

Riccardo Talami, PhD

Research Fellow in Building Performance Simulation and Optimization
National University of Singapore (NUS)

E-mail: riccardo.talami12@gmail.com

Telephone: 8044 6551

FEC1, SDE2 - 03-17, 2 Architecture Dr, Singapore 117565

Principal Field of Interests

Sustainable and Integrated Building Design; Performance-based Building Design; Building Performance Simulation and Optimization; Smart Buildings; HVAC Systems; Thermal Comfort; Daylighting; Indoor Environmental Quality. Computational Design; Evolutionary Computation; Early-design Exploration and Informed Decision Making; Uncertainty and Robustness Analysis.

Education

- Doctor of Philosophy (PhD) in Building Science/ Building Engineering January 2019 - January 2022
School of Architecture, Building and Civil Engineering
Loughborough University (Loughborough, United Kingdom)

Thesis: The sequential design optimization of building performance.

Supervisors: Prof. Jonathan Wright and Dr. Bianca Howard.

- Master of Science in Architecture and Innovation (Sustainable Design) October 2014 - March 2017
UC Berkeley, University IUAV of Venice (Venice, Italy)

Thesis: Recent trends in radiant system technology for heating and cooling: analysis of the factors that influence the built environment - United States and Italy.

Supervisors: Fred Bauman, PE (UC Berkeley, Center for the Built Environment), Prof. Piercarlo Romagnoni (IUAV) and Simone Cappelletti (STEAM Engineering).

- Bachelor of Science in Architecture October 2011 - September 2014
University IUAV of Venice (Venice, Italy)

Experience

- Research Fellow January 2022 - current
Department of the Built Environment
National University of Singapore - NUS - (Singapore)

Duties: Led a team for research projects on Temperature Setpoints of HVAC systems and Indoor Environmental Quality, and the development of online tools for practical applications. Collaborated on research projects related to Building Envelope Systems. Supervised final year students for research thesis and visiting scholars. Developed and published scientific papers. Managed the procurement for project expenses.

- Researcher January 2019 - January 2022
School of Architecture, Building and Civil Engineering
Loughborough University (Loughborough, United Kingdom)

Duties: Researched on Building Performance Optimization. Developed and published scientific papers. Delivered lectures.

- Co-Instructor and Teaching Assistant September 2017 - December 2018
ASD - Architecture and Sustainable Design Pillar
Singapore University of Technology and Design - SUTD - (Singapore)

Duties: Developed coursework structure, teaching materials, and assignments. Delivered lectures, conducted weekly reviews and supervised final exams.

• Research Assistant
Design for Climate and Comfort Lab (DCC)
Singapore University of Technology and Design - SUTD - (Singapore)

March 2017 - December 2018

Duties: Developed and conducted independent research on Radiant Cooling Systems in the Tropics (HVAC) and Human Behaviour in office settings. Collaborated on research projects related to Daylighting in Buildings and Building Performance of Tropical Building Typologies. Developed and published scientific papers.

• Student Researcher
Center for the Built Environment (CBE)
University of California Berkeley - (United States)

May 2016 - November 2016

Duties: Researched on Radiant Cooling Systems (HVAC), culminating in published scientific reports and the development of an online tool.

Research projects

• Innovative building envelope systems
National University of Singapore - NUS - (Singapore)
Role: Collaborator

June 2023 - current

The research provides a framework for the integration of vertical greenery systems (VGS), heat-reflective paints, and façade shading systems.

• Human-centric Indoor environmental quality (IEQ)
National University of Singapore - NUS - (Singapore)
Role: Project Leader.

September 2022 - current

The research explores optimal positioning of IEQ sensing devices from an occupant-centric perspective in office settings, aiming to identify sensor placements that most accurately reflect the environmental conditions experienced by occupants.

• Dynamic temperature setpoints and setbacks under weather and occupancy variability
National University of Singapore - NUS - (Singapore)
Role: Project Leader.

