Vedant Singh

+1 (551) 388-5929 | vhsingh@andrew.cmu.edu | GitHub | LinkedIn

PROFESSIONAL SUMMARY

A dedicated Machine Learning and AI Engineer with previous experience in Generative AI, Physics Informed Deep Learning, and generating 3D models using ML techniques. Skilled in programming, AI architectures, and real-time data analysis, seeking to drive technological advancements in Data Science and AI roles.

EDUCATION

Carnegie Mellon University, Pittsburgh, United States *Aug,2023-May, 2025*

Masters of Science in Mechanical Engineering - Machine Learning and Artificial Intelligence [**GPA: 4.0/4.0**]

Relevant Coursework: Introduction to Deep Learning, Generative AI, Design of AI Products, LLM and its Applications

Mumbai University, Mumbai, India *Aug 2019 - June 2023*

Bachelors in Technology in Mechanical Engineering - Minor in Data Science [**CGPA: 3.8/4.0**]

Relevant Coursework: Introduction to Machine Learning, Big Data Analytics, Machine Vision, Neural Network

SKILLS

Programming	Python, MATLAB, Julia, C#, C++ (OpenGL), Hadoop, Spark, NoSQL, Linux, R, Java
AI Architecture	Convolution Neural Network, Physics Informed Graph Neural Network, Diffusion Models
Technology Tools	AWS, GCP, Azure, Weights and Biases, Docker, Git, Flutter, Agile, Hugging Face, CUDA, Django
Frameworks	TensorFlow, Sci-kit Learn, PyTorch, XGBoost, NumPy, Pandas, Keras, PyCharm, LangChain

PROFESSIONAL EXPERIENCE

Simple Origin | *Founding Machine Learning Intern* *May. 2024 – Aug-2024*

- Developed and implemented a data pipeline for classifying atomic structures from TEM images, reducing material characterization time by 30x and streamlining the company's process
- Applied NMF to PCA-denoised data, achieving an R2 score of 0.86 for enhanced data-driven decision-making
- Trained VGG-Net CNN with an F1 score of 0.92 and improved accuracy by 15% using ensemble learning
- Presented the pipeline to the founder, CTO, and global leadership, significantly shaping material sourcing and investment strategies across the organization

SunInfra Energies | *AI Intern* *May 2022 – Dec 2022*

- Developed a solar power prediction framework using Support Vector Machines, Random Forest, and Gradient Boosting
- Implemented four-fold cross-validation techniques to train and improve performance, achieving a 99% AUC score
- Deployed the model for real-time solar power generation forecasting for improved energy management

RWTH Aachen University(Germany) | *Visiting ML Researcher* *Jan 2022 – April 2022*

- Advanced mathematical foundations of ML by researching convergence theories for stochastic gradient descent algorithms
- Analyzed optimization techniques, including robust, parametric, and gradient descent methods for compressive sensing
- Applied linear algebra, multivariate calculus, and Bayesian methods in developing machine learning models

Larsen & Toubro (Defense) | *Automation Intern* *July 2021 – Sep 2021*

- Led the development of a real-time object detection and tracking algorithm, achieving a tracking accuracy of 94%
- Fine-tuned YOLOv7 with a confidence threshold of 0.85 and an IOU threshold of 0.5, using non-maximum suppression
- Integrated DeepSort to assign unique object IDs and calculate relative positions with a 0.1-meter margin of error

RESEARCH PROJECTS

Solving PDE for Irregular Geometry using Fourier Neural Operator | *Graduate Researcher* *June 2024 – Present*

- Developed a framework, for efficient mapping of irregular geometries to regular computational domains for solving PDEs
- Integrated Fourier Neural Operators with adaptive mesh techniques for 105x faster performance on complex geometries
- Demonstrated flexibility with input formats and high-dimensional simulations in elasticity, plasticity and fluid dynamics

Predicting Structural Properties Using Knowledge Transfer Networks | *Research Assistant* *Aug 2023 – Aug 2024*

- Achieved 90% accuracy in predicting properties of novel DNA Origami structures using Knowledge Transfer Networks
- Reduced the reliance on labeled data by 30% through the application of Zero-Shot Learning for property prediction
- Classified the structures with a 0.87 F1-score, ensuring high precision and recall for complex designs

Enhancing Diffusion Models with Physics Constraints | *Deep Learning Student Researcher* *May 2024 – Sep-2024*

- Integrated physical constraints into denoising diffusion models improving sample adherence to governing equation by 20%
- Applied advanced algorithms to enhance model performance, boosting sample generation accuracy by 15%
- Developed datasets that incorporate underlying physical principles, reducing deviations in generated samples by 25%