Alexandra Hain, PhD, PE

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EDUCATION

University of Connecticut, Storrs, CT

Doctor of Philosophy in Civil Engineering, GAANN Fellow, GPA: 4.1/4.0 — 08/2015-05/2019
Advisor: Dr. Arash E. Zaghi
Dissertation Title: "Study of Large-Scale Hybrid Concrete-Filled Fiber Reinforced Polymer Tube Columns (HCFFTs)"

Bachelor of Science in Engineering, Summa Cum Laude, GPA: 3.9/4.0 — 08/2011-08/2015
Major: Civil Engineering, Minor in Environmental Engineering

APPOINTMENTS

University of Connecticut, Storrs, CT

Assistant Professor, *Department of Civil and Environmental Engineering* — 08/2022-Present
Faculty Spotlight Video

Director, *Naval Science and Technology Program* — 08/2021-Present

Assistant Research Professor, *Department of Civil and Environmental Engineering* — 08/2019-08/2022

Research Specialist, *Department of Civil and Environmental Engineering* — 05/2019-08/2019

US Department of Transportation, Federal Highway Administration, Washington, DC

Intern, *Center for Accelerating Innovation* — May 2018-August 2018

- Served on a 6-person team focused on developing, launching, and administering strategic transportation-related innovation deployment throughout the country. I specifically focused on the AID Demonstration Program and worked with the Crowdsourcing for Operations team as part of the Every Day Counts initiative (EDC-5).

Arax Engineering LLC, Windham, CT

Chief Executive Officer and Founder — April 2017-December 2021

- Founded start-up to market patented column technology. Received 50K for proof-of-concept testing and customer discovery. Company pivoted to focus on advanced imaging for infrastructure applications.

FUNDED RESEARCH PROJECTS AS PI/CO-PI

Evaluation of Failure Modes for Insulators in Contact Wire Registration Assemblies, *Connecticut Department of Transportation,* August 2022-December 2024, **$453,767 (PI)**

- Partnering with CTDOT rail division to study cause of failure for in-service insulators in contact wire registration assemblies. The study takes a comprehensive approach of FEA, experimental testing and field monitoring.

Engaging Undergraduate Engineering Students in NIUVT Research, *National Institute for Undersea Vehicle Technology (NIUVT)*, June 2022-December 2024, **$500,000 (PI)**

- Partnering with URI to provide applied research opportunities to motivated undergraduates, thus providing a pipeline of engineering students who are prepared to enter the Navy sector workforce or pursue NIUVT sponsored graduate degree programs.

The UConn & URI Navy STEM Coalition – Addressing Engineering Workforce Needs in the Naval Sector, *US Department of Defense*, October 2021-September 2024, **$3,000,000 (PI)**

- Lead $3M Department of Defense grant to enhance the pipeline of STEM students in southern New England for U.S. Navy-related careers. Partner with URI and regional naval community to develop community-engaged real-world learning activities, curriculum, and projects to improve participants' knowledge of the Navy and promote innovative thinking to address DoD S&T issues.

REU Site: Research Experience for Neurodiverse Students: Transforming the Nation's Aging Infrastructure by Advancing Radical Solutions, *National Science Foundation*, March 2021-March 2024, **$406,696 (PI)**

- Oversee specialized REU Site to serve junior- and senior-level engineering students with ADHD, anxiety, and/or dyslexia. This unique program utilizes a strength-based approach to neurodiversity and encourages students to use their unique talents to make research breakthroughs. Individual research projects focus on using AI to transform the nation's water, power, and transportation infrastructure.

Beam End Encasement for the Construction of Maintenance-Free Steel Bridges, *Connecticut Cooperative Transportation Research Program*, January 2021-December 2022, **$120,000 (PI)**

- Successfully advocated to expand use of UHPC beam encasement for new construction applications to provide a maintenance-free solution for simple span steel bridges. This project focuses on quantifying the life-cycle cost savings of the method, confirming structural performance through experimental studies, and developing design guides to enable broad implementation.