January 2022 - current

The research evaluates the energy saving potential of dynamically adjusting room temperature setpoints and setbacks of HVAC systems based on varying outdoor weather and indoor occupancy conditions.

• The sequential design optimization of building performance
Loughborough University (United Kingdom)
Role: Project Leader.

January 2019 - January 2022

The research develops and evaluates a novel sequential approach in the multi-objective design optimization of building geometry, fabric, HVAC systems and controls to support the building design process.

• Comparing laboratory and field studies of occupant lighting experience
Singapore University of Technology and Design - SUTD - (Singapore)
Role: Collaborator.

July 2018 - current

The research investigates whether laboratory conclusions related to visual discomfort and lighting quality are applicable to real building conditions. This is achieved by comparing 40 laboratory post-occupancy evaluation responses to 40 field responses in actual office workspaces in Singapore.

• Subjective and measured evidence for residential lighting metrics in the tropics
Singapore University of Technology and Design - SUTD - (Singapore)
Role: Collaborator.

July 2018 - December 2018

The research presents a comprehensive study methodology to craft statistically-valid subjective models based on predictive lighting simulation data. This is done by comparing measured and simulated lighting levels in 17 residential housing units in Singapore against the subjective opinions of 35 participants who reside in the units.

• Radiant Cooling Systems in the Tropics March 2017 - December 2018
Singapore University of Technology and Design - SUTD - (Singapore)
Role: Project Leader.

The research identifies the most influential passive and active design parameters to support early-design decisions when integrating radiant cooling systems (HVAC) in architectural design in the tropics.

• Sustainable Futures: Cooling March 2017 - December 2018
Singapore University of Technology and Design - SUTD - (Singapore)
Role: Collaborator.

The research investigates how individuals operate their air-conditioning, window shading and electric lighting in office settings. This is achieved by performing long term observational field studies and translating human behaviour observations into predictive models to inform building design decisions.

• Optimizing Radiant Systems for Energy Efficiency and Comfort May 2016 - November 2016
UC Berkeley - Center for the Built Environment (CBE) (United States)
Role: Project Leader.

This research develops a database of over 400 commercial buildings that use radiant cooling and heating across the globe, the largest of its kind to date. All buildings from the database are displayed on an online interactive map.

Teaching and Supervision

• Center for the Energy Resilience and the Built Environment (ERBE): May 2021 - May2021
Loughborough University (United Kingdom)
Role: Invited lecturer.

• Center for the Energy Resilience and the Built Environment (ERBE): May 2020 - May2020
Loughborough University (United Kingdom)
Role: Invited lecturer.

• 20.112 Sustainable Design Option Studio 2: May 2018 - December 2018
Singapore University of Technology and Design - SUTD - (Singapore)
Role: Teaching Assistant.

• 20.112 Sustainable Design Option Studio 3: January 2018 - April 2018
Singapore University of Technology and Design - SUTD - (Singapore)
Role: Teaching Assistant.

• 20.111 - 20.501 Sustainable Design Option Studio 1: January 2018 - April 2018
Singapore University of Technology and Design - SUTD - (Singapore)
Role: Teaching Assistant.

• 20.223 History, Theory and Culture 3: September 2017 - December 2017
Contemporary Architecture Between Technology, Science and Culture.
Singapore University of Technology and Design - SUTD - (Singapore)
Role: Co-Instructor.

Xudong Jia (Master student, October 2022 - current), Ilyas Dawoodjee (Research Assistant, May 2022 - November 2023), Xinhao Hu (visiting PhD candidate, January 2023 - January 2024), Glenda Cheng (undergraduate dissertation, June 2022 - March 2023), Sabrina Tay and Shirlynn Koh (undergraduate dissertation, December 2022 - March 2023), Thomas Firsich (visiting Master student, July 2023 - September 2023).

