

Shady Adib

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RESEARCH EXPERIENCE

PhD Research, Department of Civil Engineering, Newcastle upon Tyne

(2019–2024)

- Developed **hybrid Digital Twin (DT) models** for real-time Structural Health Monitoring (SHM) by integrating physics-based models with data-driven approaches.
- Enabled **proactive maintenance strategies** through the real-time detection of minor structural damages during operational stages.
- Employed advanced predictive techniques, including **deep learning algorithms**, to forecast future structural behaviour, enhancing safety and performance.
- Contributed to infrastructure management by providing valuable insights for decision-making processes, aiming to advance the field of structural engineering.
- Published two conference papers, with one awarded the *Best Paper Award*, demonstrating the impact and applicability of the research.
- Currently have **one** manuscripts under review at peer-reviewed journals, further contributing to advancements in structural engineering and AI applications.

RELEVANT RESEARCH SKILLS

- Expertise in **Reduced Basis Methods** and **Model Order Reduction techniques** for efficient structural simulations and optimisation.
- Utilised **Internet of Things (IoT)** devices for continuous real-time monitoring, improving synchronisation between physical and virtual models.
- Developed cost-effective **IoT-based SHM hardware** for real-time data collection and integration with DT systems.
- Experienced in programming with **Python, MATLAB**, and related software tools for SHM, machine learning, and data analysis.
- Applied **finite element analysis** techniques for structural analysis and optimisation.
- Skilled in **damage detection algorithms**, real-time structural anomaly identification, and decision-making processes for infrastructure management.
- Proficient in **SQL** and data platforms such as **Databricks** for efficient data management and analysis.

RESEARCH INTERESTS

- Building knowledge in advanced machine learning techniques, including **generative AI, physics-informed neural networks**, and **deep learning algorithms** to enhance **SHM systems and predictive maintenance**.
- Investigating the application of **dynamic diffusion models** to enhance the efficiency of AI models, such as **Generative Adversarial Networks (GANs)**, and to improve **transfer learning** techniques.
- Developing **self-generating digital twins** that autonomously adapt based on real-time data inputs to improve system performance and predictive capabilities.
- Exploring **self-healing materials**, such as **self-healing concrete with bacteria** and **shape memory alloys**, to integrate with self-generating digital twins for enhanced structural resilience and longevity.

AWARDS AND HONORS

Best Paper Award

Paper Title: Development of Digital Twin Concept for Real-Time Detection of Abnormal Changes in Structural Behaviour

Conference: 8th International Conference on Civil Structural and Transportation Engineering (ICC-STE'23)

Year: 2023

EDUCATION

PhD, Civil Engineering **University of Newcastle, UK (2019–Expected December 2024)**

Research focus: Development of DT concept for real-time structural damage identification.

MSc, Structural Engineering **Vilnius Gediminas Tech. University, Lithuania (2017–2019)**

Thesis: Structural analysis and design of high-strength steel cold-formed tubular beams.

BSc, Civil Engineering **German University in Cairo, Egypt (2012–2017)**

Focus: Comparison of reinforced concrete and steel structures.

TEACHING EXPERIENCE

Part-time Teaching Assistant

Newcastle University (Jan 2020 – Present)

- Actively engaged in supporting various engineering courses, including **Computational Engineering Analysis, Structural Analysis, and Lime Stabilisation Test**.
- Conducted **demonstrations, invigilated examinations**, and provided essential assistance in the **marking process**.
- Provided **personalised tutoring and mentorship** to students, enhancing their understanding and performance in engineering subjects.

ADDITIONAL SKILLS & COURSES

Relevant Courses and Certifications

- Autodesk Corporation Certified: AutoCAD Introduction, 2016 (20-hour completion).
- CSI Structure Analysis Diploma: SAP, ETABS, SAFE, CSI Column, CAD MASTER TRAINING & SOLUTIONS, Cairo, Egypt, 2016.
- Shop Drawing Course: CREATIVE GROUP, Cairo, Egypt, 2016 (24-hour course).
- Autodesk Corporation Certified: Autodesk Revit Structure, 2017 (35-hour completion).
- Six Sigma Analysis Phase: Completed online in April 2020.
- **Mastering in Digital Twin**: Completed online in May 2020.
- **Introduction to Programming with MATLAB**: Completed online in June 2020.
- **Introduction to Digital Twins**: Completed online in May 2021.
- **Digital Twins Enhancing Model-Based Design with AR, VR, and MR**: Attended and completed at Oxford University, Nov 21 – Dec 2, 2022.
- **Introduction to the Internet of Things and Embedded Systems**: University of California, Irvine (UCI), Feb 2023.
- **The Arduino Platform and C Programming**: University of California, Irvine (UCI), Feb 2023.
- **Interfacing with the Arduino**: University of California, Irvine (UCI), Feb 2023.
- **Introduction to Artificial Intelligence (AI)**: Completed online in Oct 2023, organised by IBM.
- **Digital Technologies and the Future of Manufacturing**: Completed online in Jan 2024, University of Michigan.
- **Sensitivity Analysis**: Completed online in Nov 2023, organised by Great Learning.
- Introduction to Front-End Development: Completed Jan 2024, organized by Meta.
- Programming with JavaScript: Completed in Feb 2024, organised by Meta.

