Varesh Patel

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SUMMARY

M.S. Computer Science candidate at Rutgers (May 2027) focused on machine learning engineering and applied AI, with hands-on experience in computer vision, wearable-sensor modeling, LLM representation editing, diffusion language modeling, and production-oriented AI systems.

EDUCATION

Rutgers University, New Brunswick, NJ — Sep 2025 – May 2027
M.S. in Computer Science | GPA: 3.98/4.00

G.H. Patel College of Engineering and Technology, Gujarat, India — Sep 2021 – Apr 2025
B.Tech in Computer Science and Design | CGPA: 8.3/10

EXPERIENCE

Impruvon Health — Remote — Summer 2026
AI & Software Development Intern
- Built and maintained a Python/FastMCP integration exposing 9 typed tools for operational and transformed HL7 queries, connecting authenticated REST APIs and normalized vendor responses for LLM-driven analysis.
- Implemented multi-location analytics across orders, dispenses, patient records, and clinical data with inclusion/exclusion logic, pagination, bounded responses, and typed API-contract snapshots.
- Automated pull-request demos with Claude Code and Playwright, generating browser recordings and validated narrated walkthroughs directly from code changes.

Foundation for Ecological Security — Anand, India — Jan 2025 – May 2025
Artificial Intelligence Intern
- Built a two-stage bird detection and classification pipeline using YOLO and deep-learning classifiers over a 710 GB image corpus spanning 1,150 species for the IBIS 2.0 research workflow.
- Achieved 79% validation accuracy and deployed Gradio interfaces for researcher testing, species identification, and iterative model feedback.

Arcascope — Remote — Oct 2024 – Jan 2025
Artificial Intelligence Intern
- Developed daily fatigue-prediction models from heart-rate and step data across 135 participants, engineering physiological and temporal features against survey-based fatigue labels.
- Evaluated 20 model iterations, including PyTorch ordinal regression with CORAL-style learning, to compare approaches for wearable-data fatigue prediction.

PROJECTS

DiffuLLM — *Discrete Diffusion Language Modeling*
- Trained a bidirectional Transformer with D3PM-style discrete diffusion from scratch for structured text generation using masked-token reconstruction and iterative denoising.
- Ran 500k+ training iterations with PyTorch Distributed Data Parallel (DDP) and SLURM; evaluated sampling settings and documented long-context repetition and global-coherence failure modes.

ICONOCLAST — *Open-Weight LLM Representation Editing*
- Developed a Python framework for LLM refusal-behavior editing using contrastive residual activations, benign-subspace preservation, projection edits, and Optuna-based parameter search.
- Benchmarked 10 matched model comparisons using refusal, benign-overrefusal, and KL-divergence metrics; released six edited model artifacts on Hugging Face.

CareWatch (EyeQ) — *Bitcamp 2026 – 2nd Prize, Best Social Good Hack*
- Built a caretaker-safety prototype combining YOLOv8 pose-based motion heuristics, Gemini scene verification, rolling 30-second evidence capture, SQLite event logging, and push-alert escalation.
- Developed the monitoring pipeline, React dashboard, playback/review APIs, and iOS guardian client for live and retrospective incident review.

Zypher EdgeAI — *Embedded Gesture Recognition on ARM Cortex-M*
- Built a multithreaded Zephyr RTOS application for 4-class real-time gesture recognition using TensorFlow Lite Micro, INT8 quantization, CMSIS-NN kernels, and 100 Hz accelerometer windows.
- Added UART telemetry, latency-analysis tooling, automated tests, CI builds, and runtime stack/heap monitoring; diagnosed an inference-thread stack overflow and validated the memory fix.

TECHNICAL SKILLS

Languages: Python, SQL, C++, TypeScript, JavaScript, Java, Swift
Machine Learning: PyTorch, TensorFlow, scikit-learn, Hugging Face, OpenCV, computer vision, ordinal regression, representation editing, discrete diffusion, model evaluation
Engineering: FastAPI, FastMCP, Docker, Linux, Git, React, Gradio, Qdrant, Playwright, SLURM, Distributed Data Parallel (DDP), TensorFlow Lite Micro, Zephyr RTOS

ADDITIONAL

Open Source: Published **lootqdm**, a Python/PyPI training-loop toolkit with PyTorch/Keras integrations, live metric mapping, experiment goals, persistent run profiles, and terminal-safe logging.
Leadership: Adobe Campus Ambassador, Rutgers University (2025–2026) | Secretary, IEEE GCET Student Branch (2023–2024); organized 39+ technical and networking events.