Muhammad Asif Khan, Ph.D., CEng, SMIEEE

Research Scientist, Qatar Mobility Innovations Center, Qatar.
Associate Editor at IEEE-TCE, IEEE-TTS, and CSSE.

CONTACT DETAILS	Qatar Mobility Innovations Center Address: PO Box 210531, Qatar Science & Technology Park, Doha, Qatar, E-mail: asifk@ieee.org Web: https://muasifk.github.io/ Phone: (+974) 3025-3978
RESEARCH INTERESTS	Mobile computing, Edge intelligence, Distributed ML, Deep learning for computer vision, and connected autonomous vehicles (CAVs).

EDUCATION

Ph.D. in Electrical Engineering   2014 - 2019
Qatar University, Doha, Qatar
Dissertation Title: "Framework for Content Distribution over Wireless LANs"
Advisor: Prof. Ridha Hamila

M.Sc. Telecommunication Engineering   2010 - 2013
University of Engineering and Technology Taxila, Pakistan.
Thesis Title: "MAC-Aware Dynamic Source Routing Protocol"
Advisor: Prof. Adeel Akram

B.Sc. Telecommunication Engineering
University of Engineering and Technology Peshawar, Pakistan   2005 - 2009

EXPERIENCE

Research Scientist   Mar 2024 – Present
Qatar Mobility Innovations Center, Doha, Qatar.

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

Graduate Research Assistant   Jan 2016 – Dec 2016
Qatar Mobility Innovations Center, Qatar.

Graduate Assistant   Aug 2014 – May 2015
Qatar University, Doha, Qatar.

PROJECTS

1. Smart, Connected, and Autonomous Vehicle and Energy systems for efficient, safe, secure, and sustainable transportation in metropolitan cities.
   My Role [Research Scientist]: Modelling network and sensor attacks and developing intrusion detection systems for connected and autonomous vehicles (CAVs).

2. Intelligent construction safety violation system (iVDS).
   My Role [Research Mentor]: Supervise interns to design an AI-based system to automatically detect safety violations (e.g., not wearing PPEs) in construction sites in Qatar.

3. Acoustic detection and localization of noisy vehicles
   My Role [Research Mentor]: Supervise interns to design an AI-based system to detect and localize noisy cars and motorbikes on roads.

4. Crowd counting and density estimation for metro stations
   My Role [Research Scientist]: Develop crowd counting and density estimation models and deployment over NVIDIA edge devices for real-time crowd statistics.

5. Smart customer analytics for retail.
   My Role [Research Scientist]: Developing, training, and validating AI models for customer analytics.

6. Context recognition in crowd monitoring using crowdsourced data.
   My Role [Postdoc Fellow:] Research and development of deep learning systems and models for visual crowd analysis over resource-limited drones.

7. DroneCMS: Flying Infrastructure for Intelligent Crowd Management and Security for Mega-Events.
   My Role [Postdoc Fellow]: Unauthorized drone detection, identification, and tracking using sensor fusion and attribute-based encryption.

8. Predictive QoE-Aware and ML for Secure Live Streaming Over the Edge.
   My Role [Postdoc Fellow]: Distributed data processing and training & inference of AI models in edge computing and IoT systems.

9. D-COCODI: Scalable Multimedia Multicasting Mobile Solutions for Smartphone Users in Dense Environments.
   My Role [Graduate Researcher]: Develop new algorithms and model dense Wi-Fi Direct network systems for multimedia content distribution.

10. Traffic congestion mitigation on Doha Expressway using ramp metering.
    My Role [Graduate Researcher]: Develop algorithms for isolated and coordinated ramp metering, and upstream traffic signal control strategy to mitigate congestion and reduce travel time.

11. Doha city traffic analysis and simulation modeling in PTV VISSIM.
    My Role [Graduate Researcher]: Modelling of traffic microsimulation in PTC VISSIM with real-world data collected from Doha city.

