Spring 2019

Faculty Publications for Academic Year 2018-19

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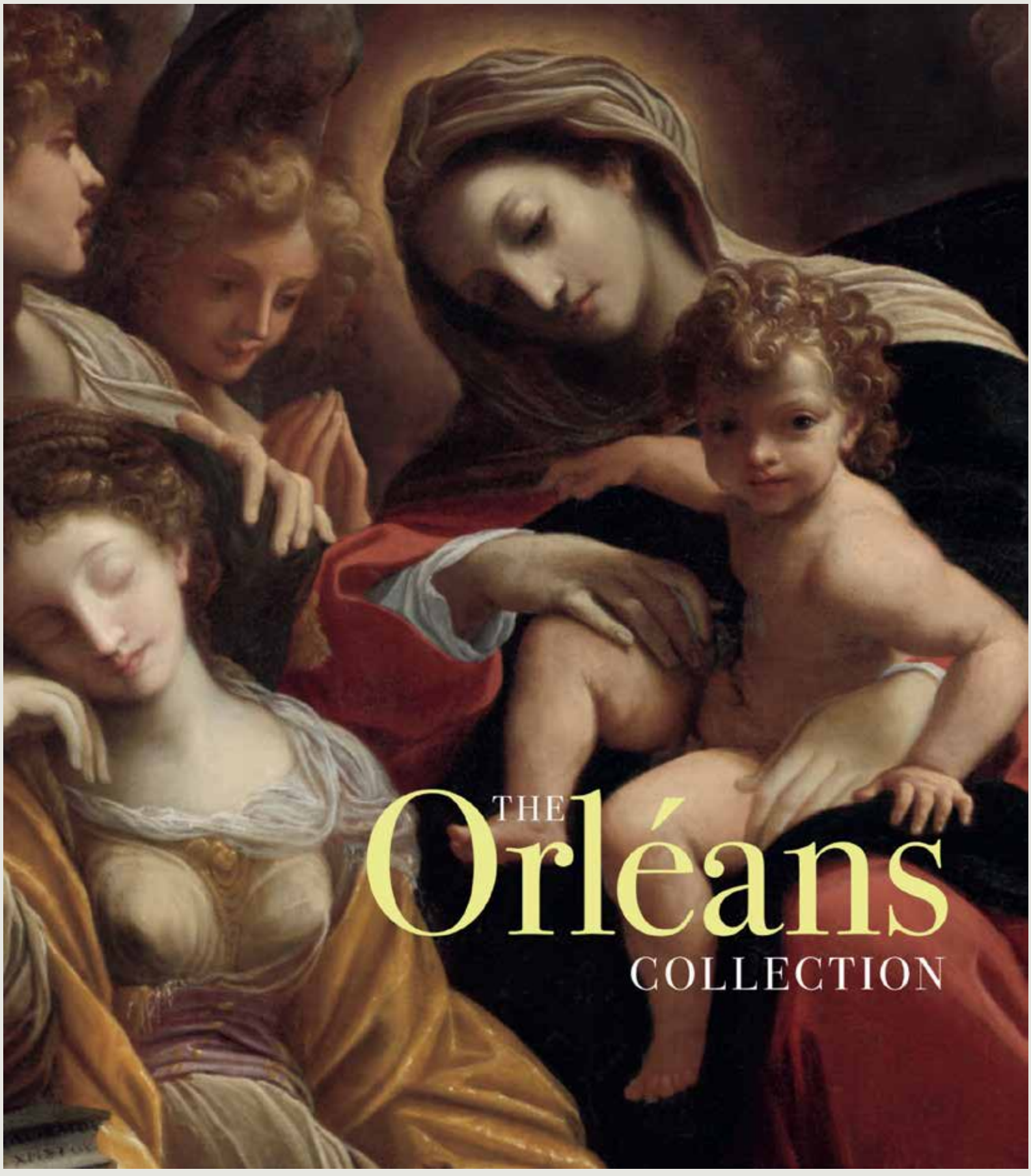
AMBER BARTOSH
Assistant Professor

Clark, Laura (co-author), "Mixed Reality Visualizations of Urban Data",
***Technology Architecture + Design (TAD)* 3, no. 1 (Spring 2019): 89–101**

JEAN-FRANÇOIS BÉDARD
Associate Professor



“The Refurbishment and Renovation of the Palais – Royal during the Regency”, in *The Orleans Collection*, 96–113. London: Giles ltd, 2018.

KATHLEEN BRANDT
P/T Instructor

BRIAN LONSWAY
Associate Professor
& Graduate Chair

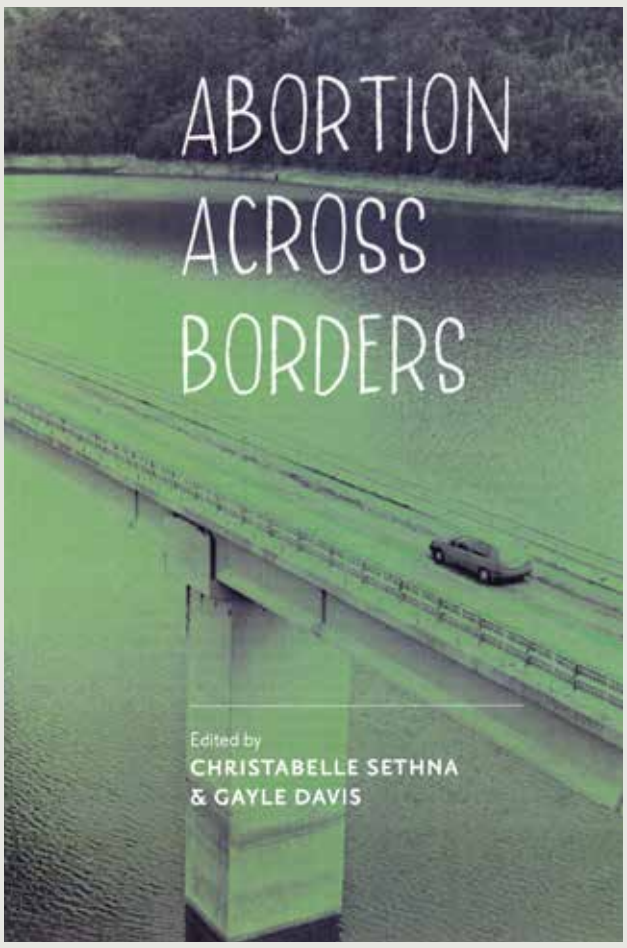
Figure 2.1
The PARC beanbag exhibit at the Computer History Museum in Mountain View, California. Photograph by the authors.

The Computer History Museum exhibits the beanbag with a nod to both historical accuracy and cultural cheekiness, acknowledging that the transformative impacts of this commonplace piece of furniture in the domain of computing history are manifold. The beanbag functions ergonomically, culturally, and symbolically, and these various functions have been built upon, expanded, and in many cases reified since this famous placement in the early PARC. Our friend the beanbag has grown up, but not necessarily matured, in the hands of designers since its invention. Together with many allies including the fern, the ping-pong table, and the playground slide, the beanbag has become a de facto indicator and erstwhile instigator of creative capacity.

What is behind this evolution? And to what do we owe the iconic status of the beanbag? We need look no further than Bruno Latour and Steve Woolgar's observational work with the Salk Institute's scientists for a method to unpack the evolution of PARC's beanbags into the Googleplex. We see that designers, much like scientists,

"Beanbags and Microscopes at Xerox Park", in *Laboratory Lifestyles: The Construction of Scientific Fiction* ed. Sandra Kaji-O'Grady, Chris L. Smith, Russell Hughes, 29–48. Cambridge, MA: The MIT Press, 2018.

LORI A. BROWN
Professor



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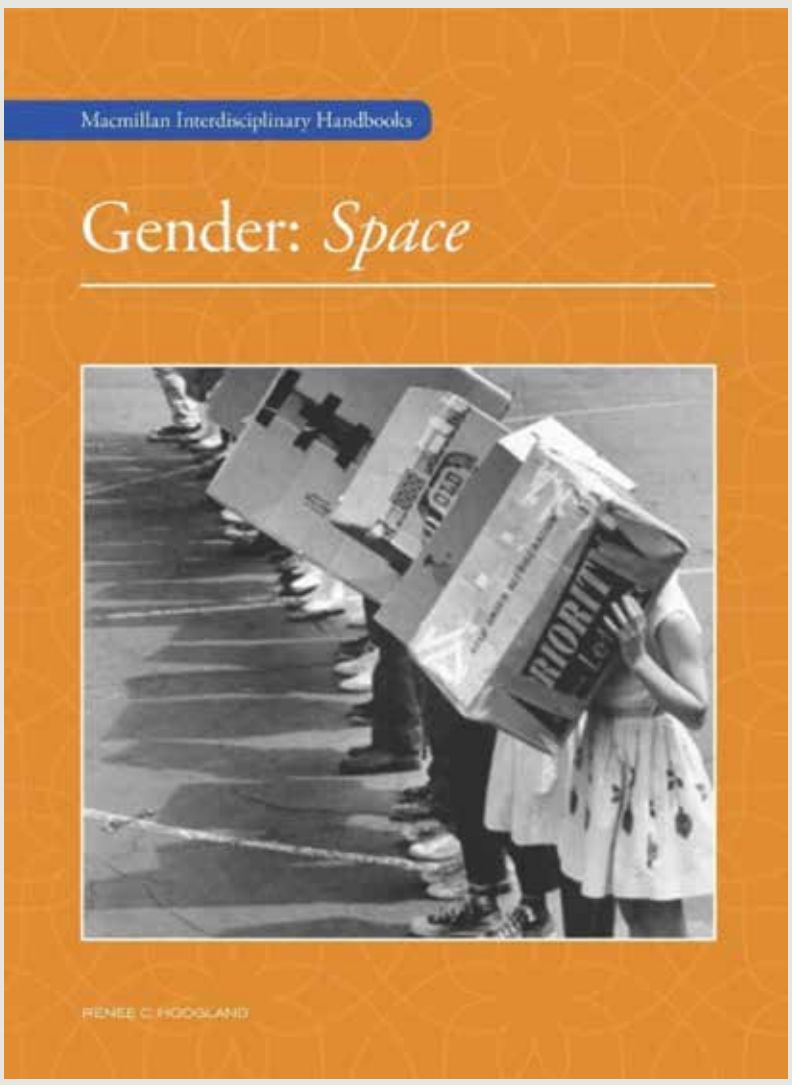

