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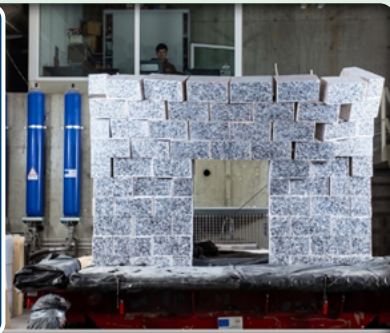
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## ■ ISISE DAY OUT 2025

On October 20–21, 2025, researchers from ISISE gathered in the historic city of Tomar for another memorable edition of the ISISE Day Out. The event brought together PhD students, postdoctoral researchers, senior researchers, and the members of the ISISE Advisory Board for two days of scientific exchange, collaboration, and team spirit.

The programme featured presentations from PhD students and postdoctoral researchers representing the different ISISE research groups, providing an opportunity to share ongoing work, discuss new ideas, and strengthen connections across the institute. The event was also enriched by presentations from the ISISE Advisory Board members: Mauro Dolce (University of Naples, Italy), Geert De Schutter (Ghent University, Belgium), Umberto Berardi (Toronto Metropolitan University, Canada), and Ben Young (The Hong Kong Polytechnic University, China). Their contributions provided valuable insights into current research challenges and future perspectives in structural engineering and related fields.

Beyond the scientific activities, participants enjoyed a unique team-building experience inspired by the history and legends of Tomar. Divided into teams, attendees took part in a treasure hunt across the city in search of the “Holy Grail,” combining problem-solving, exploration, and collaboration in a fun and engaging atmosphere.

The ISISE Day Out 2025 once again highlighted the strong collaborative spirit within the institute, promoting interaction between researchers from different backgrounds while creating lasting memories in one of Portugal’s most emblematic historic cities.





**Mohammadali  
Rezazadeh**

Assistant Prof. at  
Northumbria Univ.

*ISISE provided the foundations upon which my entire career has been built. The rigorous research environment, supported by such a scientifically active team, allowed me to develop the skills...*

▪ **In which circumstances did you join ISISE?**

I joined ISISE at the University of Minho in Guimarães in August 2011, when I began my PhD in Civil Engineering. My research focused on structural strengthening, a field that laid the foundation of my academic career.

▪ **How would you describe your experience in ISISE?**

Being a member of ISISE, one of Portugal's most respected research institutions in the field, gave me a true sense of belonging to a wider scientific community. From the beginning, I benefited from an exceptionally supportive PhD supervision team that helped me develop not only technically, but also as a researcher and as a professional.

ISISE is a truly international institution that attracts students and researchers across the world. People from different educational backgrounds and cultural perspectives came together and shared their knowledge within the ISISE research framework. That collaborative environment made my time there both encouraging and fulfilling.

▪ **Is there any anecdotal situation that you experienced in ISISE, that is worthy of sharing?**

Some of my lovely memories from that period are the ISISE day-out events, where the whole community would come together, not only to exchange research ideas, but to enjoy each other's company and also build connections for further collaborations.

The Christmas group dinners hold a particularly warm place in my memory. Everyone would gather around the table, share traditional Portuguese dishes, sing together, and enjoy the evening. Those moments captured something special about the culture of ISISE.

▪ **What was the impact of your time in ISISE on your career? And friends?**

ISISE provided the foundations upon which my entire career has been built. The rigorous research environment, supported by such a scientifically active team, allowed me to develop the skills and confidence, necessary for independent research leadership. That experience directly enabled me to secure my first research grant during the period I was an ISISE member, a milestone that taught me how to lead a project, manage a team, and deliver significant outcomes.

On a personal level, the friendships formed during those years have been just as strong as the professional connections. ISISE has a remarkable ability to bring proactive researchers together, and I am grateful for the support it has given me.



# R&D COMPLETED PROJECTS

## ▪ STAND4HERITAGE – New STANDArds for seismic assessment of built cultural HERITAGE

**ISISE Principal Investigator:** Paulo Lourenço  
**Budget:** Global: 2 968 755,00€ / ISISE-UM: 2 968 755,00€  
**ID:** 833123 — STAND4HERITAGE  
**Funding Entity:** European Commission (ERC Advanced Grants)  
**Principal Contractor:** University of Minho  
**Duration:** From 01/09/2019 to 31/12/2025  
**Summary:** STAND4HERITAGE (S4H) provided a new framework to assess built cultural heritage and safeguard it from earthquakes, especially addressing the out-of-plane collapse of masonry walls, which is the primary cause of building loss. The project explored methodologies for creating novel stochastic ground motion simulation methods and machine-learning models to extend the European earthquake datasets. To fully understand the structural behaviour of heritage structures, S4H conducted an extensive experimental campaign featuring over one thousand shaking table tests equipped with advanced Digital Image Correlation, fully characterizing masonry collapse

mechanisms. It defined comprehensive numerical models and rapid assessment tools combining limit analysis and rocking dynamics. A major achievement resulting from the project was the proposal of experimentally-informed limit state thresholds, fragility curves, and simplified assessment procedures, contributing to the next generation of Eurocode 8. Open-access outcomes were shared via 9 datasets and 94 papers, providing a robust scientific basis to drive future conservation practice and policies.



# R&D STARTED PROJECTS

## ▪ METAPORCONCRETE – Soluções em betão com metaestruturas embebidas para mitigação de ruído ferroviário

**ISISE Principal Investigator:** Paulo Jorge Rodrigues Amado Mendes  
**Budget:** Global: 211 654,08€ / ISISE-UC: 157 124,88€  
**ID:** Nr.º14677, COMPETE2030-FEDER-00917500  
**Funding Entity:** PROJECTOS DE I&D FCT  
**Principal Contractor:** University of Coimbra  
**Duration:** From 01/09/2025 to 31/08/2028

## ▪ N-GenERP – Nova Geração de ERP Potenciado por Insights de Mercado

**ISISE Principal Investigators:** Artur Mateus  
**Budget:** Global: €1 429 497.28 / ISISE-UC: €132 228.72  
**ID:** Nr.º21343, CENTRO2030-FEDER-02219400  
**Funding Entity:** COMPETE2030  
**Principal Contractor:** MOLIPOREX – Moldes Portugueses  
**Duration:** From 09/09/2025 to 08/03/2028

▪ **REBRIDGE – Reliability of Reused Bridge Structures and the Impact on the Design for a Green and Circular Eternity**

**ISISE Principal Investigators:** Luís Simões da Silva  
**Budget:** Global: €1 983 505,17 / ISISE-UC: €364 920,00  
**ID:** Nr.º101218885, RFC"-2024-02-RPG  
**Funding Entity:** Horizon Europe, RFCS  
**Principal Contractor:** UniS – University of Stuttgart  
**Duration:** From 01/09/2025 to 28/02/2029

▪ **STROBEplus – Accompanying Measures for Stronger Steels in the Built Environment**

**ISISE Principal Investigators:** João Pedro Martins  
**Budget:** Global: €497 189,65 / ISISE-UC: €92 907,00  
**ID:** Nr.º101216785, RFCS-2024-02-AM  
**Funding Entity:** Horizon Europe, RFCS  
**Principal Contractor:** ECCS – European Convention for Constructional Steelwork  
**Duration:** From 01/09/2025 to 31/08/2027

▪ **TIMELESS – Technologies for Immutable Multi-hazard rEversible Steel Structures**

