



ROB|ARCH 2018

Robotic Fabrication in Architecture, Art, and Design

CONFERENCE GUIDE

df National Centre of Competence
in Research
Digital Fabrication

ETH zürich

DARCH

Department of Architecture



Association for
Robots in Architecture

DigitalConcrete

2018

SCHEDULE

WEDNESDAY, SEPTEMBER 12 | OPENING KEYNOTE

17:00–18:00	Registration
18:00–19:00	Keynote: Chris Luebke
19:00–20:00	Panel Discussion
20:00	Reception

THURSDAY, SEPTEMBER 13 | CONFERENCE DAY 1

8:00–9:00	Registration
9:00–9:15	Welcome
9:15–9:45	Keynote: Mette Ramsgaard-Thomsen
9:45–10:15	Coffee
10:15–12:00	Session: Material and Processes Joshua Bard Zach Cohen Ryan Chee Maria Yablonina Hyeonji Claire Im Stylianios Dritsas Wes McGee and Tsz Yan Ng

12:00–13:30 Lunch

13:30–15:00	Session: Construction and Structure Johannes Greisen and Phil Ayres Hiroki Takabayashi Tristan Gobin and Romain Mesnil Christopher Battaglia and Sasa Zivkovic Hua Chai Petrus Aejmelaeus-Lindström
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15:00–15:30 Coffee

15:30–17:15	Session: Application and Practice David Jenny, Stefana Parascho, and Luka Piškorec Christian Lange and Dann Holohan Martín E. Alvarez and Erik Martinez Andreas Thoma and Arash Adel Lei Yu and Dan Luo Nadja Gaudillière Asbjørn Søndergaard
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17:15–17:45 Break

17:45–18:15	Keynote: Philip Yuan
18:15–19:00	Robots in Architecture Awards
19:00	Dinner and Workshop Exhibition in the RFL

FRIDAY, SEPTEMBER 14 | CONFERENCE DAY 2

8:00–9:00	Registration
9:00–9:15	Opening Remarks: Day 2
9:15–9:45	Keynote: Jonas Buchli
9:45–10:15	Coffee

10:15–12:00 **Session: Design and Simulation**

Joshua Bard
Kaicong Wu
Sven Stumm
Augusto Gandia
Giovanni Betti
Tim Schork
Shajay Bhooshan

12:00–13:30 Lunch

13:30–14:15 **Conference Awards**
14:15–15:15 **Panel Discussion**

15:15–15:45 Coffee

15:45–17:45	Session: Control and Fabrication Emmanuel Vercauteren, Pradeep Devadass, and Zachary Mollica Giulio Brugnaro Hyunchul Kwon Sina Mostafavi and Benjamin Kemper Dylan Wood and Miguel Aflalo Yijiang Huang Markus Kayser Alexandre Dubor
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17:45–18:00 **Closing remarks**

18:00–19:00 Transportation

19:00 **Closing Party at Empa NEST, Dübendorf**

SATURDAY, SEPTEMBER 15 | EXCURSIONS

9:30–13:30	Hello Robot Exhibition (morning round)
10:00–11:30	Zurich Old Town Tour
10:00–14:00	Zurich West and MuDA Tour
14:00–18:00	Hello Robot Exhibition (afternoon round)

KEYNOTES AND PANELLISTS

AUDITORIUM HPH G1

KEYNOTES

Chris Luebke

Arup Fellow and Global Director for Arup Foresight
Wednesday, 12 | 18:00–19:00 | HPH G1

Mette Ramsgaard Thomsen

Prof. of Architecture and Digital Tech. and Head of CITA at KADK
Thursday, 13 | 9:15–9:45 | HPH G1

Philip F. Yuan

Professor at Tongji University and Founder of Archi-Union
Thursday, 13 | 17:45–18:15 | HPH G1

Jonas Buchli

Professor of Agile and Dexterous Robotics at ETH Zurich
Friday, 14 | 9:15–9:45 | HPH G1

PANEL DISCUSSIONS

Wednesday, 12 | 19:00–20:00 | HPH G1

MODERATOR

Judit Solt, Editor-in-Chief, TEC 21 Magazine

PANELLISTS

Margarita Chli, Prof., Vision for Robotics Lab, ETH Zurich
Gudela Grote, Prof. of Work and Org. Psychology, ETH Zurich
Fabio Gramazio, Prof. of Arch. and Digital Fabrication, ETH Zurich
Hanif Kara, Prof. of Practice of Architectural Technology, Harvard
Shiho Kawashima, Assoc. Prof. in Civil Eng., Columbia Univ.
Chris Luebke, Arup Fellow and Global Dir. for Arup Foresight

Friday, 14 | 13:30–14:30 | HPH G1

MODERATORS

Mahesh Daas, Dean and Prof. of Arch., Univ. of Kansas
Andrew John Wit, Prof. of Digital Practice, Temple Univ.

