

# HONORABLE MENTION

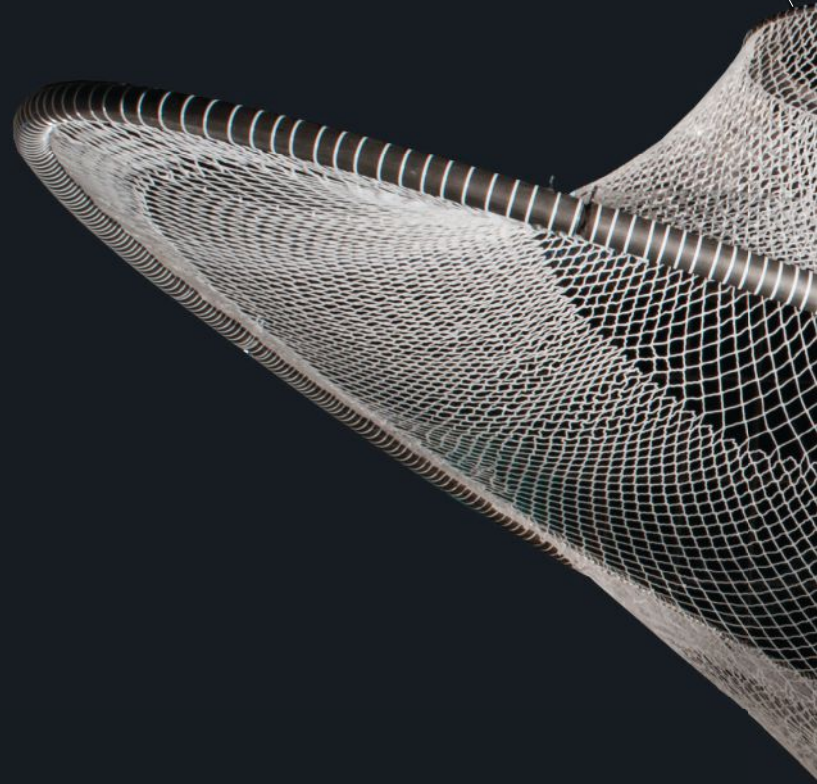
## Infundibuliforms: Kinetic Tensile Surface Environments

