

Huthaifa I. Ashqar, Ph.D.

Subject Expert Matter at Precision Systems, Inc
Assistant Professor at Arab American University

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Summary

Dr. Ashqar is a subject expert at Precision Systems, Inc. in USA and an assistant professor at the Arab American University in Palestine, who has more than ten years of experience with a primary focus on Data Science and Artificial Intelligence and their application on Traffic Theory and Engineering, Connected and Automated Vehicles, Intelligent Transportation Systems (ITS), Advanced Transportation and Energy Technologies. He has improved his ability to quickly familiarize himself with the technical content and challenges in new fields to find sustainable and robust solutions to problems throughout his rigorous engineering research and interdisciplinary teamwork experience. His experience includes being a Technical Advisor for \$50M programs in advanced transportation technologies at U.S. DOE's ARPA-E. He received the 1st place in the IEEE ITSC UAS4T Competition (2020). He has published several research papers in prestigious journals and conferences including the IEEE Transactions on ITS, Remote Sensing, IEEE ITS conference, and has been a speaker in several conferences.

Specialties

Connected and Automated Vehicles, Traffic Theory and Engineering, Signal Design, Pavement Design and Rehabilitation, Urban Planning and Development, Roadway Design, Mobility, Smart Cities, ITS, Transportation Safety and Policy, Economic Development, AI, Machine Learning, Deep Learning, and Statistical Modelling.

Education

Virginia Tech. Blacksburg, VA, USA

Ph.D. in Transportation Infrastructure and Systems Engineering, Civil Engineering, Aug 2015 – Dec 2018

Advisor: Dr. Hesham Rakha, **Co-Advisor:** Dr. Leanna House. (GPA: 3.88/4.00)

Dissertation: Strategic Design of Smart Bike-Sharing Systems for Smart Cities

Virginia Tech. National Capital Region, VA, USA

Graduate Certificate in Economic Development, Urban Affairs and Planning, Aug 2019 – July 2021

Designed to acquire a basic understanding of urban and regional economic development dynamics and the role of policy in influencing them to respond to challenges resulting from globalization, technological development, demographic changes, urban decline, sprawl, and social inequities.

Virginia Tech. Blacksburg, VA, USA

Graduate Certificate in Data Science and Urban Computing, Computer Science, Jan 2016 – Jan 2018.

Learn to apply methods in data analytics, computational modeling, and visualization to help solve key issues in urban populations such as traffic flow, and mobility systems.

University of Minho. Braga, Portugal

M.Sc. in Road Infrastructures, Urban Engineering, Sep 2013 – Feb 2015

Advisor: Dr. Hugo Silva. (GPA: 3.94/4.00)

Thesis: Evaluation of Polymer Modified Asphalt Binder Aging

An-Najah National University. Nablus, Palestine

B.Sc. in Civil Engineering, Aug 2008 – Jan 2013

Advisor: Dr. Sameer Abu-Eisheh. (GPA: 3.75/4.00)

Project: Evaluation and Re-Design of the Transportation Systems Around the New Campus

Experience

Arab American University. Jenin, Palestine.

Assistant Professor at the Civil Engineering Department, Sep 2022 – Present.

Dr. Ashqar's role includes teaching undergraduate courses toward bachelor's degree in Civil Engineering and graduate courses toward master degree in Data Science, developing and managing the class syllabus and ensuring that the syllabus meets department and college standards, planning and creating lectures, in-class discussions, and assignments, reporting student learning outcomes, class reviews, and analyzing student data, collaborating with colleagues on course curriculum, advising students on how to be successful and achieve goals, and participating in professional and research development activities.

Precision Systems, Inc. Washington D.C. Metro Area, USA.

Subject Expert Matter, Feb 2021 – Present.

Dr. Ashqar has led multiple projects in traffic design and engineering, signal design, ITS, advanced transportation, and energy technologies for several local, states, and federal USDOTs and other agencies. He has also developed simulations and modeling in cooperative automation and connected vehicles practice areas such as speed harmonization and Eco-vehicle technologies. He has also led proposal capturing and business development for multiple projects with over a \$100 million budget in ITS applications, Connected and Automated Vehicles, signal control design, smart cities, and advanced measurement of effectiveness.

Universal Group for Engineering and Consulting. Nablus, Palestine.

Subject Expert Matter, Aug 2021 – Mar 2022.

