

Daniel Cardoso Llach, Ph.D.

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EDUCATION

Ph.D. Architecture: Design and Computation. 2012
Massachusetts Institute of Technology, Cambridge, US.
School of Architecture and Planning. *Presidential Fellow*.
Advisor: Terry W. Knight, Co-advisor: Lucy Suchman

M. S. Architecture: Design and Computation. 2007
Massachusetts Institute of Technology, Cambridge, US.
School of Architecture and Planning. *With Honors*.
Thesis: A Generative Grammar for 3D Manufacturing.
Advisor: Terry W. Knight, Larry Sass and William J. Mitchell.

B. Arch. Professional Degree in Architecture: 2001
Universidad de los Andes, Bogotá, Colombia.
Thesis: Urban Erosion and Juxtaposition in San Victorino
Advisor: Phillip Weiss Salas, Marcela Angel, Fernando Arias.

ACADEMIC APPOINTMENTS

Assistant Professor Carnegie Mellon University. 2016-present
School of Architecture, College of Fine Arts
Curriculum development and teaching of graduate and undergraduate courses on histories, theories and practices of computational design. Graduate (MS, PhD and DPP) and undergraduate advising. Master of Science in Computational Design chair, co-director of CoDe Lab, and co-chair of graduate programs.

Visiting Scholar University of Cambridge. Jan-Aug 2016.
Martin Centre, Department of Architecture
Research on the early history of the Cambridge CAD group and the Land Use and Built Form Studies center at the University of Cambridge.

Research Fellow Leuphana Universitat, Germany. Apr-May 2016.
Institute for the Advanced Study of Media Cultures of Computer Simulation (MECS)

Special Faculty Carnegie Mellon University. 2015-2016
School of Architecture, College of Fine Arts

Assistant Professor Stuckeman School of Architecture and Landscape Architecture. 2012-2015
College of Arts and Architecture, The Pennsylvania State University.
Teaching of undergraduate and graduate courses on computational design. Doctoral and master's students advising. Studio instruction. Development of vision and chairing of the Stuckeman Center for Design Computing (SCDC) committee.

Teaching Assistant	School of Architecture and Planning, Massachusetts Institute of Technology. 2009-2011. Collaborator in Design Without Boundaries (with William J. Mitchell and Federico Casalegno), Design Scripting (Takehiko Nagakura), and Inquiry into Computation and Design (Terry W. Knight)
Research Affiliate	Mobile Experience Lab, Massachusetts Institute of Technology. 2008-2009. Research and design of projects exploring the intersection of mobile devices and urban space. Multidisciplinary projects in Brescia (Italy), Paris (France), and Boston (US).
Research Assistant	Digital Design and Fabrication Group & Center for Bits and Atoms, MIT Media Lab. 2006-2007. Research into design languages for numerically controlled devices for architecture, with professors Larry Sass and Neil Gershenfeld.
Lecturer	School of Architecture and Design, Universidad de los Andes. Bogotá. 2002-2005. Design and teaching of a new ‘Fundamentals of Digital Media’ course to develop core digital skills at the undergraduate level. Undergraduate studio instruction.
Research Assistant	Architecture and Design Research Center (CIFAD), Universidad de los Andes. Bogotá. 2001-2002. G.I.S. management on urban planning project.

PUBLICATIONS

Books

Refereed

Daniel Cardoso Llach, *Builders of the Vision: Software and the Imagination of Design* (New York and London: Routledge, 2015).

Rafael Villazón, Daniel Cardoso Llach, and Leonardo Parra, eds., *SIGraDi 2010: Proceedings of the 14th Congress of the Iberoamerican Society of Digital Graphics* (Uniandes, 2010).

Non refereed

Daniel Cardoso Llach et al, *Exploring Algorithmic Tectonics: A course on creative computing in architecture and design* (University Park: SCDC Press, 2015).

Cardoso Llach, Daniel, ed. *Design Across Boundaries: An Event and a Conversation about Transdisciplinary Design Practices*. (University Park: SCDC Press, 2015).

Peer Reviewed Journal Articles

Dabholkar, Avanti, Andrew Viny, and Daniel Cardoso Llach. “Two Experiments in Playful Architectural Adaptability.” *Nexus Network Journal of Architecture and Mathematics* 19, no. 3 (Forthcoming 2017).

Cardoso Llach, Daniel, Ardavan Bidgoli, and Shokofeh Darbari. “Assisted Automation: Three Learning Experiences in Architectural Robotics.” *International Journal of Architectural Computing (IJAC)* 17 (2017).

Daniel Cardoso Llach, “Software Comes to Matter: Towards a Material History of Computational Design,” *DesignIssues* 31, no. 3 (Summer 2015): 41–55, doi:10.1162/DESI_a_00337. (version of book ch. 3.)

Daniel Cardoso Llach, “Algorithmic Tectonics: How Cold War Era Research Shaped Our Imagination of Design,” *AD Architectural Design: Computation Works* 83, no. 2 (March 12, 2013): 16–21.

Daniel Cardoso Llach, “Esclavos Perfectos: Breve Historia de La Ciber-Arquitectura En MIT (1959-1967),” *Dearq*, no. 10 (August 2012): 48–59.

Daniel Cardoso Llach, “Inertia of an Automated Utopia: Design Commodities and Authorial Agency 40 Years after the Architecture Machine,” *Thresholds*, no. 39 (July 2011): 39–44.

Daniel Cardoso Llach, “Shift+Design: Scripts and Other Design Artifacts,” *International Journal of Architectural Computing* 8, no. 1 (January 1, 2010): 17–28, doi:10.1260/1478-0771.8.1.17.

Daniel Cardoso Llach and Remei Capdevila Werning, “Arquitectura, diseño y computación,” *Dearq* 1, no. 4 (2009): 136–40.