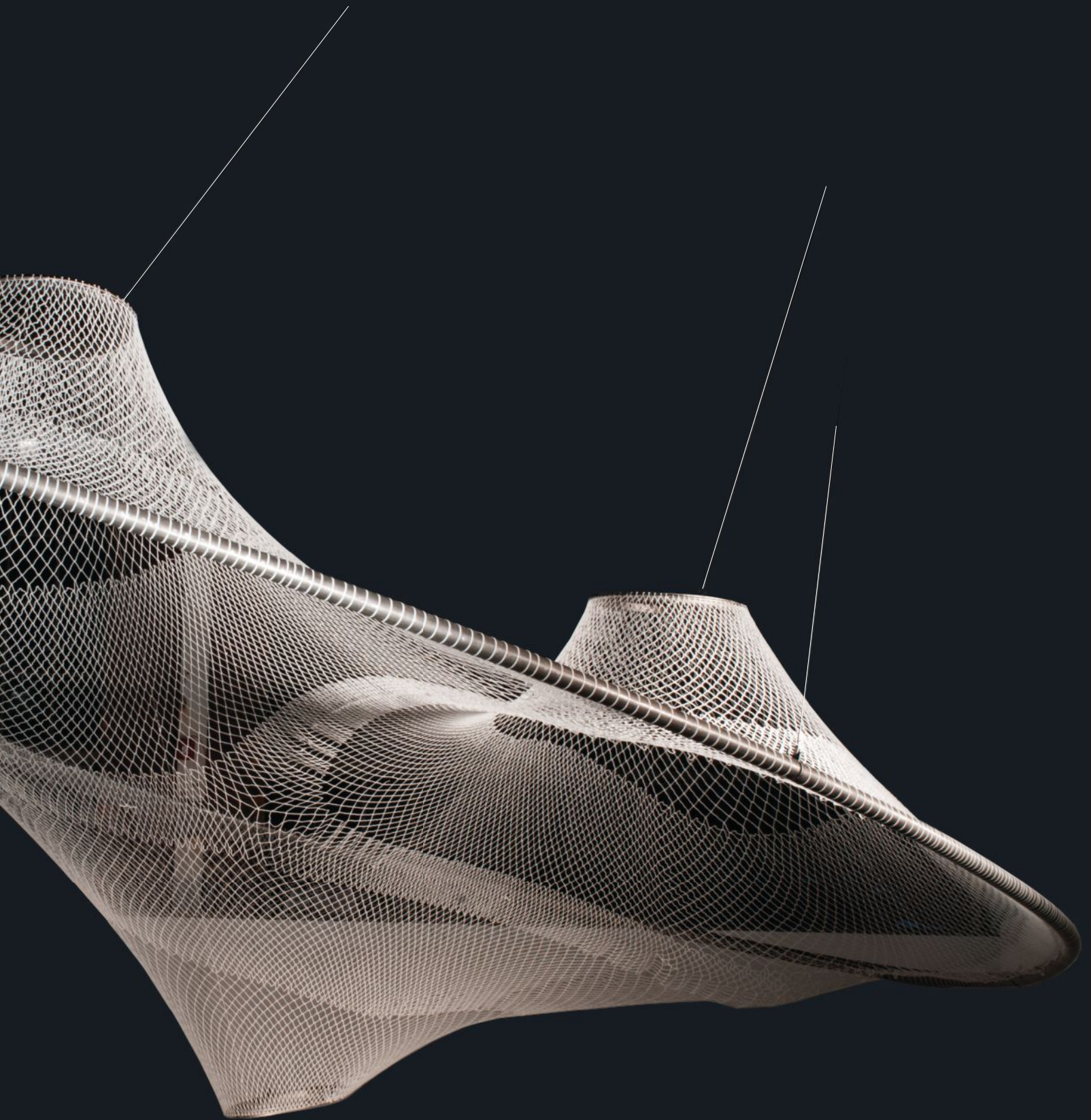
A metal ring woven with mesh, like a giant embroidery hoop, suspends from the ceiling. Suddenly, the netting moves and breaks the plane of the ring in opposing directions, creating three convex or concave funnels. Within seconds, the infundibuliform (meaning funnel- or cone-like) shapes shift again, collapsing into themselves, transitioning from mountain peaks to vortices and back again.

This exploration of kinetic architecture is the culmination of years of research and development in digital modeling, fabrication, and robotics by Kathy Velikov, AIA, and Geoffrey Thün, directors of Ann Arbor, Mich.-based RVTR, in collaboration with fellow University of Michigan faculty member Wes McGee, a principal and co-founder of Boston-based Matter Design. Computational design tools have made kinetic architecture increasingly attainable in theory, but translating digital simulations into physical objects has remained a stumbling point. Using Rhino, Grasshopper, and Kangaroo, the team created a design program that simulates what shapes and movements are possible given the constraints of physics and space, and tested applied forces on an extruded-elastomeric mesh. “It allows designers a one-to-one and immediate way to visualize something that’s very complex,” Velikov says.

Data gathered by the simulations guided the unique geometry of a mesh pattern that would enable the form to lie flat, stretch up, or distend down. Using a custom-built extruder, the team 3D printed flat panels of the tensile net surface with the thermoplastic elastomer. The physical net mimics the behavior simulated in the digital model spot-on.

Kinetic forms can be used to tune rooms acoustically or to alter the geometry of an enclosure for different lighting conditions. The team’s digital modeling and physical fabrication process is an “ingenious new technique,” juror Elizabeth Whittaker says. “The formal possibilities seem endless.” —N.B.





## Jury

**Mic Patterson** is founding principal of Los Angeles–based Design Tectonics, a consultancy that focuses on innovative façade technology applications and research. He was formerly the vice president of strategic development at Enclos. Patterson is a Ph.D. candidate in the University of Southern California School of Architecture with a focus on sustainable façade renovation practices.