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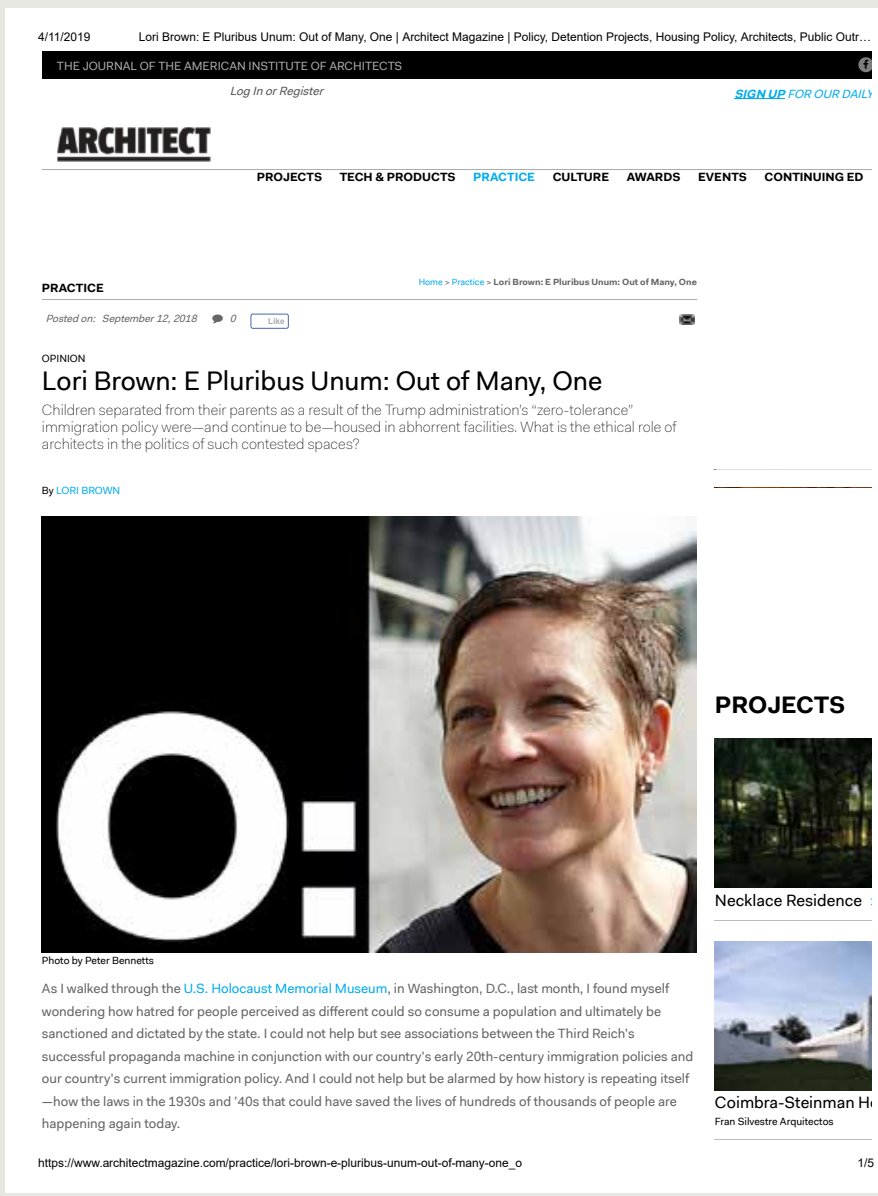

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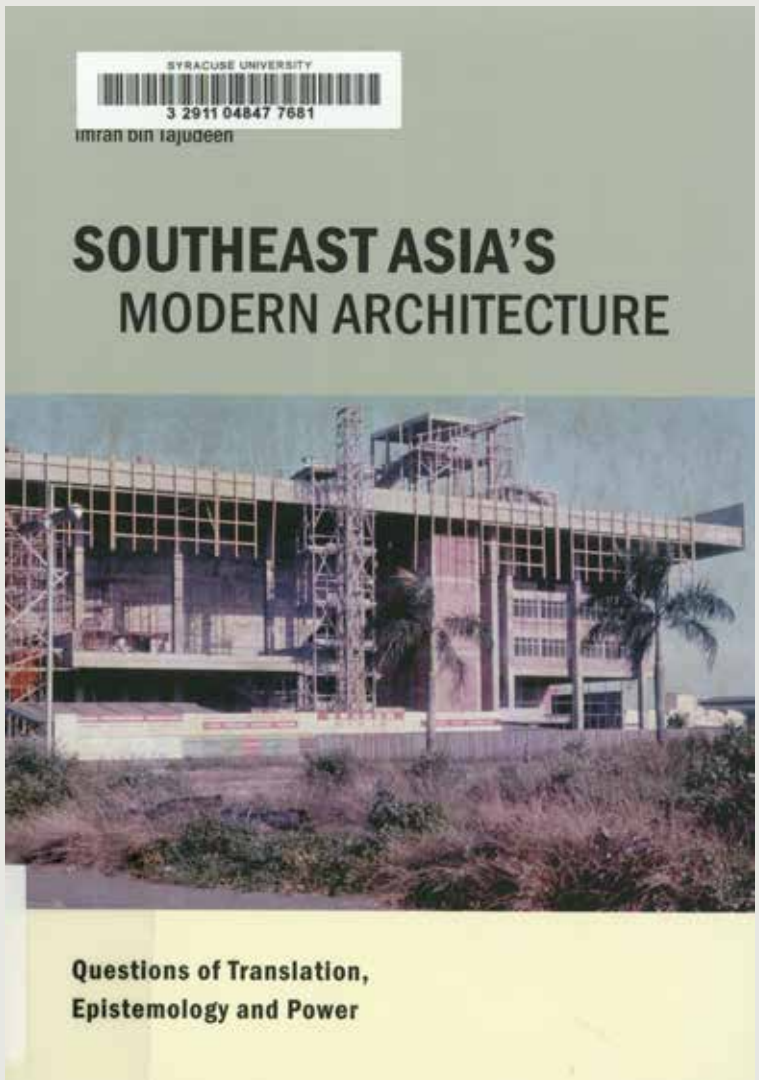
LAWRENCE CHUA
Assistant Professor



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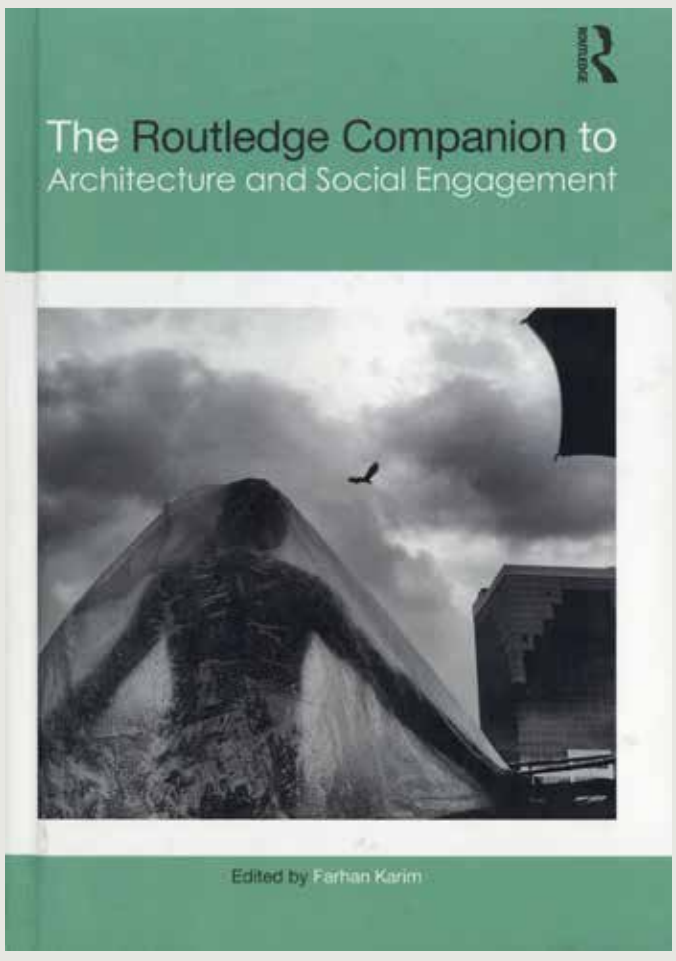

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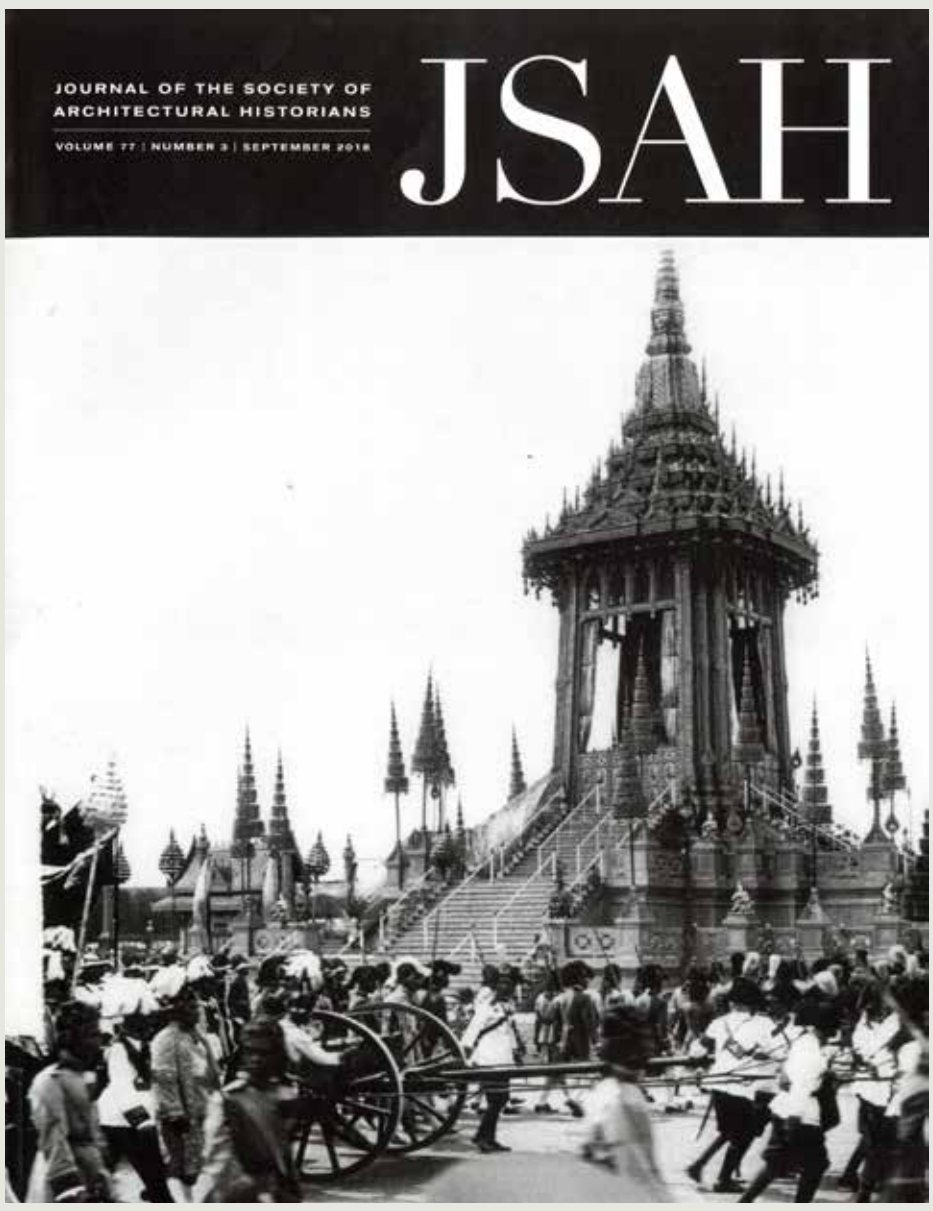

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JUNHO CHUN
Assistant Professor

TOPO-JOINT

Topology Optimization Framework for 3D-Printed Building Joints

JUNHO CHUN[1], JUHUN LEE[2] and DAEKWON PARK[3]
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Abstract. Joints and connectors are often the most complex element in building assemblies and systems. To ensure the performance of the assemblies and systems, it is critical to optimize the geometry and configurations of the joints based on key functional requirements (e.g., stiffness and thermal exchange). The proposed research focuses on developing a multi-objective topology optimization framework that can be utilized to design highly customized joints and connections for building applications. The optimized joints that often resemble tree structures or bones are fabricated using additive manufacturing techniques. This framework is built upon the integration of high-fidelity topology optimization algorithms, additive manufacturing, computer simulations and parametric design. Case studies and numerical applications are presented to demonstrate the validity and effectiveness of the proposed optimization and additive manufacturing framework. Optimal joint designs from a variety of architectural and structural design considerations, such as stiffness, thermal exchange, and vibration are discussed to provide an insightful interpretation of these interrelationships and their impact on joint performance.