External academic experience

- Reviewer for Building Simulation 2019: 16th Conference of IBPSA
2-4 September 2019, Rome (Italy). August 2018 - September 2019
- Reviewer for Building Simulation and Optimization 2020
21-22 September 2020, Loughborough (UK), on-line. September 2019 - September 2020
- Reviewer for Building Simulation 2021: 17th Conference of IBPSA
1-3 September 2021, Bruges (Belgium), in-person and on-line. August 2020 - September 2021
- Reviewer for Building Simulation 2023: 18th Conference of IBPSA
4-6 September 2023, Shanghai (China), hybrid August 2022 - September 2023
- Reviewer for Journal of Architectural Engineering January 2024 - current

Architectural experience

- Architectural internship September 2013 - February 2014
Arch. Renzo Parise (Padova, Italy).

Duties: Collaborated on the design and development of residential projects. Produced 2D and 3D drawings. Attended meetings with clients. Assisted with the materials selection.

Products and tools development

- Indoor Environmental Quality sensor package v.1.0 September 2022 - April 2023

Designed and assembled 20 Raspberry-pi-based sensor packages that monitor 9 Indoor Environmental Quality metrics continuously: Carbon dioxide, Particulate matter, Total volatile organic compound, Illuminance, Temperature, Humidity, and Sound. Prototyped and 3D printed 20 boltless sensor enclosures for easy assembly and maintenance.

- Indoor Environmental Quality sensor package v.2.0 September 2023 - current

Designed and assembled 40 Arduino-based sensor packages that monitor 4 IEQ parameters continuously. Prototyped and 3D printed 40 sensor enclosures with reduced dimensions. Introduced fast-charging battery and Wi-Fi connection.

- Optimal Temperature Setpoint Tool September 2022 - April 2023

The Optimal Temperature Setpoint Tool allows the user to identify the optimal temperature setpoint based on occupancy rates, patterns, and outdoor air temperature values (available at <https://building-robotics-lab.github.io/brlab/#/otst>).

- CBE Radiant Systems Map May 2017 - October 2017

The CBE Radiant Systems Map displays a database of over 400 commercial buildings using radiant cooling and heating in the world as online interactive map (available at <http://bit.ly/RadiantBuildingsCBEv2>). The tool has obtained 18.000 views so far.

Awards

- UK Engineering and Physical Sciences Research Council Scholarship, Engineering and Physical Sciences Research Council (2019 - 2022).
- Winner of Best Poster Award for "Subjective and Measured Evidence for Residential Lighting Metrics in the Tropics" (in collaboration with Jakubiec, J. Alstan; Srisamranrungruang, Thanyalak; Kong, Zhe; Quek, Geraldine), 16th International IBPSA Conference (2019).

Skills summary

• Transferrable Skills

- Excellent journal, conference paper, and technical report writing skills.
- Ability to work in a team and independently.
- Good presentation and communication skills (verbal and written)
- Ability to work in a multidisciplinary and multicultural environment.
- Ability to work on several projects simultaneously, with clear deadlines and under pressure.

• Software and Technical

- **Energy Analysis:** Energy Plus (Conventional, Design Builder and Open Studio interfaces), ArchSim and Honeybee plug-ins for Grasshopper.
- **Energy Certification:** Master Clima 11300.
- **Solar and Environmental Analysis:** Ecotect, Climate Consultant.
- **Daylight Analysis:** Radiance (DIVA and Ladybug interfaces).
- **Parametric Modeling:** Rhinoceros/Grasshopper.
- **Statistics and Data Science:** R.
- **Programming:** Python, Java.
- **Environmental sensors:** HOBO products, DustTrak™ DRX Aerosol Monitor 8534, XL2 Audio and Acoustic Analyzer, VelociCalc Multi-Function Ventilation Meter 9565, RAE Systems ppbRAE 3000+ Portable Handheld VOC Monitor, Testo Luxmeter.
- **Microcontrollers:** Raspberry Pi, Arduino.
- **Architecture/Engineering drafting and modeling:** AutoCAD, ArchiCAD, Revit, SketchUp, Rhinoceros.
- **Graphic and editing:** Photoshop, Illustrator, InDesign.
- **General:** Microsoft Office package.