COURSES TAUGHT	Abdul Wali Khan University Mardan, Pakistan	2023 - 2024
	o STAT-836 Advanced Techniques and Logical Reasoning (Fall-2023) o STAT-819 Advanced Machine Learning (Spring-2024)	

SUPERVISION AND MENTORSHIP	Thesis Co-advisor Abdul Wali Khan University, Mardan, Pakistan.	2023 – Present
	Research Mentor Qatar University Young Scientists Center (QUYSC), Qatar.	2023 – 2024
	Research Mentor Qatar Mobility Innovations Center, Qatar.	2022 – 2024

GRANTS AND AWARDS	Post Doctoral Research Award (PDRA) Qatar National Research Fund, USD. 200,000	Mar 2022 - Feb 2024
	Graduate Assistant Award Qatar University, USD. 40,000	Aug 2014 - May 2015

TALKS

INVITED TALKS	o Intelligent Edge for 6G and Massive IoT Systems, in the IEEE ICNGN, Bangkok, Thailand. o Machine Learning in Mobile Edge Computing - Recent Trends, Opportunities, and Challenges, in MLIS2020, October 25-28, 2020, UK
TUTORIALS	o Edge Intelligence - Enabler for the Next Generation IoT Networks, in IEEE Middle East Conference on Communications and Networking, Abu Dhabi, United Arab Emirates. November 17-20, 2024 o Mobile Edge Computing for Massive IoT (MIoT) Systems, in 10th IEEE International Symposium on Networks, Computers, and Communications, Doha, Qatar. October 23-26, 2023.
GUEST LECTURES	o Network Slicing in 5G, at College of Engineering, Qatar University, Doha, Qatar, April 11, 2023.
MEDIA	o Generative AI in FM Procurement, interview published in Facilitate - the official magazine of

IWFM UK).
   o <u>ABC of AI</u>, in Facilitate - the official IWFM magazine, Mar 2021 Issue

PUBLICATIONS

JOURNAL
ARTICLES

[J1] **M. A. Khan**, H. Menouar and R. Hamila, Accelerating Learning with Fixed Time Budget, *Neural Computing and Applications*, 2024. [Submitted].

[J2] **M. A. Khan**, H. Menouar and R. Hamila, Crowd Counting at the Edge using Weighted Knowledge Distillation, *IEEE Transactions on Emerging Topics in Computing*, 2024. [Submitted].

[J3] M. Almehdhar, A. Albaseer, **M. A. Khan**, M. Abdallah, H. Menouar, S. Al-Kuwari, and A. Al-Fuqaha, Deep Learning in the Fast Lane: A Survey on Advanced Intrusion Detection Systems for Intelligent Vehicle Networks, in *IEEE Open Journal of Vehicular Technology*, vol. 5, pp. 869-906, 2024.

[J4] M. Ishtiaq, N. Saeed and **M. A. Khan**, Edge Computing in IoT: A 6G Perspective, *IEEE IT Professional*, 2024. [In Press].

[J5] L. Hamad, **M. A. Khan** and A. Mohamed, Object Depth and Size Estimation using Stereo-vision and Integration with SLAM, *IEEE Sensors Letters*, vol. 8, no. 4, pp. 1-4, April 2024.

[J6] N. Faiz, A. K. Gardiwal, **M. A. Khan**, and S. Iftikhar, "Dynamic prediction of survival via Landmark method using the asthma prevention trial in young children" *PLOS One*. 2023 Nov 30;18(11).

[J7] **M. A. Khan**, H. Menouar, and R. Hamila, Visual Crowd Analysis - Open Research Problems," in *AI Magazine (AAAI)*, vol. 44, no. 3, pp. 296–311, Fall 2023.

[J8] **M. A. Khan**, H. Menouar, and R. Hamila, "LCDnet: A Lightweight Crowd Density Estimation Model for Real-time Video Surveillance," in *Journal of Real-Time Image Processing*., 20, 29, 2023.

[J9] **M. A. Khan**, H. Menouar, and R. Hamila, Revisiting Crowd Counting: State-of-the-art, Trends, and Future Perspectives. in *Image and Vision Computing*., 129, 104597, 2022.

[J10] **M. A. Khan**, H. Menouar, A. Eldeeb, A. Abu-Dayya, and F. D. Salim, "On the Detection of Unauthorized Drones—Techniques and Future Perspectives: A Review," in *IEEE Sensors Journal*, vol. 22, no. 12, pp. 11439-11455, 15 June 15, 2022.