Keywords. Topology optimization; parametric design; 3d printing.

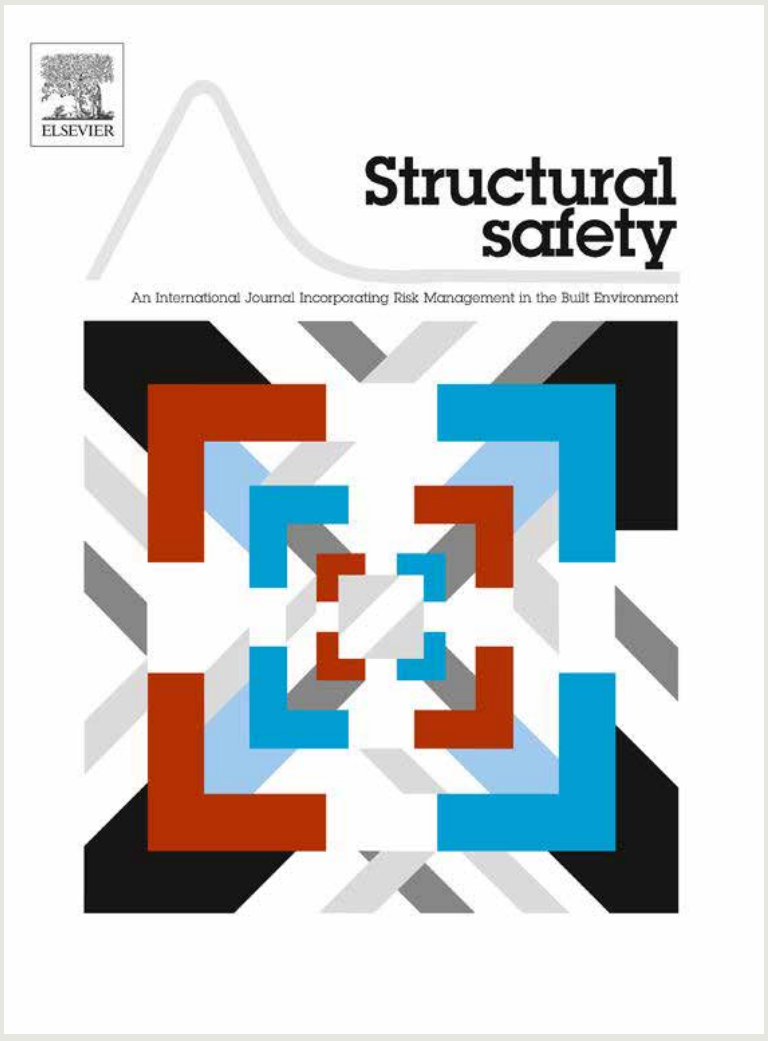
1. Introduction

Joints and connectors are among the most critical components that affect the overall performance of building assemblies and systems. This is because these components are often the most complex element in an assembly regarding geometry, functional requirement, and detailing. Many of the mechanical failures occur at joints as the stresses, loads, vibrations, and movements tend to concentrate at these locations. A structural connection is commonly exposed to a set of unique factors which makes it practically impossible to create a single joint or connector that can be universally applied to all conditions.

Some of the critical factors include load conditions, the material property of the structural components, and connection types. Metals have been the most desirable

T. Fukuda, W. Huang, P. Janssen, K. Crolla, S. Alhadidi (eds.), *Learning, Adapting and Prototyping. Proceedings of the 23rd International Conference of the Association for Computer-Aided Architectural Design Research in Asia (CAADRIA) 2018*, Volume 1, 205-214. © 2018 and published by the Association for Computer-Aided Architectural Design Research in Asia (CAADRIA) in Hong Kong.

Lee, Juhun and Park, Daekwon (co-authors), " TOPO-JOINT – Topology Optimization Framework for 3D-Printed Building Joints", *Learning Adapting and Prototyping – Proceedings of the 23rd CAADRIA Conference – Volume 1* (May 2018): 205–214



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SEKOU COOKE
Assistant Professor

Keane, Katharine. "Building Compositions," *ARCHITECT Magazine* 107, no. 11 (November 2018): 24.

GAME CHANGERS: The Hip Hop Designers Challenging the Architecture Establishment

Born in the '90s from hip-hop culture, this critical architecture movement has been coalescing for decades though may be poised for a second wave.

by Dante A. Ciampaglia
February 26, 2019

Close to the Edge: The Birth of Hip-Hop Architecture, curated by Sekou Cooke, was on view at the Center for Architecture in New York City in late 2018, featuring a mix of built and conceptual projects and highlighting the influence of attendant themes and movements, like B-boying, deconstructivism, B-sides, neo-Postmodernism, graffiti, and Afrofuturism.

Courtesy Erik Bardin

Ciampaglia, Dante A. "Game Changers: The Hip-Hop Designers Challenging the Architecture Establishment", *Metropolis*, 26 Feb. 2019. Web, 11 April 2019.

GREGORY CORSO
Assistant Professor

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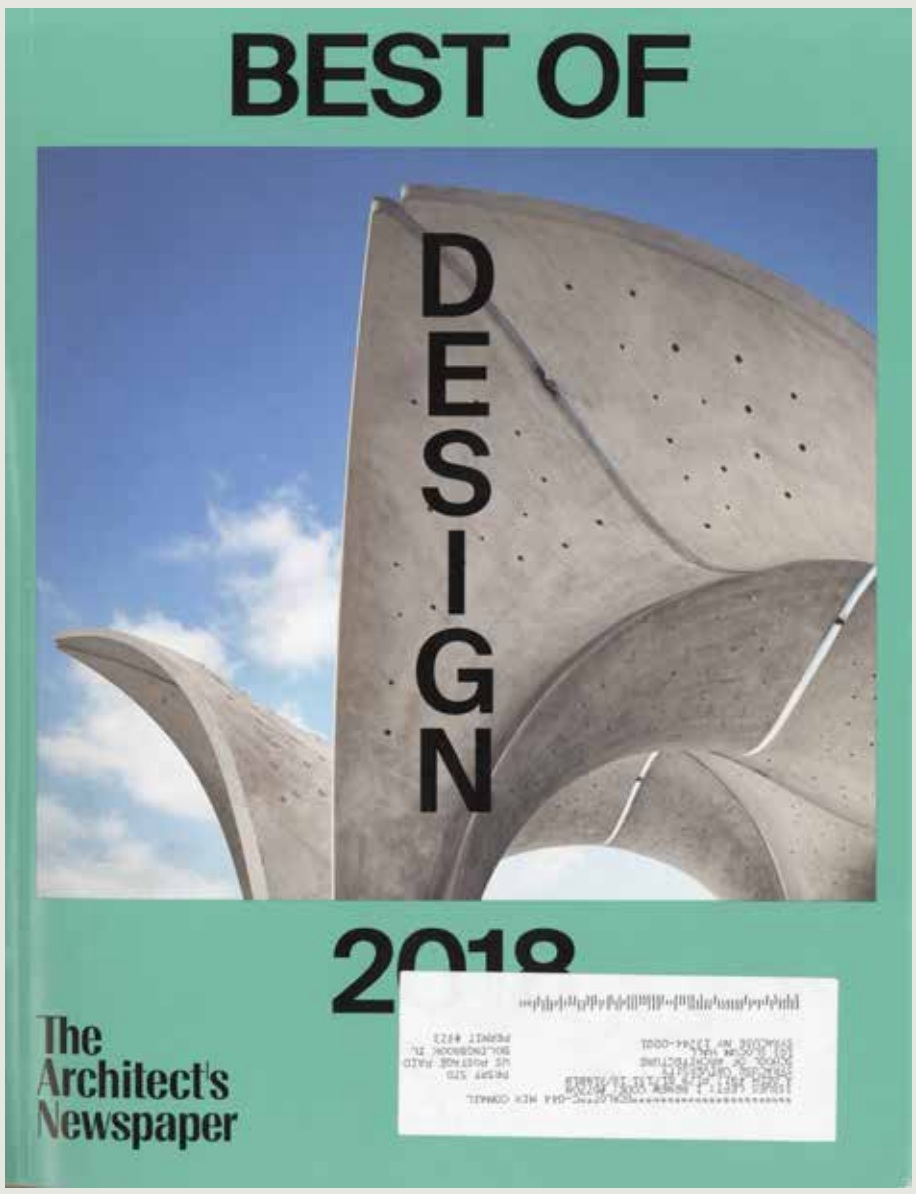
MOLLY HUNKER
Assistant Professor



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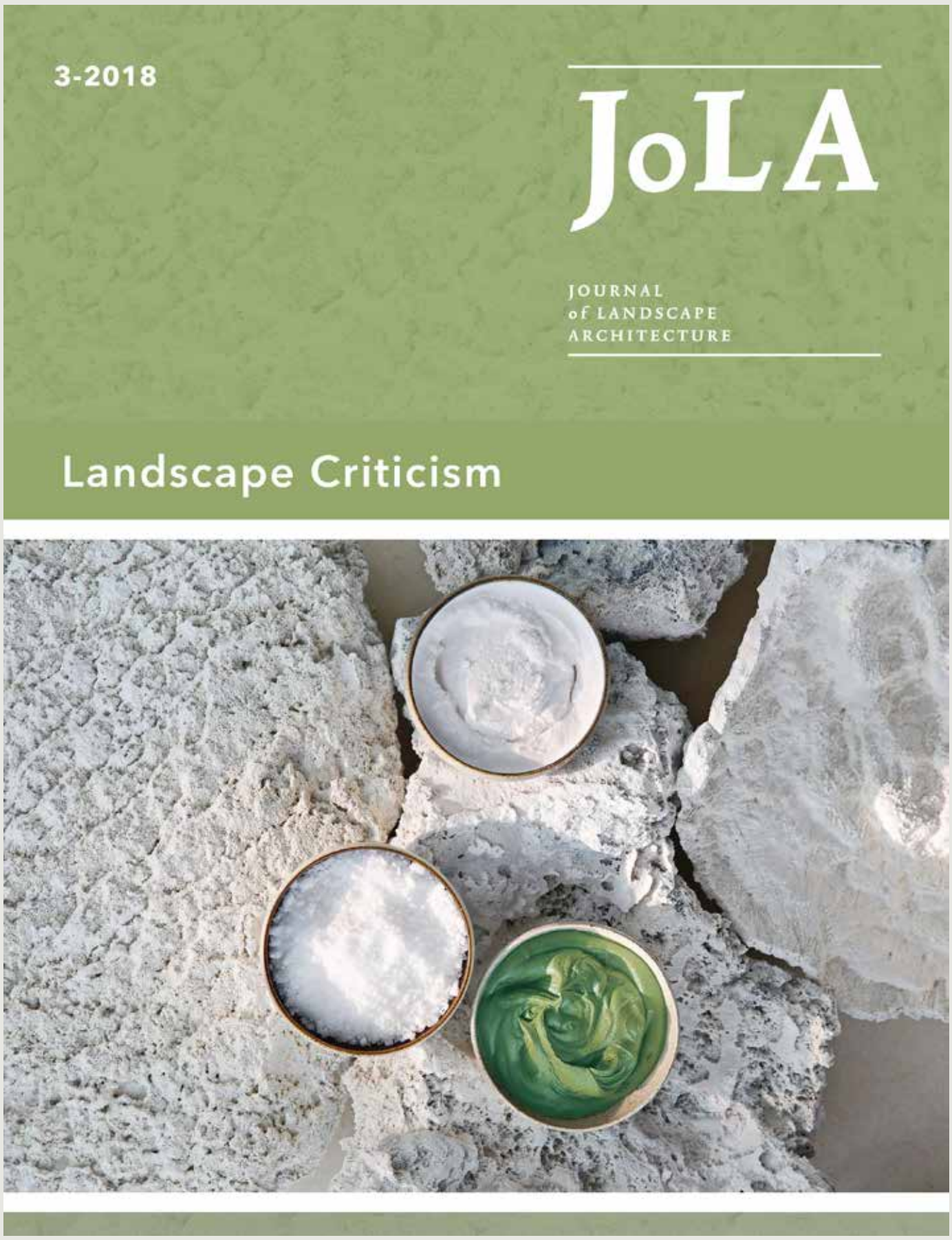
JULIA CZERNIAK
Associate Dean & Professor



