

Junaid Farooq, Ph.D.

4901 Evergreen Rd, Institute for Advanced Vehicular Systems, Dearborn, MI 48128 USA,
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EDUCATION

- **New York University** Brooklyn, NY
Ph.D. in Electrical Engineering Sept. 2016 – May 2020
 - **Dissertation:** Dynamic Cyber-Physical Decision Mechanisms for Large Scale Internet of Things (IoT) Systems and Networks.
 - **Advisor:** Dr. Quanyan Zhu
 - **Awards:** NYU University Wide Dissertation Award (Technology & Applied Science) 2021, Dante Youla Award 2020, Athanasios Papoulis Award 2018
- **King Abdullah University of Science & Technology (KAUST)** Thuwal, Saudi Arabia
M.S. in Electrical Engineering; GPA: 3.83 Sept. 2013 – Jun. 2015
 - **Dissertation:** Modeling and Analysis of Inter-Vehicle Communication: A Stochastic Geometry Approach.
 - **Advisor:** Dr. Mohamed-Slim Alouini
- **National University of Sciences & Technology (NUST)** Islamabad, Pakistan
B.S. in Electrical Engineering; GPA: 3.94 Sept. 2009 – Jun. 2013
 - **Dissertation:** A Game-Theoretic Spectrum Allocation Framework for Mixed Unicast and Broadcast Traffic Profile in Cognitive Radio Networks.
 - **Advisor:** Dr. Junaid Qadir
 - **Awards:** President's Gold Medal

EXPERIENCE

- **University of Michigan-Dearborn** Dearborn, MI
Assistant Professor Sept. 2020 - present
 - **Department:** Electrical & Computer Engineering.
- **New York University** Brooklyn, NY
Research Scientist Jun. 2020 - Aug. 2020
 - **Department:** Electrical & Computer Engineering.
- **Qatar Mobility Innovations Center** Doha, Qatar
Research Assistant Jun. 2015 - Jun. 2016
 - **Project:** Environment Aware Cellular Systems: LTE-Advanced Powered by the Smart Grid.
 - **Supervisor:** Dr. Abdullah Kadri
 - **Accomplishments:** Developed theoretical foundations for collaboration of mobile operators to reduce energy consumption and consequently increase operational profits.

PUBLICATIONS

- **Under Submission/Revision:**
 - [U1] D. Neifar*, J. Farooq, H. Ghazzai, and M. Hadded, "Collaborative CNN-Based Federated Learning for Steering Control in Diverse Driving Conditions", submitted to *IEEE Vehicular Technology Conference (VTC-Fall 2024)*.
 - [U2] Y. Wang* and J. Farooq, "Joint Positioning and Computation Offloading in Multi-UAV MEC Networks for Low Latency Applications: A Stackelberg Game Approach", submitted to *IEEE Global Communications Conference (GlobeCom 2024)*, Cape Town, South Africa, Sept 2024.
 - [U3] X. Wu*, J. Farooq, and J. Chen, "MARL-Based Dynamic Resource Orchestration for Network Slicing in 5G Edge-Cloud Networks", submitted to *IEEE Military Communications Conference (MILCOM 2024)*.
 - [U4] Y. Wang* and J. Farooq, "Joint Positioning and Computation Offloading in Multi-UAV MEC Networks for Low Latency Applications: A Stackelberg Game Approach", submitted to *IEEE Global Communications Conference (GlobeCom 2024)*.

- [U5] X. Wu* and J. Farooq, “Reliable and Resilient Connectivity and Coverage under Localized Backhauling in UAV-IoT Networks”, submitted to *IEEE Transactions on Automation Science and Engineering*.
- [U6] Y. Wang* and J. Farooq, “Multi-UAV Placement for Integrated Access and Backhauling Using LLM-Based Optimizers”, submitted to *IEEE Global Communications Conference (Globecom 2024)*.
- [U7] M. Lyu* and J. Farooq, “Zero Trust in 5G Networks: Principles, Challenges, and Opportunities”, submitted to *IEEE Network*.
- [U8] J. Farooq and Q. Zhu, “Dynamic Spatio-Temporal Resource Provisioning for On-Demand Urban Services in Smart Cities”, submitted.
- [U9] J. Farooq and Q. Zhu, “IoT Supply Chain Security: Overview, Challenges, and the Road Ahead”, submitted.
- [U10] J. Farooq and U. Pillai, “A Probabilistic Approach to Coverage Analysis in Uniform Random Wireless Networks”, submitted.