Dr. Ashqar has led multiple projects in traffic design and engineering, signal design, ITS, advanced transportation including Preparation of Economic and Environmental Feasibility Study for the construction of an alternative route for Wade Al Nar Road and Consultancy Services for Preparation of the National Spatial Development Plan for the State of Palestine 2050.

An-Najah National University. Nablus, Palestine.

Adjunct Professor, Jan 2022 – Jun 2022.

Dr. Ashqar's role includes teaching Introduction to Artificial Intelligence course toward bachelor's degree in Computer Science Apprenticeship Program; developing and managing the class syllabus and ensuring that the syllabus meets department and college standards, planning and in-class discussions, and assignments.

Lecturer and Teaching Assistant, Jan 2013 – Aug 2013.

Teaching structural analysis lab, providing guidance and technical support on materials and study skills.

University of Maryland, Baltimore County. Rockville, MD, USA.

Adjunct Professor, Aug 2019 – Present.

Dr. Ashqar's role includes teaching graduate courses toward master's degree in data science including Introduction to Data Science and Introduction to Machine Learning.

Booz Allen Hamilton. Washington D.C. Metro Area, USA.

Subject Expert Matter, Aug 2018 – Feb 2021.

Technical Advisor for the Advanced Research Projects Agency-Energy (USDOE's ARPA-E)

Dr. Ashqar worked in a team focused on support of new program development at ARPA-E. Worked closely with ARPA-E Program Directors to form program hypotheses; identified research and analysis needs, proposed execution strategies and schedules for program development, and oversaw its execution; coordinated with subject matter experts; identified technical whitespace and created associated illustrations; supported the development of program metrics, including analysis that determines the energy impact of their realization; and led the development of RFIs, workshops, program pitches, and FOAs.

Supported new program development and government funded projects across many technical areas. Topics included energy efficiency technologies for connected and automated vehicles (CAV); testing, validation, and verification of CAV safety; using Machine Learning and AI to enhance engineering design processes; and developing a planning tool to reduce GHG in the rail freight sector.

NEXT-Generation Energy Technologies for Connected and Automated On-Road Vehicles (NEXTCAR)

The objective of the projects is enabling technologies that use connectivity and automation to co-optimize vehicle dynamic controls and powertrain operation, thereby reducing energy consumption of the vehicle. Vehicle dynamic and powertrain control technologies, implemented on a single vehicle basis, across a cohort of cooperating vehicles, or across the entire vehicle fleet, could significantly improve individual vehicle and, ultimately, fleet energy efficiency. While a large portion of future vehicle energy efficiency improvements (driven by federal fuel economy standards) is expected to be achieved through a mix of well-established technologies, there is a significant new opportunity to leverage the advances of Connected and Automated Vehicle (CAV) technologies to further improve the energy efficiency of individual vehicles. Dr. Ashqar is the technical advisor for number of funded projects under NEXTCAR with over \$50M value.

Laying the groundwork to take the skies: Enhancing the energy efficiency of Urban Air Mobility

Explored the potential role of Urban Air Mobility in transforming transportation systems and the overall energy use implications of Urban Air Mobility as a means to determine where the opportunities are for technical whitespace areas for further exploration. The aim of the study is to provide information to potential stakeholders to identify innovative ideas to improve the energy efficiency as the Unmanned Aerial System technology is further developed, planned, and adopted.

Enhanced-Machine Learning for Impactful Design Engineering Processes (DIFFERENTIATE)

The DIFFERENTIATE program seeks to enhance the pace of energy innovation by incorporating machine learning and AI into the energy technology development process. It conceptualizes several machine learning tools that could help engineers to execute and solve these problems in a manner that dramatically accelerates the pace of energy innovation. Dr. Ashqar led the effort to develop and pitch the program for ARPA-E's leaders and is the technical advisor for number of projects with over \$25M value.

Lowering CO2: Models to Optimize Train Infrastructure, Vehicles, and Energy Storage (LOCOMOTIVES)

This project serves as an important step towards full decarbonization of the US freight Class 1 rail system. The targeted outcome of the LOCOMOTIVES Topic is a set of publicly available planning tools for identification, evaluation, and prioritization of ES-related technology developments whose deployment would significantly reduce GHG emissions from the rail freight sector. These tools are informed by and consistent with the economic and logistical constraints of the rail freight system or reasonable extrapolation thereof. Dr. Ashqar led the effort to develop and pitch the program for ARPA-E's leaders and is the technical advisor for the potential projects with over \$10M value.