[J11] **M. A. Khan**, R. Hamila, A. Erbad, and M. Gabbouj, "Distributed Inference in Resource-Constrained IoT for Real-Time Video Surveillance," in *IEEE Systems Journal*, 2022

[J12] **M. A. Khan**, A. Erbad, R. Hamila and E. Baccour, "CODE: Computation Offloading in D2D-Edge System for Video Streaming" in *IEEE Systems journal*.

[J13] **M. A. Khan**, E. Baccour, Z. Chkirbene, A. Erbad, R. Hamila, H. Hamdi, and M. Gabbouj, "A Survey on Mobile Edge Computing for Video Streaming: Opportunities and Challenges," in IEEE Access, vol. 10, pp. 120514-120550, 2022.

[J14] **M. A. Khan**, R. Hamila, A. Gastli, S. Kiranyaz, and N. A. Al-Emadi, "ML-based Handover Prediction and AP Selection in Cognitive Wi-Fi Networks", *Journal of Network and Systems Management*. 2022 Oct;30(4):1-21

[J15] D. Unal, M. Hammoudeh, **M. A. Khan**, A. Abuarqoub, G. Epiphaniou, R. Hamila, "Integration of Federated Machine Learning and Blockchain for the Provision of Secure Big Data Analytics for Internet of Things", *Computers and Security*, Jul. 2021

[J16] **M. A. Khan**, R. Hamila, N. A. Al-Emadi, M. S. Kiranyaz, and M. Gabbouj, "Real-time Throughput Prediction for Cognitive Wi-Fi Networks", *J. Netw. Comput. Appl.*, vol. 150, pp. 245-258, Sep. 2020.

[J17] **M. A. Khan**, R. Hamila and M. O. Hasna, "Optimal Group Formation in Dense Wi-Fi Direct Networks for Content Distribution," in *IEEE Access*, vol. 7, pp. 161231-161245, 2019.

[J18] K. Shaaban, **M. A. Khan**, and R. Hamila, Effect of Distance between Ramp and Upstream Signal on Ramp Meter Operation", *Journal of Traffic and Transportation Management*, vol. 1, no. 2, pp. 43–49, 2020.

[J19] **M. A. Khan**, R. Hamila, M. S. Kiranyaz, and M. Gabbouj, "A Novel UAV-Aided Network Architecture Using Wi-Fi Direct", in *IEEE Access*, vol. 7, pp. 67305-67318, 2019.

[J20] K. Shaaban, **M. A. Khan**, R. Hamila and M. Ghanim, "A Strategy for Emergency Vehicle Preemption and Route Selection", *Arabian Journal for Science and Engineering* 83 (2019): 1-9.

[J21] **M. A. Khan**, W. Cherif, F. Filali and R. Hamila, "Wi-Fi direct research-Current status and future perspectives", *J. Netw. Comput. Appl.*, vol. 93, pp. 245-258, Sep. 2017.

CONFERENCE
PAPERS

[C1] **M. A. Khan**, H. Menouar, A. Nassar, and M. Abdallah, "Visual Deception: Demonstrating Spoofing Attacks on Autonomous Vehicle Cameras", in International Conference on Future Technologies for Smart Society (ICFTSS) [Accepted]

[C2] Z. Ahmed, S. Al-Madeed, and **M. A. Khan**, "Enhanced Diagnostic Model for Pulmonary Embolism Detection using DenseNet and XGBoost", in International Conference on Future Technologies for Smart Society (ICFTSS) [Accepted]

[C3] K. Shaaban, **M. A. Khan**, H. Menouar, and R. Hamila, Advanced Mobility: Integrating Visible Light Communication and Sensing Technologies, in Intermountain Engineering, Technology, and Computing Conference (i-ETC), Utah, USA, 2024.

[C4] **M. A. Khan**, H. Menouar, and R. Hamila, Crowd Counting in Harsh Weather using Image Denoising with Pix2Pix GANs, in Thirty-Eighth International Conference on Image and Vision Computing, 2024.

[C5] **M. A. Khan**, H. Menouar, and R. Hamila, Multimodal Crowd Counting with Pix2Pix GANs, in 19th International Conference on Computer Vision Theory and Applications (VISAPP 2024), Rome, Italy, 2024.

