# Kapil Wanaskar

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## Research Publications

**Multimodal Benchmarking and Recommendation of Text-to-Image Generation Models,** *IEEE BigDataService* May 2025

- Evaluated 12+ (text-to-image) models (Stable Diffusion, CogView, FLUX, etc.) with ground truth from DeepFashion Multimodal dataset for alignment
- Designed Weighted Score metric combining CLIP-Score, LPIPS, FID, MRR& Recall@3 via min–max normalization
- Integrated metadata features and CLIP embeddings to align generated with ground truth image and prompt context
- Metadata-augmented models (Flux, InContext LoRA) showed ~19% higher Weighted Score & ~15 point FID reduction

**Evaluating Nano Vision-Language Models' Robustness Against Adversarial Attacks,** *in progress* Jul 2025

- Designed a modular framework to benchmark 3B/4-bit VLMs (e.g., Qwen2.5-VL) under transfer and black-box attacks (PGD, CW, Pixel, SimBA), measuring performance degradation across 15+ adversarial methods
- Built quantized inference pipeline and evaluation suite (VQA accuracy, SSIM-aware constraints); found CW-L∞ and Pixel attacks degrade accuracy by up to 52.94%, while GeoDA surprisingly improved performance (+5.88%)

**Prompt Recommendations for AI art,** *IEEE AIKE, California, USA* Sep 2023

- Extracted features of 5000 images via text embeddings and ensemble models
- Proposed Graph-based evaluation of 3 recommendation Algorithms and Community Detection Algorithms, via analyzing absence of ratings or preference scores

**Surveillance Drone Cloud and Intelligence Service,** Jul 2023
*IEEE (MobileCloud), Greece*

- Proposed a surveillance drone cloud for efficient utilization of cloud computing and real-time data sharing

**Detection of Cyber Security Threats using IOT Deep Learning** Oct 2021

- Suggested TensorFlow deep neural system to classify stolen programming with source code literary theft

**Real World Use of Deep Learning Models for Cyber Security in IoT Network** Sep 2021

- Presented Deep reinforcement learning models for cyber security in IoT (Internet of Things) networks

**Analyzing Effect of Workpiece Stiffness Variation on the Stability in Flank Milling of an Impeller Blade** Feb 2017

- Scrutinized FFT (fast-fourier-transform) plots, chatter boundary plots, and stability region diagrams

## Work Experience

**Amazon Web Services (AWS),** *LLM Optimization / Applied ML* May 2024 – present | Cupertino, CA, USA

- Enabled MoE (DBRX, Mistral) with stability-aware expert routing; improved LLM training efficiency by 18%
- Built eval pipelines for MoE variants (dropless/dropping, DPO); reducing convergence errors by 30%
- Optimized PyTorch-based NxD parallelism for MiXtral-style LLMs, enabling 12% faster training
- Developed activation/gradient drift tools (CPU vs. TRN); flagged 95% silent regressions

**Intuitive Surgical,** *Software (Machine Learning) Engineer* May 2023 – May 2024 | Sunnyvale, CA, USA

- Developed FastAPI-based ML inference pipeline with VectorDB to detect 98% precision "Unknown" attacks
- Supervised fine-tuned (SFT) Llama via PEFT (LoRA) on few-shot human-labeled feedback
- Post-trained embedding encoders and re-indexed FAISS via Online Reinforcement Learning (RL) for similarity updates, improving security by 13%
- Fine-tuned 130,000+ unsupervised models on 150+ GB data using SageMaker + MLflow; achieved 92% precision and 99.9% accurate training inputs

**Vectorr.in,** *Software Engineer* Mar 2018 – Jul 2022 | Mumbai, India

- Clustered 10k+ (daily) visits stored in Snowflake database, surging customer satisfaction from 3.1 to 4.8.
- Integrated Apache Kafka and Superset to segment real-time audience data for digital marketing while training Unsupervised models on AWS EC2, amplifying ROI by 23%.
- Deployed Docker via CI/CD for automating deployment, achieving a 43% reduction in data overhead.

## Education

**MS in Artificial Intelligence, Computer Engineering,** CA, USA
*San José State University*

**Master of Computer Integrated Manufacturing and Bachelor of Engineering,** *Indian Institute of Technology (IIT) Bombay* Mumbai, India