Theo Glashier

PhD student at Imperial College aspiring to advance research in infrastructure monitoring

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Imperial College profile

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Profile

I am an early career researcher focused on promoting structural health monitoring for society's infrastructure. I work on data-driven strategies that prepare structural datasets for analysis and overcome the pervasive effect of environmental and operational variability. I wish to pursue a career in research in the long-term monitoring of structures to enable real-time performance assessments for in-service infrastructure.

Education

PhD Student, Imperial College London, Civil and Environmental Engineering

March 2021 - December 2024

- Thesis entitled 'Temperature-based measurement interpretation of critical civil infrastructure' and supervised by Dr Craig Buchanan, which will produce four journal articles
- Developed specialty expertise in data-driven monitoring techniques, statistical methods, machine learning for regression, high performance computing and programming in Python and Matlab
- Developed considerable experience in the long-term monitoring of infrastructure, including setting-up and troubleshooting of sensor networks and performing in-person large-scale static and dynamic testing on the operational MX3D Bridge in Amsterdam
- Gained excellent written and oral communication skills through seminars, poster and presentation competitions, teaching experiences and multiple work trips to present to academic and industrial collaborators and disseminate my research at conferences
- Have co-supervised eight Master students during their final-year projects, gaining significant first-hand supervision experience while leading them to publishing their work

MEng Mechanical Engineering, University of Sheffield, First-Class Honours

October 2015 - July 2019

- Thesis entitled 'Operational modal analysis for nonlinear systems,' and supervised by Professor Worden (grade: First)
- Undertook a third year project, equivalent to a BEng dissertation, in the design and specification of a wind turbine bearing test rig that led to a research summer internship with RGL Associates
- Developed specialty expertise in condition monitoring, structural dynamics, material integrity, solid mechanics (grades: 89%, 82%, 80%, 75%, respectively), and significant experience of CAD in Solidworks within multiple design projects

Non-academic appointments

E-monitoring engineer graduate scheme, Total Energies, Pau, France
October 2019 - September 2020

- Delivered long-term monitoring projects for offshore energy infrastructure, involving the large-scale testing of machines and equipment distributed across multiple international sites using datasets that were continually supplied by hundreds of sensors
- Developed excellent management skills through taking the technical lead on the CO2 emission monitoring project, building the data infrastructure template in PI System and applying it to a large portion of Total Energies' worldwide assets. I have been acknowledged for my work in this publication
- Gained invaluable experience in delivering technical presentations to internal clients

Summer internship, RGL Associates, Sheffield
Summer 2018

- Developed professional and technical experience, early in my career, by undertaking finite element (FE) analysis of wind turbine bearings and delivering projects for a small engineering firm

Mechanical engineer, Project Sunbyte, University of Sheffield
January 2018 - November 2018

- My student-lead team mounted a telescope system of our design on a helium balloon for capturing pictures of Solar flares to further the understanding of their risks, as part of the High-Altitude Student Platform of the NASA Balloon Program. The launch took place in New Mexico, USA.

Awards

- Milija Pavlovic Research Travel Fund award to attend the European Workshop on Structural Health Monitoring 2024
- Imperial College General fund and Old Centralians' Trust awards for attendance at the International Association on Bridge Maintenance and Safety 2024
- Awarded the 2nd Prize in the Imperial College PhD Summer Showcase 2023
- Invited to deliver an oral presentation at the 25th Young Researchers Conference 2023 at the Institution of Structural Engineers
- Awarded the Skempton PhD Scholarship

Skills

Languages: English and French (both native, C2), Italian and Spanish (A2)

Software: Microsoft, Rhino, Solidworks, PI System, Ansys FE modelling and computational fluid dynamics

Programming: Python, Matlab, C, Linux command line for High Performance Computing

References

Dr Craig Buchanan, Senior Lecturer and my PhD supervisor, craig.buchanan@imperial.ac.uk

Dr Thomas Reynolds, Senior Lecturer at the University of Edinburgh, t.reynolds@ed.ac.uk

Dr Rolands Kromanis, Assistant Professor at the University of Twente, NL, r.kromanis@utwente.nl

List of publications

Glashier, T. (2023) 'Predicting the environmental response of critical infrastructure, using the first metal 3D printed structure as a case study', in *Proceedings of the 25th Young Researchers Conference. Institution of Structural Engineers*, 62–63. Available at: https://www.istructe.org/getattachment/Resources/Training/Young-researchers-conference-2023/Young-researchers-conference-2023-Proceedings.pdf?lang=en-GB.

Glashier, T., Kromanis, R. and Buchanan, C. (2024) 'An iterative regression-based thermal response prediction methodology for instrumented civil infrastructure', *Advanced Engineering Informatics*, 60, p. 102347. doi: 10.1016/j.aei.2023.102347.

Glashier, T., Kromanis, R. and Buchanan, C. (2024) 'Temperature-based measurement interpretation of the MX3D Bridge', *Engineering Structures*, 305, p. 116736. doi: 10.1016/j.engstruct.2023.116736.

Glashier, T., Kromanis, R. and Buchanan, C. (2024) 'Temperature-based damage detection for the commissioning dataset of the MX3D Bridge', in *Proceedings of the 11th European Workshop on Structural Health Monitoring (EWSHM 2024), June 10-13, 2024*. Potsdam, Germany: e-Journal of Nondestructive Testing. doi: 10.58286/29866.

Glashier, T., Buchanan, C. and Kromanis, R. (2024) 'Thermal response prediction of the MX3D bridge's operational dataset', in Jensen, J. S., Frangopol, D. M., and Schmidt, J. W. (eds) Bridge Maintenance, Safety, Management, Digitalization and Sustainability. London: CRC Press, pp. 2511–2519. doi: 10.1201/9781003483755-299.

Reynolds, T. P. S., **Glashier, T**., Cameron, J., Kromanis, R., Zhang, P., Wynne, Z., Tessier, A., Shuldiner, A., Cammers-Goodwin, S., Vahdatikhaki, F., Nagenborg, M., Siderius, K., Buchanan, C. (2025) 'Operational data collection and analysis for a smart 3D printed footbridge: the MX3D bridge', *Preprint submitted to Smart and Sustainable Built Environment.*

Glashier, T., Kromanis, R. and Buchanan, C. (2025) 'Preparation of long-term structural health monitoring data: Signal visualisation and processing', *Preprint to be submitted to Mechanical Systems and Signal Processing*.

Glashier, T., Kromanis, R. and Buchanan, C. (2025) 'Temperature-based measurement interpretation of the in-service MX3D Bridge', *Preprint to be submitted to Structural Health Monitoring*.