Connecting Pedestrians with Disabilities to Adaptive Signal Control for Safe Intersection Crossing and Enhanced Mobility (ATTRI)

This project developed and demonstrated assistive services that promote safe passage of injured veterans, older adults, and other persons with blindness, low vision, cognitive, or mobility related disabilities when crossing signalized intersections, and leverage smart traffic signal infrastructure to further provide these persons with significant mobility enhancements. Dr. Ashqar led the effort of data and performance measures analysis and evaluation.

Columbia University - School of Professional Studies. New York, NY, USA.

Adjunct Faculty (Associate), Jun 2019 – Jan 2020.

Capstone: Solving Real World Problems with Analytics. The course serves as the capstone project for the master's in applied Analytics degree. As an industry-driven project, the capstone requires synthesis of program content applied to real-world challenges to apply the leadership, strategic management, communication and modern analytics core coursework to industry-sponsored analytics projects. Working in teams and with faculty, students critically assess a company's real-world data challenges and opportunities, formulate a problem definition, derive insights, and develop an integrated data-savvy analytics plan and solution. The project helps students develop and apply the technical, leadership, and communication skills required to identify and implement solutions/approaches.

Intelligent Automation, Inc. Rockville, MD, USA.

Transportation Systems Engineer, June 2018 – July 2018.

A Wireless Sensor Network with Accurate Time Synchronization for Traffic Signal Timing Analysis

This project involved developing a wireless sensor network with accurate time synchronization and wide area coverage for traffic signal timing analysis. It includes designing and developing the Traffic Signal Analysis and Control Decision Support System (TSAC-DSS) to demonstrate and validate this product at nearby Traffic Management Centers (TMCs) with real traffic network data and events. Dr. Ashqar was involved in using High Resolution Data and signal performance measures to support the control decision system. Dr. Ashqar led the effort to formulate a control decision system based on Deep Reinforcement Learning.

Virginia Tech Transportation Institute (VTTI). Blacksburg, VA, USA.

Doctoral Researcher, Aug 2015 – May 2018.

Transportation Mode Recognition Using Hybrid Features

The project developed a novel two-layer hierarchical classifier that increases the accuracy of traditional transportation mode classification algorithms. The project also enhanced classification accuracy by extracting new frequency domain features without using features from GPS data as signals may be lost in some areas. Dr. Ashqar led the effort of all major areas of concept formation, coding programming and data analysis, as well as manuscript composition.

Effect of Mixed Motor Vehicle and Bicycle Traffic on Signalized Intersections

This project investigated the effect of mixed cars and bicycles traffic on signalized intersection using VISSIM simulation. VISSIM argued that the model can define each vehicle type separately. The bicycle specifications in VISSIM have 21 states that reflects the reality. Results show that the travel time and delay increase as the bike percentage in the movement increases. Result also illustrate that as the bike percentage increases the saturation flow of a movement decreases until it reaches specific bike percentage (about 15%) then the saturation flow remains constant. Dr. Ashqar led all major areas of concept formation and data analysis, as well as manuscript composition.

National Science Foundation. Blacksburg, VA, USA.

Research Fellow, Jan 2016 – Jan 2018.

Strategic Design of Smart Bike-Sharing Systems for Smart Cities, Aug 2015 – May 2018.

This project is a building block for designing a smart bike-sharing system BSS in the strategic level using modeling, simulation, machine learning, and statistical analysis, which could be applied in the real world. Generally, four elements were developed in this project using publicly available data from the Bay Area Bike-Sharing System: transportation mode recognition using hybrid features, quantifying the effect of various features on BSS, network and station-level BSS prediction using Machine Learning, and proposing quality-of-service measurement for BSS stations. Dr. Ashqar led all major areas of concept formation and data analysis, as well as manuscript composition.

Researcher, Sep 2013 – Feb 2015.

Urbanization Life Cycle of Nablus City and the Effect of Public Participation, Sep 2013 – Dec 2013.

This study aims to analyze the urbanization in Nablus Municipality as an urban growth area during 1946 - 2015. This is done through applying the Lourenço meta-analysis for urban growth areas, which allows a better understanding of the sequence of interdependencies that exist. Results showed that Nablus Plan-Process completed the cycle (planning, action, and living). Innovative adaptation to the faced conditions by engaging the society is one of the most important reasons of Nablus's complete cycle. Dr. Ashqar was involved in all major areas of concept formation and data analysis, as well as manuscript composition.

