

MUHAMMAD TAHA

AI/ML ENGINEER

Computer Engineer specializing in the end-to-end deployment of complex artificial intelligence. Proven track record of engineering edge-quantized vision models, calibrated clinical prediction systems, and retrieval-grounded reasoning pipelines. Adept at full-stack systems design, delivering high-accuracy predictive healthcare algorithms (0.892 AUROC on MIMIC-IV), edge-deployed multimodal AI systems, and production-grade biometric anti-spoofing suites profiled for strict execution latency.

taha-portfolio-website.vercel.app | www.github.com/mtahaarif | ch.tahaarif2005@gmail.com | +92 317 5434059
https://www.linkedin.com/in/muhammad-taha-21a163256/

EDUCATION

Bachelor of Computer Engineering
National University of Science and Technology (NUST) 2022-2026

Relevant Coursework: *Fundamentals of Programming, Object Oriented Programming, Data Structures & Algorithms, Software Engineering, Digital Image Processing, Artificial Intelligence & Decision Support System, Machine Learning, Computer Vision*

PROFESSIONAL EXPERIENCE

Computer Vision Intern Jul 2025 - Sep 2025
TruID Technologies PVT. LTD. | NSTP, Islamabad, Pakistan

- **Biometric Anti-Spoofing:** Built a MobileNetV2 screen-replay detector. Applied CLAHE & unsharp masking over 17.8k images for 99.8% validation accuracy on face/hand spoofs.
- **ID Fraud Prevention:** Architected an FPN with CBAM attention. Used LAB-space CLAHE & edge-sharpening to isolate splice artifacts, overcoming 1:5 imbalance for 93.8% accuracy & 0.97 precision.
- **Signature Verification:** Designed a deep metric learning verifier via custom hard-negative mining & Triplet Loss. Mapped signatures to 256-D embeddings, yielding 92.7% accuracy across 5k pairs.
- **Model Optimization:** Built Tesla P100 GPU inference pipelines for all 4 vision models, profiling evaluation steps to guarantee a strict ≤31ms batch latency for scalable KYC deployment.

Full Stack Engineer
A&T Nexus Solutions LLC | Remote Aug 2025 - Present

- **Client Delivery & Ownership:** Sole engineer for 9 production Next.js platforms (healthcare/IT/B2B), owning architecture/deployment across 290+ commits.
- **Security & Accessibility Baseline:** Standardized hardened defaults (CSP, X-Frame-Options, MIME-sniff headers), form honeypots, HTML escaping, and WCAG-compliant UIs.
- **Data & Integrations Layer:** Engineered JWT-secured admin APIs over Prisma/PostgreSQL and pooled MySQL. Brokered Vercel-Blob uploads and workflows (Resend, Sheets, WhatsApp).
- **Legacy Migration:** 15+ Node scripts ported WordPress to Next.js over SSH-tunneled MySQL (HTML extraction, WebP, asset validation); 3 more legacy sites rebuilt, URLs intact.
- **B2B Digital Transformation Platform:** Built flagship React 19/TS site with @react-three/fiber 3D scenes and Framer Motion storytelling, backed by validated serverless routes.

TECHNICAL SKILLS

- **Languages & Core Tools:** Python, TypeScript, JavaScript, C++, SQL, MATLAB, Bash / Linux, Git
- **Deep Learning, LLMs & MLOps:** PyTorch, TensorFlow, Keras, Hugging Face, LLMs (Qwen, Ollama), RAG, LoRA Fine-Tuning, LightGBM, XGBoost, Optuna, SHAP
- **Vision, Audio & Edge AI:** OpenCV, Librosa, Whisper, YOLOv8, ResNet / MobileNet, 3DGS, Edge AI (TFLite INT8/NF4, ONNX), Raspberry Pi 5
- **Frontend Web Architecture:** Next.js (App Router), React, Tailwind CSS, Framer Motion, Vite, WCAG Accessibility
- **Backend, APIs & Cloud:** FastAPI, Flask, Node.js, REST APIs, SSE Token Streaming, PostgreSQL, MySQL, AWS EC2