Books:

- [B1] T. Kieras*, J. Farooq and Q. Zhu, “IoT Supply Chain Security Risk Analysis and Mitigation: Modeling, Computations, and Software Tools”, *Springerbriefs in Computer Science*, Sept. 2022.
- [B2] J. Farooq and Q. Zhu, “Resource Management for On-Demand Mission-Critical Internet of Things Applications”, *Wiley-IEEE*, Sept. 2021.
- [B3] J. Farooq and U. Pillai, “Problems and solutions in undergraduate probability”, in *Amazon Kindle Direct Publishing*, 2019.

Journals:

- [J1] M. Lyu*, J. Farooq, and Q. Zhu “Mapping Cyber Threats in the 5G Supply Chain: Landscape, Vulnerabilities, and Risk Management”, submitted to *IEEE Network*.
- [J2] Y. Wang* and J. Farooq, “Deep Reinforcement Learning Based Placement for Integrated Access Backhauling in UAV-Assisted Wireless Networks”, in *IEEE IoT Journal*, vol. 11, no. 8, April 2024.
- [J3] J. Chen, J. Farooq and Q. Zhu, “Contract-based data pricing mechanism for sensing-as-a-service in the Internet of things”, in *IEEE Internet of Things Journal*, vol. 10, no. 11, pp. 10080-10094, June, 2023.
- [J4] T. Kieras*, M. J. Farooq, and Q. Zhu, “I-SCRAM: A framework for IoT supply chain risk analysis and mitigation decisions”, in *IEEE Access*, vol. 9, pp. 29827-29840, 2021.
- [J5] M. J. Farooq and Q. Zhu, “QoE based revenue maximizing dynamic resource allocation and pricing for fog-enabled mission-critical IoT applications”, in *IEEE Transactions on Mobile Computing*, vol. 20, no. 12, pp. 3395-3408, 1 Dec. 2021.
- [J6] M. J. Farooq and Q. Zhu, “Modeling, analysis, and mitigation of dynamic botnet formation in wireless IoT networks”, in *IEEE Transactions on Information Forensics and Security*, vol. 14, no. 9, pp. 2412-2426, Sept. 2019.
- [J7] M. J. Farooq and Q. Zhu, “A multi-layer feedback system approach to resilient connectivity of remotely deployed mobile internet of things,” in *IEEE Transactions on Cognitive Communications and Networking*, vol. 4, no. 2, pp. 422-432, Jun. 2018.
- [J8] M. J. Farooq and Q. Zhu, “On the secure and reconfigurable multi-layer network design for critical information dissemination in the Internet of battlefield things (IoBT),” in *IEEE Transactions on Wireless Communications*, vol. 17, no. 4, pp. 2618-2632, Apr. 2018.
- [J9] M. J. Farooq, H. Ghazzai, E. Yaacoub, A. Kadri and M.-S. Alouini, “Green Virtualization for Multiple Collaborative Cellular Operators,” in *IEEE Transactions on Cognitive Communications and Networking*, vol. 3, no. 3, pp. 420-434, Sept. 2017.
- [J10] H. Ghazzai, M. J. Farooq, A. Alsharoa, E. Yaacoub, A. Kadri and M.-S. Alouini, “Green Networking in Cellular HetNets: A Unified Radio Resource Management Framework With Base Station ON/OFF Switching,” in *IEEE Transactions on Vehicular Technology*, vol. 66, no. 7, pp. 5879-5893, Jul. 2017.
- [J11] M. J. Farooq, H. Ghazzai, A. Kadri, H. ElSawy and M.-S. Alouini, “A Hybrid Energy Sharing Framework for Green Cellular Networks,” in *IEEE Transactions on Communications*, vol. 65, no. 2, pp. 918-934, Feb. 2017.
- [J12] M. J. Farooq, H. ElSawy, and M.S. Alouini, “A stochastic geometry model for multi-hop highway vehicular communication,” in *IEEE Transactions on Wireless Communications*, vol. 15, no. 3, pp. 2276-2291, Mar. 2016.