• Certifications/Courses

- Certified Peer Reviewer Course from Elsevier, January 8-9 2020.
- Grasshopper Level 1 course from McNeel, 12 hours , January 25-29 2021.
- Grasshopper Level 2 course from McNeel, 18 hours , January 25-29 2021.

• Languages

- **English:** Full Professional proficiency.
- **Italian:** Native proficiency.
- **French:** Elementary proficiency.
- **Spanish:** Elementary proficiency.

Publications

- Journal papers: 3, Conference papers: 4, Reports: 1, Thesis: 1.

Publications are available at: <https://scholar.google.com/citations?user=EmFyzowAAAAJ&hl=en>.

Upcoming publications: Undergoing peer-review: 3, In process/Writing-up: 6.

- Talami, Riccardo; Dawoodjee, Ilyas and Ghahramani, Ali. 2023. Quantifying energy savings from optimal selection of HVAC temperature setpoints and setbacks across diverse occupancy rates and patterns. *Buildings*, 13 (12), 2998.
- Talami, Riccardo; Dawoodjee, Ilyas and Ghahramani, Ali. 2023. Demystifying energy savings from dynamic temperature setpoints under weather and occupancy variability. *Energy and Built Environment*. In press.
- Talami, Riccardo; Hu, Xinhao, Dawoodjee, Ilyas and Ghahramani, Ali. 2023. Examining Different Placement Strategies for Indoor Environmental Quality Sensors in Office Environments. Under review.
- Shah, Iqbal; Su, Xiaosong, Talami, Riccardo and Ghahramani, Ali. 2023. Enhancing Building Envelopes: Parametric Analysis of Shading Systems for Opaque Facades and Their Comparison with Cool Paints. Under review.
- Talami, Riccardo, Wright, Jonathan and Howard, Bianca. 2024. A novel whole-building design optimization approach for building performance (in progress).
- Talami, Riccardo, Wright, Jonathan and Howard, Bianca. 2024. A comparison of deterministic and probabilistic optimization algorithms for the building design process (in progress).
- Talami, Riccardo, Wright, Jonathan and Howard, Bianca. 2024. Robustness assessment of a novel whole-building design optimization approach for building performance (in progress).
- Jakubiec, J. A, Kent, M., Kong, Z., and Riccardo Talami. 2024. Comparing Laboratory and Field Studies of Occupant Lighting Experience – A Controlled Case Study (in progress)
- Talami, Riccardo, and Dawoodjee, Ilyas. 2024. A framework for evaluating novel optimization algorithms (in progress).
- Talami, Riccardo, and Dawoodjee, Ilyas. 2024. Integrating building performance optimization within the building design process (in progress).
- Talami, Riccardo, Wright, Jonathan and Howard, Bianca. 2021. Multi-criteria robustness assessment of a sequential whole-building design optimization. *Building Simulation*, Bruges, Belgium, September 1-3.
- Talami, Riccardo, Wright, Jonathan and Howard, Bianca. 2020. A comparison between sequential and simultaneous whole-building design optimization for building performance. *Building Simulation, and Optimization* Loughborough, UK, September 21-22.
- Talami, Riccardo, and J. Alstan Jakubiec. 2020. Early-design sensitivity of radiant cooled office buildings in the tropics for building performance. *Energy and Buildings*, 223, 110177.
- Talami, Riccardo, and J. Alstan Jakubiec. 2019. Sensitivity of design parameters on energy, system and comfort performance for radiant cooled office buildings in the tropics. *Building Simulation*, Rome, Italy, September 2-4.
- Jakubiec, J. A, Srisamranrungruang, T., Kong, Z., Quek, G. and Riccardo Talami. 2019. Subjective and measured evidence for residential lighting metrics in the tropics. *Building Simulation*, Rome, Italy, September 2-4.
- Talami, R., C. Karmann, F. Bauman, S. Schiavon, and P. Raftery. 2017. Recent trends in radiant system technology in North America. CBE Research Report. April.