**ISISE Principal Investigators:** Aldina Maria da Cruz Santiago  
**Budget:** Global: €1 777 189,50 / ISISE-UC: €178 431,00  
**ID:** Nr.º 101216417, RFCS-2024-02-RPJ  
**Funding Entity:** Horizon Europe, RFCS  
**Principal Contractor:** UNISA – University of Salerno  
**Duration:** From 01/09/2025 to 28/02/2029

▪ **DescarbOnMetal – Descarbonização no setor da construção Metálica e Mista**

**ISISE Principal Investigators:** Helena Gervásio  
**Budget:** Global: €402 900,00 / ISISE-UC: €221 000,17  
**ID:** Nr.º 25588  
**Funding Entity:** COMPETE2030  
**Principal Contractor:** CMM – Associação Portuguesa de Construção Metálica e Mista  
**Duration:** From 01/10/2025 to 30/09/2027

▪ **RADIANCE – Robotic, Automated and Digital solutions for improving building renovAtion and New Construction Efficiency**

**ISISE Principal Investigators:** José Campos e Matos / Joaquim Tinoco  
**Budget:** Global: 3 999 189,25€ / ISISE-UM: 192 052,50€

**ID:**  
**RADIANCE –**  
 101235536

**Funding Entity:** European Commission (Horizon Europe Energy)  
**Principal Contractor:** Universidad de Vigo (UVIGO)  
**Duration:** From 01/09/2025 to 31/08/2029

▪ **CIRWIND – Development of innovative sustainable urban furniture and equipment in composites from waste produced by the wind energy industry for circularity**

**ISISE Principal Investigators:** José Sena-Cruz  
**Budget:** Global: €249 998,40 / ISISE-UM: €249 998,40  
**ID:** 15232 – COMPETE2030-FEDER-00889600  
**Funding Entity:** Fundação para a Ciência e Tecnologia  
**Principal Contractor:** University of Minho  
**Duration:** From 01/09/2025 to 30/08/2028

▪ **FiCoFEMAI – Integrated and reliable design methodology for fibre reinforced concrete structures assisted by nonlinear finite element analysis and artificial intelligence tools**

**ISISE Principal Investigators:** António Ventura Gouveia / Joaquim Barros  
**Budget:** Global: €248 745,60 / ISISE-UM: €248 745,60  
**ID:** 16782 – COMPETE2030-FEDER-00796500  
**Funding Entity:** Fundação para a Ciência e Tecnologia  
**Principal Contractor:** University of Minho  
**Duration:** From: 01/10/2025 to 29/09/2028

▪ **REFINED – Refractory Engineering for Innovative and knowledge-based lining design**

**ISISE Principal Investigators:** João M. Pereira  
**Budget:** Global: €249 696,00 / ISISE-UM: €249 696,00  
**ID:** 16273 – COMPETE2030-FEDER-00743400  
**Funding Entity:** Fundação para a Ciência e Tecnologia  
**Principal Contractor:** University of Minho  
**Duration:** From: 01/10/2025 to 29/09/2028

▪ **REVIVE – REsilient**

**Valorizat4ion of Inland Vernacular Environment**

**ISISE Principal Investigators:** Daniel Oliveira

**Budget:** Global: €212 241,60 / ISISE-UM: €86 400,00

**ID:** 15449 – COMPETE2030-FEDER-00913100

**Funding Entity:** Fundação para a Ciência e Tecnologia

**Principal Contractor:** Faculdade de Arquitetura da Universidade do Porto

**Duration:** From 01/10/2025 to 29/09/2028

▪ **TERRA: European Masters in Earthen Architecture and Construction**

**ISISE Principal Investigators:** Daniel Oliveira

**Budget:** Global: €1 740 000,00 / ISISE-UM: €1 740 000,00

**ID:** TERRA – 101241190

**Funding Entity:** European Commission (ERASMUS+)

**Principal Contractor:** University of Minho

**Duration:** From 01/10/2025 to 29/09/2028

▪ **INTEGRATES – Intelligent digital tools for green renovation, assessment, transformation, efficiency and sustainability**

**ISISE Principal Investigators:** Helena Gervásio

**Budget:** Global: €3 999 889,41 / ISISE-UC: €242 000,00

**ID:** Nr.º 101235856, HORIZON-CL5-2024-D4-02-03

**Funding Entity:** Horizon Europe, IA

**Principal Contractor:** Academia Europea Di Bolzano

**Duration:** From 01/10/2025 to 30/09/2029

▪ **REACH – Solid state recycling of aluminium wastes**

**ISISE Principal Investigators:** Dulce Maria Esteves Rodrigues

**Budget:** Global: €209 744,64 / ISISE-UC: €163 477,44

**ID:** Nr.º 15577, COMPETE2030-FEDER-00663900

**Funding Entity:** PROJECTOS DE I&D FCT

**Principal Contractor:** UC – University of Coimbra

**Duration:** From 01/10/2025 to 30/09/2028

▪ **RE-FORM – Reusable 3D-Printed Composite Free-Form Panels**

**ISISE Principal Investigators:** Luís Simões da Silva

**Budget:** Global: €209 634,48 / ISISE-UC: €209 634,48

**ID:** Nr.º 15637, COMPETE2030-FEDER-00671800

**Funding Entity:** PROJECTOS DE I&D FCT

**Principal Contractor:** UC – University of Coimbra

**Duration:** From 01/10/2025 to 30/09/2028

▪ **CLOOP**

– Impressão

3D de mobiliário

urbano in situ com materiais

cimentícios incorporando resíduos

de construção e demolição

**ISISE Principal Investigators:** Artur Mateus

**Budget:** Global: €1 892 777,44 / ISISE-UC: €318 705,12

**ID:** Nr.º 21735, COMPETE2030-FEDER-02305400

**Funding Entity:** COMPETE2030

**Principal Contractor:** LARUS – Artigos para Construção e Equipamentos, LDA

**Duration:** From 01/10/2025 to 30/09/2028

▪ **RESCO – Renewable Energy and Sustainable Construction**

**ISISE Principal Investigators:** Ricardo Mateus

**Budget:** Global: 4 121 200,00€ / ISISE-UM: 157 492,00€

**ID:** 101238875

**Funding Entity:** European Commission (ERASMUS-EMJM-UN)

**Principal Contractor:** INSA Rouen Normandie

**Duration:** From: 01/10/2025 to 31/12/2031

▪ **AIGENT – AI-based gamification for safe construction**

**ISISE Principal Investigators:** Miguel Azenha

**Budget:** Global: €804 696,77 / ISISE-UM: €265 484,27

**ID:** 24908 - NORTE2030-FEDER-02978100

**Funding Entity:** Agência Nacional de Inovação

**Principal Contractor:** XISPOLI – ENGENHARIA LDA

**Duration:** From: 01/01/2026 to 30/12/2028

▪ **ECOBELM – Desenvolvimento de soluções inovadoras de vigas mistas, com foco na sustentabilidade**

**ISISE Principal Investigators:** Isabel Valente / João M. Pereira

**Budget:** Global: €922 742,40 / ISISE-UM: €421 926,40

**ID:** 18265 – NORTE2030-FEDER-01432600

**Funding Entity:** Agência Nacional de Inovação

**Principal Contractor:** Eme Singular, Lda

**Duration:** From: 01/01/2026 to 30/12/2028

▪ **NASC4RAIL – Noise Absorbing Sonic Crystals for Railway Noise Control**

**ISISE Principal Investigators:** Luís Manuel Cortesão Godinho

**Budget:** Global: 59 877,05 / ISISE-UC: €59 877,05

**ID:** 2024.17219.PEX

**Funding Entity:** PROJECTOS DE I&D FCT

**Principal Contractor:** UC – University of Coimbra

**Duration:** From 02/02/2026 to 01/08/2027

▪ **SeiM-Damper-RC – An Innovative Metallic Damper for Enhancing Seismic Performance of Reinforced Concrete Frames**