Achievements

- **Distinguished Researcher**, Arab American University, Palestine, 2023.
 - **1st place in the IEEE UAS4T competition**, Virginia Tech, USA, 2020.
 - **National Science Foundation Fellowship**, Virginia Tech, USA, 2016 – 2018
 - **Erasmus Mundus Scholarship**, University of Minho, Portugal, 2013 – 2015
 - **An-Najah National University's Honor List**, An-Najah National University, Palestine, 2013
 - **Civil Engineering Department's Award**, An-Najah National University, Palestine, 2013
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Projects

Local

- Traffic impact studies and transportation design for several areas including area around Nablus University and ICON Mall, 2023.
 - Preparation of Economic and Environmental Feasibility Study for the construction of an alternative route for Wade Al Nar Road, 2021.
 - Consultancy Services for Preparation of the National Spatial Development Plan for the State of Palestine 2050, 2021.
 - Implementation of pilot projects for the preparation of urban planning methodologies, manuals detailed study, 2021.
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International

- District Department of Transportation (DDOT), Traffic Engineering Support Services (TSES) in Washington, DC, **\$1.9M**, 2021 – Present.
- DDOT, Design and Construction Engineering Services for HSIP Safety Improvement Construction in Washington, DC, **\$250K**, 2021 – Present.
- DDOT, Traffic Accident Reporting and Analysis System (TARAS) of Washington, DC, **\$100K**, 2021 – Present.
- Virginia Tech Center for Economic and Community Engagement (VT CECE), Regional Economic Recovery and Resilience Toolkit for Virginia, USA, 2021.
- Virginia Tech Center for Economic and Community Engagement (VT CECE), Local Economic Portrait of a Small Urban During Covid-19 Pandemic: Mosaic District as a Case Study, 2020.
- Virginia Tech Center for Economic and Community Engagement (VT CECE), The Impact of International Assistance on Urban Economic Development of Developing Countries, 2019.
- USDOE's ARPA-E, NEXT-Generation Energy Technologies for Connected and Automated On-Road Vehicles (NEXTCAR), **\$50M**, 2018 – 2021.
- USDOE's ARPA-E, Design Intelligence Fostering Formidable Energy Reduction and Enabling Novel Totally Impactful Advanced Technology Enhancements (DIFFERENTIATE), **\$25M**, 2018 – 2021.
- USDOE's ARPA-E, LOWering CO2: Models to Optimize Train Infrastructure, Vehicles, and Energy Storage (LOCOMOTIVES), **\$10M**, 2020 – 2021.

- USDOT's ATTRI, Connecting Pedestrians with Disabilities to Adaptive Signal Control for Safe Intersection Crossing and Enhanced Mobility, **\$5M**, 2018 – 2019.
 - DelDOT, Automated Realtime Sensor Network Traffic Signal Analysis and Management Tool, **\$20M**, 2018.
 - IEEE ITSC 2020 Conference, Estimation of Queue Lengths using Unmanned Aerial Data, 2020.
 - Virginia Tech Transportation Institute (VTTI), Vulnerable Road User Classification Using RQA and Transfer Learning with CNN, 2019.
 - Michigan Department of Transportation (MDOT), Impact of Risk Factors on Work Zone Crash Severity Using Logistic and Random Forest Models, 2018.
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Publications – [Google Scholar](#)