**Douglas Stockman**, AIA, is a founding principal at El Dorado in Kansas City, Mo. He also serves on the Kansas State University College of Architecture, Planning, and Design Dean's Advisory Council, and is chair of the Downtown Council of Kansas City. Stockman received a B.Arch. from Kansas State University.

**Elizabeth Whittaker**, AIA, is founder and principal of Merge Architects in Boston. In 2015, she was a recipient of the AIA Young Architects Award and the Emerging Voices award from the Architectural League of New York. Whittaker received an M.Arch. from the Harvard Graduate School of Design, where she is an assistant professor in the practice of architecture.

## Credits

### **Cricket Shelter: Modular Edible**

#### **Insect Farm, page 112**

*Client:* Randy Jayne Rosenberg  
*Design Firm:* Terreform ONE, Brooklyn, N.Y. · Mitchell Joachim, ASSOC. AIA, (co-founder and primary investigator); Jiachen Xu, Lissette Olivares, Cheto Castellano, Ivan Fuentealba, Sung Moon, Kamila Varela, Yucel Guven, Chloe Byrne, Miguel Lantigua-Inoa, AIA, Alex Colard, Melanie Fessel, Maria Aiolova, ASSOC. AIA, Vivian Kuan (project management); Felipe Molina, Matthew Tarpley (research assistants)  
*Consultant:* Seek Food · Robyn Shapiro  
*Fabricators:* Shandor Hassan, Christian Hamrick  
*Funding:* Art Works for Change; Terreform ONE  
*Photography:* Mitchell Joachim, Matthew Tarpley  
*Special Thanks:* David Stewart, Christian Hubert, Heather Lord, Scott Pobiner, New Lab, Brooklyn Navy Yard, GMD Shipyard, New York University Gallatin School of Individualized Study

### **BayArc: A Tidal Responsive Barrier, page 116**

*Design Firm:* Skidmore, Owings & Merrill, San Francisco · Craig Hartman, FAIA (concept and interdisciplinary leader); Mark Schwettmann, AIA, Alex Cruz, Ross Findly, David Kwon (project team)  
*Project Adviser:* Moffatt & Nichol  
*Drawings:* Skidmore, Owings & Merrill  
*Structural Engineer:* Mark Sarkisian, Eric Long, David Shook, Geoffrey Brunn  
*Marine Engineering Concept:* Moffatt & Nichol · Dilip Trivedi, Richard Dornhelm

### **The Tower at PNC Plaza, page 118**

*Client:* PNC Financial Services Group  
*Design Firm:* Gensler, San Francisco · Doug Gensler, AIA (principal-in-charge); Hao Ko, AIA (principal and architectural design director); Benedict Tranel, AIA (principal and technical director); Lisa Adkins, AIA (project manager); Anastasia Huggins, AIA, David Hall, Gunwook Nam, Alison Wilkinson, AIA, Daniel Nauman, AIA, Jorge Barrero, AIA, Ethel Macleod, Eugene Lee, Joe Chisholm,

Brent Van Gunten, AIA, Len Sciarra, Philip Kaefer, AIA, Joel McCullough, AIA, Rich Peake, Mariana Vaida, Jessica Yin, Yooju No (project team)  
*Rendering:* Space Matrix; Tangram 3DS  
*Construction Manager:* PJ Dick  
*Lighting Designer:* Fisher Marantz Stone  
*Structural and M/E/P Engineer:* BuroHappold  
*Sustainability Consultant:* Paladino & Co.  
*Photography:* Connie Zhou Photography

### **LELU Exit Sign, page 122**

*Client:* Architectural Safety Components  
*Design Firm:* Interloop—Architecture, Houston · Mark Wamble, Dawn Finley, AIA (design principals); Eric Hughes, Peter Muessig, Jack Mussett (project team)  
*Project Adviser:* Architectural Safety Components · Sam Youdal  
*Consultant:* Martin Co. · John Martin  
*Fabricators:* Moore Fabrication · Kerry Krumbek; Professionalized Products and Services · Jerry Huang; Southwest Electronic Energy Group · Alex Marin; Anodizing Graphics of Houston · Linda Sayers  
*Special Thanks:* Underwriters Laboratories · Abdul Ahad (investigating engineer)