Chapters in refereed books

Daniel Cardoso Llach, “Tracing Design Ecologies” in *DigitalSTS: A Handbook and a Fieldguide*, ed. Janet Vertesi and David Ribes, (Princeton University Press: Forthcoming 2017).

Daniel Cardoso Llach, “Architecture and the Structured Image” in “*Imagery in the Age of Modelling: Operative Artifacts in the Design Process in Architecture and Engineering*,” ed. Sabine Ammon and Inge Hinterwaldner (Springer: Forthcoming 2017).

Daniel Cardoso Llach, “Scripts in the Architecture Studio,” in *Computational Constructs: Architectural Design, Logic and Theory*, ed. Josh Lobel and Shouheng Cheng (Shanghai, 2010), 180–90.

Academic Panels and Symposia

“Disciplines in Transition.” Participant at organized panel at the 3 Societies Meeting (June 2016).

“Computing Futures: Three Episodes in the Postwar Imagination of Design.” Panel proponent and organizer at the Design History Society Conference, California Center for the Arts, San Francisco, September 11-13, 2015.

“Design Across Boundaries.” Symposium organizer and Open House coordinator at the Stuckeman Center for Design Computing, The Pennsylvania State University, May 5, 2015.

Peer Reviewed Conference Papers

Daniel Cardoso Llach, Ardavan Bidgoli, and Shokofeh Darbari, “Of Hands and Robots: Experiments in Architectural Robotics Pedagogy” (FabLearn, Stanford University, 2016).

Dabholkar, Avanti, and Daniel Cardoso Llach. “Biometrically-Responsive Architecture: Mapping Biometric Data to Dynamic Spatial Change.” In *Architecture In-Play International Conference*. Instituto Universitario de Lisboa (ISCTE-IUL): Instituto Universitario de Lisboa (ISCTE-IUL), 2016.

———. “[Yours]: Distributing Design Agency through Multi-Modal Interactors.” In *Architecture In-Play International Conference*. Instituto Universitario de Lisboa (ISCTE-IUL): Instituto Universitario de Lisboa (ISCTE-IUL), 2016.

Participatory Energy Management in Building Networks. Vina Rahimian, Lisa Iulo, Daniel Cardoso Llach. *The First International Symposium on Sustainable Human-Building Ecosystems*. Carnegie Mellon University. 2015.

Ardavan Bidgoli and Daniel Cardoso Llach, “Towards a Motion Grammar for Robotic Stereotomy,” accepted for presentation in the *Association for Computer-Aided Architectural Design Research in Asia (CAADRIA)*, Kyungpook National University, Daegu, Republic of Korea. 2015.

Daniel Cardoso Llach, “The Architect’s Bargain: Building the Bilbao Effect in the Abu Dhabi Desert,” in *Industries of Architecture Conference*, University of Newcastle, Newcastle, UK, 2014.

Daniel Cardoso Llach, “Aedificatoria Binaria: On the Cold War Invocation of Alberti’s Ghost,” in *What’s the Matter: Materiality and Materialism at the Age of Computation (ENHSA, EAAE, COAC)*, Barcelona, Spain, 2014.

Daniel Cardoso Llach et al., “Acacia: A Simulation Environment for the Design and Analysis of Highly Responsive Building Facades,” in *5th Annual Symposium on Simulation for Architecture and Urban Design (SimAUD)* (Symposium on Simulation for Architecture and Urban Design (SimAUD), Tampa, FL, 2014).

Seoug Oh, Veronica Patrick, and Daniel Cardoso Llach, “Typologies of Interaction in Architectural Space,” in *5th Annual Symposium on Simulation for Architecture and Urban Design (SimAUD)* (Symposium on Simulation for Architecture and Urban Design (SimAUD), Tampa, FL, 2014).

Daniel Cardoso Llach, “Design Conflicts: Visualizing Collective Agency in BIM” (4S: Society for the Social Studies of Science, San Diego, CA, 2013).

Daniel Cardoso Llach, “Seeking a Lingua Franca: Images of Building Information Modeling” (Operative Artifacts: Imagery in the Age of Modeling, University of Basel, Switzerland, 2013).

Daniel Cardoso Llach, “The Poetics of Automation: Conceptions of Human and Non-Human Agency in Design,” in *4S 2010: Society for the Social Studies of Science* (4S: Society for the Social Studies of Science, University of Tokyo, 2010).

Daniel Cardoso Llach et al., “Drawing Transparencies: Responsible Responsiveness in Spaces Through Organic Electrochromism,” in *Computation: The New Realm of Architectural Design* (eCAADe Conference, Istanbul (Turkey), 2009), 83–88, http://cumincad.scix.net/cgi-bin/works/Show?ecaade2009_165.

Daniel Cardoso Llach, “New Geography of Design” (IACAP: European Conference of Computation and Philosophy, Barcelona, 2009).

Daniel Cardoso Llach, “Generative Craft: A Brief Critical Inquiry into Design Automation and Design Automata” (Sigradi, Universidade Presbiteriana Mackenzie, Sao Paulo, 2009), http://cumincades.scix.net/data/works/att/sigradi2009_948.content.pdf. [not presented in person]

Daniel Cardoso Llach, “Design and the Automated Utopia: Certain Assumptions in Digital Design Culture,” in *What Matters? Proceedings of the First International Conference on Critical Digital* (Critical Digital, Harvard University, 2008).

Daniel Cardoso Llach and Takehiko Nagakura, “The Melnikov Grammar” (3A International Conference of Computer Graphics and Artificial Intelligence, Athens, 2008). [not presented in person]

Daniel Cardoso Llach and Lawrence Sass, “Generative Fabrication,” in *Design Computing and Cognition '08* (GeorgiaTech, Atlanta: Springer, 2008), 713–32, http://dx.doi.org/10.1007/978-1-4020-8728-8_37.