**ISISE Principal Investigators:** Shaghayegh Karim Zadeh Naghshineh

**Budget:** Global: €59 992,63 / ISISE-UM: €59 992,63

**ID:** 2024.16312.PEX

**Funding Entity:** Fundação para a Ciência e Tecnologia

**Principal Contractor:** University of Minho

**Duration:** From: 14/02/2026 to 14/08/2027

▪ **HELIOS – Holistic Electrolyte and Lithium-Ion Recovery for Sustainable Construction: Upcycling End-of-Life Batteries**

**ISISE Principal Investigators:** Eduardo Pereira / Norma Vaca

**Budget:** Global: €59 999,46 / ISISE-UM: €59 999,46

**ID:** 2024.17462.PEX

**Funding Entity:** Fundação para a Ciência e Tecnologia

**Principal Contractor:** University of Minho

**Duration:** From: 23/02/2026 to 28/08/2027

▪ **IMPACT – Sistema Estrutural Pré-Fabricado, Sustentável e Inovador Misto combinado Aço Enformado a Frio, Madeira e Betão**

**ISISE Principal Investigators:** Hélder David da Silva Craveiro

**Budget:** Global: – / ISISE-UC: €100 574,13

**ID:** CENTRO2030-FEDER-02365800

**Funding Entity:** PRR – Plano de Recuperação e Resiliência

**Principal Contractor:** UC – University of Coimbra

**Duration:** 01/03/2026 – 31/08/2027



# COMPLETED PHD THESES

## ▪ Integrated experimental-analytical study of the durability of Textile Reinforced Mortar (TRM) composites for the strengthening of masonry

**Author:** Nima Azimi Resketi

**Supervisors:** Daniel Vitorino Castro Oliveira

**Date:** 04/09/2025

**Summary:** This thesis presents an integrated experimental-analytical investigation into the durability of Textile-Reinforced Mortar (TRM) composites used for masonry strengthening. An extensive campaign comprising over 4,000 specimens was conducted across acidic (pH 1.5–3.0), alkaline, saline, and climatic environments for up to 6,000 h. Main achievements include: (i) systematic characterization of multi-scale bond and tensile degradation mechanisms; (ii) a closed-form analytical bond model based on a rigid trilinear cohesive law with  $\phi$ - $\psi$  degradation mapping; (iii) a chemo-mechanical damage model linking microstructural changes to mechanical performance; and (iv) a machine-learning (XGBoost) framework achieving  $R^2 \approx 0.98$  for mortar degradation prediction. Results showed that bond failure governs long-term TRM performance under aggressive exposure.



**Nima Azimi** is a postdoctoral researcher at Riga Technical University (Latvia) with a PhD in Civil Engineering from the University of Minho (2025), specialising in durability and bond behaviour of TRM composites for masonry strengthening. He has authored 15 journal papers and held research stays at TU/e and Politecnico di Milano.

## ▪ Innovative and sustainable masonry strengthening system for the rehabilitation and improvement of urban resilience

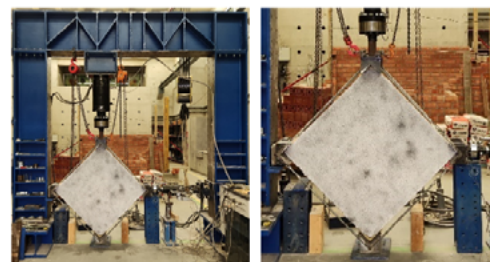
**Author:** João Alberto Pinheiro Pereira de Almeida

**Supervisor:** Eduardo Nuno Borges Pereira

**Date:** 12/09/2025

**Summary:** This thesis explored rehabilitation strategies based on thin overlays of fibre-reinforced mortars (FRMs) as a sustainable TRM strengthening technique for masonry elements. The research followed a twofold approach: developing alternative FRM formulations using recycled aggregates and fibres; experimentally characterise their effectiveness as masonry reinforcement. Testing focused on fresh and hardened mortar properties, with emphasis on toughness and residual strength under high temperature exposure. New diagonal tensile test setups were designed to assess in-plane performance of strengthened masonry under cyclic and biaxial loading. The results confirm significant improvements in mechanical performance and resilience, maintaining compatibility with masonry substrates. The adaptability of the system allows tailoring

solutions to different intervention scenarios. This work contributes to more sustainable and versatile reinforcement of existing masonry buildings, supporting urban resilience.



**João Almeida** holds an Erasmus Mundus MSc in Structural Analysis of Monuments and a PhD in Civil Engineering from the University of Minho (Portugal). His research at ISISE focuses on masonry strengthening and sustainable construction materials, with expertise spanning FRCM/TRM systems, alternative binders, recycled fibres and experimental characterisation of innovative structural solutions.

■ **Multi-Scale and Multi-physics Investigation on Durability and Long-term Behavior of Concrete Structures Strengthened with CFRP Systems: Accelerated versus Natural Ageing**

**Author:** Aloys Dushimimana

**Supervisors:** José Sena-Cruz; Luís Correia; João M. Pereira

**Date:** 16/10/2025

**Summary:** This PhD addressed the durability and long-term behaviour of RC structures strengthened with CFRP composites, combining non-prestressed and prestressed (mechanical and gradient anchorages) Externally Bonded Reinforcement (EBR) and Near-Surface Mounted (NSM) techniques. A multi-scale, multi-physics approach coupled laboratory-accelerated and outdoor (natural) ageing up to 6 years. Main achievements: (i) at material level, water diffusion reduced epoxy tensile strength and elastic modulus by 60–66% and 70–75%, accurately captured by numerical/analytical models; (ii) at bond level, EBR and NSM degraded by ~9% and ~12% under freeze-thaw and water exposure, with numerical models reproducing EBR results; (iii) at structural level, higher CFRP stiffness and prestressing reduced deflections, and analytical models predicted deflections up to 50 years; (iv) environmental conversion factors of 0.26 (material) and 0.75 (bond) were proposed for the harshest environments.



**Aloys Dushimimana** specialises in the durability and long-term behaviour of RC structures strengthened with fibre-reinforced polymer (FRP) composites. He was awarded his PhD by the University of Minho; part of his work being conducted at École Polytechnique Fédérale de Lausanne. He is currently at Swiss Federal Laboratories for Materials Science and Technology (ETH Domain), advancing research on FRP-based strengthening solutions.