Proof of Concept Evaluation of Hybrid Deck Bulb Tee (HDBT), *Advanced Bridge Construction Technologies, Inc.*, June 2020-September 2020, **$5,000 (PI)**

- Worked closely with startup company to conduct analytical proof-of-concept evaluation for novel proprietary bridge beam system using CSiBridge.

RAPID/Collaborative Research: Multi-Hazard Damage to Puerto Rico's Infrastructure - Investigation of the Interaction of Hurricane and Earthquakes, *Nation Science Foundation*, March 2020-February 2022, **$43,069 (Co-PI)**

- Participated in two reconnaissance missions in Ponce, Puerto Rico to identify structural damages following the January 2020 earthquakes series and the compounding impacts of Hurricane Maria. Lead image-based data collection including lidar scanning and UAV imaging (I am a licensed commercial drone pilot).

Repair of Steel Beam/Girder Ends with Ultra High-Strength Concrete: Implementation and Training, *Connecticut Department of Transportation*, June 2018-June 2022, **$740,393 (Co-I)**

- Oversaw the implementation of a novel UHPC repair on two bridges in CT. Provided onsite design support to adapt to unexpected field conditions and instrumented beam ends to monitor performance. Developed design guides for CTDOT to facilitate the implementation of the repair on future projects.

3D Scanning for Inspection and Assessment of Aging Bridges, *Connecticut Department of Transportation*, January 2018-June 2020, **$248,691 (Co-PI)**

- Established a system to accurately inspect bridges in a cost-effective and timely manner using preexisting scanning technology. Created training videos and implementation guide for use by CTDOT inspectors.

ADDITIONAL RESEARCH EXPERIENCE

CAREER: Promoting Engineering Innovation Through Increased Neurodiversity by Encouraging the Participation of Students with ADHD, NSF, *Program Manager for Precollege Summer Programs*, July 2019-Present; *Researcher,* August 2020 – Present

- Lead multi-year study of CEE senior design teams to determine the extent to which the engineering products of neurodiverse teams of students are more creative than the products of homogeneous teams.
- Program manager for strength-based engineering summer camp for middle school and high school students with ADHD.

Transforming Undergraduate Engineering Education through Implementation of Immersive Virtual Reality (VR) Experiences, UConn School of Engineering, *Researcher,* July 2019 – June 2020

- Developed a series of 3D models accessible using AR and VR for an entry level engineering course (CE3110) to improve students' understanding of deformations and modes of failure.
- Evaluated effect of 3D models on student performance through a study of 100+ undergraduate students.

Research Experience in Cyber and Civil Infrastructure Security for Students with ADHD at the University of Connecticut, *Program Manager*, April 2016-August 2019.

- Supervised undergraduate engineering students while they join different research labs at UCONN for a 10-week period over the summer. Performed all logistical coordination for participants, organized and oversaw all workshops and program meetings.
- Experience led to pursuing new REU site as PI, which was funded.

A Hybrid Metal/Glass Composite System for Multihazard Resilient Bridge Columns, NSF, *Researcher*, August 2016- May 2019

- Designed and ran compression, tension, and bending tests on 6-in diameter columns. The results were used results to inform the design and execution of large-scale experimental lateral loading tests.
- Through this work on my PhD project, I developed reliable structural design methodologies and identified and addressed potential scalability and manufacturing difficulties.

Repair of Corrosion Damaged Steel Girders with Ultrahigh Performance Concrete, Connecticut Department of Transportation, *Researcher*, August 2015- August 2016

- Created and validated finite element models of steel girders from previous experimental studies.

TEACHING EXPERIENCE AND COURSE DEVELOPMENT

Bridge Engineering Certificate Program, Professional Engineering Program, *University of Connecticut*

- Spearheaded development of four-course certificate program along with departmental leadership and industry expert, Michael Culmo, PE. This fully online program targets working professionals and meets industry needs of specialized training in bridge engineering.

