Stefana Parascho, Prof. Dr. sc. ETH Zurich

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Director Lab for Creative Computation - CRCL
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Personal Information

Born: 14.04.1986

Nationality: Romanian

Education

PhD: **ETH Zurich, Gramazio Kohler Research, Switzerland**

2014 – 2019 *Cooperative Robotic Assembly*

Main advisors: Prof. Matthias Kohler, Prof. Fabio Gramazio (Gramazio Kohler Research, ETH Zurich)

Co-Advisor: Prof. Dr. Stelian Coros (Computational Robotics Lab, ETH Zurich)

Diploma: **University of Stuttgart, Germany**

2006 - 2012 *Integrative Design Methods: An agent-based modelling system for gridshell structures*

Advisors: Prof. Dr.-Ing. Jan Knippers, Prof. Achim Menges

Previous Studies: University of Architecture and Urbanism "Ion Mincu"

2004 – 2006 Bucharest

High School Diploma: German Highschool Bucharest, Deutsches Goethe Kolleg, Romania

Appointments

École Polytechnique Fédérale de Lausanne (EPFL), ENAC

2022 – current Assistant Professor Tenure Track

Princeton University, School of Architecture

2019 – 2022 Assistant Professor Tenure Track

ETH Zurich, Gramazio Kohler Research, Prof. Matthias Kohler, Prof. Fabio Gramazio

2014 – 2018 PhD student, Research Assistant

University of Stuttgart, Institute for Building Structure and Structural Design, Prof. Jan Knippers

2012 – 2014 Research Associate

University of Stuttgart, Institute for Computational Design, Prof. Achim Menges

2013 Lecturer

Project List

current:

RECONFIG – On-the-fly building RECONFIGuration for post-emergency recovery: collaborative human/robot decision-making and structural safety. EPFL ENAC Cluster Grant project in collaboration with Prof. Corentin Fivet, SXL EPFL
https://www.epfl.ch/schools/enac/reconfig/

LE-AR-N – Learning Environment for Architectural Robotics for Newbies. Development of an online platform for learning and sharing architectural robotics methods. Collaboration with Prof. Kathrin Doerfler, Augmented Fabrication Lab, TU Munich
https://le-ar-n.org/

2020-2022:

Social Signals: Crowd Management using AI and Interactive Floor Projection – Research project on the analysis, prediction and adaptation of pedestrian behaviour through physical and digital interventions. In collaboration with Prof. Corina Tarnita, Ecology and Evolutionary Biology, Princeton University. C3.ai research project, COVID19 Initiative
https://createchaos.github.io/covid_distancing/

Zero Waste – Research project on the implications of circular economy systems for digital fabrication practices, and waste reduction strategies through robotic assembly methods. In collaboration with Prof. Erin Besler, School of Architecture, Princeton University. Campus as a Lab Initiative, Princeton University

https://drive.google.com/file/d/1U5ftkMMlAnag11f3rGStwWlqYY3HmauT/view?usp=sharing

Robotic Lacing – Research project on robotic assembly methods for large-scale, bending-active structures based on lace patterns. In collaboration with Prof. Basile Baudez, Art and Archaeology, Princeton University
https://createchaos.github.io/robotic_lacing/

2019 - 2021

LightVault – Research and exhibition on cooperative robotic assembly techniques for masonry vault construction. In collaboration Skidmore, Owings & Merrill Engineering and Prof. Sigrid Adriaenssens, Form Finding Lab, Princeton University
https://vimeo.com/467843836

Metropolis Project – Further development of cooperative robotic assembly techniques for self-supporting masonry construction. Collaboration with Prof. Sigrid Adriaenssens, Form Finding Lab, Princeton University

Robotic Spatial Structures – Development of design and path-planning tools for robotically assembled spatial structures. Collaboration with Prof. Caitlin Mueller, Digital Structures Group, MIT

2014 – 2018

Cooperative Robotic Assembly – PhD Project, development of a cooperative robotic assembly method and computational design tool for differentiated spatial structures. Gramazio Kohler Research, ETH Zurich
https://gramaziokohler.arch.ethz.ch/web/forschung/e/0/0/0/285.html

2017

The Brick Labyrinth – Research and Teaching Project, development of a design and robotic assembly method for a dry-stacked brick labyrinth. MAS in Digital Fabrication. Gramazio Kohler Research, ETH Zurich.
https://www.masdfab.com/work-1617-bricklabyrinth

