

Exponent®
Engineering & Scientific Consulting

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Professional Profile

Ahmad Alshami, Ph.D., is an Associate in Exponent's Construction Consulting Practice with more than six years of applied research and engineering experience in construction technology and infrastructure analytics. He applies construction data analytics, artificial intelligence, machine learning, and sensor-based monitoring to evaluate equipment operations and infrastructure performance and support evidence-based operational and planning decisions.

During his doctoral research, Dr. Alshami applied artificial intelligence and sensor-based technologies to improve demolition-equipment operations, debris sorting, and material recovery. His work translated complex operational and site information into practical decision support for safer, more efficient, and sustainable demolition practices. He also contributed to National Science Foundation-supported investigations of post-disaster debris management, with applications to operational planning, policy development, and the sustainable handling of disaster-generated materials.

Previously, at The Hong Kong Polytechnic University, Dr. Alshami conducted research on intelligent monitoring of water and wastewater infrastructure. His work supported the early identification of sewer blockages and overflow risks, proactive maintenance, and improved operational response.

Dr. Alshami has authored peer-reviewed journal articles, conference papers, and technical reports in construction automation, infrastructure monitoring, artificial intelligence, and sustainable material management that have collectively received more than 500 citations on Google Scholar. He also led the development of an AI-focused civil engineering proposal that received a $50,000 graduate fellowship.

Academic Credentials & Professional Honors

Ph.D., Civil Engineering, Florida State University, 2026

M.Eng., Civil Engineering, Florida State University, 2024

M.Sc., Construction and Real Estate, The Hong Kong Polytechnic University, 2021

B.S., Civil and Environmental Engineering, The University of Jordan, 2019

Publications

Articles in Refereed Journals

Ali, E., Elshaboury, N., Zayed, T., Alshami, A., & Elsayed, M. (2026). "Multi-tier framework for automated sewer defect classification and inspection prioritization." Automation in Construction, 187, 106972.

Alshami, A. & Choi, J. (2025). "Information Requirements for The Development of Construction Vehicle

Guidance Systems." Automation in Construction, 181, 106645.

Alshami, A., Ali, E., Elsayed, M., Elshaboury, N., & Zayed, T. (2024). "IoT Innovations in Sustainable Water and Wastewater Management and Water Quality Monitoring: A Comprehensive Review of Advancements, Implications, and Future Directions." IEEE Access, 12, 58427-58453.

Faris, N., Zayed, T., Aghdam, E., Fares, A., & Alshami, A. (2024). "Real-Time sanitary sewer blockage detection system using IoT." Measurement, 226, 114146.

Alshami, A., Elsayed, M., Ali, E., Eltoukhy, A. E., & Zayed, T. (2023). "Monitoring Blockage and Overflow Events in Small-Sized Sewer Network Using Contactless Flow Sensors in Hong Kong: Problems, Causes, and Proposed Solution." IEEE Access, 11, 87131-87149.

Alshami, A., Elsayed, M., Ali, E., Eltoukhy, A. E., & Zayed, T. (2023). "Harnessing the power of ChatGPT for automating systematic review process: Methodology, case study, limitations, and future directions." Systems, 11(7), 351.

Dolphin, W. S. Y., Alshami, A., Tariq, S., Boadu, V., Mohandes, S. R., Ridwan, T., & Zayed, T. (2023). "Effectiveness of policies and difficulties in improving safety performance of repair, maintenance, minor alteration, and addition works in Hong Kong." International Journal of Construction Management, 23(5), 814-829.

Alshami, A., Elsayed, M., Mohandes, S. R., Kineber, A. F., Zayed, T., Alyanbaawi, A., & Hamed, M. M. (2022). "Performance Assessment of Sewer Networks under Different Blockage Situations Using Internet-of-Things-Based Technologies." Sustainability, 14(21), 14036.

Peer-reviewed Conference Proceedings

Nazemi, M., Alshami, A., Choi, J., & Zhang, Q. (2026). Reducing Operator Variability in Real-World Simulation of Post-Building Collapse Rescue Operations. In the Construction Research Congress 2026.

Alshami, A., & Choi, J. (2025). "Self-Supervised Learning Framework for Automated Material Grouping of Demolition Debris: Advancing Sustainable Waste Management." In CIB Conferences (Vol. 1, No. 1, p. 29).

Alshami, A., Elsayed, M., & Choi, J. (2025). "Enhancing Sustainable, Safe, and Efficient Construction Practices: A Systematic Review of Advanced Interface Techniques for Heavy Machinery Guidance." In CIB Conferences (Vol. 1, No. 1, p. 369).

Jalloul, H., Alshami, A., Nickdoost, N., Moon, J., & Choi, J. (2024). "Automated Material Separation Activity Identification for Sustainable Demolition Operations." In the Construction Research Congress 2024 (pp. 981-990).

Nickdoost, N., Alshami, A., Choi, J., & Merrick, D. (2023). "Optimization of a temporary debris management site on a two-way roadway." In Canadian Society of Civil Engineering Annual Conference (pp. 357-370). Cham: Springer Nature Switzerland.

Peer-reviewed Technical Reports

Alshami, A., Jalloul, H., Merrick, D., Hartand, L., Choi, J., Manheim, D., and Yesiller, N. (2023). "SUMMEER – 24 June 2021 Surfside Building Collapse Virtual Assessment Report." DesignSafe-CI.

Alshami, A., Jalloul, H., Nickdoost, N., Kameshwar, S., Wu, S., and Choi, J. (2023). "SUMMEER – 29 August 2021 Hurricane Ida Virtual Assessment Report." DesignSafe-CI.

Project Experience

AI-Enabled Demolition Excavator Guidance and Worksite Analytics

Developed an integrated guidance system for demolition excavators using IMU-based equipment tracking, computer vision and machine learning for material characterization, and 3D worksite reconstruction. Integrated sensor, operational, and site data to evaluate equipment movements, activities, work sequences, and performance. The system applied predictive AI models to generate real-time guidance for activity sequencing, material selection, dump-zone assignment, movement direction, and path planning to support more efficient and sustainable demolition operations.

Disaster Debris Management and Recovery Analytics

Contributed to National Science Foundation-supported reconnaissance and research following the Surfside building collapse and Hurricanes Ida and Ian. Analyzed field observations, virtual assessments, and multidisciplinary data related to debris collection, temporary storage, material recovery, illegal dumping, and disposal practices. Evaluated the engineering, environmental, and logistical factors affecting post-disaster debris operations and synthesized the findings into peer-reviewed technical reports. The work supported recovery planning, temporary debris-management strategies, policy development, and more sustainable management of disaster-generated materials.

Water and Wastewater Infrastructure Monitoring

Developed and evaluated an IoT-based system for monitoring blockage development and overflow risk in urban sewer networks. Analyzed contactless sensor measurements under varying hydraulic and blockage conditions using Python- and SQL-based processing, time-series analysis, and rule-based methods. Integrated the results with GIS mapping and a web-based alert platform to provide early warnings and location-based information supporting proactive maintenance, faster operational response, and more reliable sewer-network management.

Peer Reviews

Journal of Pipeline Systems (American Society of Civil Engineers)

Measurement (Elsevier)

Science of The Total Environment (Elsevier)