[C6] L. Hamad, **M. A. Khan**, H. Menouar, F. Filali, and A. Mohamed, Haris: an advanced autonomous mobile robot for smart parking assistance, in 2024 IEEE International Conference on Consumer Electronics (ICCE), Las Vegas, NV, USA, 2024, pp. 1-6.

[C7] **M. A. Khan**, H. Menouar, and R. Hamila, Curriculum for Crowd Counting - Is it Worthy?, " in 19th International Conference on Computer Vision Theory and Applications (VISAPP 2024), Rome, Italy, 2024.

[C8] I. Mrad, E. Baccour, R. Hamila, **M. A. Khan**, A. Erbad, M. Hamdi, "RL-CEALS: Reinforcement Learning for Collaborative Edge Assisted Live Streaming", in 28th IEEE Symposium Computers and Communications (ISCC) 9 -12 July, Tunis Tunisia.

[C9] **M. A. Khan**, R. Hamila, and H. Menouar, "CLIP: Train Faster with Less Data" , in 2023 IEEE International Conference on Big Data and Smart Computing (BigComp), Jeju, Korea, Republic of, 2023, pp. 34-39.

[C10] **M. A. Khan**, H. Menouar, and R. Hamila, "Crowd Density Estimation Using Imperfect Labels" , 2023 IEEE International Conference on Consumer Electronics (ICCE), Las Vegas, NV, USA, 2023, pp. 1-6.

[C11] **M. A. Khan**, H. Menouar, and R. Hamila, "DroneNet: Crowd Density Estimation using Self-ONNs for Drones" , 2023 IEEE 20th Consumer Communications and Networking Conference (CCNC), Las Vegas, NV, USA, 2023, pp. 455-460.

[C12] **M. A. Khan**, H. Menouar, O. M. Khalid and A. Abu-Dayya, "Unauthorized Drone Detection: Experiments and Prototypes," 2022 IEEE International Conference on Industrial Technology (ICIT), Shanghai, China, 2022, pp. 1-6.

[C13] **M. A. Khan**, H. Menouar, and R. Hamila, "Drones-aided Asset Maintenance in Hospitals, in 2nd International Conference on Computers and Automation (CompAuto 2022), August 18-22, 2022, Paris, France

[C14] K. Shaaban, **M. A. Khan**, I. Kim and R. Hamila, "Queue Discharge at Freeway On-Ramps Using Coordinated Operation of a Ramp Meter and an Upstream Traffic Signal", Procedia Computer Science, Volume 170, 2020, Pages 347-353, ISSN 1877-0509

[C15] K. Rahman, S. Mallick, **M. A. Khan**, "Travel Time Estimation using Multivariate Regression Model", In Qatar Foundation Annual Research Conference Proceedings Volume 2018 Issue 1 2018 Mar 21, Vol. 2016, No. 1, p. EEPD1051.

[C16] W. Cherif, **M. A. Khan**, F. Filali, S. Sharafeddine, Z. Dawy, "P2P Group Formation Enhancement for Opportunistic Networks with Wi-Fi Direct", Proc. IEEE Wireless Commun. Netw. Conf. (WCNC), pp. 1-6, Mar. 2017.

[C17] **M. A. Khan**, W. Cherif, F. Filali and R. Hamila, "Realization of Dual-Hop Networks in Wi-Fi Direct and Performance Evaluation", 2017 IEEE International Conference on Internet of Things (iThings) and IEEE Green Computing and Communications (GreenCom) and IEEE Cyber, Physical and Social Computing (CPSCom) and IEEE Smart Data (SmartData), Exeter, 2017, pp. 552-559.

[C18] **M. A. Khan**, W. Cherif, F. Filali, "Group Owner Election in Wi-Fi Direct", Proc. IEEE Annu. Ubiquitous Comput. Electron. Mobile Commun. Conf. (UEMCON), pp. 1-9, Oct. 2016.

[C19] **M. A. Khan**, R. Hamila and K. Shaaban., "Mitigation of Traffic Congestion Using Ramp Metering on Doha Expressway", In Qatar Foundation Annual Research Conference Proceedings Volume 2016 Issue 1 2016 Mar 21, Vol. 2016, No. 1, p. ICTSP2224.