Daniel Cardoso Llach, Dennis Michaud, and Lawrence Sass, “Soft Façade Steps into the Definition of a Responsive Façade for High-Rise Buildings,” in *Predicting the Future* (eCAADe Conference, Frankfurt, 2007), 567–73, <http://www.docstoc.com/docs/52325870/Soft-Façade-Steps-into-the-Definition-of-a-Responsive>. [Presented by second author]

Lawrence Sass, Dennis Michaud, and Daniel Cardoso Llach, “Materializing a Design with Plywood,” in *2007, September 26-29* (eCAADe Conference, Frankfurt, 2007). [Presented by first author]

Daniel Cardoso Llach, “Controlled Unpredictability: Constraining Stochastic Search as a Form-Finding Method for Architectural Design,” in *Proceedings of the 10th Iberoamerican Congress of Digital Graphics* (Sigradi, Santiago de Chile, Chile: 263-267, 2006), http://cumincad.scix.net/cgi-bin/works/Show?_id=sigradi2006_e070c&sort=DEFAULT&search=%2fseries%3a%22SIGRADI%22&hits=1527.

Daniel Cardoso Llach, “Information Surfaces: Architecture as a multimedia practice.” in COVIRARQ. Caracas, Venezuela, 2004. [Not presented in person]

Keynote lectures

“We have never been digital”
Digital Reveal Conference, Universidad Piloto (Bogota, Colombia). September 1, 2016.

Invited Lectures and Presentations

“Cybercultures of design and architecture: cross-disciplinary origins and prospects.”
Technical University of Munich - Munich Center for Technology and Society, July 4, 2016

“Software and the imagination of design: probes and prospects”
Leuphana Universität – Institute for the Advanced Study of Media Cultures of Computer Simulation (MECS), May 10, 2016.

“Computing the architectural imagination: Postwar architectural research at MIT and Cambridge”
University of Cambridge, Department of Architecture, June 1, 2016

“Builders of the Vision”
Chelsea School of Art, University of the Arts London (UAL). May 5, 2016.

“Twentieth Century Visions of Design”
University of Cambridge, Department of History and Philosophy of Science (HPS), April 28, 2016.

“Builders of the Vision”
The Bartlett, Guest talk at Mario Carpo’s Seminar, March 16, 2016

“Computer-Aided Revolutions: A Critique of the Future”
Lecture at the Institute of Advanced Architecture of Catalunya (IAAC), Barcelona.

“Towards a Material History of Computational Design” (May 19, 2015)
Guest lecture at the Bartlett School of Architecture, University College London, London.

“Infrastructures of the Imagination: Creative and Critical Inquiry in Computational Design” (2015)
Guest lecture at the Carnegie Mellon University School of Architecture.

“Bits come to matter” (2014)
Talk at Computational Making Workshop, UCL., London.
Guest Friday Talk at the office of Foster and Partners, London.

Architecture Machine Group Panel (2013)
Introduction and Panel moderator in the Futures Past Conference, MIT

Introducing the Design Ecologies Research Group (2013)
Lunch Talk at the Mobile Experience Lab, MIT

“Accident and Control” (2013)
WWWDrawing Symposium, The Drawing Center, New York

“Building BIM” (2013)
Autodesk, Boston, MA

“De-centering Design” (2013)
PechaKucha, LA Design Week, Los Angeles

“Creative work and research” (2013)
SALA Faculty Forum, College of Arts and Architecture, The Pennsylvania State University

Introduction to Mark West (2013)
Stuckeman School of Architecture and Landscape Architecture

“Missiles, Symbiosis and the invention of an algorithmic tectonics.” (2012)
Architectural Association, AA Visiting School, Bogotá, Colombia

“Design et Imagination Technologique” (2012)

Ecole d’architecture et d’aménagement

Université Laval, Quebec, Canada

“Design and the Technological Imagination” (2012)

Stuckeman School of Architecture and Landscape Architecture, The Pennsylvania State University

“Creative Ecologies” (2012)

School of Architecture, University of Massachusetts at Amherst

“Science Vs. Storytelling” (2011)

Massachusetts Institute of Technology, MIT

“Geometry as Data, Data as Material” (2011)

American University of Sharjah, Sharjah, UAE

“The Poetics of Automation” (2010)

Universidad Francisco Marroquin, Ciudad de Guatemala, Guatemala

“A Generative Grammar for Fabrication” (2008)

Boston Architectural College

GRANTS

Graham Foundation. Funds to support the exhibition “Designing the Computational Image / Imagining Computational Design.” \$3,500.00 (pre-selected, pending final review).

CFA Research and Creativity Fund. Foundation. Funds to support the exhibition “Soft Reconstructions,” an interactive component of the “Designing the Computational Image / Imagining Computational Design.” \$4,000.00 (pending)

Berkman Faculty Development Fund. Funds to support the exhibition “Designing the Computational Image / Imagining Computational Design.” \$3,000.00 (awarded)

Manufacturing Futures Initiative. Funds to support the development of a manufacturing technology for highly responsive organic electrochromic windows for energy efficient buildings. \$136,392.00 (not awarded).

Stuckeman Center for Design Computing Faculty Grant 2014-2015. Funds to support image permission fees and other expenses linked to the production of the book “Builders of the Vision.” \$5,000.00 (awarded)

The H. Campbell and Eleanor R. Stuckeman Fund for Collaborative Design Research 2013-2014. Funds in support of the development of a software system for modeling facades of variable transmittance as a step towards low-cost organic electrochromic smart facades. \$34,588.00 (awarded).

CTSI's Innovative Approaches to Big Data Pilot Project Funding 2014. (As Co-PI with PI Darla Lindbergh). Funds in support of developing Interactive Data Visualization Tools to Support and Transform Client-Centered Dietary Health Decision Making: A Systems Architecture Approach. \$300,000 (not awarded).

Collaborative Design Research Grant, Penn State 2014. (As Co-PI with PI Frans Padt and Co-PI Mallika Bose). Funds in support of exploring the role of science in green design pedagogy. \$50,000 (not awarded).