- Ashqar, H.I., et al. "Joint Impact of Rain and Incidents on Traffic Stream Speeds." *Journal of Advanced Transportation*, vol. 2021, Article ID 8812740, 12 pages, 2021.
- Ashqar, H.I., et al. "Performance of Signalized Intersections Using Unmanned Aerial Data" *In review*.
- Ashqar, H.I., et al. "A Novel Crowdsourcing Model for Micro-mobility Ride-sharing Systems." *In review*.
- Ashqar, H.I., et al. "Impact of risk factors on work zone crashes using logistic models and Random Forest." *In review*.
- Ashqar, H.I., et al. "Quality-of-Service Measure for Bike-Sharing Systems." *In review*.
- Ashqar, H.I., et al. "Evaluation the Use of a Road Diet Strategy: An Urban Corridor Case Study in Washington, DC." *In review*.
- Ashqar, H.I., et al. "Predicting Residential Property Value in Catonsville, Maryland: A Comparison of Multiple Regression Techniques." *In review*.
- Ashqar, H.I., et al. "Ethics, Data Science, and Health and Human Services: Embedded Bias in Policy Approaches to Teen Pregnancy Prevention." *In review*.
- Ashqar, H.I., et al. "Connecting Pedestrians with Disabilities to Adaptive Signal Control for Safe Intersection Crossing and Enhanced Mobility: Final Report [2019]". No. FHWA-JPO-19-754, United States. Department of Transportation. Intelligent Transportation Systems Joint Program Office, 2019.
- Ashqar, H.I., et al. "Modeling bike counts in a bike-sharing system considering the effect of weather conditions." *Case studies on transport policy*, vol. 7, no. 2, pp. 261-268, 2019.
- Ashqar, H.I., et al. "Traffic State Prediction: A Traveler Equity and Multi-modal Perspective", 2019.
- Ashqar, H.I., et al. "Predicting station locations in bike-sharing systems using a proposed quality-of-service measurement: Methodology and case study." *Proceedings of the Transportation Research Board 98th Annual Meeting: TRB 2019*, Transportation Research Board of the National Academies, 2019.
- Ashqar, H.I., et al. "Perception analysis of E-scooter riders and non-riders in Riyadh, Saudi Arabia: Survey outputs." *Sustainability*, vol. 13, no. 2, pp. 863, 2021.
- Ashqar, H.I., et al. "Deep transfer learning for vulnerable road users detection using smartphone sensors data." *Remote Sensing*, vol. 12, no. 21, pp. 3508, 2020.
- Ashqar, H.I., et al. "A comparative analysis of e-scooter and e-bike usage patterns: Findings from the City of Austin, TX." *International Journal of Sustainable Transportation*, vol. 15, no. 7, pp. 571-579, 2021.
- Ashqar, H.I., et al. "Smartphone Transportation Mode Recognition Using a Hierarchical Machine Learning Classifier and Pooled Features from Time and Frequency Domains." *IEEE Transactions on Intelligent Transportation Systems*, vol. 20, no. 1, pp. 244-252, 2019.
- Ashqar, H.I., et al. "Bike share travel time modeling: San Francisco Bay Area case study." *2017 5th IEEE International Conference on Models and Technologies for Intelligent Transportation Systems*. IEEE, 2017.
- Ashqar, H.I., et al. "Network-wide bike availability clustering using the college admission algorithm: A case study of San Francisco Bay area." *2017 5th IEEE International Conference on Models and Technologies for Intelligent Transportation Systems (MT-ITS)*. IEEE, 2017.

- Ashqar, H.I., *et al.* "Quantifying the Effect of Various Features on the Modeling of Bike Counts in a Bike-Sharing System." *Transportation Research Board 97th Annual Meeting Transportation Research Board*, 2018.
 - Ashqar, H.I., *et al.* "Vulnerable road user detection using smartphone sensors and recurrence quantification analysis." *2019 IEEE Intelligent Transportation Systems Conference (ITSC)*. IEEE, 2019.
 - Ashqar, H.I., *et al.* "Smart Bike-Sharing Systems for Smart Cities." eds. *Data Analytics for Smart Cities*, 2018.
 - Ashqar, H.I., *et al.* "Network and Station-Level Bike-Sharing System Prediction: A San Francisco Bay Area Case Study." *Journal of Intelligent Transportation Systems: Technology, Planning, and Operations*, 2021.
 - Ashqar, H.I., *et al.* "Modeling Bike Availability in a Bike-Sharing System Using Machine Learning." *2017 5th IEEE International Conference on Models and Technologies for Intelligent Transportation Systems*, 2017.
 - Ashqar, H.I., *et al.* "Urbanization Life Cycle of Nablus City (1946-2015)." *ISUF 2014 – 21st International Seminar on Urban Form*, 2014.
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Selected Courses

Transportation: Traffic Characteristics and Flow, Traffic Signal Systems, Traffic Safety Modeling, Urban Planning, GIS, Management and Rehabilitation of Roads, Design, Security, Construction, Quality Control of Road Infrastructures, Water Resources Management, and Advanced Highway Design.

Economic Development: Urban Economics, Equity, and Society, Global Political Economy, International Policy, Planning, Management in Developing Countries, Investment Assessment, and Economic Development Studio.

Data Analytics: Urban Computing, Data Analytics, Ethics and Professionalism in Data Science, Advanced Applied Bayesian Statistics, Spatial Statistics, and Experimental Design: Concepts and Applications.

IT Skills

R, Python, MATLAB, JMP, Minitab, SAS, SPSS, C++

INTEGRATION, QueensOD, VISSIM, VISTRO, VISUM, CORSIM, HCS, Synchro/SimTraffic, PASSER, SIDRA, TransModeler/CAD, MATSim, ArcGIS, Arena, MicroStation, AutoCAD Civil 3D, 3D Max Design