

Obblivignes KanchanadeviVenkataraman

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EDUCATION

North Carolina State University	
Doctorate of Philosophy in Computer Science	August 2025 - Expected May 2029 GPA: N/A
Master of Science in Computer Science	August 2023 - May 2025 GPA: 3.97/4
Bachelor of Science in Computer Engineering	August 2020 - May 2023 GPA: 4.00/4

SKILLS

Languages & Tools | Python, MATLAB, C, C++, Java, LaTeX, Git, Bash, SLURM
Libraries & Frameworks | PyTorch, Scikit-Learn, Pandas, Plotly, Numpy, Matplotlib, Keras, Scipy, Electron JS, React.JS
Machine Learning | **Classical** (Classification, Clustering, Tree-based methods), **Deep** (UNet, Diffusion, LiteLLM, GPT)
Data Science | Data Preprocessing, Data Visualization, Statistical Analysis, Monte Carlo Simulations, Predictive Modeling

WORK EXPERIENCE

Graduate Teaching Assistant - Automated Learning & Data Analysis NC State University	January 2026 - Present
<ul style="list-style-type: none">Held office hours for 60 students to understand material, complete assignments, and build a real-world machine learning project.Managed grading for all student coursework, including assignments, quizzes, and exams.	
Graduate Teaching Assistant - Software Engineering NC State University	August 2025 - December 2025
<ul style="list-style-type: none">Mentored 60 students in two lab sections collaborate to complete assignments, and build a full-stack development application.Held office hours to help students with questions or concerns they have regarding course material and project issues.	
CV/ML Graduate Research Assistant (GRA) NC State University - MAP Lab & GIS Lab	September 2024 - Present
<ul style="list-style-type: none">Built end-to-end data pipelines for super-resolution microscopy using Python (NumPy, Pandas, Scikit-learn), applying clustering, classification, and regression to extract actionable biological insights.Generated 500k+ physics-informed Monte Carlo simulations, boosting model accuracy by 25% and training efficiency by 40% with feature engineering and custom normalization.Developed and fine-tuned deep learning models (PyTorch: U-Net, Attention U-Net, Conditional Diffusion), doubling image quality in super-resolution denoising, and up to 50% better denoising performance compared to baseline models.Improved model generalization by 50% from baselines through hyper-parameter tuning, cross-validation, and statistical evaluationPartnered with cross-functional teams to integrate AI/ML workflows into biology and materials science research, accelerating experimentation and interdisciplinary innovation.	
Software Engineering AI GRA NC State University - Dr. Bowen Xu's Lab [Link]	January 2024 - May 2024
<ul style="list-style-type: none">Presented, trained, and evaluated the performance of an existing deep just-in-time SE code-comment consistency checker technique among existing datasets such as Microsoft's CodeXGlue.Integrated the tool into SEEDGuard GitHub repository, providing video-guided tutorials and Docker images for easy deployment.	
Distributed Systems RA NC State University - Dr. Ruozhou Yu's Lab [Link]	January 2023 - August 2023
<ul style="list-style-type: none">Conducted microservice-based distributed application benchmarking by implementing a comprehensive Kubernetes cluster, utilizing Raspberry Pis, an Apache Cassandra database, Flask, Jaeger, and Opentelemetry.Trained several machine learning models and achieved a 96% R2-score using Random Forest modelsPresented all findings using data visualization techniques in a comprehensive report.	

PROJECTS

Computer Vision (Applying SpecUNet and SA-SpecUNet Towards Spatial SMLM)	August 2025 - Present
<ul style="list-style-type: none">Applied SpecU-Net to generate 100k+ Gaussian- and Perlin-based Monte Carlo single-molecule spatial simulationsTrained SpecU-Net to achieve significant improvements in super-resolution denoising performance compared to existing tools	
Multi-AI Agent System (SIMBA: Single-molecule Imaging with Multi-agent Bot Assistant)	June 2025 - Present
<ul style="list-style-type: none">Led a multi-agent desktop app to perform spectroscopic analyses, image denoising, single-molecule localization, and other tasksUtilized Electron JS and React JS for front-end integration and utilized GPT-4o and LiteLLM for backend integrationSignificantly improved scientific analysis workflow by seamlessly integrating microscopy tasks (denoising, localization, analysis)	
Computer Vision (Applying SpecDiffuse for Accurate Spectroscopic SMLM)	May 2025 - Present
<ul style="list-style-type: none">Adapted conditional diffusion, physics-informed model with U-Net backbone on SR denoising for spectroscopic analysisOutperformed conventional U-Net (SpecU-Net) and SA-SpecU-Net by 25%+ on several metrics for super-resolution denoisingEnabled accurate biological analysis by simulating 400k+ 16-bit images (~25GB) for robust GPU-based training and inference	
Computer Vision (Applying SA-SpecU-Net for Accurate Spectroscopic SMLM)	November 2024 - Present
<ul style="list-style-type: none">Integrated spatial attention component into SpecU-Net to capture specific latent representations for better contextual understandingOutperformed conventional U-Net (SpecU-Net) by ~25% on several metrics in image quality for super-resolution denoisingEnabled accurate biological analysis by simulating 400k+ 16-bit images (~25GB) for robust GPU-based training and inference	
Computer Vision (Framework for Accurate SMLM Spectroscopic Analysis) [Link]	September 2024 - December 2024
<ul style="list-style-type: none">Improved image resolution by ~70% from conventional denoising methods by developing a U-Net-based model in MATLAB (SpecU-Net) to denoise spectroscopic single-molecule localization imagesIncreased prediction precision by ~70% and accuracy by ~50% through generating 100k+ physics-informed Monte Carlo simulation datasets and creating comprehensive evaluation metricsMigrated SpecU-Net pipeline from MATLAB to Python using PyTorch, achieving 5x GPU acceleration on training and inference	

PUBLICATIONS

- Mao, H., Liu, Y., **KanchanadeviVenkataraman O.**, Shahid, M. A., Laplante C., Xu, D., Song, K., Zhang, Y. (2025). Framework for Accurate Single-Molecule Spectroscopic Imaging Analyses Using Monte Carlo Simulation and Deep Learning. Analytical Chemistry, 97(30), 16250-16258.