

INÊS CAETANO

ARCHITECT & JUNIOR RESEARCHER



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CURRENT POSITION

Algorithmic Design Specialist at BUILT CoLAB

Early-stage researcher at INESC-ID (Instituto de Engenharia de Sistemas e Computadores: Investigação e Desenvolvimento em Lisboa)

Laboratory Invited Instructor at Instituto Superior Técnico, University of Lisbon



EDUCATION

[Doctoral Program in Architecture](#)

Instituto Superior Técnico, University of Lisbon

2016 – 2022

Doctoral thesis approved with Distinction and Honour (March 2023)

[Integrated Master in Architecture](#)

Instituto Superior Técnico, University of Lisbon

2009 – 2015

Erasmus Programme (2013-2014) at Politecnico di Milano

Master thesis: DrAFT: An Algorithmic Framework for Façade Design (Grade: 19/20)



FIELDS OF INTEREST

Algorithmic Design

Algorithmic Patterns

Design Automation

Design Exploration

Digital Fabrication

Façade Design

Generative Design

Parametric Modeling

Sustainable Design



MAJOR HONORS/AWARDS

PhD thesis approved with Distinction and Honour (*Summa Cum Laude*) | 2023

PhD Student of the Year (INESC-ID Annual Awards) | 2021

CAADRIA Best Presentation Runner-up Award | 2020

CAADRIA Best Paper Award | 2019

Full PhD grant from FCT - Portuguese Foundation for Science and Technology | 2018-2022

ACADIA Conference Scholarship Award | 2017

Young CAADRIA Award | 2017

PhD grant from University of Lisbon | 2017-2018



SKILLS

- Programming fundamentals
- Programming languages: Python, Julia, Racket, Grasshopper, SQL, html, Python libraries (pandas, NumPy, matplotlib)
- CAD/BIM tools: Rhino, AutoCAD, Revit
- Adobe Photoshop
- Parametric Modeling
- Algorithmic Strategies
- Geometry Problem Solving
- Computational Notebooks
- MS Office Applications



ACTIVITIES

April 2023 - now Algorithmic Design Specialist, BUILT CoLAB

July 2022 Participation at 12th Lisbon Machine Learning School, Instituto Superior Técnico

October 2018 to September 2022 Co-PI in the Research Project *Khepri – Algorithmic Design, Analysis, and Optimization*, INESC-ID - Instituto de Engenharia de Sistemas e Computadores: Investigação e Desenvolvimento em Lisboa (National Research Project Funded by FCT)

PI – António Leitão (Associate Professor at IST/Senior Researcher at INESC-ID)

2015 – now Early-stage Researcher in the Graphics & Interaction Group, INESC-ID - Instituto de Engenharia de Sistemas e Computadores: Investigação e Desenvolvimento em Lisboa

- 2015 – now** Laboratory Invited Instructor, Instituto Superior Técnico
- Design Programming and Computing, a 2nd and 3rd year course of the Integrated Master in Architecture (since 2016)
 - Digital Design, a 1st year of Architecture and Civil Engineering Doctoral Programs (since 2021)
 - Foundations of Programming, a 1st year of Engineering Physics undergraduate programme (2022)
 - Foundations of Programming, a 1st year of Bologna Degree in Computer Science and Engineering (2023)
- 2014 - now** Member of the Algorithmic Design for Architecture (ADA) Research group, headed by Professor António Leitão
- Winter 2020** Invited reviewer at Digital Design Studio course - Final Juri Session (ARCH 3522), American University of Cairo
- Spring 2019** Guest Reviewer at CAADRIA Postgraduate Student Consortium, Victoria University of Wellington
- Spring 2019** Architectural Project Collaboration, Atelier dos Remedios
Design exploration and rationalization of a parametric façade system for a residential building.
- Winter 2018** Acoustic and Aesthetic Requalification Project, Instituto Superior Técnico
Collaboration in the design development and acoustic analysis of a parametric ceiling for a classroom.
- May 2017** Architectural Project Collaboration, Atelier dos Remedios
Design exploration and daylight analysis of facade shading panels for a private house.
- July 2016** Participation at Surfaces in-Play Summer School, ISCTE - University Institute of Lisbon
Design development and production of an origami-inspired kinetic ceiling unit using parametric design and digital fabrication techniques.
- June 2016** Monitor at the 3rd Cork Workshop “New Uses in Architecture”, Lisbon School of Architecture
- April 2016** Architecture Project Competition, Atelier dos Remédios and FOR-A
Design exploration and development of a parametric brick façade using algorithmic design.
- September 2015 to July 2016** Professional Internship, CERIS – Civil Engineering Research and Innovation for Sustainability
Research work on the field of Parametric and Algorithmic Design.

