Talha Nadeem

Machine Learning Engineer | Biomedical AI | Computer Vision & Time-Series Expert

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PROFILE

Results-driven ML Engineer and researcher with 5+ years of experience in deep learning, reinforcement learning, and GPU-accelerated computing. Skilled in designing and optimizing models (Transformers, GNNs, Generative AI) and deploying solutions across cloud and edge platforms. Strong Python & C++ background, with expertise in real-time systems, GPU programming (CUDA, PyTorch GPU), and biomedical AI. Published in IEEE and proficient at translating research into production-ready solutions.

CORE SKILLS

Languages: Python, C++, MATLAB
ML Frameworks: PyTorch GPU, TensorFlow GPU, PyTorch Geometric, Hugging Face, RLlib
GPU & Graphics: CUDA, OpenVibe, OpenCV, MediaPipe, Real-Time Rendering
ML Techniques: Transformers, GNNs, Generative Models (CLIP, Diffusion), RL, Time-Series Forecasting, Deep Unfolding Networks, Kalman Filtering, Quantization (INT8)
Tools: Git, Docker, Conda, Jupyter, CI/CD Pipelines, ONNX
Domains: Generative AI, Biomedical AI, Computer Vision, Audio Processing, Edge AI

PROFESSIONAL EXPERIENCE

09/2019 – Present
Lahore, Pakistan

Lahore University of Management Sciences (LUMS)
Machine Learning Researcher

- Designed a GPU-accelerated deep unfolding-based image restoration pipeline in PyTorch, improving PSNR by 3 dB on real-world degraded images.
- Developed a Kalman filter-based state estimation with outlier rejection, improving accuracy by 20%.
- Built an RL-based forecasting model using RLlib & NumPy, reducing false positives in preterm birth prediction by 12%.
- Implemented AI-based iterative MRI reconstruction with CUDA acceleration for large datasets.
- Supervised graduate ML labs, mentored projects in time-series, control, and biomedical AI.

06/2018 – 05/2019
Islamabad, Pakistan

National University of Sciences and Technology (NUST)
Research Assistant

- Built real-time EEG-based 3D brain activity visualization using OpenVibe & LORETA.
- Designed artifact removal & online EEG streaming for accurate source localization.

07/2018 – 08/2018
Lahore, Pakistan

Space & Upper Atmosphere Research Commission (SUPARCO)
Intern
Research intern at Power &Control Systems Lab

SELECTED PROJECTS

Retail Sales Forecasting
Built a demand forecasting model using SARIMA and k-NN regression to predict item-level sales across multiple stores. The pipeline included preprocessing of time-series data, seasonal trend analysis, and performance evaluation, aiding inventory planning decisions.
Skills: Python, Time-Series Forecasting, SARIMA, k-NN, Data Preprocessing, Pandas, Matplotlib

AQI Forecasting for Lahore
Developed a PM2.5 air quality prediction pipeline based on SARIMA using real-time environmental data from OpenAQ. Enabled future AQI visibility to support proactive health measures and urban monitoring.
Skills: Python, SARIMA, OpenAQ API, Air Quality Modeling, Data Cleaning, Visualization

Wake Word Detector
Designed a real-time audio wake-word detector using CNNs trained on MFCC features to identify the command "go" from microphone input. Deployed live inference pipeline using PyAudio and custom preprocessing.
Skills: Python, CNN, MFCC, PyAudio, Real-Time Inference, Audio Signal Processing

Gesture Volume Control
Implemented an interactive system using OpenCV and MediaPipe to control system volume based on the distance between the thumb and index fingers. The real-time solution included hand tracking and gesture calibration.
Skills: OpenCV, MediaPipe, Hand Tracking, Real-Time CV, Python

Real-Time Mask Detection
Built a face mask classification system using transfer learning (MobileNetV2) combined with OpenCV for real-time video processing. Useful for compliance monitoring and public safety in indoor spaces.
Skills: TensorFlow, MobileNetV2, OpenCV, Transfer Learning, Real-Time Detection

Transformer QA Engine
Fine-tuned a DistilBERT model on the SQuAD2 dataset to create a context-aware reading comprehension engine. Integrated Hugging Face Transformers for model loading, inference, and deployment through a simple user interface.
Skills: Hugging Face, Transformers, NLP, DistilBERT, SQuAD2, Python, Streamlit