- **Statistics with Python Specialisation:** Completed Feb 2024, University of Michigan.
- **Data-Driven Decision Making (DDDM) Specialisation:** Completed Feb 2024, University at Buffalo.
- **Vision Control:** Completed in March 2024, organised by Meta.
- **Generative AI Fundamentals Specialisation:** Completed in May 2024, organised by IBM.
- **Introduction to Digital Manufacturing:** Completed in June 2024, organised by SIEMENS.

Relevant Skills

- **Design and Analysis Software:** Proficient in ANSYS, SolidWorks, Autodesk AutoCAD, Autodesk Revit Structure, Autodesk Robot Structure, Abaqus, Oasys software, Staad Pro, **Arduino IDE, MATLAB.**
- **Programming Languages:** Proficient in **Python, machine learning libraries**, JavaScript, C#, SQL.
- **Specialised in: Digital Twins, IoT, Structural Health Monitoring, Machine Learning.**
- **Good Knowledge in:** R&D with a strong understanding of developing innovative solutions and managing multidisciplinary projects in Civil Engineering.
- **Computer Skills:** MS Office, Photoshop, Prezi, Origin Pro, Power BI, LaTeX.
- **Languages:** Arabic (Native), English (Advanced), Deutsch (Fair).

MEMBERSHIP OF PROFESSIONAL SOCIETIES

Institution of Civil Engineers (ICE)
 Institution of Structural Engineers (IStructE)
 American Society of Civil Engineers (ASCE)
 Structural Engineering Institute (SEI)
 Institute of Electrical and Electronics Engineers (IEEE)

REFEREES

Dr. Vladimir Vinogradov, Lecturer in Structural Mechanics and Materials, Department of Civil Engineering, Newcastle University, vladimir.vinogradov@newcastle.ac.uk

Prof. Peter Gosling, Professor of Computational Structural Mechanics, Department of Civil Engineering, Newcastle University, peter.gosling@newcastle.ac.uk

Dr. Ieva Misiunaite, Lecturer in Structural Engineering, Department of Civil Engineering, Vilnius Gediminas Technical University, ieva.misiunaite@vgtu.lt

PUBLICATIONS

Adib, S. et al. "Advancing Structural Health Monitoring: Accurate PCB Design for IoT-Based Real-Time Damage Detection with Digital Twin Integration," *HardwareX*, under review.

CONFERENCE PAPERS

Adib, S., Misiunaite, I. "High Strength Steel Cold-Formed Hollow Sections: Implication of Cross-Section Aspect Ratio and Slenderness Characteristics on Flexural Behavior," *13th International Conference on Modern Building Materials, Structures and Techniques*, 2019, pp. 230–237, DOI: [10.3846/mbmst.2019.066](https://doi.org/10.3846/mbmst.2019.066).

Adib, S., Vinogradov, V., Gosling, P. "Development of Digital Twin Concept for Real-Time Detection of Abnormal Changes in Structural Behaviour," *8th International Conference on Civil Structural and Transportation Engineering (ICCSTE'23)*, 2023, pp. 206-1 to 206-8, DOI: [10.11159/iccste23.206](https://doi.org/10.11159/iccste23.206).

Adib, S., Vinogradov, V., Gosling, P. "Real-Time Damage Identification of Abnormal Changes in Structural Behaviour Using Digital Twin and IoT Technologies," *In 2023 IEEE Smart World Congress (SWC)*, pp. 1-2, DOI: [10.1109/SWC57546.2023.10448986](https://doi.org/10.1109/SWC57546.2023.10448986).

PROFESSIONAL BLOGGING

Adib, S. "Real-Time Structural Damage Identification: The Future with Digital Twins," TechUK's Digital Twin Campaign, Oct 2023. [Online]. Available: [URL](#).