### **Tally, page 124**

*Design Firm:* KieranTimberlake, Philadelphia · Roderick Bates, Stephanie Carlisle, Billie Faircloth, AIA, Elizabeth Friedlander, AIA, Ryan Welch (project team)  
*Development Partners:* Autodesk; Thinkstep (previously PE International)  
*Project Team:* Autodesk · Jonathan Rowe; Thinkstep · Heather Gaddoniex, Nick Santero, Maggie Wildnauer  
*Special Thanks:* Emma Stewart, Jacky Liang

### **Pulled Plaster Panels, page 128**

*Design Firm:* Young Projects, New York · Bryan Young, AIA (principal); Jon Cielo, AIA (project architect); Noah Marciniak, Samantha Eby, Nayoung Kim (project team)  
*Lighting Designer:* Architectural Lighting · Rick Shaver  
*Structural Engineer:* Silman · Nat Oppenheimer

*Electrical Engineer:* Engineering Solutions · John Ryan  
*Consultants:* Butter and Eggs · Judy Dunne (interiors); Taocon (general contractor); Engineering Solutions · John Ryan (M/E/P engineering)  
*Drawings:* Young Projects  
*Fabricators:* Kammetal (stainless steel screen); Balmer Architectural Mouldings  
*Photography:* Young Projects and Jon Cielo

### **Chicago Horizon, page 130**

*Client:* Chicago Architecture Biennial, Chicago Park District  
*Design Firm:* Ultramoderne, Providence, R.I. · Yasmin Vobis, Aaron Forrest, AIA, Emily Yen, ASSOC. AIA, Tida Osotsapa, Will Gant, Hua Gao, Ronak Hingarh (project team)  
*Design Structural Engineer:* Guy Nordenson and Associates · Brett Schneider  
*Structural Engineer of Record:* Thornton Tomasetti  
*Architect of Record:* Animate Architecture · Joe Lambke  
*Fabricator:* Nordic Structures  
*Funding:* BP; Chicago Park District; Chicago Architecture Biennial; Rhode Island School of Design; ReThink Wood; Nordic Structures  
*Photography:* Naho Kubota  
*Special Thanks:* Laura Briggs

### **Spray-On House, page 132**

*Design Firm:* Patrick Tighe Architecture, Los Angeles · Patrick Tighe, FAIA, Zachary Teixeira, Evelina Sausina, ASSOC. AIA, Risa Tsutsumi, Bran Arifin (project team)  
*Structural Engineer:* Nous Engineering · Matt Melnyk  
*Consultant:* Demilec  
*Fabricator:* Machineous  
*Life-Cycle Assessment:* Department of Civil and Environmental Engineering, School of Engineering, Stanford University  
*Prototype:* Built at Southern California Institute of Architecture (SCI-Arc), as part of the SCI-Arc Gallery Series  
*Drawings, Renderings, and Photography:* Courtesy Patrick Tighe Architecture  
*Special Thanks:* SCI-Arc team

**Vegas Altas Congress Center and Auditorium, page 134**

*Client:* Junta de Extremadura  
*Design Firm:* Pancorbo + de Villar + Chacón + Martín Robles, Madrid · Luis Pancorbo, José de Villar, Carlos Chacón, Inés Martín Robles (project team)  
*Drawings and Lighting Designer:* Luis Pancorbo, José de Villar, Carlos Chacón, Inés Martín Robles  
*Structural Engineer:* Mecanismo · Juan Rey, Pablo Vegas, Jacinto Ruiz Carmona  
*Electrical and Facilities Engineering:* Úrculo Ingenieros · Rafael Úrculo, Sergio Rodríguez  
*Acoustics:* Arau Acústica · Higiní Arau  
*Models:* Gilberto Ruiz  
*Construction:* Placonsa · Eloy Montero; Julio Oreja (site manager)  
*Ropes Installation:* Cotesi; Lastra & Zorrilla  
*Funding:* Junta de Extremadura  
*Cost:* €10,505,187 (\$11.7 million, approx.)  
*Photography:* Jesús Granada (building); Ignacio Bisbal Grandal (model)