■ **Acoustic Performance of Non-Conventional Variable Acoustics**

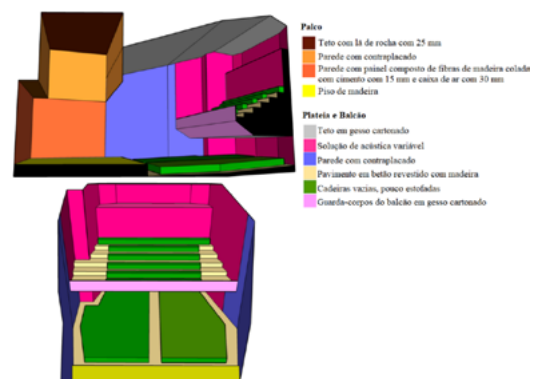
**Author:** Anna Ripke Gaspar

**Supervisor:** Andreia Pereira (University of Coimbra), Luís Godinho (University of Coimbra), Paulo Amado Mendes (University of Coimbra)

**Date:** 23/10/2025

**Summary:** This doctoral research addresses the acoustic challenges of multifunctional spaces such as auditoriums, concert halls, and theaters, which require adaptable acoustic conditions to suit diverse uses ranging from speech-focused events to musical performances. To respond to these conflicting requirements, the thesis investigates variable acoustics solutions capable of modifying room acoustic behavior in a controlled and flexible manner. The work proposes innovative systems based on adaptive geometries and reconfigurable elements, with particular attention to technical performance, architectural integration, and aesthetic value. An integrated methodology combining analytical modeling, numerical simulations, and laboratory experiments is adopted. Three solution types are explored: adjustable perforated panel systems with absorbent cavities, rotating triangular prisms with absorptive, reflective, and diffusive faces, and origami-inspired geometrical structures.

Each concept is assessed through appropriate experimental and modeling techniques, focusing on sound absorption, sound diffusion, scattering effects, and reverberation control across different environments.



**Ana R. Gaspar** has PhD in Civil Engineering (University of Coimbra), MSc in Acoustic and Energy Efficiency for Sustainable Construction (University of Coimbra), and BSc in Civil Engineering (Pontifical Catholic University of Paraná). She has worked as a research fellow in the ADJUST project – Development of progressively adjustable acoustic panels with intelligent control (POCI-01-0247-FEDER-033884).

▪ **Study and Development of Acoustic Solutions based on Acoustic Metamaterial Concepts for the Correction of Ventilated Elements on Building Facades**

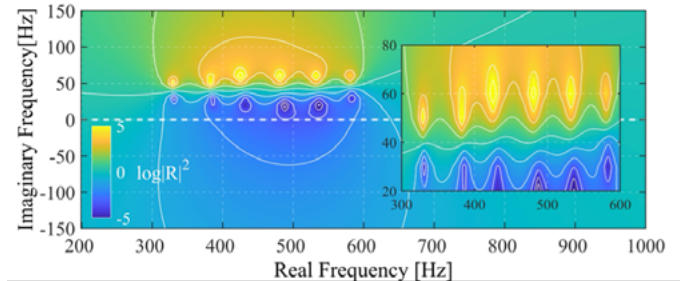
**Author:** Denilson Ramos

**Supervisors:** Luís Godinho (University of Coimbra), Paulo Amado Mendes (University of Coimbra), Paulo Mareze (Federal University of Santa Maria, Brasil)

**Date:** 23/10/2025

**Summary:** The thesis investigates the study and development of ventilated acoustic metamaterials aimed at mitigating noise in building applications. It focuses on subwavelength acoustic systems that enable effective noise reduction while maintaining airflow, addressing the challenge of balancing passive ventilation with acoustic performance. The research highlights the potential of acoustic metamaterials to form compact, thin solutions suitable for architectural integration. A ventilated hexagonal solution is proposed, based on a symmetric and parallel arrangement of Helmholtz resonators, and is evaluated in terms of sound absorption and sound transmission loss. The system is analyzed through analytical and numerical modeling using a fluid equivalent dissipative approach and the Finite Element Method, ensuring accuracy and computational efficiency. Experimental characterization is conducted to validate the models and confirm the

effectiveness of the proposed design under realistic conditions. Parametric studies are further carried out to understand the influence of key geometrical and physical parameters, supporting informed design choices and initial steps toward optimization strategies.



**Denilson Ramos** has PhD in Civil Engineering (University of Coimbra), MSc in Architecture and Urbanism (PPGAU/UFPA), and Architect and Urbanist (UFPA). Experience in R&D on environmental comfort, building acoustics, sustainable materials, and acoustic metamaterials. Former junior researcher collaborating with GVA/FEM/UFPA and LAAC/FAU/UFPA. Currently a Postdoctoral Researcher at the Department of Engineering of the University of Ferrara, focusing on acoustic metamaterials and porous materials.

▪ **Blast Load Characterization and Improvement of Critical Infrastructure Safety**

**Author:** Damjan Čekerevac

**Supervisors:** Constança Rigueiro, Eduardo Pereira and Aldina Santiago

**Date:** 12/11/2025

**Summary:** This PhD research investigated lightweight multilayer composite sandwich panels designed to protect structures from blast and impact loads. The work combined experimental testing, numerical modelling, and material characterization to understand the dynamic response and energy absorption capacity of cellular sandwich cores under extreme loading conditions. An extensive experimental campaign was conducted, including explosion chamber blast tests and Split Hopkinson Pressure Bar experiments, enabling multilayer structures to be studied across a wide range of strain rates. The research also included the development of a novel electrocontact velocimeter to directly measure impact velocities during blast tests, improving experimental diagnostics and measurement reliability. Overall, the work contributed to the development of a cost-effective methodology for evaluating the blast resistance of plates and panels intended for protective applications in critical infrastructure.



Experimental layout

**Damjan Čekerevac** is a civil engineer with research interest in protective design and energy absorbing structural systems. Obtained his PhD at the University of Coimbra in 2025, focusing on blast load characterization and critical infrastructure protection. His work combines blast testing, high-rate experiments and advanced numerical modelling. Currently works as structural engineer.

▪ **The Influence of Microwave Drying Parameters on Physical and Mechanical Properties of Wood and the Subsequent Impregnation with Resin**

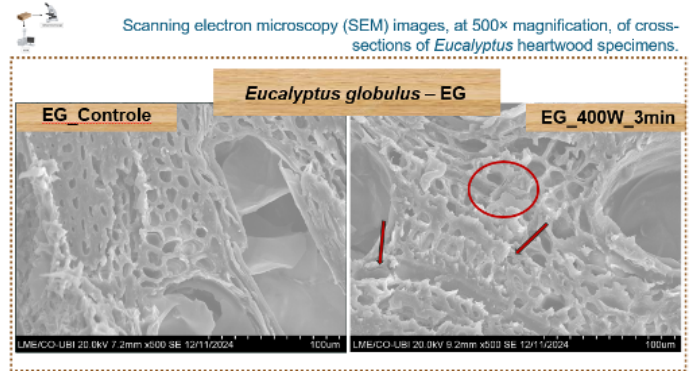
**Author:** Fernando Júnior Resende Mascarenhas

**Supervisors:** Alfredo Dias (University of Coimbra), André Luis Christoforo (Federal University of São Carlos), Rogério Simões (University Beira Interior)

**Date:** 19/11/2025

**Summary:** This PhD research investigated the application of microwave (MW) technology to improve the treatability and performance of Portuguese wood species for sustainable construction applications. The work focused on maritime pine (*Pinus pinaster*) and southern blue gum (*Eucalyptus globulus*), evaluating the influence of MW treatment parameters on physical and mechanical properties, chemical composition and biological resistance. The study also developed innovative wood polymer composites through combined MW and methyl methacrylate (MMA) treatments. The results demonstrated significant improvements in impregnability, dimensional stability, and mechanical performance, while also highlighting the importance of optimizing MW parameters according to species-specific characteristics. The research contributes to the development of sustainable wood modification

technologies and opens new possibilities for the valorisation of refractory wood species in high-performance construction materials.