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LAWRENCE DAVIS
Associate Professor & Undergraduate Chair

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MITESH DIXIT
Assistant Professor

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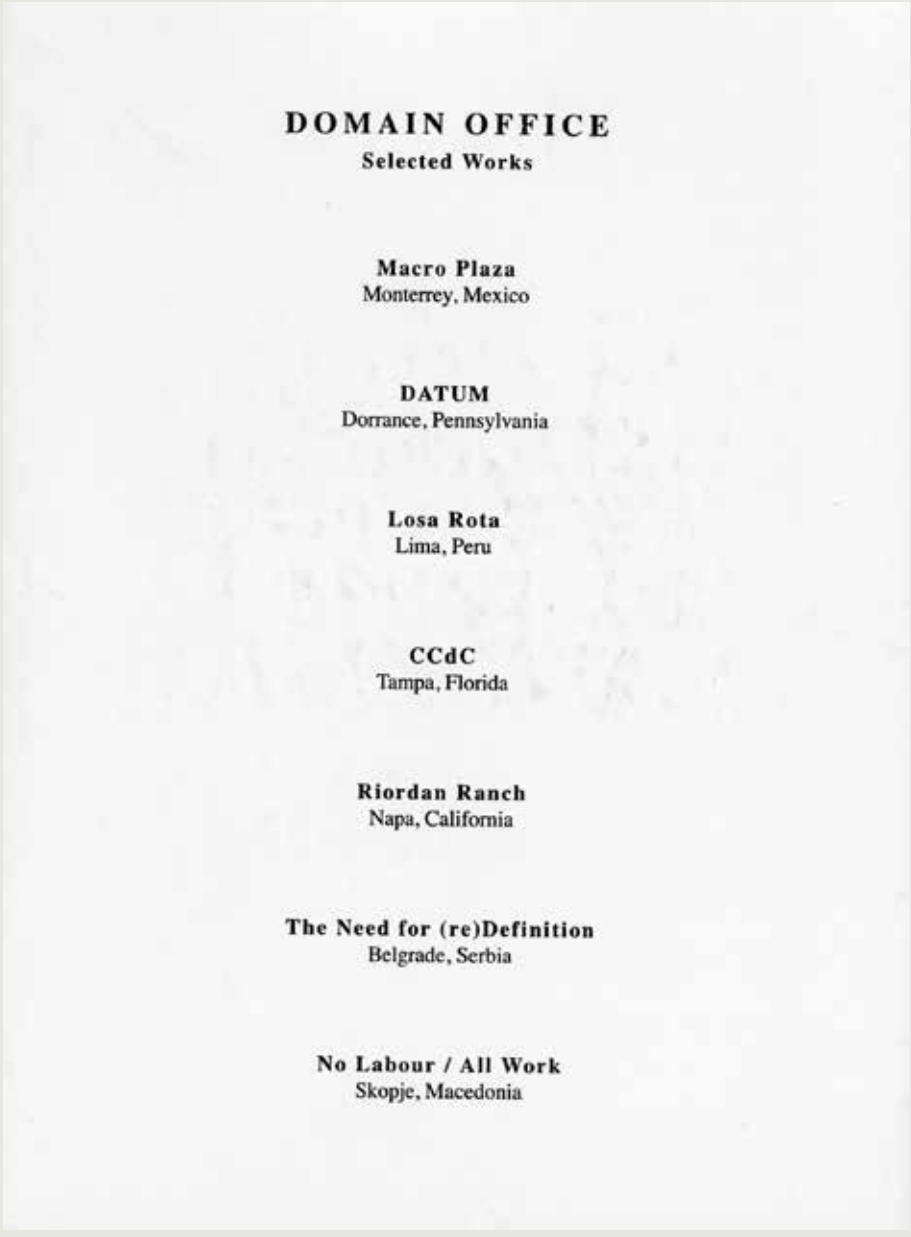
Nis: Galaksijanis, 2018.



DOMAIN OFFICE
Selected Works

Macro Plaza
Monterrey, Mexico

DATUM
Dorrance, Pennsylvania

Losa Rota
Lima, Peru

CCdC
Tampa, Florida

Riordan Ranch
Napa, California

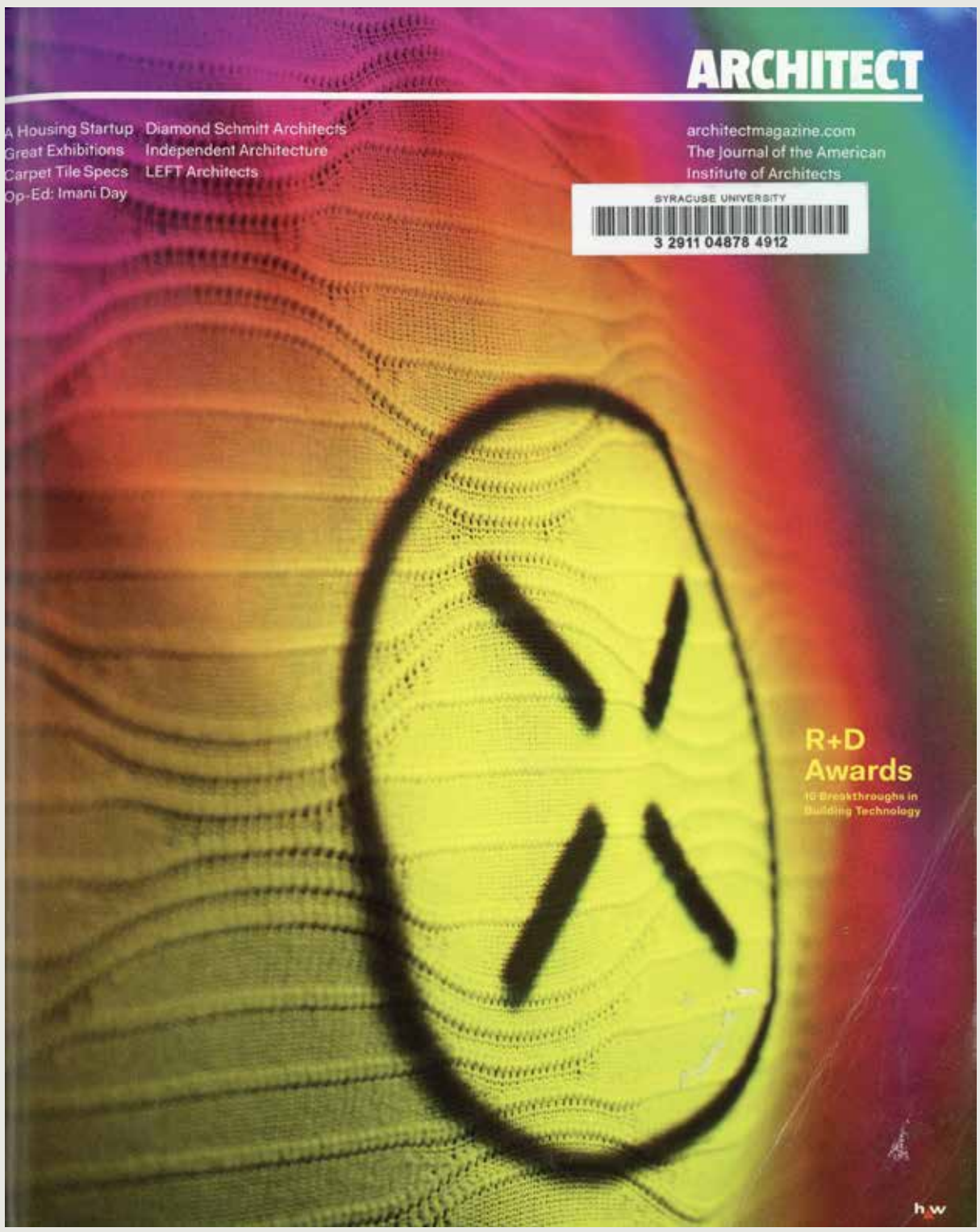
The Need for (re)Definition
Belgrade, Serbia

No Labour / All Work
Skopje, Macedonia

***Domain Office: Selected Works*, Nis: Galaksijanis, 2018.**

ROGER HUBELI
Assistant Professor

JULIE LARSEN
Assistant Professor



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***ARCHITECT Magazine* 107, no. 7 (July 2018): 112–113**

ELIZABETH (BESS) KRIETEMEYER
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SimAUD 2019

A method for integrating an UBEM with GIS for spatiotemporal visualization and analysis

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ABSTRACT

Leveraging Geographic Information Systems (GIS) for spatiotemporal visualization and analysis of simulated UBEM datasets and real-world data simultaneously can assist in identifying opportunities, as well as potential barriers, to energy efficient and climate adaptation strategies. However, current GIS-based models that support interactive exploration of adaptation strategies and future scenarios are scarce and do not easily incorporate building energy use data for visual analysis over time. This paper describes a workflow to integrate simulated building energy consumption data associated with variable energy efficiency scenarios within a GIS platform for interactive spatiotemporal visualization to support climate adaptation decision-making. The contribution of the work presented is in the ability to selectively view and analyze simulated building energy performance data layered with other real-world geospatial data through an automated feedback loop between an UBEM and ArcGIS. An interactive interface is designed in ArcGIS to enable users to explore building performance scenarios spatially and over time. Using a downtown neighborhood in Syracuse, New York, USA, as a case study, preliminary results demonstrate how the workflow provides insight into existing energy use issues and potential for implementing strategies such as energy load shifting or building retrofits. A discussion includes opportunities as well as challenges to the workflow in facilitating understanding of urban energy model outputs by multiple stakeholders in evaluating potential energy efficient strategies.

Author Keywords

UBEMs; GIS; Visualization.