DOE SBIR/STTR Programs Phase I Application (As Co-PI with PI Avni Argun). 2012. Funds in support of the development of organic electrochromic windows for energy efficient buildings. \$100,000 (not awarded).

Cardoso Llach, Daniel (PI) and Argun, Avni (Co-PI). 2009. CROMA. The MIT Council for the Arts. \$1,000 (awarded).

Research group

Between 2012 and 2015 founded and directed the interdisciplinary “Design Ecologies” research group at Penn State, comprising students from architecture, computer science and civil engineering to explore new theoretical and technological links between architecture, design, computation and culture. The group is now being re-imagined within the Computational Design (CODE) Lab at Carnegie Mellon University.

ACADEMIC DISTINCTIONS

MIT Presidential Fellowship (2007)

Awarded full tuition and stipend for doctoral research.

Best SMArchS Thesis Prize (2007)

Awarded to the best SMArchS theses at MIT.

Center for Bits and Atoms Fellowship (2006)

Awarded one-year full tuition and stipend support, by the Center for Bits and Atoms at the MIT MediaLab.

Tuition Support Grant, Department of Architecture, MIT (2005)

Awarded partial tuition support at MIT upon admission.

Special Merit Recognition, Department of Architecture, MIT (2005)

Awarded stipend support at MIT upon admission.

Andres Bello National Award. Andres Bello Foundation, Colombia (1996)

Granted to the Top 50 scores nationwide on the ICFES (equivalent to the SAT in the US) test (ranked 26th). The award included financial aid towards college tuition.

DOCTORAL STUDENTS

Principal Advisor

Ardavan Bidgoli, Carnegie Mellon University School of Architecture. PhD-CD Main Advisor. Title of dissertation: Integrating Design and Making in Architectural Robotics (working title). Expected completion date: May 2019.

Oscar Kwang, Carnegie Mellon University School of Architecture. DPP (Doctor of Professional Practice) Main Advisor. Expected completion date: 2018.

Co-advisor or Committee Member

Jonathan Weston, Cambridge University Department of Architecture. UK. Title of dissertation: Seeing beyond the pretty picture: exploring the aesthetic and function of architectural visualisation (working title). Expected completion date: December 2020.

Ricardo Correia, Instituto Universitario de Lisboa (ISCTE-IUL) Departamento de Arquitetura e Urbanismo, Portugal. Co-Advisor. Title of dissertation: A transdisciplinary vision of digital architecture through computational methods of mapping, analysis and visualization (working title). Expected completion date: December 2020.

Anne Burdick, Carnegie Mellon University School of Design (DDes). USA. Title of dissertation: Designing Text Technologies for Critical Interpretation (working title). Expected Completion Date: May 2019.

Philippa Mothersill, MIT Media Lab. Massachusetts Institute of Technology. Committee Member. Title of dissertation: Communicating Through the Design of Man-Made Artifacts (working title). Expected Completion Date: May 2019.

Vernelle Noel. Stuckeman School of Architecture and Landscape Architecture. Penn State. Main Advisor. Title of dissertation: Computational Approaches to Craft: Exploring Wire-Bending in Trinidad (working title). Expected completion date: May 2019.

Guangxuan Zhang. Department of Information Sciences and Technology. Penn State. Committee Member. Title of dissertation: Designing a Platform to deal with Conflicts in Organizations: A Design Science Project. Completion date: 2016.

Michael Marcinkoswki. Department of Information Sciences and Technology. Penn State. Committee Member. Title of dissertation: Data, Design, Dialogue: Hermeneutics of Socio-Technical Design. Completion date: May 2015.

Camilo Cifuentes. Escuela Técnica Superior de Arquitectura de Barcelona (ETSAB), Spain. Committee Member. Title of dissertation: Narrativas cibernéticas y arquitectura computacional (Cybernetic narratives and computational architecture). Completion date: October 2014.

MASTER STUDENTS

Principal Advisor

Qiaozhi Wang, Carnegie Mellon University School of Architecture. Main Advisor. Expected Completion Date: May 2017.

Lu Han, Carnegie Mellon University School of Architecture. Main Advisor. Expected Completion Date: May 2017.

Hetian Cao, Carnegie Mellon University School of Architecture. Main Advisor. Expected Completion Date: December 2017.

Ardavan Bidgoli. Penn State School of Architecture and Landscape Architecture. Principal Advisor. Title of thesis: "Robotic affordances." Completion date: August 2015.

Vina Rahimian. Penn State School of Architecture and Landscape Architecture. Principal Advisor. Title of thesis (provisional): "How Can Energy Distribution Management in a Network of Intelligent Buildings Perform as a Learning Machine within a Framework of Self-Organized Interactions?" Completion date: May 2015.

Seoug Oh. Penn State School of Architecture and Landscape Architecture. Title of thesis: "Typologies of Interaction in Architectural Space." Completion date: June 2014.

Alicia Gomes. Boston Architectural College. Masters of Architecture. Thesis Advisor. 2008.

Co-advisor, Committee Member or Examiner

Martin West, Cambridge University Department of Architecture. UK. External Examiner. Thesis title: Can architecture ascribe the human condition? Completion Date: May 2016.

Amit Nambiar, Carnegie Mellon University School of Architecture. Committee member. Completion Date: December 2016.

Dustin Julius. Penn State School of Architecture and Landscape Architecture. Committee Member. Title of thesis: Complexity. Completion Date: May 2015.

Savia Palate. Penn State School of Architecture and Landscape Architecture. Committee Member. Title of thesis: "Visualizing Famagusta's Coastline: Co-existence in a contested ghost-city." Completion date: May 2014.

Prince C. Kwabi. Salford Institute of Technology, UK. Masters Thesis Committee Member. Title of thesis: "Does the Management of BIM Implementation of a Project's Design Phase Require a Specialist?." Completion date: March 2012.