October 2014 to April 2015 Research Fellow in the Research Project *Rosetta – The Generative Design Tool*, INESC-ID - Instituto de Engenharia de Sistemas e Computadores: Investigação e Desenvolvimento em Lisboa (National Research Project Funded by FCT)

PI – António Leitão (Associate Professor at IST/Senior Researcher at INESC-ID)



PUBLICATIONS

Peer-reviewed articles in International Journals: 9

Book Chapters: 5

Peer-reviewed papers in International Conferences: 17

Technical reports: 2

Dissertation/Thesis: 2

Posters: 3

Submitted Papers: 1

Papers under preparation: 2

Lectures/Presentations: 4

Citations: 420, h-index: 9, i10-index: 9

Peer-reviewed Articles in International Journals

Leitão, A., Caetano, I., & Correia, H. (2016). Processing Architecture. *International Journal of Architectural Computing*, 14(2).

Caetano, I., & Leitão, A. (2019). Integration of an Algorithmic BIM Approach in a Traditional Architecture Studio. *Journal of Computational Design and Engineering*, 6.

Caetano, I., & Leitão, A. (2020). Architecture Meets Computation: an Overview of the Evolution of Computational Design Approaches in Architecture. *Architectural Science Review*, 63(2).

Caetano, I., Leitão, A., & Bastos, F. (2020). From Architectural Requirements to Physical Creations. *Journal of Façade Design and Engineering*, 8(2).

Caetano, I., Santos, L., & Leitão, A. (2020). Computational design in architecture: Defining parametric, generative, and algorithmic design. *Frontiers of Architectural Research*, 9(2).

Castelo-Branco, R., Caetano, I., & Leitão, A. (2022). Digital representation methods: The case of algorithmic design. *Frontiers of Architectural Research*.

Castelo-Branco, R., Caetano, I., Pereira, I., & Leitão, A. (2022). Sketching Algorithmic Design. *Journal of Architectural Engineering*, 28(2).

Castelo-Branco, R., Caetano, I., & Leitão, A. (2022). Algorithmic Representation Space. *Prospectives*, 2.

Caetano, I., Pereira, I., & Leitão, A. (2023). Balancing Design Intent and Performance: an algorithmic design approach. *Architectural Science Review*.

Peer-reviewed Book Chapters

Caetano, L. Santos, and A. Leitão (2015). From idea to shape, from algorithm to design: A framework for the generation of contemporary facades. In *Computer-Aided Architectural Design Futures (CCIS 527)*. Springer.

Caetano, I., & Leitão, A. (2021). Mathematically Developing Building Facades: An algorithmic framework. In S. Eloy, D. Leite Viana, F. Morais, & J. Vieira Vaz (Eds.), *Formal Methods in Architecture: Advances in Science, Technology & Innovation (IEREK Interdisciplinary Series for Sustainable Development)*. Springer, Cham.

Caetano, I., Leitão, A., & Bastos, F. (2022). Converting Algorithms into Tangible Solutions: A Workflow for Materializing Algorithmic Facade Designs. In A. Correia, M. Azenha, P. Cruz, P. Novais, & P. Pereira (Eds.) *Trends on Construction in the Digital Era. ISIC 2022. Lecture Notes in Civil Engineering*, vol 306. Springer, Cham.

