Vivaan Singhvi

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EDUCATION

University of Michigan | Ann Arbor, MI   August 2024 – May 2026
- Bachelor of Science in Engineering (Computer Science), 4.0/4.0 GPA
- Relevant Coursework: Foundations of LLMs, Machine Learning, Applied Parallel Programming with GPUs, Operating Systems, Computer Graphics and Generative Models (planned)
- **Peer Advisor** for Michigan Research and Discovery Scholars, **Instructional Aide** for EECS 482: Introduction to Operating Systems, member of the software team of Michigan RoboSub

SELECT EXPERIENCE

Research Intern | Oak Ridge National Laboratory   May 2025 – August 2025
- Researched dozens of 3D reconstruction algorithms, including variations on NeRFs and Gaussian Splatting, running tests and benchmarks to measure accuracy, efficiency, usability, and applicability
- Built an automated mesh processing pipeline using 2D Gaussian Splatting, PyMeshLab, and neural mesh parameterization, creating 3D meshes with over 5 million vertices from images of an object
- Created an attack algorithm in PyTorch against YOLO object detection models using automatically generated 3D models, achieving a 75% misdetection rate for physically printed adversarial stickers

Undergraduate Research Assistant | University of Michigan   Sept. 2024 – May 2025
- Applied algorithm design and optimization techniques to phylogenetic reconstruction for digital evolution, achieving over a 100-fold speedup and significantly better asymptotic complexity
- Rigorously benchmarked the algorithm, quantifying performance and ensuring fair comparisons
- Published and presented a paper on the work at the ALIFE 2025 conference in Kyoto, Japan

Research Intern | Oak Ridge National Laboratory   June 2024 – July 2024
- Applied knowledge of signal processing and deep learning to create an adversarial image detector, able to detect basic adversarial images against computer vision models with over 99% accuracy
- Prototyped a novel digital attack completely invisible to the human eye, robust to transformation
- Presented work in front of about 30 people in a 5-minute lightning talk format

SELECT PROJECTS

CUDA CNN Optimization | Course: Applied GPU Programming | CUDA, C++   2025
- Created a novel 2D convolution algorithm and implemented it in CUDA using Tensor Cores and other GPU features, beating the previous class record's performance by 25%

LLM Dictionary Learning | Course: Foundations of LLMs | Python, PyTorch   2025
- Trained and evaluated transformers augmented with a sparse autoencoder layer under varying objectives
- Evaluated tradeoffs between dictionary sparsity, dataset complexity, and reconstructed model accuracy

Bluetooth Wearable Mouse | Self-Guided | C, nRF5 SDK   Present
- Programmed bare-metal firmware utilizing the nRF5 BLE stack to make a low-latency bluetooth mouse
- Utilized 4 gyroscopes from BMI270 and LSM6DS-family IMUs to support a dozen unique gestures
- Integrating deep learning algorithms on-chip for real-time air-writing recognition

SKILLS

Programming Languages: Python, C, C++, CUDA, JavaScript/TypeScript, HTML/CSS, SQL
Tools: PyTorch, Tensorflow, OpenCV, Scikit-Learn, NumPy, Pandas, Git/Github, Unix, Vim