Secondary advisor on multiple SMArchS thesis projects at the Massachusetts Institute of Technology as a Teaching Assistant (TA) in Pre-Thesis and Thesis Preparation Seminars. 2008-2009.

TEACHING

Fall 2016 Pre-Thesis Seminar, Carnegie Mellon University

This seminar guides students to propose and refine a set of critical questions and research methods, to engage seriously and rigorously with prior work, and to extend its intellectual scope through their own contribution. Through assignments, discussion and presentations students acquire the skills and concepts to situate your research within a wider scholarly conversation, state its relevance to the field, and clearly formulate its methods and key proposition.

Inquiry into Computational Design, Carnegie Mellon University

The subject of this course is the emergence of computing as a pivotal concept in contemporary practices in architecture and design. It explores design theories and practices responding to the so-called “computer revolution,” cybernetics, Artificial Intelligence (AI) and the linked transformations on our conceptions of design, creativity, nature, body and place. The aim of the course is to develop a view of computation beyond particular technologies and tools, and an understanding of an expanding landscape of hybrid practices and theories linked to computational, tangible and interactive forms of design practice and expression.

Fall 2015,
Spring 2017

Fundamentals of Computational Design, Carnegie Mellon University

The Fundamentals of Computational Design course offers second year architecture students a holistic view of computation covering the different roles computing plays in the design, construction and experience of our built environment. The course is driven by themes, each combining state of the art examples, historical insight, and hands-on exploration.

Undergraduate Thesis Studio, Carnegie Mellon University (Fall 2015)

The aim of this studio is to guide you to through the process of clearly defining and structuring a thesis project. Participants will undertake a semester long investigation including writing up and refining their project’s crucial argument (or a debatable proposition); framing it in terms of relevant literature and precedent projects; exploring it through a range of design methods such as diagramming, drawing, hacking, prototyping and making; outlining a rigorous structure for the final semester; and submitting their work to public discussion and critique in the form of a final publication and exhibition.

Springs
2013-2015

Algorithmic Tectonics, The Pennsylvania State University

This is a course on creative computing. By learning to create computational design tools (such as experimental CAD systems, responsive artifacts and robotic applications) students explore computation as a territory for speculative, critical and poetic thinking about design—rather than as a mere instrument of production or representation. By learning the fundamental concepts for creating and manipulating geometry, data, images, robots, and other objects through code, students challenge the paradigms of conventional tools and expand their design imagination. By the end of the course, students are able to formulate and pursue computational approaches to design exploration, analysis, visualization and numerically controlled fabrication. No experience required. This course is open to graduate and undergraduate students.

Fall 2014

Inquiry into Design Computing, The Pennsylvania State University

This course introduces computational design as a field of creative and scholarly inquiry. Topics include practices and theories of computation as they relate to design, digital

fabrication, wearable computers, systems theory, and design knowledge in architecture. Special attention is paid to computation understood broadly as a procedural paradigm independent of different technical substrates (e.g. computers). Weekly assignments and discussions familiarize students with the key technical paradigms, theories and methods of the field. The course also introduces students to the research of the different faculty within the School's Design Computing cluster, who participate in the course as guests, giving an overview of the cluster's diverse approaches to computational design.

- Spring 2014 Technology and the Imagination of Design, The Pennsylvania State University
The subject of this graduate seminar is the emergence of technology as a pivotal concept in contemporary design discourses. Through weekly reading, writing, and discussion, we will examine architectural responses —mainly technological propositions and design theories— to the so-called computer revolution, cybernetics, information theory, and the linked transformations to the conceptions of nature, work, authorship, and the human. The course is recommended for research students preparing a thesis in Design Computing, or undergraduate students interested in developing a critical understanding of design technologies.
- Falls 2012- Architectural Design I (Second Year studio), The Pennsylvania State University
Design and coordination of studio-wide exercises in digital modeling and fabrication for small-scale architectural projects, general studio coordination, as well as desk crits, pin ups, and reviews.
- Springs 2012- Architectural Design II (Second Year studio), The Pennsylvania State University
Design and coordination of studio-wide exercises in digital modeling and fabrication for medium-scale architectural projects, general studio coordination, as well as desk crits, pin ups, and reviews.
- Springs 2003-2005 Fundamentals of Digital Media, Universidad de los Andes. Bogotá
An introduction to computation for undergraduate students in the School of Architecture and Design in Universidad de los Andes. Designed and taught in collaboration with María F. Méndez.
Third Year Studio, Universidad de los Andes. Bogotá
Studio teaching conducting projects concerned with the integration of tectonics in architectural design.
- Springs and Falls 2002-2004 First Year Studio, Universidad de los Andes. Bogotá
Studio teaching conducting projects concerned with basic understanding of spatial elements and description.

Workshops

University of Brighton, Brighton, UK (June 17, 2016)
Proponent and leader of Visualizing Design Ecologies at the Design Research Society Conference, 2016, in collaboration with Yanni Loukissas.

University College London, London UK (June 21, 2014).
Co-organizer of and presenter in a Computational Making Workshop at the 6th International Conference on Design Computing and Cognition (DCC'14), June 21, 2014.

The Pennsylvania State University, University Park, PA (2013)
Tutor of a 3 hour workshop on Gestural Modeling and Interactive Architecture.

Massachusetts Institute of Technology, Cambridge, MA (2011)
Tutor of a 1-week International Architectural Design Workshop part of ARCHIPRIX 2011.
Co-taught with Nida Rehman.

American University of Sharjah, Sharjah, UAE (2011)
Guest lecturer and tutor of a 3-day workshop on scripting and digital fabrication.
Co-taught with Santino Medina and Maher El-Khaldi.

Universidad Francisco Marroquin, Ciudad de Guatemala, Guatemala (2010)
Guest lecturer and tutor of a 1-day workshop on scripting for design exploration.