Conferences:

- [C1] X. Wu*, J. Farooq, and J. Chen, “Adaptive Risk-Aware Resource Orchestration for 5G Microservices over Multi-Tier Edge-Cloud Systems”, in *IEEE International Conference on Communications, Workshop on Intelligent Cloud Continuum for B5G services (ICC Wkshps 2024)*, Denver CO, Jun 2024.
- [C2] X. Wu* and J. Farooq, “Attack Resilient Wireless Backhaul Connectivity With Optimized Fronthaul Coverage in UAV Networks”, in *IEEE Conference on Communications and Network Security (CNS 2023), Cyber Resilience Workshop*, Orlando, FL, Oct. 2023.

- [C3] Y. Wang* and J. Farooq, “Optimal 3D Placement for Integrated Access Backhauling in UAV-Assisted Wireless Networks Using Reinforcement Learning”, in *IEEE International Conference on Mobile, Ad-hoc, and Smart Systems (MASS 2023)*, UAV-IoT Workshop, Toronto, ON, Sept. 2023.
- [C4] Y. Wang* and J. Farooq, “Zero Touch Coordinated UAV Network Formation for 360° Views of a Moving Ground Target in Remote VR Applications”, in *IEEE Military Communications Conference (MILCOM 2022)*, Washington D.C., USA, Nov. 2022.
- [C5] Y. Wang* and J. Farooq, “Proactive and Resilient UAV Orchestration for QoS Driven Connectivity and Coverage of Ground Users”, in *IEEE Conference on Communications and Security (CNS 2022)*, Cyber Resilience Workshop, Austin, TX USA, Oct. 2022.
- [C6] Y. Wang* and J. Farooq, “Resilient UAV Formation for Coverage and Connectivity of Spatially Dispersed Users”, in *IEEE International Conference on Communications (ICC 2022)*, Seoul, South Korea, May 2022.
- [C7] T. Kieras*, M. J. Farooq, and Q. Zhu, “Modeling and Assessment of IoT Supply Chain Security Risks: The Role of Structural and Parametric Uncertainties”, in *IEEE Symposium on Security and Privacy (SP 2020)*, Workshop on Cyber Resilient Supply Chain Technologies, San Francisco, CA, May 2020.
- [C8] M. J. Farooq and Q. Zhu, “PhD Forum: Enabling Autonomic IoT for Smart Urban Services,” in *IEEE 6th World Forum on Internet of Things (WF-IoT 2020)*, New Orleans, USA, Apr. 2020.
- [C9] T. Kieras*, M. J. Farooq and Q. Zhu, “RIoTS: Risk Analysis of IoT Supply Chain Threats,” in *IEEE 6th World Forum on Internet of Things (WF-IoT 2020)*, New Orleans, USA, Apr. 2020.
- [C10] M. J. Farooq and Q. Zhu, “Optimal dynamic contract for spectrum reservation in mission-critical UNB-IoT systems,” in *16th International Symposium on Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks (WiOpt 2018)*, Shanghai, China, May 2018.
- [C11] M. J. Farooq and Q. Zhu, “Adaptive and resilient revenue maximizing dynamic resource allocation and pricing for cloud-enabled IoT systems,” in *American Control Conference (ACC 2018)*, Milwaukee, WI, USA, Jun. 2018.
- [C12] M. J. Farooq and Q. Zhu, “Cognitive connectivity resilience in multi-layer remotely deployed mobile Internet of things,” in *Proc. IEEE Global Communications Conference (Gobecom 2017)*, Singapore, Dec. 2017.
- [C13] M. J. Farooq, H. ElSawy, Q. Zhu, and M.-S. Alouini, “Optimizing mission critical data dissemination in massive IoT networks,” in *Proc. 15th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt 2017)*, Workshop on Spatial Stochastic Models for Wireless Networks, Paris, France, May 2017.
- [C14] M. J. Farooq and Q. Zhu, “Secure and reconfigurable network design for critical information dissemination in the Internet of battlefield things (IoBT),” in *Proc. 15th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt 2017)*, Paris, France, May 2017.
- [C15] M. J. Farooq, H. Ghazzai, and A. Kadri, “Energy sharing framework for microgrid-powered cellular base stations,” in *Proc. IEEE Global Communications Conference (Globecom 2016)*, Washington, D.C., USA, Dec. 2016.
- [C16] M. J. Farooq, H. Ghazzai, and A. Kadri, “A stochastic geometry-based demand response management framework for cellular networks powered by smart grid,” in *Proc. IEEE Wireless Communications and Networking Conference (WCNC 2016)*, Doha, Qatar, Apr. 2016.
- [C17] M. J. Farooq, H. Ghazzai, and A. Kadri, “Optimized energy procurement for cellular networks powered by smart grid based on stochastic geometry,” in *Proc. IEEE Globecom Workshops (GC Wkshps 2015)*, San Diego, USA, Dec. 2015.
- [C18] M. J. Farooq, H. ElSawy, and M.S. Alouini, “Modeling inter-vehicle communication in multi-lane highways: A stochastic geometry approach,” in *Proc. IEEE Vehicular Technology Conference, (VTC-Fall 2015)*, Boston, USA, Sept. 2015
- [C19] M. J. Farooq, M. Hussain, J. Qadir and A. Baig, “A game-theoretic spectrum allocation framework for mixed unicast and broadcast traffic profile in cognitive radio networks,” in *Proc. IEEE Conference on Local Computer Networks (LCN 2013)*, Sydney, Australia, Sept. 2013.