CE5384 Accelerated Bridge Construction, Graduate Course, *University of Connecticut*

- Developed online course in coordination with Center for Excellence in Teaching and Learning for Bridge Engineering Certificate Program. First delivery was spring 2021 (n=16).
- **Instructor ratings: Mean=4.8/5, Median=5/5**

CE3630L Design of Steel Structures, Undergraduate Course, *University of Connecticut*

- Taught steel design course with laboratory complement (SAP2000) in spring 2021 (n=32).
- **Instructor ratings: Mean=4.7/5, Median=5/5**

CE4900W/4920W Civil Engineering Projects I and II, Undergraduate Course, *University of Connecticut*

- Led acquisition of structural senior design project for CEE in AY20-21, 21-22. Was successful in increasing the number of industry-sponsored projects.
- Taught structural section of CE4900/20W AY20-21 (n=19).
- **Instructor ratings** (CE4900W; CE4920W)**: Mean=4.5/5, Median=5/5**; **Mean=4.8/5, Median=5/5**

CE3110 Mechanics of Materials, Undergraduate Course, *University of Connecticut*

- Co-taught online accelerated 5-week summer session course with Sarira Motaref in summer 2020.

CE5380 Bridge Structures, Graduate Course, *University of Connecticut*

- Co-developed and co-taught online course with Arash E. Zaghi in coordination with Center for Excellence in Teaching and Learning in spring 2018.

ADVISING

Graduate Student Advising

Watson III, Robert, *PhD Student*	May 2028
Wondolowski, Maxwell, *PhD Student*	May 2027
Lassy Jr, Brian, *PhD Student*	May 2026
Bugash, Caitlin Nicole Oribello, *Bridge Certificate*	December 2022
Farr, Kelsey Rae, *Bridge Certificate*	December 2022
Flynn, Brian Dimascio, *Bridge Certificate*	December 2022

Undergraduate Research Advising

Alec VanSlooten, *Undergraduate Researcher,* June 2019-May 2021

- Honors Thesis Advisee (May 2021) Thesis: *Comparison of 3-D Laser Scanning and Photogrammetry for Corrosion Damage Evaluation of Steel Beams*

Nathan Nye, *Undergraduate Researcher,* November 2021-present

Michael David, *Undergraduate Researcher,* November 2021-present

PROFESSIONAL ACTIVITIES AND MEMBERSHIPS

PE Kentucky, February 2022

Structural Extreme Events Reconnaissance (StEER), *Level 3 Member*, November 2021-Present
Eligible to deploy on Field Assessment Structural Teams (FAST) after an event.

National Science Foundation, Panel Reviewer, October 2021-Present

American Society for Engineering Education (ASEE), *Member & Reviewer*, February 2020-Present

Journal of Bridge Engineering, *Reviewer,* November 2018-Present

American Society of Civil Engineers (ASCE), S.M.ASCE, January 2014-August 2019, A.M.ASCE, November 2019-Present

Earthquake Engineering Research Institute (EERI), *Member,* August 2014-May 2019

Chi Epsilon, *Member*, November 2013-Present

DIVERSITY, EQUITY, AND INCLUSION EFFORTS

CEE Antiracism and Equity Action Team (ACT), *Member,* University of Connecticut

- Team of 10 students, faculty, and alumni from the Civil and Environmental Department focused on reviewing current practices and defining actionable items to enhance diversity, equity, and inclusion in the department. Serve as civil engineering faculty representative.

SOE Inclusive Excellence Program: Justice, Equity, and Transformation (Inclusive JET), *Member,* University of Connecticut

- Member of 25-person team of faculty and staff from various departments in the School of Engineering working towards a more inclusive community. Engage in weekly collaborative work group focused on personal growth, setting goals, and implementing actionable items for the good of the community.