ORG Architects, Cambridge, MA (2010)
Tutor of a 3-day workshop on scripting and parametrics.

Cornell University School of Architecture, Ithaca, NY (2010)
Tutor of a 3-day workshop scripting for design exploration.
Co-taught with Kenfield Griffith and Yann Loukissas.

Harvard University Graduate School of Design, Cambridge, MA (2009)
Tutor of a 3-day workshop on scripting and parametrics.
Co-taught with Kenfield Griffith.

Lynden High School, Lynden, WA (2009)
Tutor of a 3-day “All Hands On Deck” workshop, teaching the fundamentals of programming and computational geometry for high-school students in the town of Lynden, Washington (with support from McNeel and Associates).
Co-taught with Kenfield Griffith.

Universidad de los Andes, Bogotá, Colombia (2009)
Tutor of a 3-day design-scripting and parametrics workshop (with support from McNeel and Associates).
<http://mit.edu/~dcardoso/www/workshops/bogota>

Universidad Peruana de Ciencias Aplicadas, Lima, Perú (2008)
Tutor of a 4-day Computational Design Solutions scripting workshop.

Universidad de Chile, Santiago de Chile, Chile (2006)
Computational Design Solutions II: tutor of a 4 day workshop on scripting for design and fabrication, in the context of SIGRADI.

Universidad Javeriana, Bogotá, Colombia (2005)
Teaching Assistant in the Bogotá-Región Workshop, with students from UC Berkeley and Colombia’s Universidad Javeriana, about urban strategies for Bogotá’s metropolitan region.

Invited Critic

At Carnegie Mellon

School of Design, invited by Terry Irwin as guest critic to the Doctor of Design (DDes) first year review. March 9-11, 2017.

School of Architecture, invited by Mary-Lou Arscott as guest critic to the B.Arch thesis studio. February 24, 2017.

School of Art, invited by Ali Momeni as guest critic to the Physical Computing class review. November 10, 2016.

School of Art, invited by Ali Momeni as guest critic to the Physical Computing class review. December 16, 2015.

School of Architecture, invited by Daragh Byrne as guest critic for the Emergent Media Proseminar. December 2015.

School of Architecture, invited by Dana Cupkova as guest critic for mid-term studio review. October 16 2015.

School of Architecture, invited by Mary-Lou Arscott as guest critic for thesis final reviews. April 2015.

Other Universities

Institute for Advanced Architecture of Catalonia (IAAC). Invited by Tomas Diez as a guest critic for a review of Urban Workshop. March 4, 2016.

The Pennsylvania State University, Department of Architecture, invited by Felecia Davis as a guest critic for a final review of 2nd Year Architecture Studio. December 10, 2015.

The Pennsylvania State University, Department of Landscape Architecture, invited by Maria and Chris Counts, as a guest critic for a final review of LARCH 312 and graduate LARCH 540 (combined) capstone design studio. May 2, 2014.

Harvard University, Graduate School of Design, invited by Yanni Loukissas as a guest critic for the final review of the course The Mixed Reality City. Fall 2013.

The Pennsylvania State University, Department of Architecture, invited by Lisa Iulo as a guest critic for a mid-term review of third year studio. Fall 2013.

The Pennsylvania State University, Department of Architecture, invited by Nida Rehman as a guest critic for a mid-term review of first year studio. Spring 2013.

Wentworth Institute of Technology, Boston, Department of Architecture, invited by Zenovia Touloudi as a guest critic for the final review of thesis projects. Fall 2012.

American University of Sharjah, Sharjah, UAE, invited by Ginger and Michael Dossier as a guest critic for the mid-term review of studio projects. Fall 2011.

Massachusetts Institute of Technology, Cambridge, invited by Meijin Yoon as a guest critic for the mid-term review of first year M.Arch studio projects. Fall 2010.

Wentworth Institute of Technology, Boston. Invited by Carlos Cardenas as a guest critic for the final review of first year architecture course. Fall 2010.

Pratt Institute, New York, NY. Invited by Kyle Steinfeld as a guest critic for the final review of the Summer Architecture Studio. Summer 2010.

Wentworth Institute of Technology, Boston, MA. Invited by Carlos Cardenas as a guest critic for the final review of drawing and visualization course. Spring 2009.

Cornell University, Ithaca, NY. Invited by Yanni Loukissas as a guest critic for the final review of Second Year Studio. Fall 2009.

Wentworth Institute of Technology, Boston. Invited by Peter Minosh as a guest critic for the final review of fourth year architecture studio. Fall 2008.

Massachusetts Institute of Technology, Boston. Invited by Andres Sevtsuk as a guest critic for the final review of First Year Architecture Studio. Spring 2008.

Boston Architectural College, Boston. Invited by Marcel Botha as a guest critic for the final review of thesis projects Spring 2007.

SERVICE

Professional and Editorial Service

Edited Book Series

Founder and co-editor: Routledge Series in Design Technology and Society, 2017

Book Reviewer MIT Press (1), Routledge (2)

Editorial Boards Dearq Journal

Scientific Committees *Journals*
 IJAC (International Journal of Architectural Computing), FOOTPRINT (Delft Architectural Theory Journal)

Conferences
 CAADRIA, SIGGRAPH, SIGRADI, ICDHDS (International Committee for Design History and Design Studies), Futures Past Conference (MIT), ICIE (International Conference on Intelligent Environments), ACSA (Association of Collegiate Schools of Architecture).

Juries MIT Media Lab Hackaton, Spring 2015.
 Jury in a hackathon tribute to William J. Mitchell.
 Universidad de los Andes Faculty Grants, 2013.
 Reviewer of faculty research grant proposals related to computational design.