1 INTRODUCTION

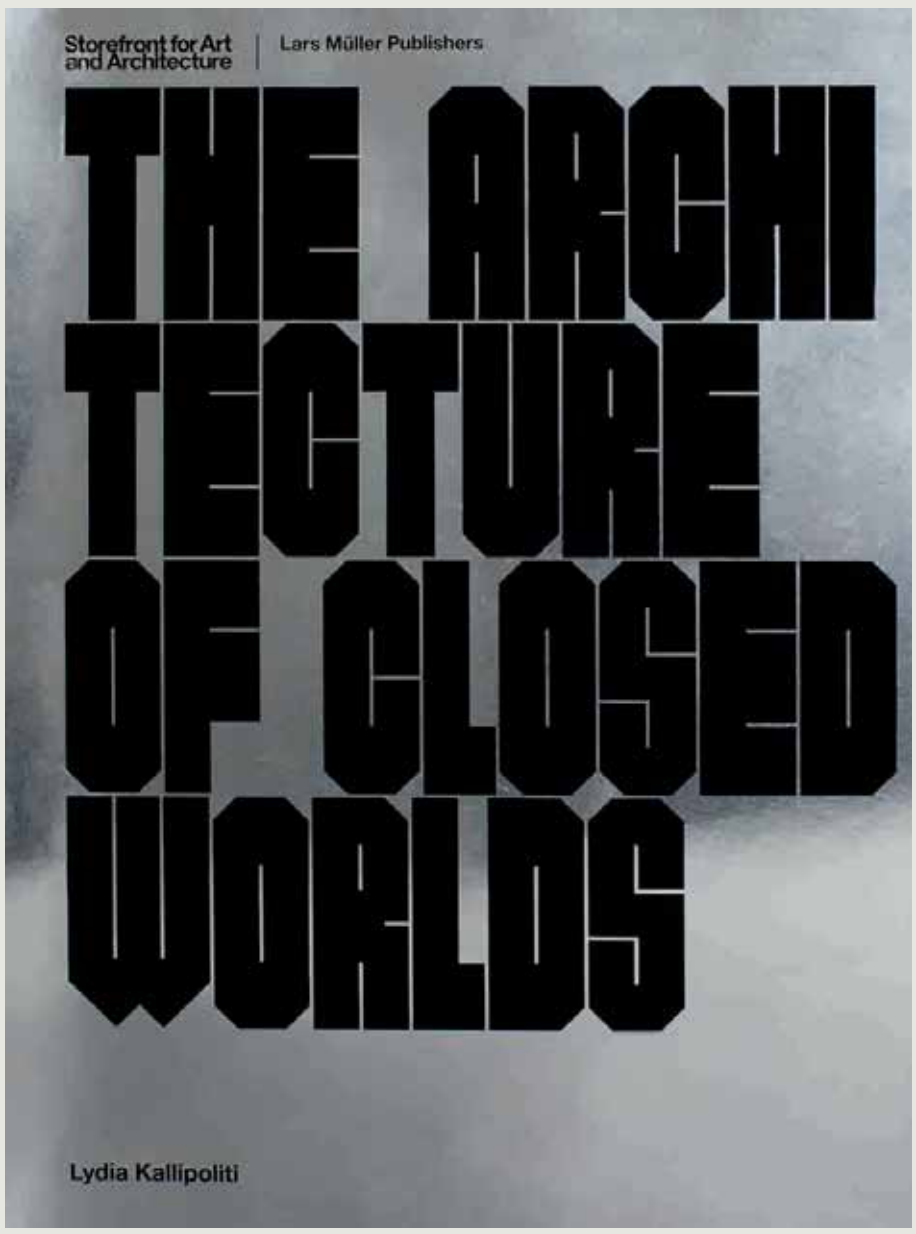
In the context of sustainable urban planning and resource management, the integration of energy modeling and real-world data into decision support tools is becoming increasingly important for stakeholder involvement in determining climate adaptation measures. Developing neighborhood-scale energy efficiency strategies for building stocks is a key component to meeting GHG emission reduction targets, since a majority of near-term implementation of sustainable measures often occur at the municipal level [19]. Common practices for energy efficiency strategies include building retrofits such as glazing replacement or enhanced insulation, advanced conversion and storage technologies integrated with smart grid systems, energy load-shifting, and distributed generation schemes [9]. Whereas an understanding of building performance is a key factor to address the implementation of strategies such as building retrofits, conversion technologies, and energy use load-shifting, the spatiotemporal characterization of building demands in the context of other information, such as demographic data and renewable resources, is especially necessary to assess the effectiveness and economic viability of adaptation measures. The characterization of renewable resources is important for sizing and operation of technologies such as heat pumps, combined heat and power, and thermal storage, whose efficiencies are time- and temperature-dependent [8].

1.1 UBEMs in Sustainable Planning

Visualizing and forecasting impacts of various building adaptation measures can assist city governments and community stakeholders in creating a net-positive environmental impact while enhancing their resilience to climate change. Urban building energy models (UBEMs) are being developed to support forecasting of climate adaptation strategies at the building level by estimating neighborhood-scale hourly energy demand loads. The goal for such models is to explore future scenarios for various design strategies, and to prioritize the most effective solutions. UBEMs can be used by urban planners to evaluate and quantify the efficiency of urban design policies by comparing different proposed strategies and understanding implications at a community level. Furthermore, they can be used to inform individual citizens about estimated energy consumption behaviors in order to reduce electricity bills and to contribute to energy efficient targets on the community scale. UBEMs thus provide a pathway between municipality or city goals, and the specific proposed strategies or design interventions

SimAUD 2019 April 07-09 Atlanta, Georgia

"A method for integrating an UBEM with GIS for Spatiotemporal visualization and analysis", *Society for Modeling & Simulation International*, SIMAUD 2019 April 07–09 Atlanta, Georgia.



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MARK LINDER
Professor

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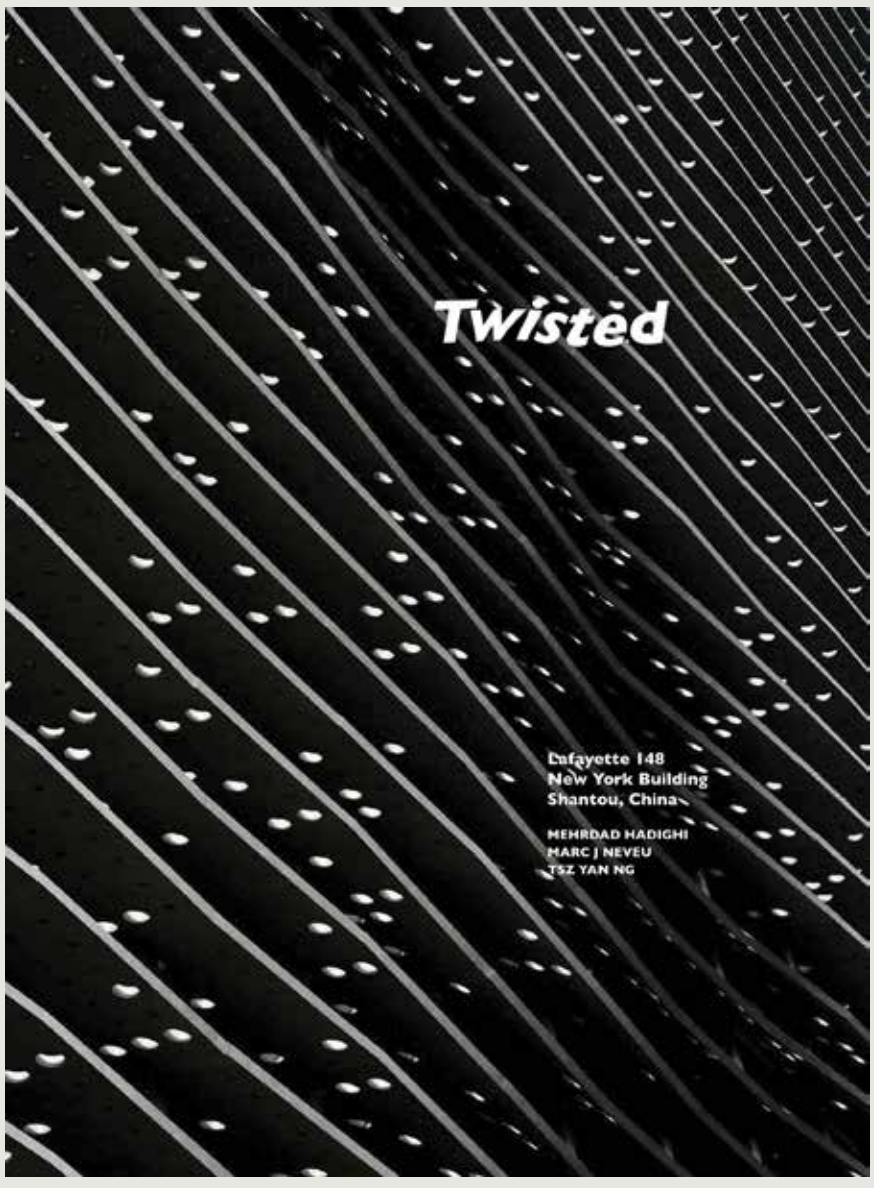

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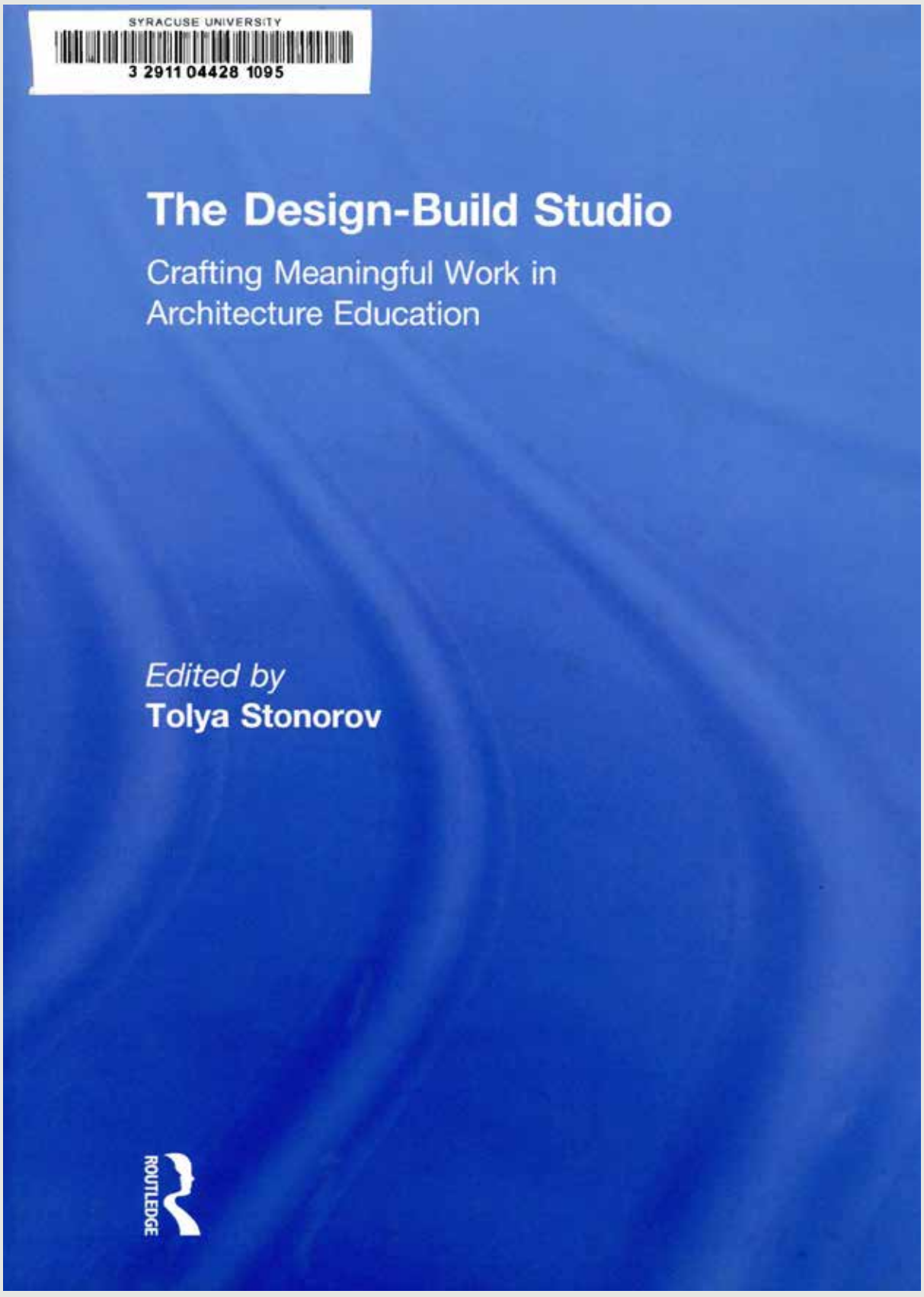
SINÉAD MAC NAMARA
Associate Professor