[C20] K. Shaaban, **M. A. Khan**, and R. Hamila, "Literature Review of Advancements in Adaptive Ramp Metering", *Procedia Computer Science* 83 (2016): 203-211.

[C21] M. Shah, **M. A. Khan**, T. Mahmood, K. Islam, and J. Akbar, "Generation of orthogonally polarized chaotic waveforms for secure optical communication" 2013 IEEE 9th International Conference on Emerging Technologies (ICET), Islamabad, 2013, pp. 1-5.

[C22] **M. A. Khan**, S. Zakiuddin and J. Ahmad, "Cross-layer optimization of dynamic source routing protocol using IEEE 802.11e based medium awareness", 2013 3rd IEEE International Conference on Computer, Control, and Communication (IC4), Karachi, 2013, pp. 1-6.

[C23] M. S. Khan, S. Bashir, **M. A. Khan**, and K. Asaf, "Design and integration of dual-band textile antenna with high impedance surface", 2013 IEEE 9th International Conference on Emerging Technologies (ICET), Islamabad, 2013, pp. 1-6.

[C24] **M. A. Khan** and S. Zakiuddin, "Research review of the development of novel routing algorithms for mobile Ad-hoc networks", Eighth International Conference on Digital Information Management (ICDIM 2013), 2013, pp. 61-66

BOOKS

[B1] Nasir Saeed and **M. A. Khan**, "Localization in Wireless Networks, Technologies, and Applications", Wiley-IEEE Press, 2024 [In preparation]

BOOK CHAPTERS

[B1] **M. A. Khan**, and M. A. Ahmadon, "Mobile Edge Computing for the Next Generation Massive Internet of Things" in Evolution of Information, Communication and Computing System, 2023

[B2] **M. A. Khan**, M. A. Ahmadon, N. A. A. Rauf, A. M. Zaid, A. K. Mahamad, S. Saon, N. S. A. M. Taujuddin, and A. Jamil, "Implementation and simulation of udp client server environment using contiki cooja simulator." 2023.

SERVICES

JOURNAL EDITORIAL BOARDS

o Associate Editor, IEEE Transactions on Consumer Electronics (July 2024 - June 2026)
o Associate Editor, IEEE Transactions on Technology and Society (May 2024 - May 2026)
o Associate Editor, IEEE Future Directions Technology Policy and Ethics (Apr 2021 - Present)
o Editorial Board Member, Computer Systems Science and Engineering (Feb 2024 - Feb 2026)
o Editorial Board Member, Frontiers in Communications and Networks (Feb 2021 - Present)

JOURNAL REVIEWER

o IEEE Transactions on Artificial Intelligence (TAI)
o IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
o IEEE Transactions on Emerging Topics in Computing (TETC)
o IEEE Transactions on Systems, Man, and Cybernetics (SMC)
o IEEE Transactions on Consumer Electronics (TCE)
o IEEE Transactions on Circuits and Systems for Video Technology (TCSVT)
o IEEE Transactions on Microwave Theory and Techniques (TMTT)
o IEEE Transactions on Dependable and Secure Computing (TDSC)
o IEEE Communications Surveys and Tutorials (COMST)
o IEEE Communications Magazine (COMMAG)
o IEEE Wireless Communication Magazine (WCM)
o IEEE Wireless Communications Letters (WCL)
o IEEE Communication Standards Magazine (COMSTD)
o IEEE Internet of Things Journal (IOT)
o IEEE Internet of Things Magazine (IOTMAG)
o IEEE Networking Letters (NL)
o IEEE Systems Journal (ISJ)
o IEEE Sensors Journal (Sens. J.)
o IEEE Sensors Letters (SENSL)
o IEEE Transactions on Aerospace and Electronic Systems (TAES)
o IEEE Access
o IEEE Open Journal of the Communication Society (OJCOMS)
o IEEE Open Journal of Vehicular Technology (OJVT)
o Nature Scientific Reports
o IET Communications
o IET Intelligent Transportation System
o Elsevier Future Generation Computer Systems (FGCC)

CONFERENCE COMMITTEE CHAIR/CO-CHAIR

o Co-Chair of Technical Committee at IEEE International Conference on Future Technologies for Smart Society (ICFTSS 2024).