University Service

Carnegie Mellon School of Architecture Representative: University Senate. 2017-
 Co-chair: Graduate programs. 2016-
 Track Chair: Computational Design Program. 2015-
 Co-director: Computational Design (CODE) Lab. 2015-

Penn State University level: Presidential Commission for Racial and Ethnic Diversity (CORED). The Pennsylvania State University. Fall 2013-2015
 College level: Faculty Advisory Council. Fall 2013.
 School level: Stuckeman Center for Design Computing (SCDC) Executive Committee (chair); Stuckeman School Director Search Committee. Fall 2013.
 Department Level: Graduate Curriculum Committee, 2014-2015; Graduate Admissions Committee, Spring 2014; Technology Committee, Fall 2012; Design Computing Cluster Curriculum Representative, Fall 2013-2015; Beehive Faculty Advisor, Spring 2013-2015.

MIT Admissions Committee student representative, 2010

PROFESSIONAL EXPERIENCE

Architectural Consultant-Researcher Gehry Technologies, Abu Dhabi. 2010-2011.
 Development of Building Information and Parametric models and simulations for large-scale projects including the Abu Dhabi Midfield Terminal Building (KPF), Cleveland Clinic (AEDAS). Development of rule-based and automation tools for construction coordination and geometric rationalization.

UI/UX Designer THE MEME, Cambridge, MA. 2009-2010.
 Development of UI/UX prototypes and scenarios for mobile applications for clients including Samsung and IRiver. Design and development of the company's website.

Computation- Design Specialist	<p>Kohn Pedersen Fox, NY, NY. 2007.</p> <p>Use of scripting and parametric tools for geometric rationalization and design exploration. Design development of an in-house web tool for archiving and navigating the products of the computational design team.</p> <p>ORG, Somerville, MA. 2010 (as consultant).</p> <p>Collaboration with Boston-based architecture and urban design practice to develop a set of parametric studies for design exploration of the roof of the public space of the SOMA project in Brussels. The consultancy included a 3 day training for employees.</p>
Independent Architect and Designer	<p>Independent Practice, Bogotá, Colombia. 2001-2005.</p> <p>Design and development of numerous visualization, multimedia, and architectural projects, including the design and construction of a bathhouse in Choachí, Colombia.</p>

CREATIVE PROJECTS

Exhibitions (curated)

Forthcoming: Designing the Computational Image / Imagining Computational Design. Miller Gallery, September-November 2017.

Exhibitions (as participant)

Future New York: Archiprix 2011 Workshop Exhibition
Solomon R. Guggenheim Museum, July 7th, 2011.
1071 5th Avenue (at 89th Street)
On Display: student work of tutored Archiprix Workshop.
Co-instructor: Nida Rehman

Future New York: Archiprix 2011 Workshop Exhibition
Center for Architecture, 536 Laguardia Place, Manhattan, NY, July 8th, 2011
On Display: student work of tutored Archiprix Workshop.
Co-instructor: Nida Rehman

MACHINIC PROCESSES: Architecture Biennial Beijing 2010
798 Space, 798, Beijing, Oct. 15 - Oct. 20, 2010
Curators: Neil Leach, Xu Weiguo
On Display: Tutored student work from Chile and Lima scripting workshops.
Co-instructors: Kenfield Griffith and John Snavelly

Exhibición de Proyectos, UPCA
Universidad Peruana de Ciencias Aplicadas School of Architecture, Spring 2008
Work Exhibited: Voronoi Pavilion
On Display: Digitally generated and fabricated installation.
Co-designers: Natalija Bojlsakov and Brian Miller.

Architectural Design

Voronoi Pavilion (Universidad Peruana de Ciencias Aplicadas, Lima, Perú, 2008)
Description: scripted and digitally fabricated studio projects exhibition space.
Roles: Workshop instructor, rhinoScript programmer and design consultant with designers Natalija Bojlsakov and Brian Miller.

Bath House (Choachí, Colombia, 2005)

Description: private bath house in the town of Choachí, Colombia.

Role: lead designer with collaborator Carlos Moncada.

Selected Creative Computing Projects

Visualizing BIM (2012)

By digitally capturing and visualizing the traces indexed during the design coordination of a real building, this project explores new ways of visualizing architecture as a collective and socio-technical practice.

Site: <http://vimeo.com/51693897>

CROMA (2010)

An interdisciplinary creative research initiative started at MIT bringing together chemical engineering, architecture, and media arts, to develop technologically and conceptually innovative smart facades. In 2010, with funding from the MIT Council for the Arts, developed the first prototype of a touch-sensitive organic electrochromic window.

Collaborator: Avni Argun

The Melnikov Grammar (2010)

Original software in LISP, and digital fabrication prototypes, exploring and re-interpreting Konstantin Melnikov's architecture.

Site: <http://mit.edu/dcardoso/www/projects/melnikov/>

Differentiated Surface (2008)

Algorithmic Form-finding and digital fabrication tool.

Roles: Concept development, VBScript programming, digital fabrication.

Collaborators: Neri Oxman

The Observatory of Bogota (2005)

Online interactive 3-D environment exploring the Observatory of Bogotá building —the first observatory built in America, built in 1804.

Campus (2004)

Online interactive 3-D environment featuring a virtual tour of the School of Architecture, and its academic output.

Roles: concept, research, 3-D modeling, Flash development, implementation.

Collaborators: María F. Méndez.

Webarq (2004)

Official website for the Universidad de los Andes Department of Architecture. Online between 2004 and 2013.

Site: www.arquitectura.uniandes.edu.co

Roles: Lead designer.

Collaborators: Carlos Cárdenas, María F. Méndez, Hernán Velásquez.

OUTREACH AND OTHER ACTIVITY

Reviews and Critical Essays

Daniel Cardoso Llach and Nida Rehman, "Functional Utopias: Interrogating Latin America's New Modernisms," *Urban Flux*, no. (forthcoming, 2017).