PANELLISTS

Sigrid Brell-Cokcan, Pres. of the Assoc. for Robots in Arch.
Kendra Byrne, Head of Product, Figure
Matthias Kohler, Prof. of Arch. and Digital Fabrication, ETH Zurich
Achim Menges, Prof./Dir., ICD, Univ. of Stuttgart
Sina Mostafavi, Manager, Robotic Building Lab, TU Delft

CONFERENCE DAY 1

THURSDAY, SEPTEMBER 13 | AUDITORIUM HPH G1

MATERIAL AND PROCESSES

10:15–12:00

SESSION CHAIR

Iain Maxwell, supermanoeuvre

Thermally Informed Robotic Topologies: Profile-3D-Printing for the Robotic Construction of Concrete Panels, Thermally Tuned Through High Resolution Surface Geometry

Joshua Bard, Dana Cupkova, Newell Washburn, and Garth Zeglin

Hold Up: Machine Delay in Architectural Design

Zach Cohen

Concrete Fabrication by Digitally Controlled Injection

Ryan Wei Shen Chee, Wei Lin Tan, Wei Hern Goh, Felix Amtsberg, and Stylianos Dritsas

Towards the Development of Fabrication Machine Species for Filament Materials

Maria Yablonina and Achim Menges

Spatial Print Trajectory: Controlling Material Behavior with Print Speed, Feed Rate, and Complex Print Path

Sulaiman Alothman, Hyeonji Claire Im, Francisco Jung, and Martin Bechthold

An Additive and Subtractive Process for Manufacturing with Natural Composites

Stylianos Dritsas, Yadunund Vijay, Marina Dimopoulou, Naresh Sanadiya, and Javier G. Fernandez

Hard + Soft: Robotic Needle Felting for Nonwoven Textiles

Wes McGee, Tsz Yan Ng, and Asa Peller

CONSTRUCTION AND STRUCTURE

13:30–15:00

SESSION CHAIR

Matthias Rippmann, ETH Zurich

SCRIM—Sparse Concrete Reinforcement in Meshworks

Phil Ayres, Wilson Ricardo Leal da Silva, Paul Nicholas, Thomas Juul Andersen, and Johannes Portielje Rauff Greisen

Versatile Robotic Wood Processing Based on Analysis of Parts Processing of Japanese Traditional Wooden Buildings

Hiroki Takabayashi, Keita Kado, and Gakuhito Hirasawa

Form Finding of Nexorades Using the Translations Method

Tristan Gobin, Romain Mesnil, Cyril Douthe, Pierre Margerit, Nicolas Ducoulombier, Leo Demont, Hocine Delmi, and Jean-François Caron

Sub-Additive 3D Printing of Optimized Double Curved Concrete Lattice Structures

Christopher A. Battaglia, Martin Fields Miller, and Sasa Zivkovic

Investigations on Potentials of Robotic Band-Saw Cutting in Complex Wood Structures

Hua Chai and Philip F. Yuan

Direct Deposition of Jammed Architectural Structures

Petrus Aejmelaeus-Lindström, Gergana Rusenova, Ammar Mirjan, Fabio Gramazio, and Matthias Kohler

APPLICATION AND PRACTICE

15:30–17:15

SESSION CHAIR

Martha Tsikgari, Foster + Partners

Tailored Structures, Robotic Sewing of Wooden Shells

Martin E. Alvarez, Erik E. Martínez-Parachini, Ehsan Baharlou, Oliver David Krieg, Tobias Schwinn, Lauren Vasey, Chai Hua, Achim Menges, and Philip F. Yuan

Dynamic Robotic Slip-Form Casting and Eco-Friendly Building Façade Design

Lei Yu, Dan Luo, and Weiguo Xu

Ceramic Constellation | Robotically Printed Brick Specials

Christian J. Lange, Donn Holohan, and Holger Kehne

Robotic Fabrication of Bespoke Timber Frame Modules

Andreas Thoma, Arash Adel, Matthias Helmreich, Thomas Wehrle, Fabio Gramazio, and Matthias Kohler

Large-Scale Additive Manufacturing of Ultra-High-Performance Concrete of Integrated Formwork for Truss-Shaped Pillars

Nadja Gaudillière, Romain Duballet, Charles Bouyssou, Alban Mallet, Philippe Roux, Mahriz Zakeri, and Justin Dirrenberger

Realization of Topology Optimized Concrete Structures Using Robotic Abrasive Wire-Cutting of Expanded Polystyrene Formwork

Asbjørn Søndergaard, Jelle Feringa, Florin Stan, and Dana Maier

The Brick Labyrinth

Luka Piškorec, David Jenny, Stefana Parascho, Hannes Mayer, Fabio Gramazio, and Matthias Kohler

CONFERENCE DAY 2

FRIDAY, SEPTEMBER 14 | AUDITORIUM HPH G1

DESIGN AND SIMULATION

10:15–12:00

SESSION CHAIR

Dagmar Reinhardt, The University of Sydney

Image Classification for Robotic Plastering with Convolutional Neural Network

Joshua Bard, Ardavan Bidgoli, and Wei Wei Chi

Designing Natural Wood Log Structures with Stochastic Assembly and Deep Learning

Kaicong Wu and Axel Kilian

Mockup Method: Heuristic Architectural Fragments as Central Models in Architectural Design