PRACTICAL EXPERIENCE

Machine Learning and AI Systems

SERENITY: Smart Emotion Recognition & Neural Intervention Technology

- **Edge AI & Perception:** Trained ResNet-18 FER (93.0%) and CNN-BiLSTM SER (80.6%) on a balanced 53k-utterance corpus; INT8/NF4-quantized to 3.86 MB on Raspberry Pi 5.
- **Hybrid Systems Architecture:** Architected a privacy-first edge-cloud pipeline running Whisper STT locally, streaming metadata to an EC2 LLM over SSE at 8-12s latency.
- **LLM Safety & EHR Integration:** Built a rule-based router computing risk independently of the LLM, feeding a React 18 EHR dashboard with PHQ-9/GAD-7 tracking.

MedTraceAI: ED to ICU Clinical Deterioration Model

- **Data Engineering:** Built an out-of-core Polars pipeline streaming 37.1M vital rows from 40GB+ of MIMIC-IV into a hospital-agnostic OMOP/LOINC triplet schema.
- **Architecture & Tuning:** Fused a 192-feature XGBoost branch and Clinical Event Transformer into an isotonic-calibrated ensemble via 300-trial Optuna.
- **Clinical Impact:** Forecast ICU transfer 6 hours early at 0.892 AUROC, 0.667 PR-AUC and 0.051 Brier across 19,248 ED visits, with SHAP audit trails.

Robust Speech Emotion Recognition via Hybrid Deep Neural Networks

- **Architecture:** Engineered a TensorFlow hybrid network (1D-CNNs, Stacked BiLSTMs, Multi-Head Attention) to isolate acoustic triggers across 7 emotion classes.
- **Data Pipeline:** Aggregated 9 datasets into a balanced 53.4k corpus. Extracted 40-band MFCCs, ZCR, and RMS energy, mitigating imbalance via stochastic augmentation.
- **Edge Deployment:** Achieved 80.61% test accuracy. Applied dynamic-range quantization to export a 3.86 MB TFLite model for resource-constrained edge inference.

Santander Customer Transaction Prediction

- **ML Pipeline:** Built a LightGBM classifier for Santander transactions, overcoming a 90/10 class imbalance. Achieved a 0.8941 ROC-AUC using Optuna Bayesian tuning and 5-Fold Stratified CV.
- **Algorithmic Optimization & LightGBM:** Deployed gain-based pruning to isolate 180 key features. Calibrated the decision threshold to 0.6744, reaching ~56% precision to slash false-positive costs.
- **Post-Hoc Model Explainability:** Integrated SHAP and permutation importance to translate black-box probabilities into transparent business insights.

Computer Vision and Image Processing

3D Environment Reconstruction from Multi-View Images

- **Classical CV Pipeline:** Engineered an SfM pipeline over 49 calibrated DTU views using SIFT, FLANN-RANSAC and DLT triangulation for a 30,500-pt cloud.
- **MVS Densification:** Plane-sweep Multi-View Stereo scoring 96 depth hypotheses/pixel via illumination-invariant NCC, cleaning 166,303 pts to 130k.
- **Neural Rendering:** Trained a 3D Gaussian Splatting model over 15,000 iterations with MVS initialization, reaching ~25 dB PSNR at 0.04 L1+SSIM loss.

Human Pose Estimation and Classification

- **CV Pipelines:** Architected a pose estimation framework over 17.3k MPII images, comparing a 33-to-16 joint MediaPipe mapping against a custom OpenCV baseline.
- **Benchmarking:** Designed a mathematical evaluation suite, proving deep-learned features (0.586 PCKh@0.5) out-scale fixed classical heuristics.
- **ML Classification:** Extracted 53-D scale-invariant features (limb ratios, joint angles) to train SVM and Random Forest models for a 397-way activity classification task.

LICENSES & CERTIFICATIONS

- **Deep Learning Specialization** — *DeepLearning.AI | Dec 2025*
- **Machine Learning Specialization** — *DeepLearning.AI | Jul 2025*
- **AI for Everyone** — *DeepLearning.AI | Jun 2024*
- **Introduction to Front-End Development** — *Meta | Oct 2023*
- **CS50: Introduction to Programming with Python** — *Harvard's CS50 | Sep 2023*