Caetano, I., & Leitão, A. (2023). Behind Algorithmic Geometric Patterns: A Framework for Facade Design Exploration. In P. Lizancos, D. Leite Viana, F. Morais, & J. Vieira Vaz (Eds.), *Formal Methods in Architecture: Proceedings of the 6th International Symposium on Formal Methods in Architecture (6FMA), A Coruña 2022* (Digital Innovations in Architecture, Engineering and Construction book series). Springer Singapore.

Caetano, I., & Leitão, A. (2023). The Right Algorithm for the Right Shape: An algorithmic framework for efficient design and conception of building facades. In Barberio, M., Colella, M., Figliola, A., & Battisti, A. (Eds.), *Architecture and Design for Industry 4.0: Theory and Practice*. Springer.

Peer-reviewed Papers in International Conferences

Caetano, I., & Leitão, A. (2016). DrAFT: An Algorithmic Framework for Façade Design. Complexity & Simplicity: Proceedings of the 34th eCAADe Conference.

Caetano, I., & Leitão, A. (2016). Using Processing with Architectural 3D Modelling. Complexity & Simplicity: Proceedings of the 34th eCAADe Conference.

Caetano, I., & Leitão, A. (2016). Exploring Buildings' Surface Patterns. Architecture In-Play International Conference.

Caetano, I., & Leitão, A. (2016). Processing for Architecture. ASK the Conference – Education for Research, Research for Creativity.

Caetano, I., & Leitão, A. (2017). Integration of an Algorithmic BIM Approach in a Traditional Architecture Studio. Protocols, Flows and Glitches: Proceedings of the 22nd CAADRIA Conference.

Alfaiate, P., **Caetano, I., & Leitão, A. (2017).** Luna Moth Supporting Creativity in the Cloud. Disciplines & Disruption: Proceedings of the 37th ACADIA Conference.

Sousa, S., **Caetano, I., & Leitão, A. (2017).** Saving Lives with Generative Design and Agent-based Modeling. ShoCK - Sharing of Computable Knowledge: Proceedings of the 35th eCAADe Conference.

Caetano, I., Belém, C., Ilunga, G., Feist, S., Leitão, A., & Bastos, F. (2018). Casos de Estudo sobre a Integração de Processos de Projeto Algorítmico em Fluxos de Trabalho de Projeto em Modelo BIM. 2^o Congresso Português de BIM.

Caetano, I., Ilunga, G., Belém, C., Aguiar, R., Feist, S., Bastos, F., & Leitão, A. (2018). Case Studies on the Integration of Algorithmic Design Processes in Traditional Design Workflows. Learning, Adapting and Prototyping - Proceedings of the 23rd CAADRIA Conference.

Caetano, I., & Leitão, A. (2018). Algorithmic Patterns for Facade Design: Merging design exploration, optimization and rationalization. FACADE TECTONICS 2018 World Congress Conference Proceedings.

Sammer, M., Leitão, A., & **Caetano, I. (2019).** From Visual Input to Visual Output in Textual Programming. Intelligent & Informed - Proceedings of the 24th CAADRIA Conference.

Caetano, I., & Leitão, A. (2019). Weaving Architectural Façades: Exploring algorithmic stripe-based design patterns. "Hello, Culture": Proceeding of the 18th CAADFutures Conference.

Santos, L., **Caetano, I., Pereira, I., & Leitão, A. (2020).** A Generative System for the Design of High-Performing Shading Devices: Exploring the Daylight Potential of Weaving Patterns. Planning Post Carbon Cities - Proceedings of the 35th PLEA Conference.

Castelo-Branco, R., **Caetano, I., Pereira, I., & Leitão, A. (2020).** The Collaborative Algorithmic Design Notebook. Imaginable Futures: Design Thinking, and the Scientific Method - Proceedings of the 54th ASA Conference.

Caetano, I., & Leitão, A. (2020). When the Geometry Informs the Algorithm: A hybrid visual/textual programming framework for facade design. Anthropologic - Architecture and Fabrication in the cognitive age: Proceedings of the 38th eCAADe Conference.

Caetano, I., Garcia, S., Pereira, I., & Leitão, A. (2020). Creativity inspired by analysis: An algorithmic design system for designing structurally feasible façades. RE: Anthropocene: Proceedings of the 25th CAADRIA Conference.