**Nanobiome Building Skin, page 136**

*Design Firm:* Michael K Chen Architecture (MKCA), New York · Michael Chen, Justin Snider, AIA, Alan Tansey, Natasha Harper, Elena Hasbun, Braden Caldwell, AIA, Julian Anderson, AIA (project team)  
*Drawings:* MKCA  
*Landscape Architect:* Local Office Landscape Architecture · Walter Meyer, Jennifer Bolstad, AIA, Jenny Hindelang  
*Conservation Consultant:* State University of New York College of Environmental Science and Forestry, Department of Environmental and Forest Biology · Danilo Fernando (associate professor and graduate program director)  
*Façade and Structural Engineer:* Buro Happold  
*General Contractor:* IA Construction Management  
*Manufacturer:* Boston Valley Terra Cotta  
*Photography:* MKCA

**Infundibuliforms: Kinetic Tensile Surface Environments, page 138**

*Design Firms:* Matter Design, Boston · RVTR, Ann Arbor, Mich., and Toronto · University of Michigan  
*Primary Investigators:* Wes McGee, Geoffrey Thün, Kathy Velikov  
*Design Research Associate:* Daniel Tish  
*Fabrication Assistants:* Asa Peller, Dustin Brugman, Andrew Kremers, Andrew Wald, Iram Moreno Pinon  
*Wireless Sensing Adviser:* Jerome Lynch  
*Technical Partners:* Buckeye Polymers; Industrial Fabricating Systems; Beckhoff  
*Funding:* Taubman College of Architecture and Urban Planning; 2016 Research Through Making Program; University of Michigan Office of Research; Small Projects Grant  
*Photography:* Peter Smith

**Timber Waste Modular Unit ("TwMU"), page 140**

*Design Firm and Fabricator:* IKD, Boston · Yugon Kim, Tomomi Itakura (leaders); Yuki Kawae, Steven Hien, Brendan Casimir, David Morgan, Erin Kim, James Fan, Miguel Lorenzo Gumila (student research assistants)  
*Drawings:* IKD  
*Funding:* Heritage Museums & Gardens; Rhode Island School of Design  
*Photography:* IKD  
*Special Thanks:* Windy Hill Farm Sawmill

**Grove, page 141**

*Client:* Design Biennial Boston, Boston Society of Architects (BSA)  
*Design Firm and Fabricator:* GLD Architecture, Brookline, Mass. · Joel Lamere, Cynthia Gunadi, Sophia Chesrow, Grigori Enikolopov, Zain Karsan, Dohyun Lee, Elizabeth Galvez (project team)  
*Drawings:* GLD  
*Funding:* Design Biennial Boston; GLD  
*Photography:* Jane Messinger  
*Special Thanks:* Rose F. Kennedy Greenway Conservancy, Boston Art Commission, Pinkcomma Gallery, BSA Space, Boston Mayor's Office of New Urban Mechanics, David Costanza, Sixto Cordero, Caitlin Mueller, Steven O. Anderson, John Skibo, Matt Wagers, Chris Dewart, Christopher Gunadi

**Blooming Bamboo Home, page 142**

*Design Firm:* H&P Architects, Hanoi, Vietnam · Doan Thanh Ha, Tran Ngoc Phuong, Chu Kim Thinh, Erimescu Patricia, Nguyen Van Manh, Nguyen Khanh Hoa, Nguyen Quynh Trang, Tran Quoc Thang, Pham Hong Son, Hoang Dinh Toan, Pham Quang Thang, Nguyen Hai Hue, Nguyen Khac Phuoc (project team)  
*Fabricator:* H&P Architects  
*Photography:* Doan Thanh Ha  
*Cost:* \$2,500  
*Special Thanks:* Nguyen Tri Thanh