RESEARCH GRANTS (\$1.29M AS PI, \$0.9M AS CO-PI)

- [G1] “5G Hardware Encryption Cybersecurity Integration Evaluation”, U.S. Department of Defense (Prime) through MxD USA via OPEX Solutions (Direct), Amount: **\$45,000**, Role: **PI**, Sept. 2024.
- [G2] “Systemic Cyber Risk Management for Complex Automotive Supply Chains” submitted to MTRAC Innovation Hub for Advanced Computing, *Michigan Economic Development Corporation (MEDC)*, Amount: **\$99,960**, Role: **PI**, Jan. 2024.
- [G3] “Robotic wireless signal strength mapping of industrial facilities”, U.S. Department of Defense (Prime) through MxD USA (Direct), Amount: **\$899,999**, Role: **Co-PI**, Nov. 2023.

- [G4] “5G Cybersecurity Reference Architecture”, U.S. Department of Defense (Prime) through MXD USA via OPEX Solutions (Direct), Amount: **\$50,000**, Role: **PI**, Apr. 2022.
- [G5] “NSF Convergence Accelerator Track G: Proactive End-to-End Zero Trust-Based Security Intelligence for Resilient Non-cooperative 5G Networks”, National Science Foundation, Amount: **\$749,866**, Award number: 2226232, Role: **PI**, Aug. 2022.
- [G6] “Cyber Supply Chain Risk Assessment and Mitigation for Automotive IoT”, *Michigan Economic Development Corporation (MEDC)* through the *MTRAC Advanced for Transportation at the University of Michigan*, Amount: **\$34,500**, Role: **PI**, Jun. 2022.
- [G7] “Multi-layer cyber-physical supply chain risk analysis for improving the resilience of IoT enabled critical infrastructures”, *Department of Homeland Security S&T* (Prime) through the *Critical Infrastructure Resilience Institute (CIRI) at the University of Illinois Urbana-Champaign* (Direct), Amount: **\$299,747**, Award number: 2015-ST-061-CIRC01, Role: **PI**, Jul. 2021.
- [G8] “Multi-tier Aerial Network Formation and Control for Emergency Communications”, *UM-Dearborn Research Initiation and Development Grant*, Amount: **\$10,000**, Role: **PI**, Jul. 2021.