**Fernando Mascarenhas** is a Civil Engineer and researcher affiliated with ISISE-UC. His research focuses on timber engineering, wood modification, microwave treatment of wood, and sustainable construction materials. He completed his Ph.D. in Civil Engineering with Distinction and Honors at the University of Coimbra and has authored several first-author publications on the microwave modification of wood.

▪ **Development of sustainable GFRP-reinforced seawater concrete**

**Author:** Eduarda da Conceição Nepomuceno

**Supervisors:** José Sena-Cruz; Lúcio Abel Pereira Lourenço; José Dinis Silvestre

**Date:** 02/12/2025

**Summary:** This PhD investigated the use of seawater (SW) and glass fiber reinforced polymer (GFRP) bars as a sustainable, corrosion-free reinforcement system for marine concrete structures. A multidisciplinary approach was adopted, combining experimental studies, analytical modelling, and life cycle assessment (LCA). The mechanical and time-dependent behavior of SW concrete was evaluated under long-term marine exposure at different temperatures, showing comparable performance to freshwater concrete after prolonged curing, though with higher creep. The bond durability between GFRP bars and SW concrete was also assessed, revealing recovery of bond strength over time, and a calibrated regression model outperformed existing formulation. Finally, a cradle-to-grave LCA of three slab typologies confirmed significant environmental advantages of GFRP-reinforced SW concrete over a 100-year life cycle. The findings support SW-GFRP systems as viable and sustainable alternatives for marine infrastructure.



**Eduarda Nepomuceno** holds a PhD in Civil Engineering from the University of Minho (2025), supported by an FCT grant. Her research focuses on sustainable construction materials, particularly GFRP-reinforced seawater concrete, encompassing experimental mechanics, durability assessment, analytical modelling, and environmental life cycle analysis.

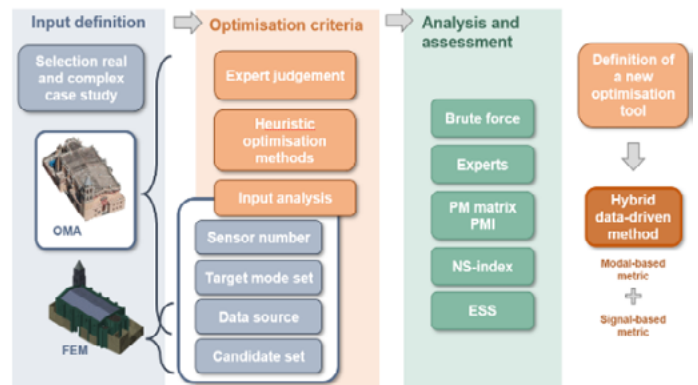
▪ **Optimal sensor placement for structural health monitoring networks of historical constructions**

**Author:** Amanda Estefanía Chaves Moreno  
**Supervisors:** Nuno Mendes; Alberto Barontini; Víctor Compán Cardiel

**Date:** 04/12/2025

**Summary:** This PhD addresses Optimal Sensor Placement (OSP) for dynamic Structural Health Monitoring (SHM) of heritage buildings, where constraints such as limited accessibility, conservation requirements, and reduced sensor availability hinder instrumentation. A novel data-driven framework, independent of numerical models, is proposed and validated through the Church of Santa Ana (Seville) using operational modal analysis data. The methodology evaluates expert-based and heuristic approaches, analysing sixteen metrics under varying conditions. An Essential Sensor Set (ESS) is introduced as an objective reference, together with a new NS-index to define the optimal number of sensors. Hybrid approaches combining Effective Independence (Efi) with spectral metrics (PDR and APV) are also developed, improving modal identification and enabling control of sensor configuration strategies. The results provide practical guidelines for

efficient, non-invasive monitoring of heritage structures.



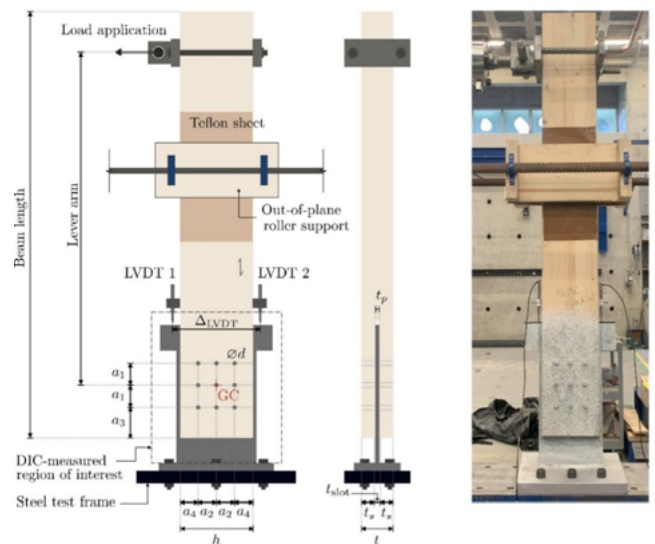
**Amanda MOrenos** is an Architect with two master's degrees and a Ph.D. in Civil Engineering. Specialized in heritage conservation, including advanced FEM modelling, model calibration, and structural analysis, as well as Structural Health Monitoring, with a focus on dynamic identification, Optimal Sensor Placement, and data analysis. Strong research background with publications and interdisciplinary expertise.

▪ **Numerical modelling approaches for dowelled timber connections based on fracture mechanics**

**Author:** Caroline Dapieve Aquino  
**Supervisors:** Jorge Manuel Gonçalves Branco; Leonardo Filipe Guilherme Rodrigues

**Date:** 12/12/2025

**Summary:** The thesis proposed an efficient numerical modelling strategy for the comprehensive assessment of dowel-type timber connections, accounting for ductile and brittle failure. The work included: (i) development of a computationally efficient model capturing load–displacement and moment–rotation responses, load distribution, crack initiation/propagation, and axial forces in screw reinforcement; (ii) an experimental programme with full-scale and material characterisation tests; (iii) validation against experimental and literature data; and (v) evaluation of design rules for brittle failure. An upscaling modelling strategy was developed, combining a Beam-on-Foundation model with a multiple-fastener approach. Brittle failure was predicted using a LEFM-based method. The model showed strong agreement with experiments and enabled assessment of design rules such as effective thickness and number of fasteners, providing a reliable and efficient tool for analysis and design.



**Caroline Aquino** has a PhD in Structural Engineering focused on numerical modelling and experimental assessment of dowel-type timber connections. Experience in FE modelling, fracture mechanics, and structural testing, with emphasis on ductile and brittle behaviour and design-oriented analysis.

▪ **Avaliação numérica e experimental de barreiras acústicas periódicas com perdas visco-térmicas**

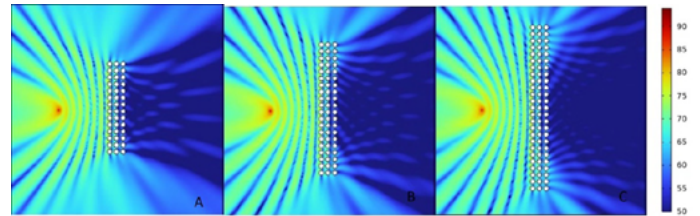
**Author:** Matheus Duarte Veloso

**Supervisors:** Paulo Mendes (University of Coimbra), Luís Godinho (University of Coimbra), Javier Redondo (Universitat Politècnica de València)

**Date:** 05/12/2025

**Summary:** This Ph.D. focused on the development and assessment of unconventional traffic noise barriers based on sonic crystal concepts to mitigate high sound pressure levels near buildings. A two-dimensional numerical model using the Method of Fundamental Solutions (MFS) was developed to evaluate the acoustic performance of barriers with different geometries and materials, and validated through reduced-scale experiments and comparisons with FEM and SBM results. Subsequently, three-dimensional FEM models were implemented and experimentally validated, enabling detailed parametric analyses of geometric and assembly effects. The work also addressed visco-thermal losses in small-scale configurations through advanced modeling approaches, including Boundary Layer Impedance methods coupled with meshless techniques, validated against commercial

software and laboratory data. Finally, the integration of porous concrete layers was investigated, demonstrating optimized configurations that enhance insertion loss and broaden the effective bandgap.



