

Obblivignes KanchanadeviVenkataraman

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EDUCATION

North Carolina State University	August 2025 - Expected May 2029
Doctorate of Philosophy in Computer Science	GPA: 4.00/4
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, JavaScript, TypeScript, 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

CV/ML Graduate Research Assistant (GRA) NC State University - MAP & GIS Lab [Link]	September 2024 - Present
<ul style="list-style-type: none">Designed end-to-end pipelines for super-resolution microscopy, integrating AI/ML workflows into biological and microscopy research to accelerate experimental innovation.Generated 500k+ physics-informed Monte Carlo simulations, boosting model accuracy by 25% and training efficiency by 40% with feature engineering and custom normalization.Migrated legacy MATLAB analysis tools to a high-performance PyTorch/Python version, achieving a 5x acceleration in training and inference speeds for real-time biological analysis.Improved model generalization by 50% across diverse datasets through various deep learning architectures (spatial attention, conditional diffusion), advanced statistical evaluation, and rigorous hyper-parameter tuning.Research funded by several NC State grants, including the NC State University Dean’s COE Applied AI Research Accelerator Award and NC State Comparative Medical Institute Ideation Award.	
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 collaborating across two lab sections 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.	
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

Multi-AI Agent System (SIMBA: Single-molecule Imaging with Multi-agent Bot Assistant)	August 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 (Advanced Deep Learning Framework for Spectroscopic SMLM)	January 2025 - Present
<ul style="list-style-type: none">Implemented advanced model complexity, evolving from baseline Spec-U-Net to SA-SpecU-Net using spatial attention for contextual feature extractionFurther enhanced model architecture by deploying a conditional diffusion (DDPM) model SpecDiffuse to iteratively maximize denoising and reconstruction fidelitySignificantly improved simulated and experimental image resolution by ~25% and ~50% from existing U-Net-based implementations with SA-SpecU-Net and SpecDiffuse models, respectivelyTransformed entire pipeline from MATLAB to Python (Monte Carlo Data Simulations, model training, model inference) for significantly greater efficiency and 5x acceleration speeds	
Computer Vision (Framework for Accurate SMLM Spectroscopic Analysis) [Link]	September 2024 - July 2025
<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 metrics.	

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.