Contents

Part I Keynotes

Robots at the Sagrada Familia Basilica: A Brief History
of Robotised Stone-Cutting ........................................... 3
Mark Burry

Psychaestenia ......................................................... 17
Francois Roche, Camille Lacadee and Stephan Henrich

Part II Scientific Papers

Building a Bridge with Flying Robots ............................... 35
Ammar Mirjan, Federico Augugliaro, Raffaello D’Andrea,
Fabio Gramazio and Matthias Kohler

Autonomous Robotic Assembly with Variable Material Properties ........................................ 49
Michael Jeffers

An Integrated Modelling and Toolpathing Approach
for a Frameless Stressed Skin Structure, Fabricated Using
Robotic Incremental Sheet Forming .................................. 63
Paul Nicholas, David Stasiuk, Esben Nørgaard, Christopher Hutchinson
and Mette Ramsgaard Thomsen

Robotic Lattice Smock .................................................. 79
Andrew Saunders and Gregory Epps

Robotic Multi-dimensional Printing Based on Structural
Performance ............................................................... 93
Philip F. Yuan, Hao Meng, Lei Yu and Liming Zhang

Fabric Forms: The Robotic Positioning of Fabric Formwork ........................................... 107
Ron Culver, Julia Koerner and Joseph Sarafian
Path Planning for Robotic Artistic Stone Surface Production .......... 123
Gregor Steinhagen, Johannes Braumann, Jan Brüninghaus,
Matthias Neuhaus, Sigrid Brell-Cokcan and Bernd Kuhlenkötter

Towards a Micro Design of Acoustic Surfaces ....................... 137
Dagmar Reinhardt, Densil Cabrera, Alexander Jung and Rod Watt

Robotic Hot-Blade Cutting ........................................... 151
Asbjørn Søndergaard, Jelle Feringa, Toke Nørbjerg, Kasper Steenstrup,
David Brander, Jens Graversen, Steen Markvorsen, Andreas Bærentzen,
Kiril Petkov, Jesper Hattel, Kenn Clausen, Kasper Jensen, Lars Knudsen
and Jacob Kortbek

Part III Projects

Fabrication-Aware Design of Timber Folded Plate Shells
with Double Through Tenon Joints ................................. 167
Christopher Robeller and Yves Weinand

RBDM_Robodome: Complex Curved Geometries
with Robotically Fabricated Joints ................................. 179
Alexander Jung, Dagmar Reinhardt and Rod Watt

Topology Optimization and Robotic Fabrication of Advanced
Timber Space-Frame Structures ................................ 191
Asbjørn Søndergaard, Oded Amir, Phillip Eversmann, Luka Piskorec,
Florin Stan, Fabio Gramazio and Matthias Kohler

Mobile Robotic Brickwork ........................................... 205
Kathrin Dörfler, Timothy Sandy, Markus Giftthaler, Fabio Gramazio,
Matthias Kohler and Jonas Buchli

Closeness: On the Relationship of Multi-agent Algorithms
and Robotic Fabrication ............................................. 219
Roland Snooks and Gwyllim Jahn

The SPIDE:Robot: A Cable-Robot System for On-site
Construction in Architecture ...................................... 231
José Pedro Sousa, Cristina Gassó Palop, Eduardo Moreira,
Andry Maykol Pinto, José Lima, Paulo Costa, Pedro Costa,
Germano Veiga and A. Paulo Moreira

Developing Architectural Geometry Through Robotic
Assembly and Material Sensing .................................. 241
Kaicong Wu and Axel Kilian
Stigmergic Accretion .......................................................... 399
Roland Snooks and Gwyllim Jahn

Sensors and Workflow Evolutions: Developing a Framework for Instant Robotic Toolpath Revision .................................................. 411
Alexandre Dubor, Guillem Camprodom, Gabriel Bello Diaz,
Dagmar Reinhardt, Rob Saunders, Kate Dunn, Marjo Niemelä,
Samantha Horlyck, Susana Alarcon-Licona, Dyan Woznak-O’Connor
and Rodney Watt

Towards Real-Time Adaptive Fabrication-Aware Form Finding in Architecture .............................................................. 427
Dave Pigram, Iain Maxwell and Wes McGee

Part V Industry Papers

Direct Robot Control with mxAutomation: A New Approach to Simple Software Integration of Robots in Production Machinery, Automation Systems, and New Parametric Environments ................. 441
Heinrich Munz, Johannes Braumann and Sigrid Brell-Cokcan

Collaborative Robotics ................................................................. 449
Frank-Peter Kirgis, Peter Katsos and Martin Kohlmaier

Flexible Gripper Design Through Additive Manufacturing .......... 455
Marcel Nagel, Felix Giese and Ralf Becker

Individual Serialism Through the Use of Robotics in the Production of Large-Scale Building Components ........................................ 461
Martin Krammer

PowerMILL Robot: Simplifying the Complex Issue of Robotic Programming ................................................................. 469
Robert Simunic

Erratum to: The SPIDERobot: A Cable-Robot System for On-site Construction in Architecture .......................................................... 473
José Pedro Sousa, Cristina Gassó Palop, Eduardo Moreira,
Andry Maykol Pinto, José Lima, Paulo Costa, Pedro Costa,
Germano Veiga and A. Paulo Moreira

Scientific Committee ................................................................. 473
Robotic Fabrication in Architecture, Art and Design
2016
Reinhardt, D.; Saunders, R.; Burry, J. (Eds.)
2016, XVIII, 474 p. 344 illus., 269 illus. in color.,
Hardcover
ISBN: 978-3-319-26376-2