Muhammad Asif Khan

Senior Applied Scientist (Amazon)

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About me

Senior applied scientist, innovator, and AI solution architect with 8+ years of experience in designing and deploying AI systems for retail, smart city, mobility, and urban infrastructure. Specialized in AI/ML, vision/perception (2D and 3D detection, segmentation, density estimation, depth estimation), control (RL/DRL), generative AI (GANs, Diffusion models, LLMs, VLMs), and IoT solutions. Proven track record embedding with internal business teams and external partners to convert ambiguous client/enterprise pain points into reliable, scalable solutions in high-stakes environments such as **FIFA World Cup 2022** and **Amazon**.

Education

MBA, Business Administration, INTI International University – Malaysia 2025 - 2026

PhD in Electrical Engineering, Qatar University – Qatar 2014 - 2019

M.Sc. Telecommunication Engineering, UET Taxila – Pakistan 2010 - 2013

B.Sc. Telecommunication Engineering, UET Peshawar – Pakistan 2005 - 2009

Experience

Senior Applied Scientist, Amazon – Seattle, WA May 2026 – present

- Designed and shipped loss prevention and theft prediction ML pipelines in production for Amazon's middle-mile supply chain, collaborating directly with operations teams to define workflow requirements and track business outcomes.
- Buyer abuse detection for the entire Amazon customer base [in progress].

Senior Research Associate, Louisiana State University. – Baton Rouge, LA Jan 2026 – May 2026

- Led technical architecture and prototype specs for high-ambiguity DoD contractor proposals, communicating deep technical trade-offs to senior non-technical stakeholders.
- Developed proposals for new funding opportunities in collaboration with DoD contractors.
- Conducted research to identify solutions for data-driven modeling and data transmission over limited bandwidth channels in distributed maritime operations.

Research Scientist, Qatar Mobility Innovations Center, – Doha, Qatar Mar 2024 – Dec 2025

- Embedded with city infrastructure partners (e.g., Supreme Committee for FIFA World Cup 2022 operations) to translate real-world crowd-monitoring pain points into end-to-end Jetson/TensorRT edge deployments with live dashboard integrations.
- 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 several models and enhancements to **Falcon-I** smart city platform integration for traffic insights.

Postdoc Research Fellow, Qatar Mobility Innovations Center, Qatar University – Doha, Qatar Jun 2020 – Feb 2024

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

Research Assistant, Qatar Mobility Innovations Center – Doha, Qatar Jan 2016 – Dec 2016

- Developed 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, Qatar University – Doha, Qatar Aug 2014 – Jul 2015

- Developed traffic micro-simulation of traffic on Doha-expressway.
- Implemented ramp-metering strategy for congestion mitigation on Doha Expressway.

Selected Projects / Prototypes

LASIK 2026

Developed a loss prevention and prediction model for Amazon's middle mile supply chain network, from data pipeline to ML model training and deployment in production.

Crowd Density Estimation for FIFA 2022 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.

RoadScans 2024

Designed an AI system to detect faulty street pole lights in real-time in Lusail smart city.Custom annotated dataset used from local field deployments. Inference optimized for Jetson deployment and integrated into maintenance vehicle for city surveillance.

DroneCMS 2022

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.

RoadSense 2025

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.

NoiseRADAR 2025

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.

Skills

Languages: Python, C++, Julia

Infrastructure: AWS (Cradle/Spark, SageMaker, Redshift), distributed training

Deployment: Docker, NVIDIA Jetson, ONNX Runtime, Real-time edge AI inference

ML Frameworks: PyTorch, TensorFlow, Keras, Scikit-learn, ONNX, TensorRT, Hugging Face, LangChain

GenAI: Pretraining, Post-training (SFT, PPO, DPO, GRPO, LoRA), RAG, tooling, agentic AI.

ML/DL Models: ML (MLP/SVM/RF/DT/XGBoost), DL (LSTM/CNNs/Transformers/ViTs/Diffusion.), RL/DRL

Data Processing: SQL, OpenCV, Open3D, Librosa, BeautifulSoup.

Visualization: Matplotlib, Plotly, Seaborn

Simulation Tools: SUMO, VISSIM, ns-3, Mininet

Visualization: MQTT, Git, Unix, bash, MLOps, Dash.

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

Selected Honors

- Postdoctoral Research Award (200,000 USD), Qatar – 2022
- Best Presenter Award, ICFTSS, Malaysia – 2024

Courses and Certifications

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

Professional Services

- **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.