PEER-REVIEWED JOURNAL ARTICLES

Lassy Jr, B., **Hain, A.,** *Zaghi, A. E.,* Kanyo, Z., Chuong, B. and Cardinalli, A. (20xx). Rehabilitation of Corroded Steel Bridge Girder Ends using Partial Height Ultra-High Performance Concrete Encasement. *Transportation Research Record*, Under Review.

Hain, A. & Motaref, S. (20xx). Enhancing Undergraduate Engineering Students' Visualization Skills through Implementing AR in an Entry Level Course. *Studies in Engineering Education,* Under Review.

Lanning, A., **Hain, A.,** *Zaghi, A. E.*, & Saiidi, M. S. (2022). Experimental study on hybrid concrete-filled fiber reinforced polymer tube (HCFFTs) columns under simulated seismic loading. *Engineering Structures*, *264*, 114478. https://doi.org/10.1016/j.engstruct.2022.114478

Mawson, J., Mehr, M., Constant, J., *Zaghi, A. E.*, & **Hain, A.** (2022). Structural Performance of Acute Corners on Skewed Bridge Decks Using Non-Linear Modeling of the Deck Parapet. *Infrastructures*, *7*(6), 77. https://doi.org/10.3390/infrastructures7060077

Hain, A., & *Zaghi, A. E.* (2021). Experimental investigation of a simple shear connection to concrete-filled FRP tube (CFFT) columns. *Engineering Structures*, 247, 113174. https://doi.org/10.1016/j.engstruct.2021.113174

Hain, A. & *Zaghi, A. E.* (2021). Learnings from the Field Implementation of a Novel Ultra-High Performance Concrete Beam End Repair on a Corroded Steel Girder Bridge in Connecticut. Transportation Research Record, 03611981211004128. https://doi.org/10.1177/03611981211004128

Syharat, C. M., **Hain, A.**, & *Zaghi, A. E.* (2020). Promoting Neurodiversity in Engineering Through Specialized Outreach Activities for Pre-college Students. *Journal of Higher Education Theory & Practice*, 20(14). https://doi.org/10.33423/jhetp.v20i14

Hain, A. & *Zaghi, A. E.*, (2020). Applicability of Photogrammetry for Inspection and Monitoring of Dry-Stone Masonry Retaining Walls. *Transportation Research Record*. https://doi.org/10.1177/0361198120929184

Hain, A., *Zaghi, A. E.*, & Saiidi, M. S. (2019). Flexural Behavior of Hybrid Concrete-Filled Fiber Reinforced Polymer Tube Columns. *Composite Structures*, 230, 111540. https://doi.org/10.1016/j.compstruct.2019.111540

Hain, A., Motaref, S., & *Zaghi, A. E.* (2019). Influence of Fiber Orientation and Shell Thickness on the Axial Compressive Behavior of Concrete-Filled Fiber-Reinforced Polymer Tubes. *Construction and Building Materials*. https://doi.org/10.1016/j.conbuildmat.2019.05.194

Hain, A., *Zaghi, A. E.*, Kamali, A., Zaffetti, R. P., Overturf, B., & Pereira, F. E. (2019). Applicability of 3-D Scanning Technology for Section Loss Assessment in Corroded Steel Beams. *Transportation Research Record*. https://doi.org/10.1177/0361198119832887

BOOK CHAPTERS

Hain, A. & *Zaghi, A. E.*, (2022) Field Implementations of a Novel UHPC Beam End Repair on Steel Girder Bridges in Connecticut, USA. In *Bridge Safety, Maintenance, Management, Life-Cycle, Resilience and Sustainability*. (pp. 2560-2567). CRC Press.

Hain, A., Zhang, T., & *Zaghi, A. E.* (2021) Estimation of the residual bearing capacity of corrosion damaged bridge beams using 3D scanning and finite element analysis. In *Bridge Maintenance, Safety, Management, Life-Cycle Sustainability and Innovations* (pp. 3806-3813). CRC Press.

