Zixia Xia

Ph.D. Student, University of California, Irvine

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Objective

My research focuses on improving the reliability of embodied AI systems by building structured world representations. I work on integrating geometry, uncertainty, and multi-sensor information to support tasks such as navigation, SLAM, and 3D reconstruction. My experience includes BEV-based perception, multi-sensor fusion(e.g., cameras, lidars, radars), reinforcement learning and vision-language-action models, with prior work in depth estimation and image restoration.

Technical Skills

Programming	Python, C++, MATLAB, SQL, Java
Frameworks	JAX, PyTorch, TensorFlow, MMCV, TensorRT, CUDA
Methodologies	Reinforcement Learning, LoRA/Fine-tuning, Distillation
Tools	ROS2, Carla, AirSim, Kubernetes, Docker, HuggingFace, Slurm

Education

2023 – 2028 (expected) **Ph.D. in Networked Systems**, *University of California, Irvine*, Irvine, USA
Advisor: Prof. Marco Levorato GPA: 3.96/4.0

2020 – 2023 **M.S. in Computer Science and Technology**, *Tianjin University*, Tianjin, China
Advisor: Prof. Gang Pan
Research: Image Denoising, Depth Estimation, and Camera Model
LuKaining Professor Scholarship (Rank 1/255)

2016 – 2020 **B.S. in Software Engineering**, *Tianjin University*, Tianjin, China

Publications

[1] **Zixia Xia**, Marco Levorato. "RiskGuard: A Trajectroy Revision Method Based on Unified Differentiable Risk Fields for VLA." IROS 2026. (under review)

[2] Gang Pan, Zhijie Sui, **Zixia Xia**, Chao Kang, and Di Sun*. "DGNv2: A DWT-Guided Frequency-Spatial Dual-Domain Dehazing Network for Sewer Inspection Images." *Computer-Aided Civil and Infrastructure Engineering (CACAIE)*, 2026. (under review)

[3] **Zixia Xia**, Marco Levorato. "SmartFusion-SLAM: From Passive Fusion to Temporal Uncertainty-Aware Sensor Adaptation in BEV SLAM." *Proceedings of the IEEE/ACM International Conference on Cyber-Physical Systems (ICCPS)*, 2026.

[4] Gang Pan, Chen Wang, Zhijie Sui, Shuai Guo, Yaozhi Lv, Honglie Li, Di Sun, and **Zixia Xia***. "Sewer Image Super-Resolution with Depth Priors and Its Lightweight Network." *Computer-Aided Civil and Infrastructure Engineering (CACAIE)*, 2025.

[5] Tim K. Johnsen, **Zixia Xia**, Ian A. Harshbarger, Marco Levorato. "NaviSplit: Dynamic Multi-Branch Split DNNs for Efficient Distributed Autonomous Navigation." *IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM)*, 2024.

[6] **Zixia Xia**, Shuai Guo, Di Sun, Yaozhi Lv, Honglie Li, Gang Pan. "Structure-Aware Dehazing of Sewer Inspection Images Based on Monocular Depth Cues." *Computer-Aided Civil and Infrastructure Engineering (CACAIE)*, 2023.

Industry Experience

2025.06–2025.09 **Machine Learning Engineer Intern**, *KLA Corporation*, Milpitas, USA

Tech Stack: Super-Resolution, Model Fine-Tuning, Synthetic Data Generation

- Developed a physics-based synthetic data generation pipeline simulating optical distortions, effectively expanding the training dataset for corner-case scenarios.
- Fine-tuned RCAN models using transfer learning techniques, improving geometric reconstruction robustness by 18% under suboptimal tilt conditions.
- Built automated data tooling pipelines to unblock scalable experimentation and model evaluation.

2023.03–2023.08 **Research Intern**, *Qcraft Inc.*, Beijing, China / Santa Clara, USA

Tech Stack: Multi-GPU Training, Multi-Sensor Perception, Weighted Loss

- Tackled long-tail detection challenges by enhancing CenterNet with adaptive heatmaps and weighted loss functions, boosting rare-class recall and overall mAP by 3.1%.
- Implemented data-driven improvements by jointly training detection and segmentation models, leveraging semi-automated labeling to handle large-scale unlabeled data based on Segment Anything.
- Engineered a high-precision LiDAR-Camera fusion module for depth estimation, integrating it into the production perception system (AbsRel less than 0.07).

2022.06–2022.09 **Software Engineer Intern**, *Microsoft Corporation*, Suzhou, China

Tech Stack: Active Directory, Cloud Infrastructure, PowerShell

- Designed and implemented PowerShell cmdlets to repair service instance errors during tenant relocation, improving reliability of large-scale directory services.
- Built a size-aware AD handler optimizing forest selection and balancing relocation workloads across clusters.

2019.05–2019.07 **Research Intern**, *China Automotive Technology and Research Center*, Tianjin, China

Tech Stack: Embedded Deep Learning, Jetson TX2, Real-Time Detection

- Deployed a lightweight YOLO-V3 with Fire modules on Jetson TX2, achieving real-time traffic sign detection in embedded environments.
- Reduced model parameters by 32% while maintaining comparable accuracy to full-scale architectures.

Selected Projects

2024 – 2025 **SmartFusion-SLAM: From Passive Fusion to Temporal Uncertainty-Aware Sensor Adaptation in BEV SLAM**, *UC Irvine*, Irvine, CA

Tech Stack: Reinforcement Learning (RL), BEV Perception, Sensor Fusion

- Developed a Reinforcement Learning-based fusion framework that dynamically re-weights sensor inputs (LiDAR/Camera/Radar) based on real-time uncertainty states.
- Designed a novel reward function penalizing high-uncertainty poses, enabling the system to autonomously adapt to long-tail weather scenarios and improving trajectory accuracy by 27%.

2023 – 2024 **NaviSplit: DRL-Based Split Computing for Distributed Navigation**, *UC Irvine*, Irvine, CA

Tech Stack: Deep Reinforcement Learning (DRL), Dynamic Multi-Branch DNN, Knowledge Distillation

- Designed a dynamic multi-branch DNN architecture allowing flexible partition points between edge (UAV) and cloud, jointly optimized via knowledge distillation to preserve feature fidelity.
- Engineered a Deep RL policy to adaptively select the optimal split branch based on real-time network constraints, balancing on-device compute load against transmission latency.
- Achieved effective UAV navigation, reducing data transmission by 95% (1.2–18 KB) while maintaining $>$72% depth estimation accuracy.

2022 – 2023 **DWT-Guided Sewer Image Dehazing (Master's Thesis)**, *Tianjin University*, Tianjin, China

Tech Stack: Discrete Wavelet Transform, Contrastive Learning

- Introduced DWT-guided residual blocks and contrastive regularization to enhance convergence and structural detail.
- Achieved PSNR 27.43, SSIM 0.9154outperforming state-of-the-art sewer restoration benchmarks.

2021 – 2022 **Structure-Aware Dehazing Based on Monocular Depth Cues**, *Tianjin University*, Tianjin, China

Tech Stack: Camera Physics Model, Depth Estimation, Coordinate Attention, Joint Learning

- Designed SANL-Net integrating semantic and spatial attention for structure-preserving dehazing.
- Achieved PSNR 27.28, SSIM 0.8963 with a compact 15.47M-parameter network.