Teaching

Princeton University

ARC 574 *Computational Fabrication in Architecture* – Graduate seminar
ARC 573 *Pro Seminar: Computation, Energy and Technology in Architecture* – PhD seminar
ARC 311 *Building Science and Technology: Building Systems* – Undergraduate seminar
ARC 351 *Architecture One:One* – Junior studio, co-taught with Prof. Jesse Reiser
ARC 374 *Computational Design in Architecture* – Undergraduate seminar
ARC 708 *Freeze-Frame Artifacts* – Independent research study with four graduate students
ARC 596 *Embodied Computation* – Graduate seminar

Junior Paper Advisor – Natalie Lu, *Redefining the Theater Concourse*
Junior Paper Advisor – Sandy Lee, *The Architecture of Video Games*
Senior Thesis Advisor – Alyssa Cai, *Seeing Doubled: Exploring Extended Reality Applications in the Architecture and Design Exhibition*

ETH Zurich

The Digital in Architecture – Tutoring of seminar for Bachelor and Master students

The Brick Labyrinth – Studio, Master of Advanced Studies in Digital Fabrication, GKR

University of Stuttgart

ICD/ITKE Research Pavilion 2013-14 – Studio, ICD/ITKE
ICD/ITKE Research Pavilion 2015 –Studio, ICD/ITKE
Building Information Modelling – Master seminar
Structural Design – Teaching Assistant at Bachelor level

Workshops

2021 *Remote Robotic Assemblies* – Workshop at ACADIA 2021 (upcoming)

2019 *Fabrication-Informed Design of Robotically Assembled Structures* – Workshop at Design Modelling Symposium Berlin, taught together with the Digital Structures Group, MIT

2012 *Lacuste in Eter* – Workshop focused on the development of a computationally designed pavilion, Edukube, Timisoara, Romania

Academic Activities

current Director of the Lab for Creative Computation (CRCL), EPFL, https://crcl.epfl.ch, https://crclcrclcrcl.org

Member of the Diversity Office ENAC EPFL

2019-2022 Director of the CREATE Lab Princeton

Co-Director of the *Computation and Energy PhD Program* at Princeton University, School of Architecture, together with Prof. Forrest Meggers

Member of Princeton University School of Architecture PhD Committee

PhD Advisor of: Ian Ting, EPFL (current) – "Heterogeneous collaborative robotics for construction"
Isla Xi Han, Princeton University (current) – "Designing with Robots: Expanding design decision-making models among human-robot teams in stigmergic construction"

PhD Co-Advisor of:

Maxence Grangeot, EPFL, together with SXL EPFL (current) – "Digital tools for material reuse in construction"
Andrei Jipa, ETH Zurich, Digital Building Technology (defended 2022) – "Free Formwork – 3d printed for complex concrete architecture"
Edvard Bruun, Princeton University, Form Finding Lab – "Fabrication-Informed Structural Design: Planar Trusses and Space Frames Designed for Robotic Assembly and Disassembly"

PhD Committees: Kaicong Wu (2019) – Princeton University
Eric Teitelbaum (2020) – Princeton University
Mauricio Loyola (2020) – Princeton University
Dorit Aviv (2020) - Princeton University

Academic Committees:

Member of the Association for Computer Aided Design in Architecture (ACADIA) Board 2021-22

Co-chair of the Association for Computer Aided Design in Architecture (ACADIA) conference 2021 "Realignments – toward critical computation"

Scientific Review Committees:

Symposium on Computational Fabrication (SCF)
Advances in Architectural Geometries (AAG)
Association for Computer Aided Design in Architecture (ACADIA)
3DP + Journal
Automation and Construction Journal
Construction Robotics Journal
International Journal for Architectural Computing (IJAC)

Participation in:

ETH Zurich "Nationaler Zukunftstag" – Event for schoolchildren at ETH Zurich, showcasing research and potential career paths to children aged 10-15, particularly focusing on diversity.

Funding Awards

ENAC Cluster Grant 2022 – In collaboration with Prof. Corentin Fivet

HRC Living Lab Grant – *Motion Pictures: A camera-projector system for increasing engagement with pedestrian public space*. Internal EPFL grant.

National Science Foundation: Engineering for Civil Infrastructure. *Spatial Discrete Element Structures for Waste-free Robotic Construction* – PI: Sigrid Adriaenssens, Co-PI: Stefana Parascho. External federal grant, USA.

Princeton Catalysis Initiative – In collaboration with Prof. Sigrid Adriaenssens, internal grant Princeton University.