PUBLISHED DATA SETS

Zaghi, A. Padgett, J. **Hain, A**. Tafur, A. Lanning, A., & Grilliot, M. (2021). Data collection of damage to Puerto Rico's infrastructure due to Hurricane Maria and the 2019-2020 earthquakes, in *RAPID: Multi-Hazard Damage to Puerto Rico's Infrastructure - Investigation of the Interaction of Hurricane and Earthquakes*. DesignSafe-CI. https://doi.org/10.17603/ds2-jj5g-yg64

PEER-REVIEWED CONFERENCE PROCEEDINGS

Hain, A. & Motaref, S. (2020, June). Implementing Interactive 3-D Models in an Entry Level Engineering Course to Enhance Students Visualization. In *2020 ASEE Virtual Annual Conference Experience*. 10.18260/1-2--34782

Syharat, C.M., **Hain, A.**, & *Zaghi, A. E.*, (2020, June). Diversifying the Engineering Pipeline through Early Engagement of Neurodiverse Learners. In *2020 ASEE Virtual Annual Conference Experience*. 10.18260/1-2--34470

Hain, A., *Zaghi, A. E.*, Fields, T., Barakat, R., Cardinali, A., Culmo, M. P., & Lopata, T. (2019, June). Implementation of UHPC for the Repair of a Steel Bridge with Corrosion Damage in Connecticut, USA. In *International Interactive Symposium on Ultra-High Performance Concrete* (Vol. 2, No. 1). Iowa State University Digital Press. https://doi.org/10.21838/uhpc.9684

Hain, A., *Zaghi, A. E.*, & Taylor, C. L. (2018, June). Board 164: Promoting Neurodiversity in Engineering through Undergraduate Research Opportunities for Students with ADHD. In *2018 ASEE Annual Conference & Exposition*. https://peer.asee.org/29969

Hain, A., *Zaghi, A. E.*, & Lanning, A. (2018, April). Moment-Curvature Analysis of Hybrid Concrete-Filled Fiber Reinforced Polymer Tube Columns. In *Structures Congress 2018: Bridges, Transportation Structures, and Nonbuilding Structures* (pp. 338-348). Reston, VA: American Society of Civil Engineers. https://ascelibrary.org/doi/10.1061/9780784481332.030

Hain, A., *Zaghi, A. E.*, & Turek, S. (2017, December). Structural Behavior of Hybrid Concrete-Filled FRP Tubes (HCFFT). In *2017 National Accelerated Bridge Construction Conference - Conference Papers/Extended*

Abstracts. https://abc-utc.fiu.edu/wp-content/uploads/sites/52/2018/05/2017-Conference-Papers-Combined-Optimized.pdf

Hain, C. C., Turek, W. C., *Zaghi, A. E.*, & **Hain, A.** (2017, June), Board #156: Experiences of Pre-College Teachers Working with Undergraduate Engineering Students with ADHD in Research Laboratories. In *2017 ASEE Annual Conference & Exposition*. https://peer.asee.org/board-156-experiences-of-pre-college-teachers-working-with-undergraduate-engineering-students-with-adhd-in-research-laboratories

Zmetra, K., **Hain, A.**, *Zaghi, A. E.*, & Wille, K. (2017, January). Finite Element Analysis and Experimental Comparison for Repair of Corrosion Damaged Steel Girder Ends Using Ultra-High Performance Concrete Encasement. In *TRB 96th Annual Meeting Compendium of Papers*. (No. 17-05019). https://trid.trb.org/view/1438948

CONFERENCE AND INVITED PRESENTATIONS

*Invited Presentation

Hain, A. & *Zaghi, A. E.* (2022, July). Field Implementations of a Novel UHPC Beam End Repair on Steel Girder Bridges in Connecticut, USA. In *11th International Conference on Bridge Maintenance, Safety, and Management*, Barcelona, Spain.

