Yifei Liu

(818) 414-1460 | yifeilkx@gmail.com | https://migoyliu.github.io

EDUCATION

Carnegie Mellon University Aug. 2023 - Oct. 2025
- Master of Science in Robotics. GPA: 4.19/4.0 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
- Developed learning-based stereo depth estimation, visual mapping and odometry modules for UGV and UAV navigation.
- Enabled full offroad nighttime autonomy by designing cross-modal calibration for accurate fusion of RGB, thermal, IMU, LiDAR and leveraging visual foundation models and inverse reinforcement learning for robust traversability estimation.
- Built cross-modality and cross-environment synthesis pipelines using conditional diffusion models and text-to-image diffusion models for generative data augmentation and downstream model generalization.
- Designed and benchmarked long range navigation pipelines incorporating automated query mark generation, VLM spatial reasoning, and chain-of-thoughts prompting to enable generalizable embodied AI in outdoor environments.

NASA Jet Propulsion Laboratory | Robotics Perception Intern May 2025 - Aug. 2025
- Analyzed deployed stereo vision performance on Mars rovers (Curiosity, Perseverance) using curated datasets from the entire M2020 mission, identifying key degradation factors in featureless terrains and challenging illumination.
- Implemented and benchmarked learning-based 3D vision methods (efficiency-oriented CNNs, transformers, foundation models), analyzing accuracy-efficiency trade-offs and proposing feasible flight solutions for Mars surface mobility.

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, integrating depth foundation model, LiDAR fusion, and dynamic satellite maps into the ROS autonomy stack.
- Trained and fine-tuned deep neural networks for real-time depth estimation 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/U-Net segmentation and reinforcement learning; deployed on Jetson Nano-based edge platform.
- 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.
- Published and managed HITS on Amazon Mechanical Turk for labeling real-world data to evaluate model performance.

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 and trained customized UNet for precise segmentation of blood vessels in brain CT slides.

PUBLICATIONS

S. Bansal, W. Wang, **Y. Liu**, P. Maheshwari. ThermalDiffusion: Visual-to-Thermal Image-to-Image Translation for Autonomous Navigation, in *International Conference on Robotics and Automation (ICRA) TIRO*, 2025.

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," in *Robotics and Automation Letters (RAL)*, 2025.

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) AI+HADR*, 2023.

LEADERSHIP

Artificial Intelligence at UCI | President Jun. 2022 - Mar. 2023
- Led AI/ML workshops for 60+ participants, teaching deep learning applications to solve real-world tasks.
- Organize external AI events to foster connections between students, faculty, and industry professionals.
- Managed multiple long-term student project teams, guiding them in building AI-based solutions and maintained communication with 1.5k+ club members via newsletters.

SKILLS & INFORMATION

- **Frameworks/Tools:** PyTorch, ROS, TensorRT, OpenCV, Sklearn, Docker, HPC (Slurm), Unreal Engine.
- **Programming Languages:** Python, C++, HTML/CSS, JavaScript. **Languages**: English, Mandarin, Thai, Korean.