C3.ai COVID19 Research Initiative – *Bringing Social Distancing to Light: Crowd Management using AI and Interactive Floor Projection*

Campus as Lab – *Zero Waste* – In collaboration with Prof. Erin Besler, internal grant Princeton University.

Magic Grant – *Robotic Lacing* – In collaboration with Prof. Basile Baudez, internal grant Princeton University.

Council for Science and Technology Funds – *Perceptive Robots*

Metropolis Project – *Robotic Construction of Self-supporting Assemblies* – In collaboration with Prof. Sigrid Adriaenssens, internal grant Princeton University.

University Committee on Research in the Humanities and Social Science – *LightVault,* internal grant Princeton University.

Professional Experience

FAT LAB Stuttgart – Project Engineer, Stuttgart, Germany

2014 Research in parametric planning and geometric optimisation

Max Bögl Neuer Markt – Neumarkt, Germany. Facade planning, automated generation of building element models

DesignToProduction Stuttgart – Project Engineer, Stuttgart, Germany

2012-2014 Development, programming and implementation of construction principles, optimisation and solutions for geometric problems in architecture

Solar Station Point.One – Munich, Germany. In collaboration with Lava Architects. Geometry optimisation, development and automated generation of details and production data

Unification Memorial – Berlin, Germany. In collaboration with Milla+Partner. Study for geometry optimisation and detail planning

Mitoseum, Bautzen, Germany. In collaboration with Rimpf Architecture. Geometry optimisation, planning and detail development for gridshell structures, automated generation of production data

Knippers Helbig Engineering – Architectural Assistant, Geometry Department, Stuttgart, Germany

2009-2010 Development and programming of complex geometries

Noida Center - Highrise Complex, Noida India. Geometry optimisation and panelisation of freeform building envelopes

Exhibitions

SheRobots – Exhibition participation at the University of Sydney, Australia. Planned Oct. 2022.

Anatomy of Structure – Exhibition with SOM Engineering, Ambika Gallery London, March 2020. https://www.som.com/news/major_exhibit_in_london_explores_robotics_and_the_future_of_art__architecture

Minding the Digital – Design Society, Exhibition of the ICD/ITKE Pavilion 13/14, Shenzhen, December 2017. http://icd.uni-stuttgart.de/?p=21405

Academic Platforms of Computational Design - Academy of Arts, Architecture and Design Prague, September - October 2017. Exhibition and invited talk. https://www.umprum.cz/web/en/umprum/academic-platforms-of-computational-design-6008

Reinforce Expose - The Inner Forms of Tomorrow, Gramazio Kohler Research – Instituto Svizzero, Milan, April - May 2017.
http://www.istitutosvizzero.it/eventi/calendario/milano-eventi/gramazio-kohler

Advanced Architectural Geometry Conference - Exhibition of Fabrication Prototype of *Robotic Lightweight Structures*, ETH Zurich, September 2016

10th Shanghai Biennale – Exhibition of the *ICD/ITKE Research Pavilion 2013-14*, January – February 2015. http://www.shanghaibiennale.org/en/artist/detail/107/12.html

Invited Talks

The Robot in the Loop - On Multi-Agent Construction Approaches – Invited talk, Smart Living Lab, Fribourg, EPFL, May 2022

Rethinking Architectural Robotics – Invited talk, Leeds University, April 2022.

Designing with Machines – Invited talk, University of Florida, March 2022

Architecture and (Computer) Science – Invited talk and panel, Women in Architecture Festival, Berlin, July 2021

Architectural Robotics– Invited talk, University of Toronto, Toronto, April 2021

Rethinking Architectural Robotics– Invited talk, University of California, Berkeley, April 2021

Designing with Robots – Invited talk, American University in Cairo, February 2021

Keynote Panel ACADIA 2020, October 2020

Designing with Robots – Invited talk, University of Toronto, Toronto, January 2020

Cooperative Robotic Fabrication – Invited talk, University of Pennsylvania, Philadelphia, October 2019

Cooperative Robotic Fabrication – Invited talk Princeton University, Black Imagination Matters Symposium. Princeton, May 2019

(con)sequences – **Keynote Speaker**, Symposium for Computational Fabrication, Pittsburgh, June 2019

(robot)² – Invited talk, Stuttgart University, ITECH Masters Program, Stuttgart, December 2018

Next Build Conference – Invited talk, London, June 2018

Foster + Partner Specialist Modelling Group – Invited talk, June 2018

Negotiating Complexity - Invited talk, Princeton School of Architecture, February 2018

