Muhammad Asif Khan

Applied AI Researcher | Solution Architect
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Portfolio: https://muasifk.github.io/portfolio.html
E1 Visa (Green Card) processing in progress. Sponsorship is not required.

SUMMARY

Applied AI, innovations, and smart cities solution architect with 15+ years of experience in designing and deploying edge AI systems for smart mobility and urban infrastructure. Specialized in AI/ML, computer vision, GenAI (LLMs, Diffusion models), smart cities, IoT, and digital solutions. Proven track record of translating research into deployable systems in high-stakes environments such as **FIFA 2022** World Cup and smart city platforms.

EXPERIENCE

Research Scientist (Applied AI) Nov 2021 – Present
Qatar Mobility Innovations Center, Doha, Qatar.

- Designed and deployed a crowd queue length estimation system on NVIDIA Jetson Nano; used during FIFA 2022 for real-time metro station load balancing.
- Developed multi-modal drone detection pipeline using acoustic, RF, and visual cues; further enhanced by attribute-based encryption to detect unauthorized drones.
- Led end-to-end deployment of anomaly detection models in road infrastructure.
- Contributed to **Falcon-I** smart city platform integration for traffic insights.

Research Fellow (AI) Jun 2020 – Oct 2021
Qatar University, Doha, Qatar.

- Investigated edge-based video surveillance techniques for IoT environments.
- Developed a WiFi AP handover prediction models using ML in cognitive networks.
- Developed new deep neural network inferencing strategies for IoT networks.

Research Assistant (Computing) Jan 2016 – Dec 2016
Qatar Mobility Innovations Center, Qatar.

- Develop a novel group formation algorithm for P2P group owner in Wi-Fi Direct.
- Developed an Android-based prototype for video streaming over Wi-Fi Direct.

Graduate Assistant Aug 2014 – Jul 2015
Qatar Mobility Innovations Center, Qatar.

- Developed traffic micro-simulation of traffic on Doha-expressway.
- Implement ramp-metering strategy for congestion mitigation on Doha expressway.
- Developed a platform for traffic and parking management for university campus.

INDUSTRIAL INNOVATION PROJECTS

❖ **RoadSense: Smartphone-based Road Anomaly Detection**
Collected and fused (`accelerometer, gyroscope, GPS, video, and CAN bus`) data to build a real-time classifier for road surface conditions (e.g., potholes, bumps) monitoring. Deployed ML models on Android; integrated output with OpenStreetMap via cloud dashboard.

❖ **Crowd Estimation for Metro Stations during FIFA 2022**
Developed a real-time crowd counting system using `PTZ cameras` and custom CNN models, deployed on `NVIDIA Jetson Nano`. Converted models to `TensorRT` for low-latency inference. Enabled queue estimation at metro entry points for crowd control via live dashboards, as part of the QMIC's **Falcon-I** platform for smart cities.

❖ **Acoustic detection and localization of noisy vehicles**
Developed an acoustic-based system to detect and localize noisy vehicles using signal processing (`ZCR, RMS, FFT`) and ML models (`SVM, RF, LSTM`). Integrated a multi-microphone array to perform sound source localization using `GCC-PHAT and SRP-PHAT` algorithms in real road environments.

❖ **Unauthorized Drone Detection in Urban Airspace**
Built a prototype multi-modal drone detection system using `ReSpeaker mic array, Ettus USRP RF sensors, and Jetson Xavier` for vision. Combined acoustic, RF, and visual modalities using early fusion strategies. Integrated attribute-based encryption for secure

drone alert propagation.

❖ **Intelligent construction safety violation system (iVDS).**
Designed an AI system to detect PPE violations (helmets, vests) in real-time on construction sites. Custom annotated dataset used from local field deployments. Inference optimized for Jetson deployment and integrated into safety compliance system.

EDUCATION

Ph.D. in Electrical Engineering, Qatar University, Doha, Qatar. 2014 - 2019
M.Sc. Telecommunication Engineering, UET Taxila, Pakistan. 2010 - 2013
B.Sc. Telecommunication Engineering, UET Peshawar, Pakistan. 2005 - 2009

SKILLS

- **GenAI:** Pretraining, Post-training (SFT/LoRA), RAG, tooling, agentic AI.
- **ML/DL Models:** ML (MLP/SVM/RF/DT/XGBoost), DL (LSTM/CNNs,/Transformers/ViTs/Diffusion.)
- **Frameworks:** Hugging Face, LangChain, PyTorch, TensorFlow, Keras, Scikit-learn, ONNX, TensorRT.
- **Deployment:** Docker, NVIDIA Jetson, ONNX Runtime, REST APIs, edge AI integration.
- **Cloud Platforms:** Azure, AWS.
- **Data Processing:** OpenCV, Open3D, Librosa, BeautifulSoup.
- **Visualization:** Matplotlib, Plotly, Seaborn.
- **Simulation Tools:** SUMO, VISSIM, ns-3, Mininet.
- **Others:** MQTT.

SELECTED PUBLICATIONS

1. Revisiting the Intrusion Detection in In-Vehicle Networks, in IEEE Transactions on ITS, 2025.
2. Crowd Counting at the Edge using Weighted Knowledge Distillation, in Nature Scientific Reports, Feb 2025.
3. LiDAR in Connected and Autonomous Vehicles - Perception, Threat Model, and Defense, in IEEE Transactions on Intelligent Vehicles, 2024
4. Accelerating Learning with Fixed Time Budget, in Neural Computing and Applications, 2024.
5. Object Depth and Size Estimation using Stereo-vision and Integration with SLAM, in IEEE Sensors Letters, 2024.
6. LCDnet: A Lightweight Crowd Density Estimation Model for Real-time Video Surveillance, in Journal of Real-Time Image Processing, 2023.
7. Distributed Inference in Resource-Constrained IoT for Real-Time Video Surveillance, in IEEE Systems Journal, 2022
8. CLIP: Train Faster with Less Data , in IEEE BigComp, Republic of Korea, 2023.

For full publication list: Google Scholar

COURSES & CERTIFICATES

- TensorFlow Developer, Deeplearning.ai [Click to verify]
- Deep Learning Specialization, Deeplearning.ai [Click to verify]
- Machine Learning, Stanford University [Click to verify]
- AWS Machine Learning, Amazon Web Services [Click to verify]
- AWS Generative AI, Amazon Web Services [Click to verify]
- AWS AI & ML Scholar [Click to verify]
- AWS Cloud Practitioner [Click to verify]
- Generative AI, Databricks [Click to verify]
- Introduction to On-device AI, Qualcomm [Click to verify]
- Fundamentals of Accelerated Computing with CUDA Python, Nvidia [Click to verify]
- Getting Started with AI and Jetson Nano, Nvidia [Click to verify]
- ChatGPT Prompt Engineering for Developers, Deeplearning.ai

PROFESSIONAL SERVICE

- *Associate Editor:* IEEE Transactions on Neural Networks and Learning Systems
- *Area Chair:* International Joint Conference on Neural Networks, 2025
- *Reviewer:* NeurIPS, IJCV, WACV, ICCV, TAI, IJCNN, TMLCN.