**Matheus Veloso** has a PhD in Civil Engineering (University of Coimbra), MSc in Mechanical Engineering (UFSC) and Mechanical Engineer (PUC Minas). 10+ years in R&D in acoustics, vibration and vibroacoustics. Specialist at KFB in NVH simulations, modeling and numerical-experimental correlation. Strong background in numerical methods and experimental validation of complex vibroacoustic systems.

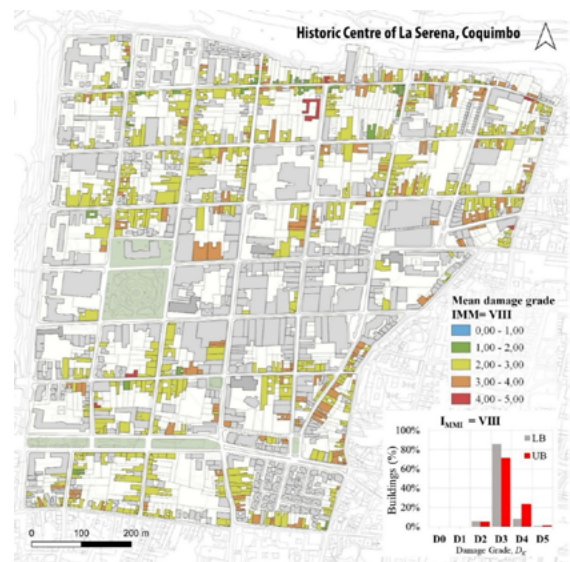
▪ **Multi-dimensional Vulnerability Assessment of Historic Urban Centres Under Multiple Hazards**

**Author:** Pilar Alejandra Baquedano Juliá

**Supervisors:** Tiago Miguel Ferreira; Daniel V. Oliveira; Cristián Sandoval

**Date:** 12/01/2026

**Summary:** The research work addresses the growing need to protect historic urban centres exposed to natural and anthropogenic hazards, particularly earthquakes and fires. It develops and applies a multi-vulnerability risk assessment framework that integrates physical and social dimensions of vulnerability in heritage contexts. Based on index-based methodologies, Census-block-level analysis, and GIS mapping, the framework identifies spatial risk patterns and classifies urban areas into five intervention priority levels. The study was applied to two Chilean case studies: La Serena, focused on seismic vulnerability in earthen constructions, and Valparaíso, focused on fire risk in a dense UNESCO World Heritage hillside area. Its main achievements include the development of an adaptable decision-support methodology, the integration of social vulnerability into heritage risk assessment, and the generation of evidence-based tools to guide risk reduction, prioritisation, and sustainable urban resilience.



**Pilar Baquedano Juliá** is an architect, researcher, and holder of an MSc in Structural Analysis of Historical Constructions. Her expertise includes multi-hazard risk assessment, physical and social vulnerability, and disaster risk reduction in historic urban centres. She has authored several journal papers and book chapters and is currently an Assistant Professor at Universidad Técnica Federico Santa María.

▪ **Application of Artificial Intelligence Techniques for the Design of Buildings**

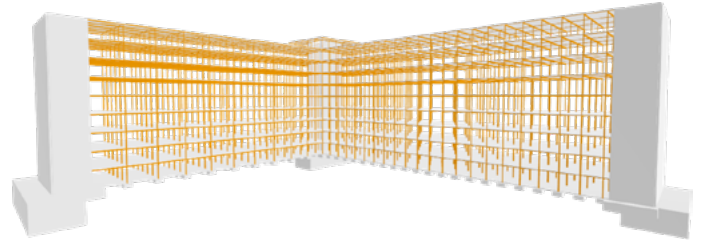
**Author:** Jorge Fernando Cunha Teixeira

**Supervisors:** João Pedro Martins; João Nuno Correia; Luís Simões da Silva

**Date:** 15/01/2026

**Summary:** This PhD thesis develops AI-based algorithms for optimised structural building design. The research introduces a modular Python tool that automates pre-design in accordance with Eurocode safety standards. Main achievements include genetic algorithm (GA) optimisation, which efficiently determines optimal structural element positioning to minimise cost, weight, construction time, and environmental impact (GWP); machine learning (ML) surrogate models that successfully predict building performance metrics with high accuracy, significantly reducing computation time for complex structural optimisations; a post-solvers module that implements specialised algorithms for detailed construction scheduling, life-cycle costing, and environmental analysis

(LCEA); and decision support tools, such as Pareto frontiers and multi-criteria analysis, to assist engineers in selecting sustainable solutions.



**Jorge Teixeira** is currently a Civil Engineer at Fénix Engenharia, where he has been working since 2024. Before, he was a researcher at ISISE from 2016, focusing on structural optimisation, genetic algorithms, machine learning, and life-cycle assessment. His PhD thesis, defended in 2026, focused on the optimisation and design of buildings.

▪ **Feasibility assessment of manufacturing green concrete by combination of wastewater and glass powder**

**Author:** Mohammad Sheikh Hassani

**Supervisors:** Elisabete Rodrigues Teixeira; José António Silva de Carvalho Campos e Matos; Yixia Zhang

**Date:** 28/01/2026

**Summary:** The construction industry faces major sustainability challenges, including water scarcity, emissions, and resource depletion. Reusing waste materials has emerged as a promising strategy. This study investigates the feasibility of producing green concrete using wastewater and glass powder simultaneously. Wastewater can replace potable water, reducing environmental impact, though impurities may affect performance. Glass powder slightly reduces mechanical properties but improves sustainability. Experimental tests evaluated mechanical, durability, and environmental performance. Results show that treated wastewater can fully replace freshwater with minor performance losses and significant environmental benefits. The optimal mix combined treated wastewater with 10% glass powder, achieving the best balance between strength, durability, and sustainability.



**Mohammad** holds a PhD in Civil Engineering from the University of Minho. His research focuses on using waste materials in concrete to develop sustainable solutions. He has a strong interest in graphic design and game development, with over six years of experience in Unreal Engine, including AR/VR, and advanced skills in AI tools such as WarpFusion and ComfyUI.

■ **Assessment of Small-Diameter and Minimally Processed Round Logs of the Invasive Species *Acacia dealbata* Link for Structural Applications**

**Author:** Manuel Ernesto Suazo Uribe

**Supervisors:** Jorge Manuel Gonçalves Branco; José Luis Penetra Cerveira Louzada

**Date:** 19/02/2026

**Summary:** Experimental campaigns were carried out on invasive species *Acacia dealbata* logs harvested from the Peneda–Gerês National Park, northern Portugal, comprising a total of 45 logs (90–143 mm in diameter) collected across two harvesting seasons: spring (17 logs, 2.0 m) and autumn (28 logs, 2.4 m). Both destructive and non-destructive tests were applied, including longitudinal stress-wave, transverse vibration, and drilling resistance. Results showed consistent differences between harvesting seasons, suggesting a relationship between harvest time and physical–mechanical properties. Strong correlations between dynamic and static moduli of elasticity confirmed the reliability of non-destructive techniques for grading roundwood. Visual-grading parameters showed limited predictive capacity, although they remain useful for preliminary field preselection.



