Xiao Li

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Education

University of Florida *Aug 2021 - Dec 2025*
Ph.D. Student of Computer Science, GPA: 3.8/4.0 *(expected)*
- Advisor: Prof. Sanjay Ranka and Prof. Anand Rangarajan

Sun Yat-Sen University *Aug 2018 - Jun 2020*
Master of Electronics and Communication Engineering, GPA: 3.9/4.0

Sun Yat-Sen University *Aug 2014 - Jun 2018*
Bachelor of Communication Engineering, GPA: 3.7/4.0

Skills

- **Language and Tools:** Python, C/C++, Matlab, Git, Pytorch, OpenCV, Open3D, Hugging Face
- **Expertise:** Vision Language Models, Diffusion Models, Spatiotemporal Modeling, Transformer Models, Data Compression, Point Cloud Processing, Unsupervised Learning, Smart Transportation, Pose Estimation

Selected Research Projects

Vision-Language Model for Fine-grained Image Understanding *Jan 2025 - Present*
- Building a vision-language dataset for visual navigation, incorporating diverse environments and task-specific instructions to improve generalization.
- Applied LoRA to the BLIP-2 vision-language model, fine-tuning it for vision-navigation-based query answering, enabling efficient adaptation to new tasks.
- Designed a benchmarking framework to evaluate the model's performance in fine-grained vision-language understanding, especially for spatial reasoning and navigation.

Foundation Models (FMs) for Scientific Applications *Jun 2022 - Present*
- Advancing FMs with temporally consistent latent diffusion for efficient data generation and reduction.
- Developed FMs for compressing spatiotemporal scientific data across diverse domains (e.g., climate, turbulence), achieving up to $3\times$ higher compression ratio compared to state-of-the-art (SOTA) methods.
- Applied transformer architectures, variational autoencoders, and hybrid methods to address the challenge of capturing spatiotemporal correlations for efficient data reduction, leading to 5 authored research papers.

Machine Learning for Smart Traffic Analysis and Management *Oct 2021 - Jun 2022*
- Built LiDAR point cloud dataset for traffic intersection and label data with semi-supervised method.
- Enhanced semi-supervised labeling tools by integrating multi-object tracking, achieving up to $4\times$ faster annotation while improving data labeling accuracy.
- Proposed a spatiotemporal correspondence approach for unsupervised semantic segmentation for LiDAR point cloud.

Gesture, Gaze, and Pose Estimation for Human-Computer Interaction *Sept 2019– Jul 2021*
- Built labeled datasets, including hand keypoints (1M hand images), gaze, and head pose, using synchronized multi-view cameras for keypoints and pose estimation.
- Developed and deployed real-time, lightweight neural networks for hand keypoint detection, hand mesh reconstruction, gaze, and head pose estimation on resource-constrained platforms.
- Enabled the application of hand-computer interaction models in an VR device and the adoption of gaze and head pose models for autism diagnosis in hospitals.

Selected Publications

Under Review and In Preparation:

- 2025   **X. Li**, B. Gandhi, M. Zhan, M. Nehra, Bonnie J. Dorr. *Visual Navigator: Leveraging Vision-Language Models for Spatial Reasoning and Navigational Query Answering.* (In Preparation 50% completed).

- 2025   **X. Li**, Liangji Zhu, A. Rangarajan, S. Ranka. *Bridging Generation and Compression: Latent Diffusion for Efficient Spatiotemporal Data Reconstruction.* (Submitted to Super Computing Conference).

- 2025   J. Lee, **X. Li**, A. Rangarajan, S. Ranka. *Guaranteed Conditional Diffusion: 3D Block-based Models for Scientific Data Compression.* (Submitted to ECML PKDD).

Published Papers:

- 2025   **X. Li**, J. Lee, A. Rangarajan, S. Ranka. *Foundation Model for Lossy Compression of Spatiotemporal Scientific Data.* Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD).

- 2025   **X. Li**, J. Lee, A. Rangarajan, S. Ranka. *Machine Learning Techniques for Data Reduction of Climate Applications.* Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD).

- 2024   **X. Li**, J. Lee, A. Rangarajan, S. Ranka. *Attention Based Machine Learning Methods for Data Reduction with Guaranteed Error Bounds.* IEEE International Conference on Big Data (BigData).

- 2023   **X. Li**, Q. Gong, J. Lee, S. Klasky, A. Rangarajan, S. Ranka. *Hybrid Approaches for Data Reduction of Spatiotemporal Scientific Applications.* Data Compression Conference (DCC).

- 2023   **X. Li**, P. He, A. Wu, S. Ranka, and A. Rangarajan. *A Spatiotemporal Correspondence Approach to Unsupervised LiDAR Segmentation with Traffic Applications.* IEEE 26th International Conference on Intelligent Transportation Systems (ITSC).

- 2023   A. Wu, P. He, **X. Li**, K. Chen, S. Ranka, A. Rangarajan. *An Efficient Semi-Automated Scheme for LiDAR Annotation and A Benchmark Infrastructure Dataset.* ML4IoT Workshop at International Conference on Learning Representations (ICLR).

- 2022   **X. Li**, D. Zhang, M. Li, and D. J. Lee. *Accurate Head Pose Estimation Using Image Rectification and Lightweight Convolutional Neural Network.* IEEE Transactions on Multimedia (TMM).