# Vishal Purohit

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## Research Interests

Generative models for 2D and 3D data, video understanding, representation learning, and multi-agent generative systems.

## Education

**Purdue University** — Aug 2021 - Dec 2026
Ph.D. in Electrical and Computer Engineering — West Lafayette, USA
Advisor: Qiang Qiu

**KLS Gogte Institute of Technology** — Aug 2014 - May 2018
B.Eng. in Electronics and Communication — Karnataka, India

## Research Experience

**Research Assistant, Visual Learning Lab, Purdue University** — Aug 2021 - Present
Advisor: Qiang Qiu — IN, USA

- Working on inverse problems in 2D and 3D domains, leveraging flow and diffusion priors to synthesize diverse and high-quality samples [C1] [C2] [C3].

**Research Intern, AMD - Artificial Intelligence Group** — May 2024 - Aug 2024
Manager: Dr. Zicheng Liu — WA, USA

- Worked on scaling discrete diffusion language models and ported Gaussian Splatting from CUDA C++ to HIP C++ for AMD GPUs.

**Research Assistant, Google x Purdue** — Jan 2023 - Dec 2023
Mentors: Prof. James Davis & Dr. Abdullah Rashwan (Google, USA) — IN, USA

- Contributed to open-source efforts for research on reproducibility of universal segmentation models, integrating them into TensorFlow Model Garden and ensuring robust implementation and performance [Code][R3].

**Research Intern, Indian Institute of Technology (IIT), Varanasi** — Oct 2020 - Aug 2021
Mentor: Prof. Sanjay Kumar Singh — Varanasi, India

- Tackled classification challenges with long-tailed data distributions in the medical domain and developed federated learning frameworks to enable secure and efficient training on distributed medical datasets [J1] [J2] [J3].

## Publications

(* - equal contribution)

[C3] Decomposed Generative Imaging
**Vishal Purohit**, Ze Wang, Qiang Qiu. IEEE Conference on Computer Vision and Pattern Recognition **(CVPR) (Under review)**, 2025.

[C2] Posterior Sampling via Langevin Dynamics Based on Generative Priors
**Vishal Purohit***, Matthew Repasky*, Jianfeng Lu, Qiang Qiu, Yao Xie, Xiuyuan Cheng. IEEE Conference on Computer Vision and Pattern Recognition **(CVPR) (Under review)**, 2025.

[C1] Generative Quanta Color Imaging
**Vishal Purohit**, Junjie Luo, Yiheng Chi, Qi Guo, Stanley H. Chan, Qiang Qiu. IEEE Conference on Computer Vision and Pattern Recognition **(CVPR)**, 2024.

[J3] A Label Efficient Semi Self-Supervised Learning Framework for IoT Devices in Industrial Process
Vandana Bharti, Abhinav Kumar, **Vishal Purohit**, Amit Kumar Singh, Sanjay Kumar Singh. IEEE Transactions on Industrial Informatics, 2024.

[J2] MediSecFed: Private and Secure Medical Image Classification in the Presence of Malicious Clients
Abhinav Kumar*,**Vishal Purohit***, Vandana Bharti, Rishav Singh, Sanjay Kumar Singh. IEEE Transactions on Industrial Informatics, 2021.

[J1] MetaMed: Few-Shot Medical Image Classification using Gradient-Based Meta-Learning
Rishav Singh, Vandana Bharti, **Vishal Purohit**, Amit Kumar Singh, Sanjay Kumar Singh. Pattern Recognition, Elsevier, 2021.

## Work Experience

**MobiQuest Solutions** June 2020 - Oct 2020
Machine Learning Software Engineer Remote

- Led the deployment of object detection models using TensorFlow JS and developed a web application for real-time monitoring.

**Tata Elxsi** Sep 2018 - May 2020
Machine Learning Engineer Pune, India

- Responsible for development, deployment, and model validation of object detection models, Faster RCNN for bacteria colony enumeration. Optimized inference pipeline of vision model time by 0.5 seconds and reduced memory footprint of the model by 30% using techniques like quantization on the Nvidia Jetson platform.
- Designed & shipped scalable and production-quality algorithms for optical system calibration with improvement in performance by 50% for MTF calculation, chromatic aberration detection, and spatial distortion. Successfully shipped multiple image processing algorithms in C++. Led development of customer-facing desktop application for predictive model validation, deployment, implementation, and support for continuous training and model updates. Solely responsible for increasing project revenue by $100k.

## Technical Skills

**Languages**: C/C++, Python, JS.
**Libraries / Frameworks**: PyTorch, TensorFlow, Jax, Scikit-Learn, Hugging Face, CUDA.
**Relevent Coursework**: Linear Algebra, Optimization for Deep Learning, Deep Learning, Computer Vision, Advanced Topics in Reasoning with LLM, Machine Learning Theory, Artificial Intelligence, Computational Optimal Transport and Generative Models.

## Technical Reports

[R4] Decomposed Prompt Synthesis for Large Language Models - **Vishal Purohit**, 2024.
[R3] A Partial Replication of MaskFormer in TensorFlow on TPUs for the TensorFlow Model Garden - **Vishal Purohit**, Wenxin Jiang, Akshath R. Raghav, James C. Davis, arXiv, 2024.
[R2] Counterfactual Outcome Prediction using Structured State Space Model - **Vishal Purohit**, arXiv, 2023.
[R1] Ortho-ODE: Enhancing Adverserial Robustness of Neural ODEs - **Vishal Purohit**, arXiv, 2023.

## Awards

- Research assistantship - 2023, awarded from Google, USA for research on reproducibility in vision models.
- Research assistantship - 2022, awarded from HP, USA.
- Outstanding graduate mentor - Purdue University, 2022.
- Share with the world award - Purdue University, 2022.
- *Teaching assistantship - 2021 - 2022*, awarded from College of Engineering, Purdue University, USA.

## Professional Responsibilities

- **Review Service:** ICME 2023, ICML 2023/24, NeurIPS 2023/24, ICLR 2024/25, CVPR 2025.