Molecular Property Prediction with GNNs
Developed a graph neural network (GNN) model to predict molecular properties based on structural graph data. Applied techniques such as message passing and node embedding to learn chemical representations for AI-assisted drug discovery.
Skills: PyTorch Geometric, GNNs, Molecular Graphs, Chemistry ML, Node Embedding, Regression

Language Model Optimization for Edge Deployment
Applied post-training INT8 quantization to Transformer-based language models to reduce memory footprint and improve inference speed on edge devices. Benchmarked model performance pre- and post-optimization to assess trade-offs in accuracy and latency.
Skills: Transformers, Quantization, INT8 Optimization, Model Compression, ONNX, Edge AI

Semantic Image Search using CLIP
Built a semantic search engine leveraging OpenAI's CLIP model to retrieve relevant images based on natural language queries. Aligned vision and language embeddings to enable zero-shot semantic search from a local image dataset.
Skills: CLIP, OpenAI, Vision-Language Models, Zero-Shot Learning, PyTorch, Semantic Search

Real-Time 3D Brain Visualization
Built a 3D brain imaging pipeline that captures real-time EEG data and visualizes source-localized brain activity using LORETA and dipole fitting methods. Developed artifact removal filters and implemented live signal acquisition through OpenVibe and Lab Streaming Layer. Enabled interactive and accurate visualization of neural events on a dynamic 3D brain model.
Skills: OpenVibe, EEG Acquisition, LORETA, Dipole Fitting, Real-Time Signal Processing, Python, MATLAB

EDUCATION

09/2021 – Present
Lahore, Pakistan

PhD Electrical Engineering
Lahore University of Management Sciences (LUMS)
- 3.18 GPA
- Completed Coursework: Robot Motion Planning, Applied Probability, Remote Sensing of the Environment, Information Theory & ML, Smart Grid Systems
- Dissertation proposal: From Optimization to Learning: Adapting Model-Based Methods for Designing Learning Algorithms

09/2019 – 05/2021
Lahore, Pakistan

MSc Electrical Engineering
Lahore University of Management Sciences (LUMS)
- 3.63 GPA
- Completed Coursework: Stochastic Systems, Linear System Theory, Machine Learning, Advanced Digital Signal Processing, Convex Optimization, Multiagent Systems, Deep Learning, Digital Control Systems
- Thesis Title: Generalized Norm Estimator Based on Observer Principle for Robust State Estimation

09/2015 – 05/2019
Islamabad, Pakistan

BSc Electrical Engineering
National University of Sciences and Technology (NUST)
- 3.35 GPA
- Selected Coursework: Calculus, Linear Algebra & ODEs, Applied Physics, Linear Circuits Analysis, Electrical Network Analysis, Complex Variables and Transforms, Probability and Statistics, Signals and Systems, Electromagnetic Field Theory, Electrical Machines, Communication Systems, Digital Signal Processing, Microwave Engineering, Digital Image Processing
- Research Project :Real Time 3D Brain Visualization Depicting Source-localized Activity

CERTIFICATIONS

- AI for Medical Prognosis (2025) - DeepLearning.AI
- Medical Image Processing (2025) - Mathworks
- Machine Learning (2020) - Stanford University
- AI for Medical Diagnosis (2025) - Deep Learning.AI
- Introduction to Neural Networks & Pytorch (2023) - IBM
- Python for Everybody (2020) - University of Michigan
- Generative AI for Everyone (2025) - Deep Learning.AI
- Image Denoising using Autoencoders & Keras (2023) - Deprecated Guided Projects

PUBLICATIONS

- T. Nadeem, K.Ali, and M. Tahir **"NIR-EKF: Normalized Innovation Ratio based EKF for Robust State Estimation,"** *IEEE Sensors Letter*
- T. Nadeem, and M. Tahir, **"DUOV PCA: Deep Unfolded Orthogonal V ariational PCA Network for Image Denoising,"** *Under Review to IEEE Signal Processing Letters.*
- T. Nadeem, and M. Tahir, **"Multi-Degradation Image Restoration Network Based on Deep Unfolding Neural Network"** *Under Preparation for Submission to IEEE Transaction on Image Processing*
- T. Nadeem, and M. Tahir, **"Hybrid Reinforcement Guided Deep Unfolded Estimation for Preterm Birth Prediction under Influence"** *Under Preparation for Submission to IEEE Transaction on Biomedical Engineering*

LANGUAGES

English ●●●●○ Urdu ●●●●●