

Sarvesh Rathod

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EDUCATION

Vishwakarma Institute of Technology

Bachelor of Technology (B.Tech) in Computer Engineering

Pune, Maharashtra, India

Aug. 2024 – May 2028

RESEARCH EXPERIENCE

Scientific Machine Learning Research – Gravitational Lensing Analysis

Jan. 2026 – Present

Independent Research – ML4SCI DeepLense Evaluation Work

- * Implemented deep learning pipelines for the analysis of strong gravitational lensing images as part of the ML4Sci DeepLense GSoC evaluation task.
- * Developed a modified ResNet-18 classification model for the detection of dark matter substructures in simulated lensing datasets, which achieved 98% validation accuracy and ROC-AUC of 0.99.
- * Built a super-resolution reconstruction pipeline using the EDSR architecture to upscale astronomical images ($75 \times 75 \rightarrow 150 \times 150$), achieving PSNR 41.75 dB and SSIM 0.976.
- * Implemented a Physics-Informed Neural Network (PINN) incorporating gravitational lensing equations and Poisson constraints for physically interpretable predictions.
- * Pretrained a Vision Transformer Masked Autoencoder (MAE) for self-supervised representation learning on astrophysical datasets and fine-tuned it for substructure classification.
- * Designed modular PyTorch training pipelines with mixed-precision GPU training and experiment tracking for large-scale experiments.

PROJECTS

DeepLense Scientific ML Pipeline | *PyTorch, Vision Transformers, Scientific ML* [[Code](#)]

Jan. 2026 – Present

- Implemented a modified ResNet-18 model for strong gravitational lensing classification, achieving 98% validation accuracy and ROC-AUC of 0.99 on simulated astrophysical datasets
- Developed an Enhanced Deep Super-Resolution (EDSR) model to reconstruct high-resolution Einstein ring structures ($75 \times 75 \rightarrow 150 \times 150$) achieving PSNR 41.75 dB and SSIM 0.976
- Built a Vision Transformer Masked Autoencoder (MAE) for self-supervised representation learning on lensing data and fine-tuned it for dark matter substructure classification

Pulse-Mind | *Python, Machine Learning, Flask, React, SQLite, Docker, C++* [[Code](#)]

Oct. 2025 – Present

- Developed a real-time ML pipeline for cardiac rhythm analysis using PPG signals, integrating DSP preprocessing, feature extraction, and supervised learning inference
- Implemented a Random Forest classifier for rhythm classification with quantitative validation under fault and stress scenarios
- Designed a deterministic control engine enabling robust ML-driven decision making with latency-aware performance

Deforestation Analysis using SVM | *Python, Scikit-learn* [[Code](#)]

June 2025 – July 2025

- Developed an SVM regression model with RBF kernel to analyze global deforestation trends using environmental datasets
- Applied preprocessing, PCA-based dimensionality reduction, and hyperparameter tuning via GridSearchCV with 5-fold cross-validation

TECHNICAL SKILLS

Programming: Python, C/C++, SQL

Machine Learning: Scikit-learn, Supervised & Unsupervised Learning, Representation Learning, Model Evaluation, Cross-Validation, Hyperparameter Tuning

Deep Learning: PyTorch, CNN, ResNet, Vision Transformers (ViT), Masked Autoencoders (MAE), Transfer Learning, Super-Resolution, Physics-Informed Neural Networks (PINNs)

Scientific Computing: NumPy, Pandas, Matplotlib, Statistical Analysis

Tools & Systems: Git, Docker, Linux, REST APIs, SQLite, MQTT

Mathematics: Linear Algebra, Probability & Statistics, Multivariable Calculus