**Manuel Uribe** is a Chilean architect, PhD in Civil Engineering (Universidade do Minho), MSc in Timber Construction (Universidad del Bío-Bío, UBB, Chile), with postgraduate studies in building technologies and structural design (Universidad Politécnica de Cataluña, Spain). Academic at the UBB, researching timber structures (CLT and sawn wood, among others) and teaching undergraduate structural design for architects.

■ **Vibration-based experimental technique for assessment of viscoelastic properties of cement-based materials**

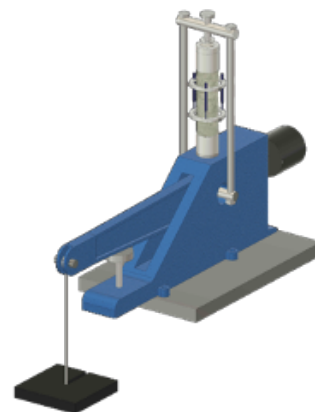
**Author:** Renan Rocha Ribeiro

**Supervisors:** José Luís Duarte Granja; Miguel Ângelo Dias Azenha; Rodrigo de Melo Lameiras

**Date:** 19/02/2026

**Summary:** This thesis develops a comprehensive framework for the viscoelastic characterization of cement pastes using Dynamic Mechanical Analysis (DMA) as an alternative to conventional static creep testing. It identifies the main sources of uncertainty in creep tests and establishes standardized DMA procedures in three-point bending and torsion, including specimen preparation, environmental control, and operational limits. The work also demonstrates that frequency-domain DMA results can be reliably converted into time-domain properties, enabling constitutive modelling comparable to traditional approaches. A further major achievement is the experimental validation of time-temperature superposition in cement pastes, together with the quantification of activation energies for both solidification and viscoelastic processes. Overall, the thesis confirms DMA as a robust and practical tool for viscoelastic

characterisation, with improved control of temperature effects and better access to fast response ranges.



**Renan Rocha Ribeiro** holds a degree in Civil Engineering (UFV/ Brazil), an MSc in Structures and Civil Construction (UnB/ Brazil), and a PhD in Civil Engineering (UnB/UMinho, 2026). His work focuses on experimental research, early age viscoelastic constitutive laws of cementitious materials, development of low-cost monitoring equipment, and construction information management.

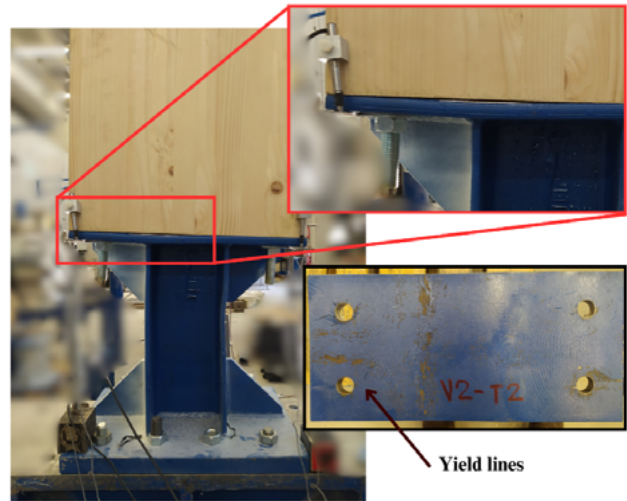
▪ **Design of ductile moment-resisting steel-timber joint using the component method**

**Author:** Arthur da Silva Rebouças

**Supervisors:** Jorge Manuel Gonçalves Branco; Paulo José Brandão Barbosa Lourenço

**Date:** 23/02/2026

**Summary:** This research optimizes timber-steel hybrid joints by refining the component method for multiple bonded-in rod arrangements. It focuses on the interaction between timber and steel, evolving analytical models to determine rotational stiffness and mechanical capacity for configurations with two or four rows of rods and stiffened end-plates. The work achieved significant methodological advancement by developing accurate analytical formulations to predict the rotational behaviour of complex steel-timber joints. These predictions were validated against 15 full-scale tests using Digital Image Correlation for precise structural tracking. The findings identified end-plate thickness, rod diameter, and link stiffness as the critical drivers of performance. The analytical proposition based on the component method shows good predictive capability regarding initial rotational stiffness and joint mechanical capacity for both stiffened and unstiffened end-plates with two and four bonded-in rod rows.



**Arthur da Silva Rebouças** is currently an Assistant Professor in the field of Structural Engineering at IFRN, Brazil. He has concluded his PhD at ISISE, University of Minho within the Timber Innovation Lab. He works in the area of Structural Design with emphasis on the high-performance connections, meaning ductile timber connections and structural behaviour of steel-timber connections.

▪ **Assessing the indirect costs of flooding as a traffic disruption on urban mobility**

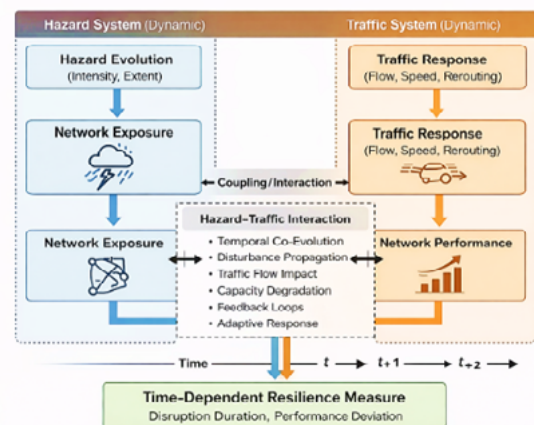
**Author:** Fereshteh Jafari Shahdani

**Supervisors:** José Campos e Matos; Paulo Jorge Ribeiro; Stephen Birkinshaw

**Date:** 10/03/2026

**Summary:** This Ph.D. research investigates the indirect impacts of flooding on urban mobility by integrating hydrodynamic flood modelling with traffic simulation. A dynamic framework was developed to couple CityCAT flood outputs with SUMO traffic modelling, enabling time-dependent assessment of road network performance under flood conditions. The methodology captures both infrastructure disruption and traffic response, including rerouting, congestion, and public transport impacts. The study applies resilience-based indicators to evaluate system performance across multiple flood scenarios. Results highlight the significant role of temporal flood evolution in shaping traffic disruption patterns and demonstrate that indirect costs and mobility degradation are often underestimated in static approaches. The research contributes a transferable modelling framework

for supporting risk-informed urban transport planning and resilience assessment.



**Fereshteh Jafari Shahdani** is a researcher in transport resilience and infrastructure systems. Her work focuses on the integration of hazard modelling and traffic simulation to assess climate-related disruptions. She has contributed to international projects and conferences in transport resilience and urban systems modelling.