Kevin Pazik

Haptic Programming

Sven Stumm and Sigrild Brell-Cokcan

Towards Automatic Path Planning for Robotically Assembled Spatial Structures

Augusto Gandia, Stefana Parascho, Romana Rust, Gonzalo Casas, Fabio Gramazio, and Matthias Kohler

Communication Landscapes

Giovanni Betti, Saqib Aziz, Andrea Rossi, and Oliver Tessmann

Towards Visual Feedback Loops for Robot-Controlled Additive Manufacturing

Sheila Sutjipto, Daniel Tish, Gavin Paul, Teresa Vidal-Calleja, and Tim Schork

Function Representation for Robotic 3D-Printed Concrete

Shajay Bhooshan, Johannes Ladinig, Tom Van Mele, and Philippe Block

CONTROL AND FABRICATION

15:45–17:45

SESSION CHAIR

Ammar Mirjan, ETH Zurich

FIBERBOTS: Design and Digital Fabrication of Tubular Structures Using Robot Swarms

Markus Kayser, Levi Cai, Christoph Bader, Sara Falcone, Nassia Inglessis, Barrak Darweesh, João Costa, and Neri Oxman

InFormed Ceramics: Multi-axis Clay 3D Printing on Freeform Molds

Minjae Ko, Donghan Shin, Hyunguk Ahn, and Hyungwoo Park

Altered Behaviour: The Performative Nature of Manufacture Chainsaw Choreographies + Bandsaw Manoeuvres

Emmanuel Verduyts, Zachary Mollica, and Pradeep Devadass

Cyber Physical Macro Material as a UAV [re]Configurable

Dylan Wood, Maria Yablonina, Miguel Aflalo, Jingcheng Chen, Behrooz Tahanzadeh, and Achim Menges

Adaptive Robotic Carving

Giulio Brugnaro and Sean Hanna

Multimode Robotic Materialization

Sina Mostafavi, Benjamin N. Kemper, and Daniel L. Fischer

Digital Composites: Robotic 3D-Printing of Continuous Carbon Fiber-Reinforced Plastics for Functionally-Graded Building Components

Hyunchul Kwon, Martin Eichenhofer, Thodoris Kyttas, and Benjamin Dillenburger

Robotic Extrusion of Architectural Structures with Nonstandard Topology

Yijiang Huang, Josephine Carstensen, Lavender Tessmer, and Caitlin Mueller

On-Site Robotics for Sustainable Construction

Alexandre Dubor, Jean-Baptiste Izard, Edouard Cabay, Aldo Sollazzo, Areti Markopoulou, and Mariola Rodriguez

INFORMATION

ROB|ARCH 2018 CONFERENCE VENUE

ETH Zurich
Building HPH
Joseph-von-Deschwanden-Platz 1
8093 Zurich

INTERNET ACCESS ON CAMPUS

Network: public or public-5
Login: conference_guest
Password: Robarch2018

PUBLIC TRANSPORT

ZURICH AIRPORT–ETH HÖNGGERBERG

Take S2, S16 or S24 to 'Oerlikon', then walk to Bahnhof Oerlikon Nord bus stop (2 min.) and take bus 80 to 'ETH Hönggerberg' (direction 'Triemlispital').

ZURICH MAIN STATION–ETH HÖNGGERBERG

Take tram 11 from 'Bahnhofquai' tram stop to 'Bucheggplatz' (direction 'Auzelg') and change to bus 69 which takes you to 'ETH Hönggerberg'. Alternatively you can take a train to 'Oerlikon', then walk to 'Oerlikon Nord' bus stop (2 min.) and take bus 80 to 'ETH Hönggerberg' (direction 'Triemlispital').

PARKING

When arriving at ETH Hönggerberg by car, use the P2 garage.

RECOMMENDED VENUES TO GO OUT IN ZURICH

AM DAMM

Hönggerstrasse 3

FRAU GEROLDS GARTEN

Geroldstrasse 23

LES HALLES

Pfingstweidstrasse 9

STAZIONE PARADISO

Wasserwerkstrasse 89a

KOSMOS

Lagerstrasse 104

RIMINI BAR

Badweg 10

CONFERENCE CHAIRS

Fabio Gramazio and Matthias Kohler

SCIENTIFIC CHAIRS

Philippe Block, Kendra Byrne, Marco Hutter, Tim Schork, and Jan Willmann

WORKSHOP CHAIR

Romana Rust

INITIATORS/ROBOTS IN ARCHITECTURE

Sigrid Brell-Cokcan and Johannes Braumann

SITE CHAIR

Russell Loveridge

COORDINATION

Orkun Kasap, Kaitlin McNally, and Aurèle Gheyselincx

MEDIA RELATIONS

Tanja Coray and Linda Seward

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