*__Hain, A__. (2022, June). Advanced Imaging for the Evaluation of Multi-Hazard Damages to Puerto Rico's Infrastructure - Investigation of the Interaction of Hurricane Maria and the 2020 Earthquake Sequence. In *12th National Conference on Earthquake Engineering*. Salt Lake City, UT.

*__Hain, A__. & *Zaghi, A. E.* (2022, June). Emerging Technologies for Bridge Inspection and Evaluation. In *CSCE Structural Engineering Seminar*. Hartford, CT.

***Hain, A**. & *Zaghi, A. E.* (2021, November). SPR-2313: Repair of Steel Beam/Girder Ends with Ultra High-Performance Concrete - Phase III. In *AASHTO RAC Region 1 Meeting*, Virtual Meeting.

Kim, D., *Zaghi, A. E.*, **Hain, A.**, & Frame, L. (2021, October). Predicting Corrosion Behavior of A36 Plain Carbon Steel and A588 Weathering Steel in Bridge Applications. In *240th ECS Meeting*. ECS.

Hain, A. & *Zaghi, A. E.* (2021, October). Field Implementation of UHPC Beam End Repair on Steel Girder Bridges in CT. In *Fall 2021 ACI Virtual Concrete Convention,* Virtual Conference.

Hain, A., Zhang, T., and Zaghi, A. E. (2021, April). Estimation of the residual bearing capacity of corrosion damaged bridge beams using 3D scanning and finite element analysis. In *10th International Conference on Bridge Maintenance, Safety, and Management*, Sapporo, Japan.

***Hain, A**. & *Zaghi, A. E.* (2021, January) Adaptation of 3D Scanning Technology for High Precision Bridge Inspection. In *Transportation Research Board (TRB) 100th Annual Meeting,* Virtual Conference (Invited presentation as AASHTO RAC/TRB High Value Supplemental Projects awardee).

Hain, A. & *Zaghi, A. E.* (2021, January) Learnings from the Field Implementation of a Novel UHPC Beam End Repair on a Corroded Steel Girder Bridge in Connecticut. *Transportation Research Board (TRB) 100th Annual Meeting,* Virtual Conference.

Hain, A. & *Zaghi, A. E.* (2020, January) Applicability of Photogrammetry for Inspection and Monitoring of Dry-Stone Masonry Retaining Walls. *Transportation Research Board (TRB) 99th Annual Meeting*, Washington, D.C.

***Hain, A**. & *Zaghi, A. E.* (2020, January) Applicability of Photogrammetry for Inspection and Monitoring of Dry-Stone Masonry Retaining Walls. *TRB Joint Subcommittee on Geotechnical Asset Management at the 99th Annual TRB Meeting,* Washington, D.C.

Hain, A. (2019, November) Virtual Reality in the Workplace. In *Women in Technology International (WITI) meeting*. Hartford, CT. (Invited as speaker on three-person panel)

Hain, A. & *Zaghi, A. E.* (2019, June) Adaption of 3D Scanning Technology for High Precision Bridge Inspection. In *Tran-SET Webinar Series: Innovative Technology, Techniques, and Processes in Transportation Infrastructure Inspection*, Webinar.

Hain, A. & *Zaghi, A. E.*, Kamali, A., Zaffetti, R. P., Overturf, B. & Pereira, F. E., (2019, January) Applicability of 3D Scanning Technology for Section Loss Assessment in Corroded Steel Beams. *Transportation Research Board (TRB) 98th Annual Meeting*, Washington, DC.

Hain, A. & *Zaghi, A. E.* & Turek, S., (2017, December) Structural Behavior of Hybrid Concrete-Filled FRP Tubes (HCFFT). *National Accelerated Bridge Construction Conference*, Miami, FL.

Zmetra, K., **Hain, A**., *Zaghi, A. E.* & Wille, K. (2017, January) Finite Element Analysis and Experimental Comparison for Repair of Corrosion Damaged Steel Girder Ends Using Ultra-High Performance Concrete Encasement. *Transportation Research Board (TRB) 96th Annual Meeting*, Washington, DC.