TUTORIALS

- [T1] “IoT Supply Chain Security Risk Assessment and Mitigation: Methodologies and Computational Tools”, at *IEEE Military Communications Conference (MILCOM 2022)*, Nov. 2022.
- [T2] “Understanding IoT Security Risks and Resilience: From Networks to Supply Chain”, at *IEEE 6th World Forum on Internet of Things (WF-IoT 2020)*, Apr. 2020.
- [T3] “Resource management for on-demand mission-critical Internet of things applications”, at *IEEE International Symposium on Dynamic Spectrum Access Networks (DySpan 2019)*, Nov. 2019.

INVITED TALKS

- [I1] “Supply Chain Cybersecurity and Resilience for Internet of Things”, *INFORMS Conference on Security*, Aug. 2022.
- [I1] “Supply Chain Security of Industrial Control Systems”, *Panel discussion at Resilience Week*, Oct. 2021.
- [I2] “Protecting Connected Cities Present and Future”, *Panel discussion organized by Critical Infrastructure Resilience Institute (CIRI)*, Jan. 2021.
- [I3] “IoT and the Curse of Massive Wireless Connectivity: A Systems Outlook”, *Webinar delivered at the Center for Urban Science and Progress (CUSP)*, Sept. 2020.
- [I4] “Supply Chain Risk and Mitigation for IoT-Enabled Infrastructure Systems”, *Webinar delivered at the Institute for Information Infrastructure (I3P)*, Apr. 2020.
- [I5] “Cyber-Physical Supply Chain Risk Analysis and Mitigation for Internet of Things Networks”, *Webinar delivered at the Monthly Community Call of the Automotive Information Sharing and Analysis Center (Auto-ISAC)*, Feb. 2020.
- [I6] “Securing Wireless IoT Networks from Coordinated Stealthy Attacks”, *ECE Departmental Seminar at Stony Brook University*, Sept. 2019.
- [I7] “Securing Wireless IoT Networks from Backdoor Stealthy Attacks” at *5th International Conference on Artificial Intelligence and Security (ICAIS 2019)*, Brooklyn, NY, USA, Jul. 2019.
- [I8] “Adaptive and Resilient Revenue Maximizing Dynamic Resource Allocation and Pricing for Cloud-Enabled IoT Systems”, at *AMS Sectional Meeting on Optimization under Uncertainty*, Boston, MA, USA. Apr. 2018.
- [I9] “Optimal Dynamic Contract for Spectrum Reservation in Mission-Critical UNB-IoT Systems”, at *International Conference on NETwork Games, COntrol and OPTimisation (NETGCOOP 2018)*, Brooklyn, NY, USA, Nov. 2018.

AWARDS

- Outstanding Dissertation Award:** Awarded by New York University in the Technology and Applied Sciences category. The award is in recognition of the dissertations' scholarly rigor, writing quality, and potential for academic and social impact. Apr. 2021
- Dante Youla Award:** Awarded by Dept. of Electrical & Computer Engineering, NYU Tandon School of Engineering for graduate research excellence. May. 2020
- NSF Travel Award:** To attend Networking Technology and Systems Early-Career Investigators (NeTS-ECI) Workshop, Alexandria, VA. Jul. 2019
- ICERM Travel Award:** To attend Workshop on Scientific Machine Learning organized by ICERM at Brown University, Providence, RI USA. Jan. 2019
- Athanasios Papoulis Award:** Awarded by Dept. of Electrical & Computer Engineering, NYU Tandon School of Engineering (in memory of late Prof. Athanasios Papoulis) for excellence in undergraduate teaching. Jun. 2018
- Outstanding Reviewer:** Awarded by Elsevier Computer Communications in recognition of the contributions made to the quality of the journal. Mar. 2018
- Ernst Weber Fellowship:** Awarded by Dept. of Electrical & Computer Engineering, NYU Tandon School of Engineering to support PhD studies and research. Sept. 2016 - May. 2018
- KAUST Fellowship Award (70,000 USD/yr):** Covers tuition, housing, insurance, travel and stipend for MS study at KAUST. Sept. 2013 - Jun. 2015
- President's Gold Medal:** Awarded by National University of Sciences & Technology (NUST) for best academic performance. Jan. 2014
- Merit Scholarship:** 75% tuition fee waiver awarded by NUST. Jan. 2010 - Jun. 2013
- Presidential Award:** Awarded by Ministry of Education, Govt. of Pakistan for achieving world distinction in Cambridge International Examinations (CIE) in O Level Mathematics. May 2009

