Exponent®
Engineering & Scientific Consulting

Khalid Alkady, Ph.D.

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Professional Profile

Dr. Khalid Alkady specializes in structural health and vibration monitoring of buildings and bridges, dynamic and static laboratory testing of large-scale structures, surveying structural damage using Lidar technology and photogrammetric techniques, and modal analysis and system identification. He employs remote sensing technologies (such as Lidar, cameras, and UAVs), alongside computer vision and machine learning (ML) algorithms, to remotely monitor the dynamic response of structures and components. Additionally, Dr. Alkady specializes in non-linear finite element modeling of structural systems. During his Ph.D. studies, he received the prestigious 2022 UTC Outstanding Student of the Year Award from the U.S. Department of Transportation (DOT) in recognition of his interdisciplinary academic achievements.

Dr. Alkady's doctoral research focused on enhancing civil infrastructure systems through Lidar-based dynamic monitoring frameworks and phased-construction bridges. He developed novel spatio-temporal frameworks that integrate signal processing and ML algorithms to remotely monitor dynamic responses and conduct system identification of structures using dynamic point clouds from Lidar scanners. These frameworks have been successfully applied to monitor the full-field out-of-plane response of a large-scale unreinforced masonry structure during shake-table tests, and conduct system identification of a highway bridge. He conducted extensive controlled-laboratory operational modal analysis tests to assess the robustness of these frameworks under various operational scenarios, utilizing statistical analyses.

His research also examined the impact of traffic-induced vibrations on the structural integrity and durability of bridge decks built in stages. To investigate this, Dr. Alkady conducted ambient-vibration monitoring and system identification of phased-construction bridges before, during, and after construction stages. He further explored this issue with large-scale dynamic and static experimental testing of full-scale phased-construction bridge decks, using servo-hydraulic actuators to simulate traffic-induced vibrations observed in the field.

During his Master's studies, Dr. Alkady performed non-linear response history analyses to assess the seismic behavior of self-centering steel plate shear walls (SC-SPSWs), focusing on the effect of wall aspect ratio. Prior to joining Exponent, he collaborated with researchers at Sandia National Laboratories to study the non-linear dynamic response of bolted joints, utilizing high-speed cameras, stereo-digital image correlation, and piezoelectric ultrasonic transducers during his internship at Sandia.

Academic Credentials & Professional Honors

Ph.D., Civil and Structural Engineering, University of Nebraska, Lincoln, 2024

Masters, Structural Engineering, Cairo University, 2021

Bachelors, Structural Engineering, Cairo University, 2017

Recipient of the 2022 University Transportation Center (UTC) Outstanding Student of the Year Award by the U.S. Department of Transportation

Milton E. Mohr Fellowship from the College of Engineering at the University of Nebraska-Lincoln 2023-2024

Professional Affiliations

Society of Experimental Mechanics member

American Society of Civil Engineers associate member

Structural Engineers Association of New York associate member

Publications

Alkady, K. (2024). Enhancing Civil infrastructure Performance through LIDAR-based Dynamic Monitoring and Phased-Construction Bridges. The University of Nebraska-Lincoln.

Alkady, K., Wittich, C. E., & Wood, R. L. (2024). A novel framework and validation for the dynamic characterization of civil structures via ground-based lidar. Journal of Sound and Vibration, 587, 118523.

Wittich, C. E., Wood, R. L., & Alkady, K. (2024). Lidar-Based Vibration Monitoring for Assessing Safety of Damaged Bridges (No. 25-1121-0005-004-51). Mid-America Transportation Center for Transportation Safety and Equity (MATC-TSE) Region 7 University Transportation Center (UTC).

Alkady, K., Wittich, C. E., & Wood, R. L. (2023). A Novel Framework for the Dynamic Characterization of Civil Structures Using 3D Terrestrial Laser Scanners. In Society for Experimental Mechanics Annual Conference and Exposition (pp. 91-95). Cham: Springer Nature Switzerland.

Alkady, K., Rasquinha, A. G., Brandl, J. T., Wittich, C. E., & Detweiler, C. (2023). Target-free, vision-based system identification of civil structures using unmanned aerial vehicles. STRUCTURAL HEALTH MONITORING 2023.

Alkady, K., Wittich, C. E., Wood, R. L., & Morcous, G. (2022). Phased Construction Bridges: Monitoring and Analysis for Traffic-Induced Vibration (No. SPR-P1 (20) M102). Nebraska. Department of Transportation.

Alkady, K. (2022). Seismic Performance of Self-Centering Steel Plate Shear Walls. Cairo University.

AHM, N. C., Alkady, K. H., Jin, H., Bai, F., Samal, A., & Ge, Y. (2021). A deep convolutional neural network based image processing framework for monitoring the growth of soybean crops. In 2021 ASABE Annual International Virtual Meeting. American Society of Agricultural and Biological Engineers.

Presentations

Alkady, K., Parker, S., & Roettgen, D. (2025). Application of a Pump-probe Technique to Detect Fatigue Damage in a Complex Structure. International Modal Analysis Conference (IMAC) XLIII 2025, Florida, USA.

Alkady, K., Arroyo, J.E., and Rohe, D.P., Hopkins, R., Kuether, R. J., & Moore, K. J. (2024). Full-Field Diagnostics of Bolted Joints Using High-Speed Optical Sensing Techniques. International Modal Analysis Conference (IMAC) XLII 2024, Florida, USA.

Alkady, K., Rasquinha, A.G., Brandl, J. T., Wittich, C.E., and Detweiler, C. (2023). A Target-Free Framework for the Dynamic Characterization of Structures Using Unmanned Aerial Vehicles. The 14th International Workshop on Structural Health Monitoring (IWSHM) 2023, California, USA.

Alkady, K., Wittich, C.E., and Wood, R.L. (2023). A Novel Framework for the Dynamic Characterization of Civil Structures Using 3D Terrestrial Laser Scanners. International Modal Analysis Conference (IMAC) XLI 2023, Texas, USA.

Alkady, K., Wittich, C.E., Wood, R.L., and Morcous, G. (2022). Phased Construction Bridges: Field Monitoring of Traffic-Induced Vibration and Large-Scale Experimental Testing. The 11th Conference on Short and Medium Span Bridges 2022, Toronto, Canada.

Alkady, K., Wood, R.L., and Wittich, C.E. (2022). Case Study System Identification of a Phased Construction Bridge During Construction. The Eighth World Conference on Structural Control and Monitoring 2022, Orlando, Florida.

Chamara, A.H.M.N., Alkady, K., Jin, H., Bai, F., Samal, A., and Ge, Y. (2021). SoyMonitoringNet: A Deep Convolutional Neural Network Based Image Processing Framework for Monitoring the Growth of Soybean Crops. ASABE 2021 Annual International Meeting.