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DAEKWON PARK
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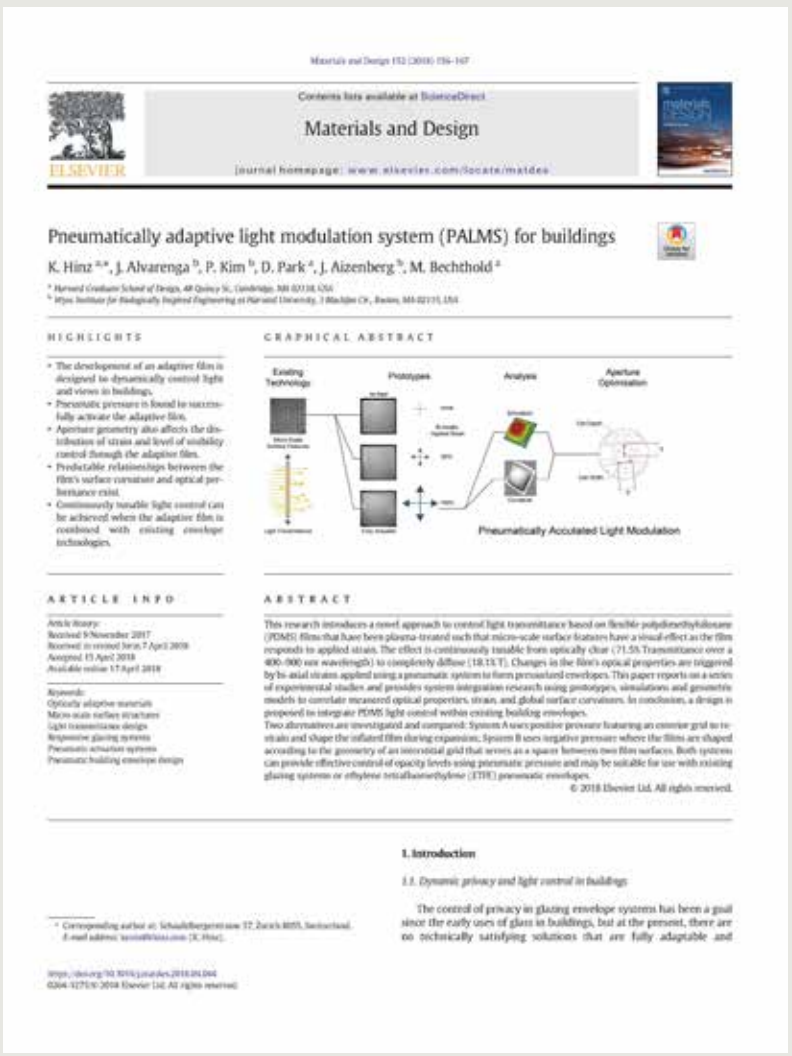

Materials and Design 152 (2018) 156–167

Contents lists available at ScienceDirect

Materials and Design

journal homepage: www.elsevier.com/locate/matdes

Pneumatically adaptive light modulation system (PALMS) for buildings

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HIGHLIGHTS

- The development of an adaptive film is designed to dynamically control light and views in buildings.
- Pneumatic pressure is found to successfully activate the adaptive film.
- Aperture geometry also affects the distribution of strain and level of visibility control through the adaptive film.
- Predictable relationships between the film's surface curvature and optical performance exist.
- Continuously tunable light control can be achieved when the adaptive film is combined with existing envelope technologies.

GRAPHICAL ABSTRACT

ARTICLE INFO

Article history:
Received 9 November 2017
Received in revised form 7 April 2018
Accepted 15 April 2018
Available online 17 April 2018

Keywords:
Optically adaptive materials
Micro-scale surface structures
Light transmittance design
Responsive glazing systems
Pneumatic actuation systems
Pneumatic building envelope design

ABSTRACT

This research introduces a novel approach to control light transmittance based on flexible polydimethylsiloxane (PDMS) films that have been plasma-treated such that micro-scale surface features have a visual effect as the film responds to applied strain. The effect is continuously tunable from optically clear (71.5% Transmittance over a 400–900 nm wavelength) to completely diffuse (18.1% T). Changes in the film's optical properties are triggered by bi-axial strains applied using a pneumatic system to form pressurized envelopes. This paper reports on a series of experimental studies and provides system integration research using prototypes, simulations and geometric models to correlate measured optical properties, strain, and global surface curvatures. In conclusion, a design is proposed to integrate PDMS light control within existing building envelopes.
Two alternatives are investigated and compared: System A uses positive pressure featuring an concave grid to restrain and shape the inflated film during expansion; System B uses negative pressure where the films are shaped according to the geometry of an interstitial grid that serves as a spacer between two film surfaces. Both systems can provide effective control of opacity levels using pneumatic pressure and may be suitable for use with existing glazing systems or ethylene tetrafluoroethylene (ETFE) pneumatic envelopes.

1. Introduction

1.1. Dynamic privacy and light control in buildings

The control of privacy in glazing envelope systems has been a goal since the early uses of glass in buildings, but at the present, there are no technically satisfying solutions that are fully adaptable and

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https://doi.org/10.1016/j.matdes.2018.04.044
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K. Hinz, J. Alvarenga, P. Kim, J. Aizenberg, M. Bechthold (co- authors), "Pneumatically adaptive light modulation system (PALMS) for buildings", *Materials and Design* 152, (2018): 156–167

TOPO-JOINT

Topology Optimization Framework for 3D-Printed Building Joints

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Abstract. Joints and connectors are often the most complex element in building assemblies and systems. To ensure the performance of the assemblies and systems, it is critical to optimize the geometry and configurations of the joints based on key functional requirements (e.g., stiffness and thermal exchange). The proposed research focuses on developing a multi-objective topology optimization framework that can be utilized to design highly customized joints and connections for building applications. The optimized joints that often resemble tree structures or bones are fabricated using additive manufacturing techniques. This framework is built upon the integration of high-fidelity topology optimization algorithms, additive manufacturing, computer simulations and parametric design. Case studies and numerical applications are presented to demonstrate the validity and effectiveness of the proposed optimization and additive manufacturing framework. Optimal joint designs from a variety of architectural and structural design considerations, such as stiffness, thermal exchange, and vibration are discussed to provide an insightful interpretation of these interrelationships and their impact on joint performance.

Keywords. Topology optimization; parametric design; 3d printing.

1. Introduction

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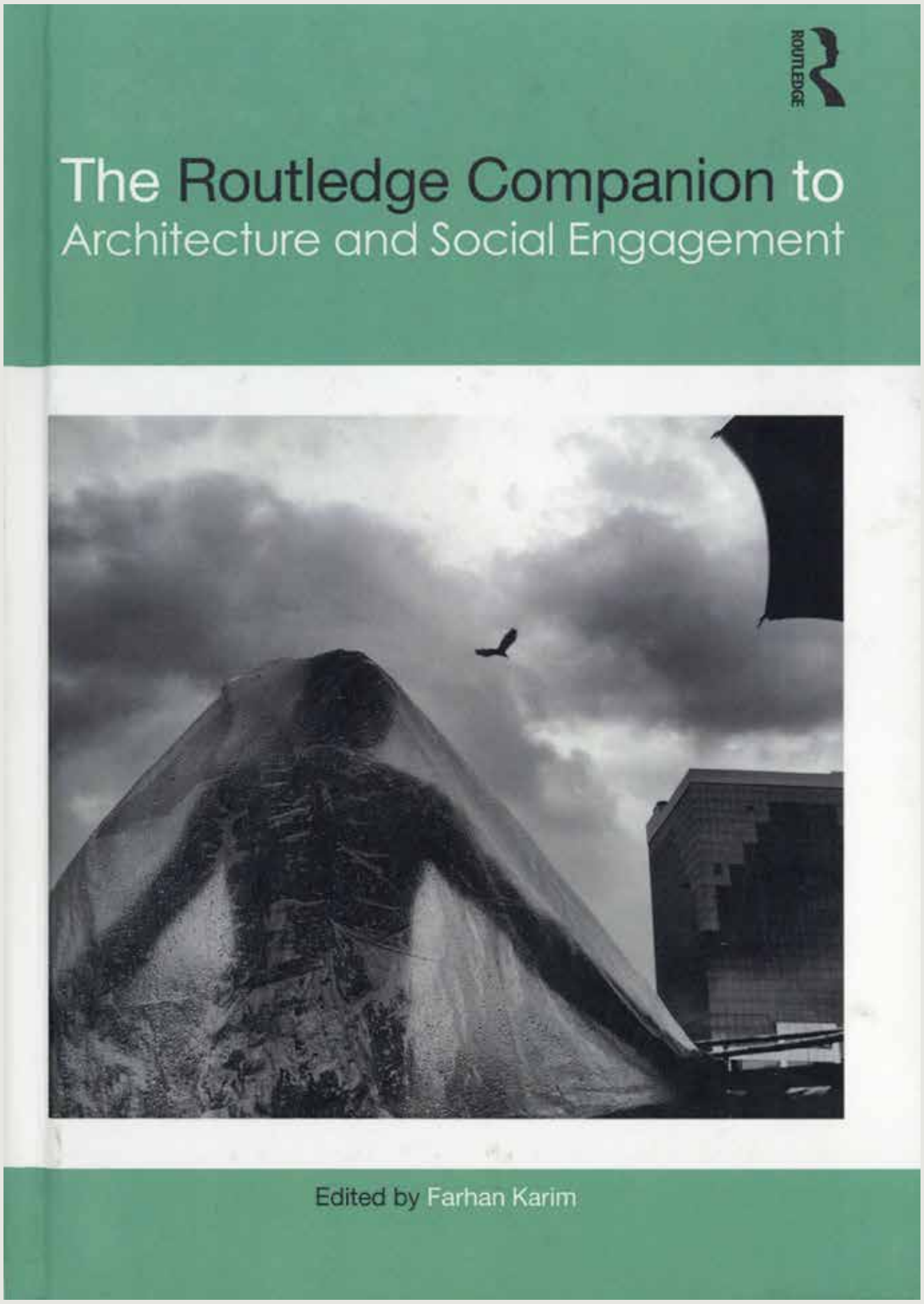
Some of the critical factors include load conditions, the material property of the structural components, and connection types. Metals have been the most desirable

T. Fukuda, W. Huang, P. Janssen, K. Crolla, S. Alhadidi (eds.), *Learning, Adapting and Prototyping. Proceedings of the 23rd International Conference of the Association for Computer-Aided Architectural Design Research in Asia (CAADRIA) 2018*, Volume 1, 205-214. © 2018 and published by the Association for Computer-Aided Architectural Design Research in Asia (CAADRIA) in Hong Kong.