- o Program Co-Chair at International Conference on Computers and Automation (CompAuto 2023-2024).
- o Program Co-Chair at International Conference on Control, Robotics Engineering Technology (CRET 2024).
- o Tutorial Chair at IEEE Gaming, Entertainment, and Media Conference (IEEE GEM 2023).
- o Session Chair at Innovation and Technological Advances for Sustainable Development (ITAS 2023).
- o Workshop Co-Chair at Sensing, Communication, and Localization in 6G (6GIoTT 2022).
- o Session Chair at "IEEE 41st International Conference on Consumer Electronics (ICCE 2023).
- o Session Chair at International Conference on Computers and Automation (CompAuto 2022).

CONFERENCE TPC
- o IEEE International Conference on Communications (ICC 2021-2024)
- o IEEE Global Communications Conference (GLOBECOM 2024)
- o IEEE Consumer Communications and Networking Conference (CNCC 2021-2025)
- o IEEE Vehicular Technology Conference (VTC2023-Fall)
- o International Conference on Consumer Electronics (ICCE Berlin 2023)
- o International Conference on Consumer Electronics (ICCE Taiwan 2024)
- o IEEE Conference on Technologies for Sustainability (SusTech 2020-2025)
- o Asia Conference on Computer Vision, Image Processing, and Pattern Recognition (CVIPPR'24)
- o IEEE BigData 2020
- o IEEE International Conference on Acoustics, Speech & Signal Processing (ICASSP 2020)
- o IEEE Sensors 2020
- o IEEE 4th World Forum on Internet of Things (WF-IoT 2018)

TECHNICAL COMMITTEES
- o IEEE TCCC - CompSoc's Technical Community on Computer Communications
- o IEEE TCPAMI - CompSoc's Technical Community on Pattern Analysis and Machine Intelligence
- o IEEE MDA-TC - CTSoc's Technical Committee on ML, DL and AI in CE
- o IEEE IOT-TC - CTSoc's Technical Committee on Internet of Things
- o Internet of Things Community
- o IEEE Sensors Council

COURSES
- o Chartered Engineer, EC UK
- o TensorFlow Specialization, Andrew Ng (Deeplearning.ai)
- o Deep Learning Specialization, Andrew Ng (Deeplearning.ai)
- o Machine Learning, Andrew Ng (Stanford University)
- o Introduction to On-device AI, Qualcomm
- o Fundamentals of Accelerated Computing with CUDA Python, Nvidia
- o Getting Started with AI and Jetson Nano, Nvidia
- o Machine Learning School 2019, BigML and QCRI, Doha, Qatar
- o Supervising Doctoral Studies, Epigeum, Oxford University Press
- o Certified Peer Reviewer, Elsevier
- o Certified Peer Reviewer, Web of Science Academy
- o Mentor Community and Training, Coursera
- o IBM Maximo, Asset, Inventory, and Work Order Management
- o Energy Efficiency and Building Automation Systems, Schneider Electric
- o Juniper Networks Certified Internet Associate - JNCIA
- o IPv6 Forum Certified Network Engineer, IPv6 Forum
- o 4G Mobile and Future Internet, ITU Academy
- o Mobile Broadband: LTE/LTE-Advanced, WiMAX and WLAN, ITU Academy
- o Future Internet, ITU Academy
- o Migration to IPv6, ITU Academy

SKILLS
- o **ML/DL frameworks:** Scikit-learn, PyTorch, TensorFlow, Keras
- o **Scientific computation:** OpenCV, Numpy, Scipy, Pandas, ...
- o **Image/Sound/Text Processing:** OpenCV, Open3D, Librosa, Beautiful Soup
- o **Visualization:** Matplotlib, Plotly, Seaborn
- o **GPU/Edge:** Cuda, ONN, TensorRT, NVIDIA Jetson edge devices
- o **ML/DL Models** MLP, SVM, RF, DT, XGBoost, LSTM, CNNs, ViTs

REFERENCES   Upon request ..