Santos, L., **Caetano, I., Leitão, A., & Pereira, I. (2021).** Uncertainty in daylight simulations of algorithmically generated complex shading screens. Proceedings of the 17th IBPSA Building Simulation Conference.

Leitão, A., Castelo-Branco, R., & **Caetano, I. (2022).** Affordable Computation for Architecture. Hybrid Spaces of the metaverse: Proceedings of the 10th International Conference of the Arab Society for Computer Aided Architectural Design (ASCAAD).

Thesis and dissertations

Caetano, I. (2015). DrAFT: An Algorithmic Framework for Façade Design. Department of Civil Engineering and Architecture, Instituto Superior Técnico, University of Lisbon.

Caetano, I. (2022). DrAFT 2.0: An Algorithmic Framework for the Design, Optimization, and Fabrication of Facades. Department of Civil Engineering and Architecture, Instituto Superior Técnico, University of Lisbon.

Technical Reports

Caetano, I. (2018). An Algorithmic Framework for the Design, Optimization, and Fabrication of Facades. CAT – Ph.D. Thesis Advisory Committee (CAT) Department of Civil Engineering and Architecture, Instituto Superior Técnico, University of Lisbon.

Leitão, A., & Caetano, I. (2022). Project Khepri - Algorithmic Design, Analysis, and Optimization (PTDC/ART-DAQ/31061/2017). Final Report.

Papers under preparation

Caetano, I. & Leitão A. (2023). Large Scale Algorithmic Design. Automation in Construction.

Caetano, I. & Leitão A. (2023). Connecting Design and Fabrication through Algorithms: Current state and future prospects. Nexus Journal.



PEER REVIEWER

Since 2023	Engineering Applications of Artificial Intelligence
Since 2023	Journal of Architectural Engineering
Since 2022	ASCAAD Conference
Since 2022	Heliyon Journal
Since 2019	Journal of Asian Architecture and Building Engineering
Since 2019	Architectural Engineering and Design Management
Since 2018	Journal of Computational Design and Engineering
Since 2017	Frontiers of Architectural Research
Since 2015	CAADRIA Conference



CERTIFICATES

2023	Criteria and Rubrics in Evaluation, Pedagogical Training for Professors, University of Lisbon
2023	Workshop Moodle – Initial, Intermediate, and Evaluation Tools Level, Pedagogical Training for Professors, University of Lisbon
2022	Data Science Specialization (10 Modules), IBM Developer Skills Network and Coursera
2022	12 th Lisbon Machine Learning School, Instituto Superior Técnico, Instituto de Telecomunicações, INESC-ID and Unbabel

- 2022 Introduction to NumPy, SkillUp b Simplilearn
- 2022 Partners @ MOOC Técnico, Instituto Superior Técnico, University of Lisbon
- 2022 Plagiarism - Copy detection using Urkund and MOSS, Instituto Superior Técnico, University of Lisbon
- 2022 Teaching STEM Students – Transformation Guide for Teaching Assistances 9th Edition, Instituto Superior Técnico, University of Lisbon
- 2022 Pedagogical Training for Professors: Pedagogical Feedback, Flipped learning, Google Jamboard, Google Sheets, Google Slides, Interrogative Methods, Pedagogical Training for Professors, University of Lisbon
- 2020 Teaching STEM Students – Transformation Guide for Teaching Assistances 4th Edition, Instituto Superior Técnico, University of Lisbon
- 2016 Certificate in Advanced English, Cambridge English Level 2 Certificate in ESOL International (Advanced), Cambridge School
- 2016 Surface InPlay International Summer School, ISCTE
- 2015 Revit Architecture Fundamental, QualiCAD Formação e Consultoria em Informática
- 2015 3D Studio Max Fundamental, QualiCAD Formação e Consultoria em Informática
- 2015 Grasshopper Level I, Rhino 3D Portugal
- 2014 Scientific Writing, FUNDEC – Associação para a Formação e o Desenvolvimento em Engenharia Civil e Arquitectura
- 2011 Photoshop Level I, FormaBase