# AWARDS & PRIZES

▪ **3Young Researcher Award – Title of presentation: Structural Integrity and Durability Optimization of WAAM Carbon Steel Elements for Fatigue-Sensitive Components**

**Winner:** Mariela Mendez-Morales

**Venue:** 3<sup>rd</sup> International Symposium on Risk Analysis and Safety of Complex Structures, Wrocław University of Science and Technology, Poland

**Date:** 12/09/2025



▪ **Novos Materiais e Produtos para a Sustentabilidade**

**Winner:** Paulo Santos

**Venue:** Ordem dos Engenheiros da Região Centro

**Date:** 24/10/2025



▪ **Best PhD Thesis on Conservation of Architectural and Urban Heritage INAH 2025, National Institute of Anthropology and History, Mexico (Instituto Nacional de Antropología e Historia)**

**Winner:** Elesban Nochebuena Mora

**Venue:** National Museum of Anthropology, Mexico City

**Date:** 26/11/2025

▪ **Featured Paper Award from Engineering Structures – Featured Article for Volume 343-B, the November 15th issue of Engineering Structures: “Numerical and fracture mechanics-based simulations of brittle failure in dowelled timber connections under in-plane multiaxial forces and bending moment”**

**Winner:** Caroline D. Aquino, Michael Schweigler, Leonardo G. Rodrigues, Luis C.M. da Silva, Jorge M. Branco, Thomas K. Bader

**Venue:** National Museum of Anthropology, Mexico City

**Date:** 23/01/2026



## ▪ MODENERLANDS'25 International Conference

**Venue:** CAE, Figueira da Foz, Portugal

**Date:** 03-05/09/2025

**Website:** <https://modenerlands.eu/final-conference/>

**ISISE Members:** Carlos Rebelo, Helena Gervásio, Mariela Mendez-Morales, Luana Tesch, Jafar Tekantappeh, Melaku Seyoum Lemma and Kaike Monteiro

**Summary:** MODENERLANDS'25 marked the conclusion of COST Action CA20109, celebrating four years of research and international collaboration. The organising committee included several members of ISISE, with Professor Carlos Rebelo serving as Chair of the conference. The event was co-sponsored by the COST Association, the University of Coimbra, ISISE, SeaPower, Município da Figueira da Foz, and ACIV.



## ▪ The 2<sup>nd</sup> International RILEM conference on early-age and long-term cracking in RC structures

**Venue:** Katowice, Poland

**Date:** 11-12 September 2025

**Website:** <https://crc2025.org/>

**ISISE Members:** Miguel Azenha

**Summary:** CRC2025 brought together 40 researchers and practitioners in the historic Hotel Monopol in Katowice, Poland, to exchange knowledge on cracking in reinforced concrete structures. Hosted at the historic Hotel Monopol, the conference featured 30 presentations and lively discussions. After the conference, members of RILEM Association Technical Committee 287-CCS gathered for a working meeting.



## ▪ Kick-off Meeting of the CEN/TC250/SC3 Ad-hoc Group

**Venue:** Department of Civil Engineering, University of Coimbra

**Date:** 10 October /2025

**ISISE Members:** Filip Ljubinkovic, Luis Simões da Silva, João Pedro Martins

**Summary:** The University of Coimbra hosted the Kick-off Meeting of the CEN/TC250/SC3 Ad-hoc Group on AI Design of Steel Structures. Convened by the ISISE researcher Filip Ljubinkovic, the group brings together European experts to explore how Artificial Intelligence can support the future development of Eurocode 3 and AI-assisted steel design.



▪ **International Conference on Moisture in Buildings**

**Venue:** Guimarães, Portugal

**Date:** 23-24 October 2025

**Website:** <https://icmb25.pt/>

**ISISE Members:** Jorge Branco, Yina Moscoso, Sandra Silva, Rafael Lara

**Summary:** ICMB25 gathered 129 participants from 33 countries, featuring 81 presentations and 4 keynotes on moisture in buildings. Topics included modelling, retrofit, materials, health impacts, and climate risks, with 5 special sessions on emerging challenges. Proceedings: Springer <https://link.springer.com/book/9783032090539>; extended abstracts: UCL Press <https://journals.uclpress.co.uk/ucloe/collections/628/>.

## UPCOMING EVENTS

▪ **ESREL 2026**

**Venue:** Braga, Portugal

**Date:** 14-19 June 2026

**Website:** <https://www.esrel2026.com/>

**ISISE members:** José Campos e Matos / Paulo B. Lourenço

▪ **Conservation of Monuments and Historical Buildings**

**Venue:** Lisboa, Portugal

**Date:** 02 October 2026

**Website:** <https://iscarsah.org/>

**ISISE members:** Paulo B. Lourenço

▪ **Conservation of Monuments and Historical Buildings**

**Venue:** Lisboa, Portugal

**Date:** 02 October 2026

**Website:** <https://iscarsah.org/>

**ISISE members:** Paulo B. Lourenço

▪ **CONGREGA 2026**

**Venue:** Braga, Portugal

**Date:** 14-16 October 2026

**Website:** <https://www.congrega.eu/congrega-2026/>

**ISISE members:** José Campos e Matos

▪ **IV HPSSRC – High Performance Steel Structures Research Council**

**Venue:** Coimbra, Portugal

**Date:** 2-3 September 2027

**Website:** [hpsrc.com](https://hpsrc.com)

**SISE members:** Luís Simões da Silva

▪ **XVI Conference on Steel and Composite Construction and II Conference on Facade Engineering**

**Venue:** Porto, Portugal

**Date:** 26-26 November 2027

**Website:** <https://www.cmm.pt/congresso16>

**ISISE members:** Luís Simões da Silva

- **Advanced Masters in Structural Analysis of Monuments and Historical Constructions (SAHC)**

**Venue:** Dept. of Civil Engineering, University of Minho

**Website:** [www.msc-sahc.org](http://www.msc-sahc.org)

- **Erasmus Mundus Master Waves**

**Venue:** Dept. of Civil Engineering, University of Coimbra

**Website:** <https://www.master-waves.eu>

- **European Master in Building Information Modelling BIM A+**

**Venue:** Dept. of Civil Engineering, University of Minho

**Website:** [www.bimaplus.org](http://www.bimaplus.org)

- **European Master Course in Advanced Structural Analysis and Design using Composite Materials – FRP++**

**Venue:** Dept. of Civil Engineering, University of Minho

**Website:** <https://msc-frp.org/>

- **International Master in Risk Assessment and Management of Civil Infrastructures (NORISK)**

**Venue:** Dept. of Civil Engineering, University of Minho

**Website:** <https://msc-norisk.org/>

- **International Master on Sustainable Built Environment iMiSBE**

**Venue:** Dept. of Civil Engineering, University of Minho

**Website:** <https://civil.uminho.pt/imisbe/>

- **Master in Steel and Composite Construction**

**Venue:** Dept. of Civil Engineering University of Coimbra

**Website:** <https://www.uc.pt/en/fctuc/dec/oferta-formativa/mestrados/master-in-steel-and-composite-construction-engineering/>

- **Master in Sustainable Construction and Rehabilitation (taught only in Portuguese)**

**Venue:** Dept. of Civil Engineering, University of Minho

**Website:** <http://civil.uminho.pt/mcrs/>

- **Doctoral Programme in Civil Engineering**

**Venue:** Dept. of Civil Engineering, University of Minho

**Website:** <https://pdec.civil.uminho.pt/>

- **Doctoral Program Steel and Composite Construction**

**Venue:** Dept. of Civil Engineering, University of Coimbra

**Website:** <https://apps.uc.pt/courses/EN/course/12782/2026-2027>

- **International Doctoral Programme in Sustainable Built Environment**

**Venue:** Dept. of Civil Engineering, University of Minho

**Website:** <http://civil.uminho.pt/idisbe/>