Lee, Juhun and Chun, Junho (co-authors), "TOPO-JOINT – Topology Optimization Framework for 3D-Printed Building Joints", *Learning Adapting and Prototyping- Proceedings of the 23rd CAADRIA Conference – Volume 1* (May 2018): 205–214

YUTAKA SHO
Associate Professor



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FEI WANG
Assistant Teaching Professor

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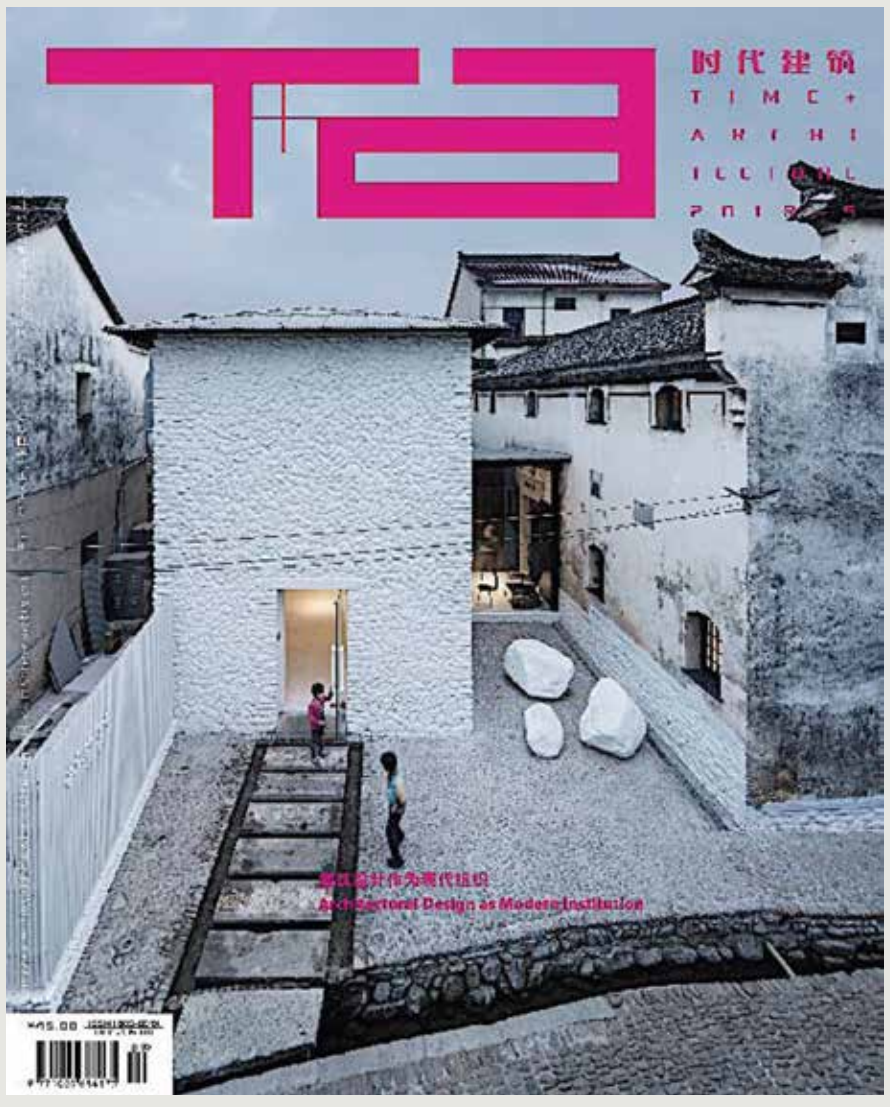

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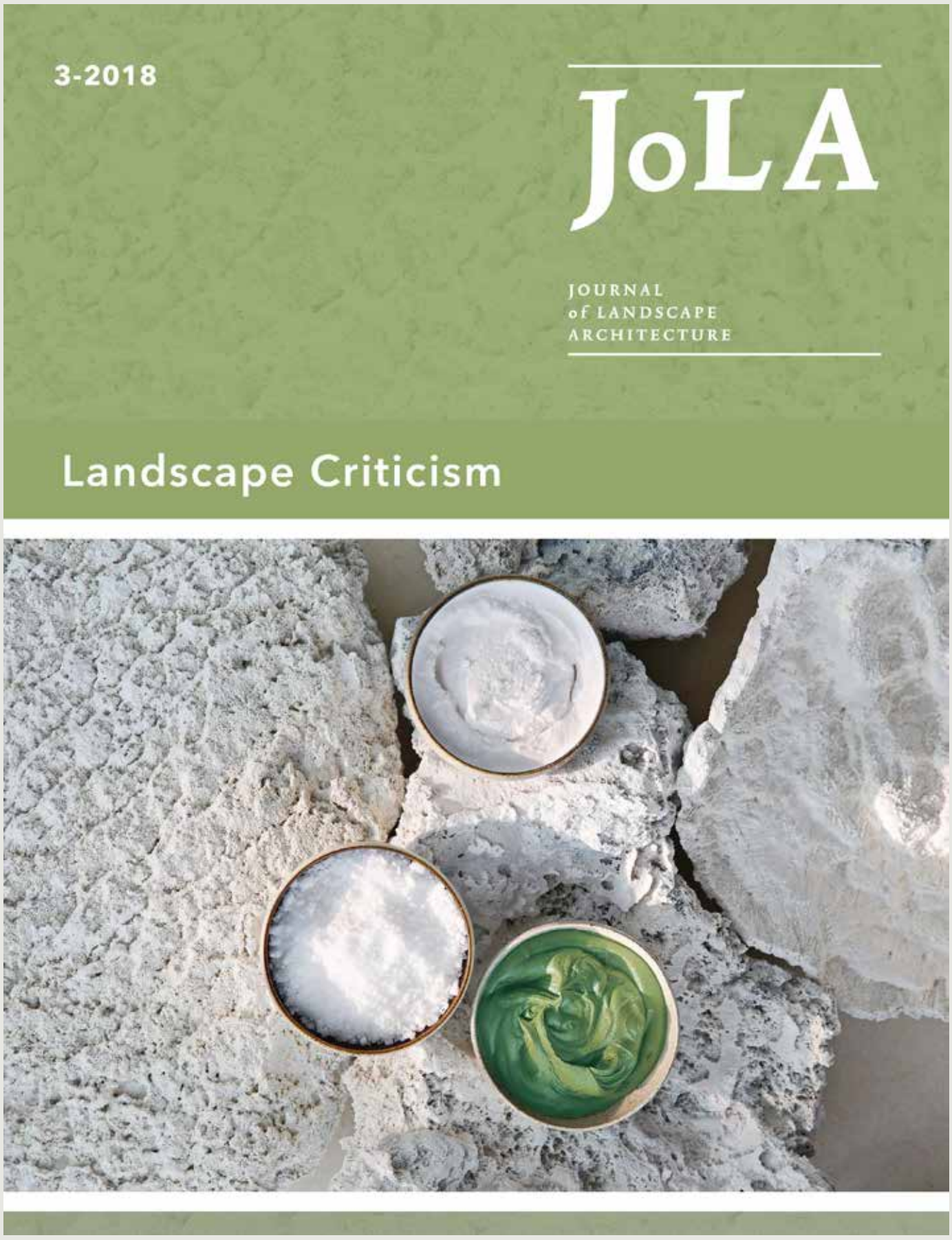
TED BROWN
Professor



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JONATHAN LOUIE
Assistant Teaching Professor

NICOLE McINTOSH
Assistant Teaching Professor


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This Glowing Grilled-Cheese Restaurant Offers the Formerly Incarcerated a Fresh Start

The Minneapolis restaurant All Square, a pro bono project by Syracuse, New York–based Architecture Office, operates under the mantra "Don't Judge, Just Eat."

metropolismag.com/interiors/all-square-minneapolis-restaurant-architecture-office

LABIOMISTA, a "Reverse Zoo" Anchored by a Mario Botta–Designed Building, Set to Open This Year

Conceived and led by Belgian artist Koen Vanmechelen, the combination zoo, art studio, and gallery is spread throughout a 80-acre compound.

metropolismag.com/architecture/labiomista-zoo-mario-botta-architecture

Ethiopia's First Contemporary Art Museum Aims to Revive a Local Architectural Tradition

The Zorta Museum, which features wattle-and-daub construction, is a collaboration between curator Meskerem Assegued and artist Elias Sime.

metropolismag.com/architecture/addis-ababa-zorta-museum-design/

Video

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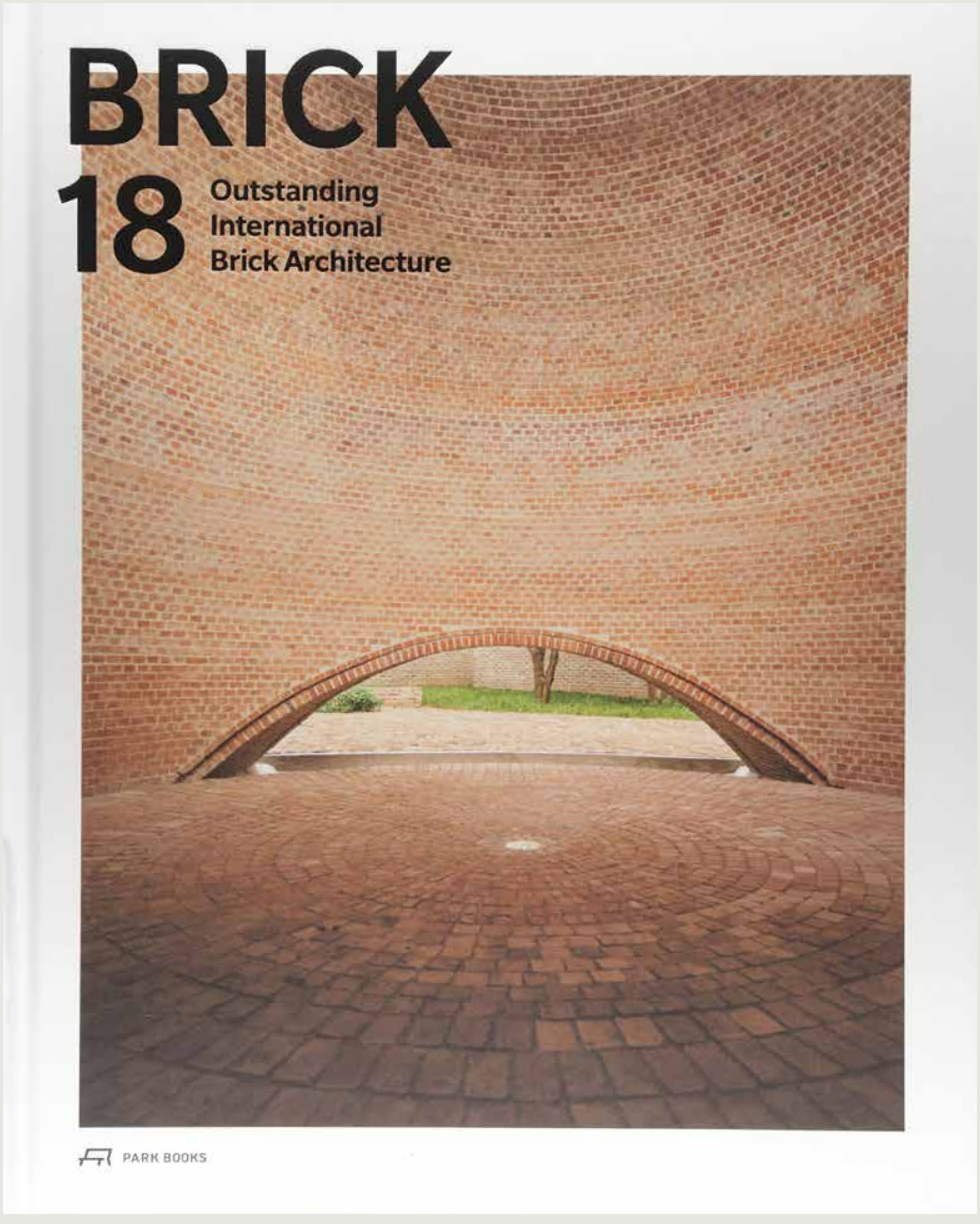
MARCOS PARGA
Assistant Professor