Daniel Cardoso Llach, “Lessons on Realarchitektur: The ‘Bosque de La Esperanza’ by Giancarlo Mazzanti and the Social Moment of Colombian Architecture.,” *Cuadernos de Vivienda Y Urbanismo* 5, no. 9 (June 2012): 142–56. Reviewed Building: “Bosque de La Esperanza” by Giancarlo Mazzanti.

Nida Rehman and Daniel Cardoso Llach, “The Manhattan Promenades,” in *By the City / For the City: An Atlas of Possibility for the Future of New York*, 1st ed. (New York: Mult, 2012), 296–97.

Daniel Cardoso Llach, “La vanguardia es así: ansiedades paramétricas en From Control to Design,” *dear*, no. 8 (July 2011): 153–55. Reviewed Book: Michael Meredith et al., *From Control to Design: Parametric/Algorithmic Architecture* (Actar, 2008).

Daniel Cardoso Llach, “Hello 3D World! Introduction to Geometry Automation Using RhinoScript,” 2010, http://mit.edu/dcardoso/www/hello3dworld/hello3dworld_1105.pdf.

Daniel Cardoso Llach, “Omar Khan’s Reflexive Architecture Machines: A Parametric Expressionism of Sorts,” *Descomp: The MIT Design and Computation Group Blog*, March 16, 2010, <http://www.des-comp.net/blog/?p=387>.

Daniel Cardoso Llach, “Talking about Sketching and Scripting: Notes on the ‘Only Tools?’ IAP Workshop at MIT,” *Descomp: The MIT Design and Computation Group Blog*, January 31, 2010, <http://www.des-comp.net/blog/?p=291>.

Daniel Cardoso Llach, “Design as Search through Discrete Spaces: Notes on Prof. Kostas Terzidis’s Idea of Supernatural Computation,” *Descomp: The MIT Design and Computation Group Blog*, November 20, 2009, <http://www.des-comp.net/blog/?p=188>.

Daniel Cardoso Llach, “Halloween Special: Jose Pinto Duarte, Shape Grammarian,” October 31, 2009, <http://www.des-comp.net/blog/?p=166>.

Daniel Cardoso Llach, “Blur: La Construcción de La Nada,” *Piedepágina*, March 2005. Reviewed book: Ricardo Scofidio, *Blur: The Making of Nothing* (Harry N. Abrams, 2002).

Op-Eds

Daniel Cardoso Llach, Alejandro Morales, and Carlos Mendivil, “Apostarle a la esperanza,” *El Planeta*, June 18, 2010, sec. Opinion.

Daniel Cardoso Llach, Alejandro Morales, and Carlos Mendivil, “La Esperanza Es Verde,” *Siglo21*, June 2010, sec. Opinion, <http://siglo21.com/uncategorized/la-esperanza-es-verde/>.

Daniel Cardoso Llach, “Mockus, El Déspota,” *Días de Verde*, 2010, <http://dias-de-verde.tumblr.com/post/634346115/mockus-el-despota-daniel-cardoso-llach>.

Reviews and Press

Pfaff, Marc. “Daniel Cardoso Llach: Builders of the Vision: Software and the Imagination of Design.” *PLANBILDER: Medien Der Architekturgestaltung*, no. 11 (2015): 207–2012.

Roberto Quevedo, “Arquitecto Cardoso Llach En La UFM,” *El Amigo de La Marro*, October 6, 2010, http://noticias.ufm.edu/index.php?title=Arquitecto_Cardoso_Llach_en_la_UFM.

MIT spotlight, “A Better Window: MIT Team Designs a Light-Controlling, Energy-Smart Facade,” *Massachusetts Institute of Technology*, January 5, 2010, <http://web.mit.edu/>.

McNeel, “All Hands on Deck,” *McNeel Wiki*, June 22, 2009, <http://wiki.mcneel.com/events/allhandsondeck>.

The Lynden Tribune, “All Hands On Deck,” *The Lynden Tribune*, July 24, 2009.

Proyectos, “Unidad Residencial,” *Proyectos*, 2002.

Other contributions

Digital models and illustrations of Guastavino vaults for the book: John Ochsendorf et al., *Guastavino Vaulting: The Art of Structural Tile*, 1 edition (Princeton Architectural Press, 2010).

Art direction and illustration for the book: William J. Mitchell and Federico Casalegno, *Connected Sustainable Cities*, Connected Urban Development (MIT Mobile Experience Lab Publishing, 2008), <http://www.connectedsustainablecities.org/>.

Organized Guest Talks

At Carnegie Mellon

Computational Design (CODE) Lab Lectures:

Daniel Leithinger: Hold that Thought: Designing Interfaces for Embodied Cognition. March 5, 2017;

Ruari Glynn: Animating Architecture. December 8, 2016.

Other Universities

SCDC Lectures (Penn State)

Daniel Rosenberg: Feeling the Doing: Transforming Experience Through Design. September 27, 2013;

Josh Lobel: Building Information: Examples of a Hybrid Modeling Approach for Design Development and Construction. October 18, 2013;

Avni Argun: Electrochromism. Friday, October 25, 2013;

Rick Mistrick: Modeling of Daylighting and Integrated Electric Lighting Control. November 1, 2013.

Membership in professional and learned societies

SCS (Society for Modeling & Simulation International)
Member since 2013;

4S: Society for the Social Studies of Science
Registered Member since 2010;

SCA (Colombian Society of Architects)
Registered (licensed) member since 2002.

Languages

English (proficient), Spanish (native), French (intermediate).

Programming/Scripting Languages

Expert: Processing, Python, RhinoScript
Proficient: JAVA, C#, ActionScript, VB.

Software Expertise

Digital Project/CATIA, Rhinoceros, AutoCAD, Generative Components, 3DMax.
Adobe Suite CS5, Microsoft Office and others.

Other Interests

An occasional musician, I have recorded and performed live with different projects such as Altiplano, Juan Lanas (simo) and C.Kubli.