi-modal long range perception module for autonomous navigation in off-road terrains using depth foundation model, LiDAR fusion, and dynamic satellite maps; integrated into ROS workspace
- Trained and fine-tuned deep neural networks (DNNs) for real-time depth and semantic segmentation

UCI Intelligent Dynamics Lab | Undergraduate Researcher Oct. 2021 - May 2023
- Achieved zero-shot visual sim-to-real transfer for autonomous navigation, using cGAN and U-Net for semantic segmentation and Reinforcement Learning for control; deployed on edge device (Jetson Nano based vehicle)
- Created a customizable Unreal Engine 5 simulation for effective domain randomization; evaluated sim-to-real techniques

USC Energy Efficient Secure Sustainable Computing Group | Amazon Research Fellow May. 2022 - Oct.2022
- Rendered realistic simulation in Unreal Engine 4 and developed an automatic synthetic dataset generation pipeline for UAV-based ember detection in wildfires; enabled zero-shot detection of embers in real wildfire scenarios
- Implemented and trained object detection models (Faster R-CNN, RetinaNet, DETR, Yolov7) to track tiny embers
- Built Readytosky S500 drone and calibrated system of Vicon motion capture cameras
- Published and administered HITS on Amazon Mechanical Turk to label real-world data for model evaluation

UCI Center for Artificial Intelligence in Diagnostic Medicine | Research Personnel Mar. 2022 - Jun. 2022
- Preprocessed and augmented cancer histopathology images, implemented deep learning models (ResNet, VGG, DenseNet, etc.) for multi-class classification of tumor patches with 95% accuracy
- Designed variations of UNet for precise segmentation of blood vessels in brain CT slides

PROJECTS

Image Translation for Off-road Driving Data Augmentation March 2024 - May 2024
- Implemented unpaired translation between off-road environments (e.g. desert, forest) using a text-to-image one-step diffusion model and cycle-consistency loss (CycleGAN-Turbo)
- Developed segmentation constraints to preserve terrain structure for accurate data augmentation

Advanced Image Processing and Object Detection Jan. 2022 - Mar. 2022
- Built a camera view extension tool by blending and forming homography mosaic from multiple images
- Developed an object detector using gradient orientation histograms and template learning

PUBLICATIONS

D. Dhrafani*, **Y. Liu*,** A. Jong, U. Shin, Y. He, T. Harp, Y. Hu, J. Oh, S. Scherer. "FIReStereo: Forest InfraRed Stereo Dataset for UAS Depth Perception in Visual-Degraded Environments," under review for Robotics and Automation Letters (RAL), 2024.

Y. Hu, X. Ye, **Y. Liu**, S. Kundu, G. Datta, S. Mutnuri, N. Asavisanu, N. Ayanian, K. Psounis, P. Beerel. "FireFly: A Synthetic Dataset for Ember Detection in Wildfire," in *International Conference on Computer Vision (ICCV)*, 2023.

LEADERSHIP

Artificial Intelligence at UCI | President Jun. 2022 - Mar. 2023
- Led workshops on AI/ML techniques, guiding 60+ participants in applying deep learning to real-world tasks
- Organize external AI events to foster connections between students, professors, and industry professionals
- Managed long-term student project teams, guiding them in building AI-based solutions; maintained communication with 1500+ club members through newsletter

SKILLS & INFORMATION

- **Programming Languages:** Python, C++, HTML/CSS, JavaScript
- **Frameworks/Tools:** PyTorch, TensorFlow, TensorRT, OpenCV, Sklearn, ROS, Docker, HPC (SLURM), Unreal Engine
- **Work Authorization:** U.S. Citizen