STUDENT ADVISING

- **PostDoctoral:**
 - * Ahmed Al Amin - Zero Trst Cybersecurity for 5G networks Sept. 2022 - Aug. 2023
- **Graduate:**
 - * Dhia Neifar (UMD) - Federated learning assisted decision-making for vehicular networks Sept. 2023 - present
 - * Xingqi Wu (UMD) - Resource Orchestration and Management for 5G networks Jul. 2023 - present
 - * Moyan Lyu (UMD) - Zero Trust cybersecurity of 5G networks Jul. 2023 - present
 - * Yuhui Wang (UMD) - UAV formation for coverage and connectivity of ground users Sept. 2021 - Dec. 2021
 - * Zhaoguo Wang (UMD) - Improving profitability of ride sharing by efficient resource matching May. 2021 - Aug. 2022
 - * Yunfan Xu (NYU) - Development of iSCRAM software tool May 2021 - May 2022
 - * Timothy Kieras (NYU) - Supply chain risk analysis and mitigation in IoT networks Jun. 2019 - May 2020
- **Undergraduate:**
 - * Jawad Hazime (UMD) - Spatial Mapping of Signal Strength for Wireless Protocols Jun. 2024 - Aug. 2024
 - * Meher Jabbar (UMD) - Experimentation on NSF AERPAAW Testbed for Aerial Networks Jun. 2022 - Aug. 2022
 - * Shouryan Nikam (UMD) - Intelligent refueling strategies for smart and autonomous vehicles Jun. 2021 - Aug. 2021
 - * Teddy Zheng (NYU) - Load balancing in Citibikes Jun. 2017 - Aug. 2017
 - * Jin Shang (NYU) - Power saving mode design for realtime IoT sensors Jun. 2018 - Aug. 2018
 - * Rundong Chen (NYU) - Autonomous pickup decisions in autonomous taxis Jun. 2018 - Aug. 2018
- **Dissertation Committee Member:**
 - * Abdul Rahman Abu Elkhail (UMD PhD Dissertation) - "Towards Defending Against Malware Attacks" Jun. 2023

SERVICE

- **ECE Department Service:**
 - * Chair, Faculty Search Committee 2022 - Successfully led the recruitment of faculty member for Computer Engineering for the ECE department.
- **Conference Organization:**
 - * General Chair for IEEE Conference on Communications and Network Security (CNS 2023) Cyber Resilience Workshop, Orlando FL, Oct. 2023.
 - * Session Chair for IEEE International Conference on Mobile Ad-Hoc and Smart Systems (MASS 2023), Toronto ON, Sept. 2023.
 - * Session Chair for IEEE Conference on Communications and Network Security (CNS 2022) Cyber Resilience Workshop, Austin TX, Oct. 2022.
 - * Regional Co-Chair (USA/Canada) for Cyber Security Awareness Week (CSAW 2019), Nov. 2019, Brooklyn, NY
 - * Session Chair for 'Wireless Networks' session at International Conference on Networks, Games, Control, and Optimization (NETGCOOP 2018), Nov. 2018, Brooklyn, NY
- **Miscellaneous:**
 - * Facilitator for ARO workshop on Cyber Deception, Brooklyn NY, Aug. 2023.
 - * Invited attendee for ARO workshop on AI for Security at Virginia Tech., Arlington VA, Jan. 2022.
 - * Panelist for NSF proposal review Nov. 2022
- **Technical Reviews:**
 - * IEEE Transactions on Wireless Communications
 - * IEEE Transactions on Communications
 - * IEEE Transactions on Vehicular Technology
 - * IEEE Transactions on Mobile Computing
 - * IEEE Communications Letters
 - * IEEE Transactions on Green Communications & Networking
 - * IEEE Transactions on Information Forensics & Security
 - * IEEE Conference on Communications and Network Security
 - * IEEE Vehicular Technology Conference
 - * IEEE Transactions on Big Data
 - * IEEE Conference on Communications and Network Security
 - * Elsevier Computer Communications

REFERENCES

Available upon request.