Awards and Scholarships

Architect's Magazine R+D Award, for the *LightVault* Project, 2021

Nominated for the Institution of Structural Engineers (IStructE) Award 2021 for the *LightVault* Project, Category for Structural Artistry, 2021

Isabelle Rucki Prize, for the Article: *Integrative Architekturmodelle* published in Kunst + Architektur, Swiss Art History Society, 2019

Norman Foster Foundation - Scholarship for the Robotics Atelier 2017

ALGODeQ – Algorithmic Design Quest, 2012 – Vanguard Prize *Agent Freeform Gridshell Generation*. http://algodeq.org/?page=award_list

Hanns Seidel Foundation Germany – Scholarship for Intellectual Excellence 2008-2012

Release of the payment of university fee due to exceptional achievements (best 5% of student results) 2008

Publications

PhD Dissertation

Parascho, Stefana “Cooperative Robotic Assembly. Computational Design and Robotic Fabrication of Spatial Metal Structures.” ETH Zurich, 2019. DOI: https://doi.org/10.3929/ethz-b-000364322

Scientific Papers

Huang, Yijiang, Caelan R. Garrett, Ian Ting, Stefana Parascho, and Caitlin T. Mueller. 2021. “Robotic Additive Construction of Bar Structures: Unified Sequence and Motion Planning.” *Construction Robotics (2021)*, Springer. https://doi.org/10.1007/s41693-021-00062-z

Han, Isla Xi, Forrest Meggers and Stefana Parascho. 2021."Bridging the Collectives: A Review of Collective Human-Robot Construction." In *International Journal of Architectural Computing*.

Bruun, Edvard, Rafael Pastrana, Vittorio Paris, Alessandro Beghini, Attilio Pizzigoni, Stefana Parascho and Sigrid Adriaenssens. 2021. “Three cooperative robotic fabrication methods for the scaffold-free construction of a masonry arch.” In *Automation in Construction* 129(6), Elsevier. https://doi.org/10.1016/j.autcon.2021.103803

Han, Isla Xi, Edvard Bruun, Alessandro Beghini, Samantha Walker, Sigrid Adriaenssens and Stefana Parascho. 2020. “From Concept to Construction: A Transferable Design and Robotic Fabrication Method for a Building-Scale Vault.” In *ACADIA 2020: Distributed Proximities, Proceedings of the 40th Annual Conference of the Association for Computer Aided Design in Architecture*.

Parascho, Stefana, Isla Xi Han, Alessandro Beghini, Masaaki Miki, Samantha Walker, Edvard Bruun and Sigrid Adriaenssens. 2021. “LightVault.” In *AAG 2020: Advances in Architectural Geometry*.

Parascho, Stefana, Isla Xi Han, Samantha Walker, Alessandro Beghini, Edvard Bruun and Sigrid Adriaenssens. 2020. “A Cooperative Robotic Assembly Method for Compression-Only Vault Construction.” In *Construction Robotics 4 (2020),* pp. 117-126, Springer. https://doi.org/10.1007/s41693-020-00041-w

Bruun, Edvard P. G., Ian Ting, Sigrid Adriaenssens, and Stefana Parascho. 2020. “Human–Robot Collaboration: A Fabrication Framework for the Sequential Design and Construction of Unplanned Spatial Structures.” *Digital Creativity* 31 (4): 320–36. https://doi.org/10.1080/14626268.2020.1845214

Vittorio, Paris, M. Lepora, Alessandro Beghini, Stefana Parascho and Sigrid Adriaenssens, 2020. “Robotic construction of a self-balancing glass masonry vault: DEM study of the stability during the construction stages.”, In *IASS Annual Symposium and Spatial Structures Conference 2020/21* (accepted)

Beghini, Alessandro, Samantha Walker, Masaaki Miki, Isla Xi Han, Sigird Adriaenssens and Stefana Parascho, 2021. “Robotic construction of a self-balancing glass masonry vault: Design and Tessellation.” In *IASS Annual Symposium and Spatial Structures Conference 2020/21* (accepted)

Parascho, Stefana, Thomas Kohlhammer, Stelian Coros, Fabio Gramazio and Matthias Kohler. 2018. “Computational Design of Multi-Robotically Assembled Spatial Structures.” In *AAG - Advances in Architectural Geometry 2018*, pp. 112–139, edited by Lars Hesselgren, Axel Kilian, Olga Sorkine Hornung, Samar Malek, Karl-Gunnar Olsson, and Christopher John Kenneth Williams, Göteborg, Sweden: Klein Publishing GmbH. https://research.chalmers.se/en/publication/504188