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JOSEPH GODLEWSKI
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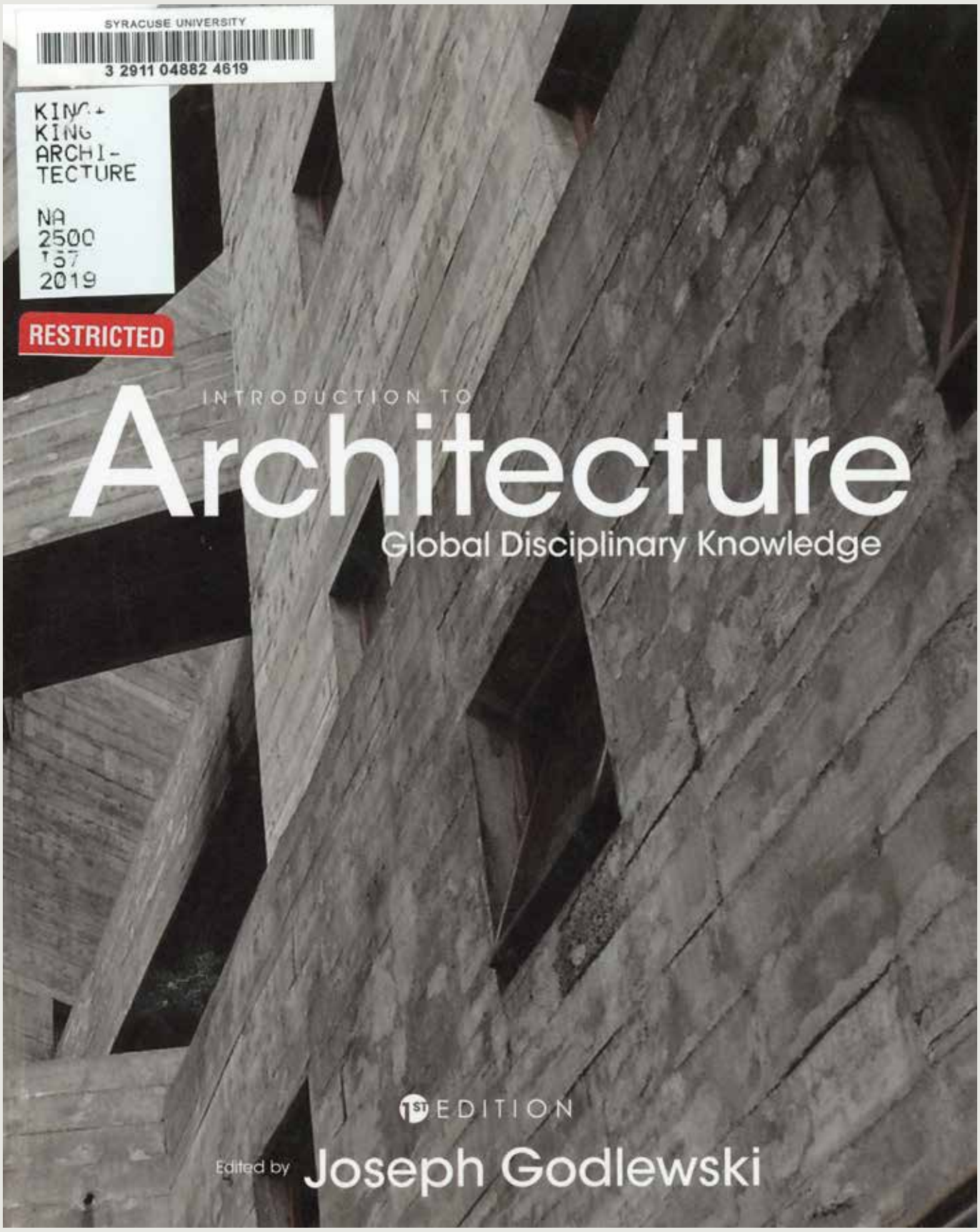

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KYLE MILLER
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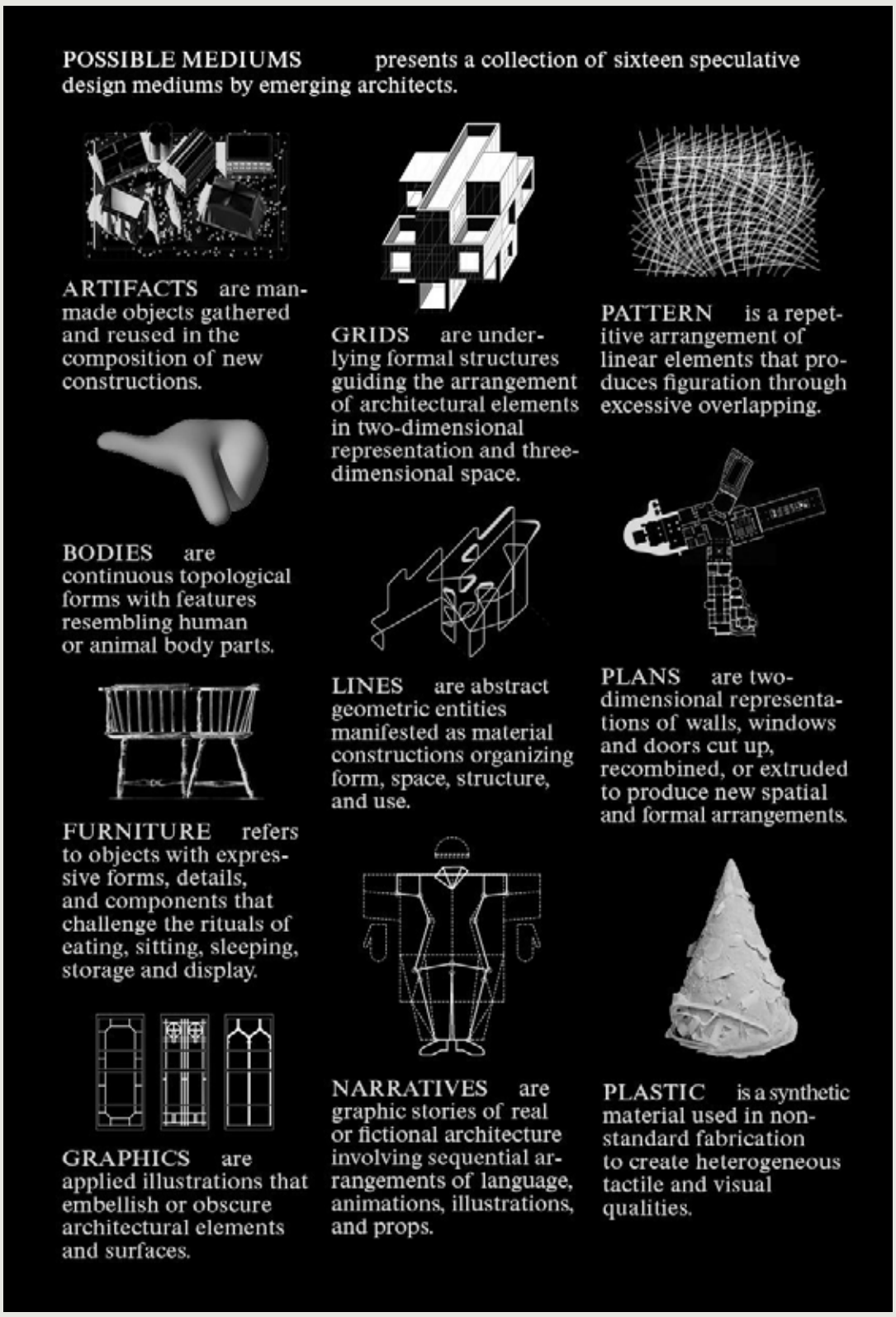

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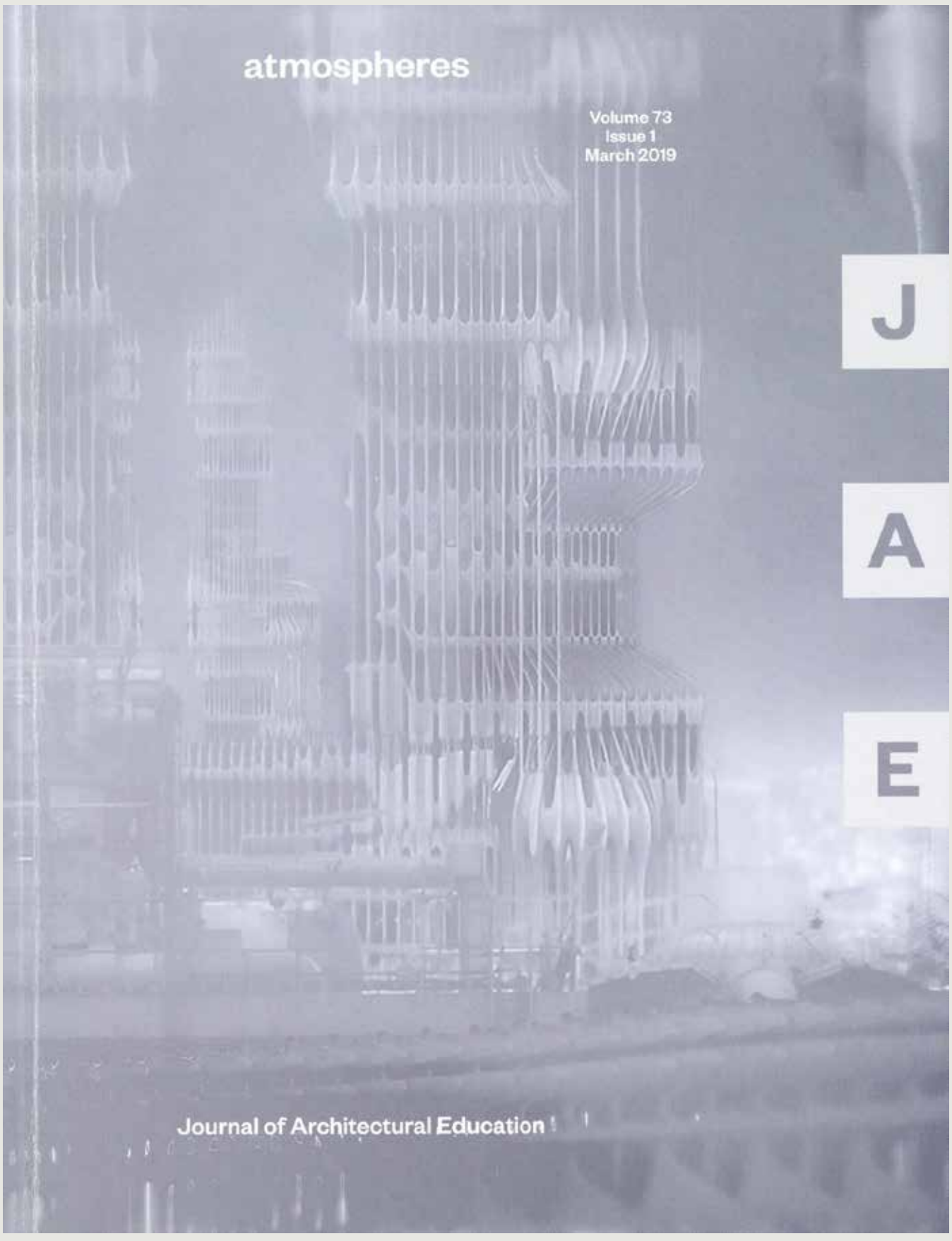
DAVID SHANKS
Assistant Professor



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