Gandia Augusto, Stefana Parascho, Romana Rust, Gonzalo Casas, Fabio Gramazio, Matthias Kohler (2019) "Towards Automatic Path Planning for Robotically Assembled Spatial Structures." In *ROBARCH - Robotic Fabrication in Architecture, Art and Design*, edited by Willmann J., Block P., Hutter M., Byrne K., Schork T. Springer, Cham. https://doi.org/10.1007/978-3-319-92294-2_5

Piškorec Luka, David Jenny, Stefana Parascho, Hannes Mayer, Fabio Gramazio, Matthias Kohler (2019) "The Brick Labyrinth." In *ROBARCH - Robotic Fabrication in Architecture, Art and Design*, edited by Willmann J., Block P., Hutter M., Byrne K., Schork T. Springer, Cham. https://doi.org/10.1007/978-3-319-92294-2_37

Parascho, Stefana, Augusto Gandia, Ammar Mirjan, Fabio Gramazio and Matthias Kohler. 2017. "Cooperative Fabrication of Spatial Metal Structures." In *Fabricate 2017,* pp. 24-29, edited by Achim Menges, Bob Sheil, Ruairi Glynn and Marilena Skavara, London: UCL press, ISBN: 978-1-78735-001-4, www.jstor.org/stable/j.ctt1n7qkg7.7

Parascho, Stefana, Jan Knippers, Moritz Dörstelmann, Marshall Prado and Achim Menges. 2014. "Modular Fibrous Morphologies: Computational Design, Simulation and Fabrication of Differentiated Fibre Composite Building Components." In *AAG - Advances in Architectural Geometry 2014*, pp. 29-45, edited by Philippe Block, Jan Knippers, Niloy J. Mitra, Wenping Wang, Springer, ISBN 978-3-319-11418-7, DOI: https://doi.org/10.1007/978-3-319-11418-7_3

Dörstelmann, Moritz, Stefana Parascho, Marshall Prado, Jan Knippers and Achim Menges. 2014. "Integrative Computational Design Methodologies for Modular Architectural Fiber Composite Morphologies." In *ACADIA 2014 Design Agency: Proceedings of the 34th Annual Conference of the Association for Computer Aided Design in Architecture*, pp. 219-228, edited by David Gerber, Alvin Huang and Jose Sanchez, ACADIA and Riverside Architectural Press, ISBN 978-1-926724-49-2, DOI: https://doi.org/10.13140/2.1.5186.0485

Scientific Papers – accepted for publication

Parascho, Stefana. 2022. "From Automation to Collaboration: A Review of Construction Robotics". In Annual Review of Control, Robotics and Autonomous Systems.

Pastrana, Rafael, Patrick Ole Ohlbrock, Thomas Oberbichler, Pierluigi D'Acunto, Stefana Parascho. 2022. "Constrained Form-Finding of Tension-Compression Structures using Automatic Differentiation." In *Computer Aided Design*.

Bruun, Edvard, Erin Besler, Sigrid Adriaenssens and Stefana Parascho. 2022. "Towards Computing Cooperative Robotic Sequences for the Disassembly and Reuse of Timber Frame Structures." In *ACADIA 2022 Hybrids and Haeccieties: Proceedings of the 41st Annual Conference of the Association for Computer Aided Design in Architecture*.

Articles

Parascho Stefana. 2021. "Home Position", book article, in *Design Studio Vol. 2: Intelligent Control 2021: Disruptive Technologies: 2021,* edited by Rob Hyde and Filippos Filippidis, RIBA Publishing. ISBN 9781859469705

Parascho Stefana. 2021. "Design Space Explorations: On the role of visualisation in architectural fabrication and design." book article, in *Bio/Matter/Techno/Synthetics*, University of Pennsylvania. Currently in production. (not published yet)

Parascho Stefana. 2018. "Integrative Architekturmodelle" Kunst + Architektur, nr. 2018.4. Gesellschaft für Schweizerische Kunstgeschichte, Berne, Switzerland. ISBN: 978-3-03797-345-5

Parascho Stefana. 2019. “def help(): technical support” *Pidgin Magazine*, nr. 26. Princeton University.

Parascho, Stefana. 2017. “Un labirint de caramida.” *igloo habitat & architectura,* nr. 179, Aug-Sep 2017. pp. 138-141. Igloo Media, Bucharest, Romania.