Bridges Baltimore

Mathematics, Music, Art, Architecture, Culture

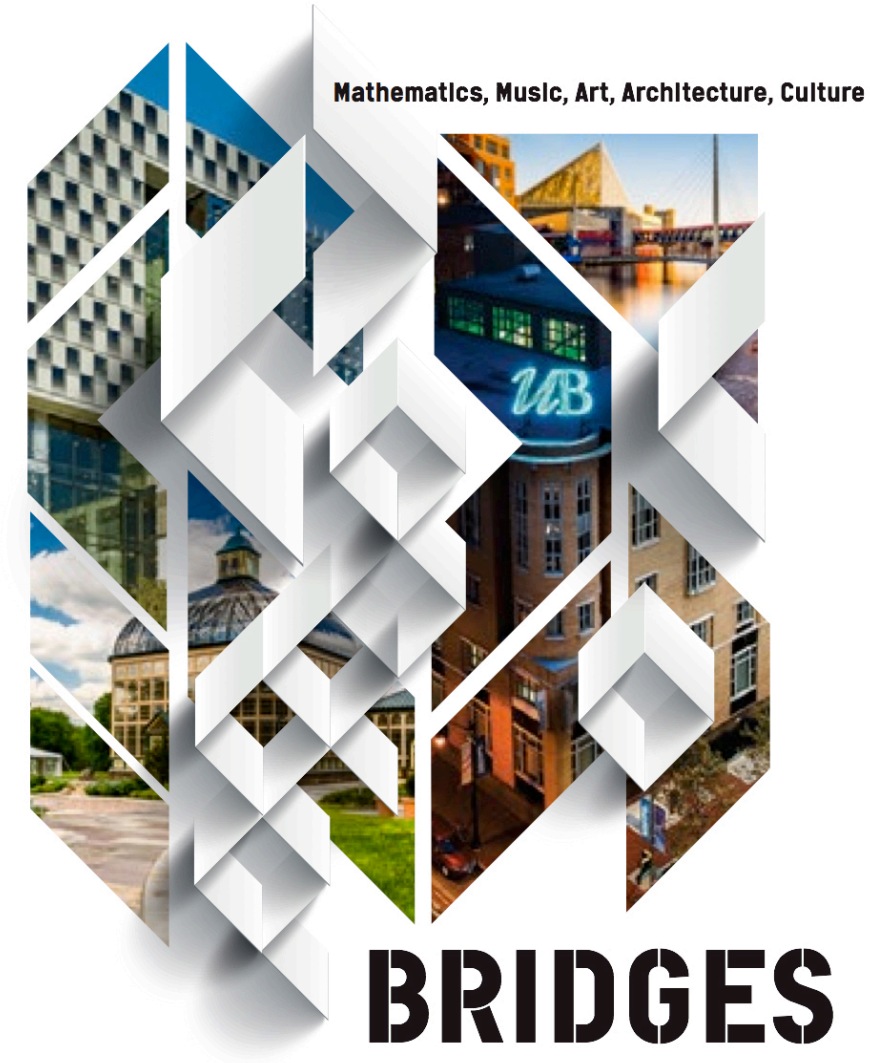
Conference Proceedings

ub UNIVERSITY OF BALTIMORE

Bridges

2015

Celebrating the 18th Annual Bridges Conference
at the University of Baltimore
Baltimore, Maryland
United States of America



Proceedings 2015

Kelly Delp, Craig S. Kaplan, Douglas McKenna, and Reza Sarhangi,
Editors

Tessellations Publishing, Phoenix, Arizona

Editors:

Program Chair

Kelly Delp
Department of Mathematics
Cornell University
Ithaca, New York, USA

Workshop Paper Chair

Craig S. Kaplan
School of Computer Science
University of Waterloo
Waterloo, Ontario, Canada

Short Paper Chair

Douglas McKenna
Mathemaesthetics Inc.
Boulder, Colorado, USA

Production Chair

Reza Sarhangi
Department of Mathematics
Towson University
Towson, Maryland, USA

Bridges Baltimore Conference Proceedings (http://www.BridgesMathArt.org). All rights reserved. General permission is granted to the public for non-commercial reproduction, in limited quantities, of individual articles, provided authorization is obtained from individual authors and a complete reference is given for the source. All copyrights and responsibilities for individual articles in the 2015 Conference Proceedings remain under the control of the original authors.

ISBN: 978-1-938664-15-1
ISSN: 1099-6702

Published by Tessellations Publishing, Phoenix, Arizona, USA (© 2015 Tessellations)
Distributed by *MathArtFun.com* (http://mathartfun.com) and *Tarquin Books* (www.tarquinbooks.com)

All Escher images used in the 2015 Bridges Proceedings are published with the kind permission of the M.C. Escher Foundation, Baarn, The Netherlands.

Proceedings and Catalog Cover Designer: Thomas James O'Donnell, Klein Family School of Communications Design, University of Baltimore, Maryland, USA

Production: Craig S. Kaplan

Scientific Conference Organizers

Kelly Delp
Department of Mathematics
Cornell University, New York, USA

George W. Hart
Stony Brook University
New York, USA

Craig S. Kaplan
David R. Cheriton School of Computer Science
University of Waterloo
Waterloo, Ontario, Canada

Reza Sarhangi
President
Bridges Organization
Towson University, Maryland, USA

Carlo H. Séquin
Computer Science Division
University of California, Berkeley, USA

Kurt L. Schmoke
President
University of Baltimore

Sujan Shrestha
Division of Science, Information Arts and Technologies
University of Baltimore

Joseph S. Wood
Provost
University of Baltimore

The University of Baltimore Conference Committee Members

Haitham Alkhateeb
Division of Science, Information Arts and Technologies
University of Baltimore

Bridget Blodgett
Division of Science, Information Arts and Technologies
University of Baltimore

Donald Brown
Division of Science, Information Arts and Technologies
University of Baltimore

Joseph Achille Fioramonti
Klein Family School of Communications Design
University of Baltimore

Stephenie Gibson
Klein Family School of Communications Design
University of Baltimore

Lucy Holman
Division of Science, Information Arts and Technologies
University of Baltimore

Jeffery Hoover
Klein Family School of Communications Design
University of Baltimore

Mohammed Ketel
Division of Science, Information Arts and Technologies
University of Baltimore

S. Michael Kiel
Division of Science, Information Arts and Technologies
University of Baltimore

Deborah Kohl
Division of Science, Information Arts and Technologies
University of Baltimore

Thomas James O'Donnell
Klein Family School of Communications Design
University of Baltimore

Aaron R. Oldenburg
Division of Science, Information Arts and Technologies
University of Baltimore

Amy Pointer
Klein Family School of Communications Design
University of Baltimore

Peter Ramsey
Division of Science, Information Arts and Technologies
University of Baltimore

Jonathan L. Shorr
Klein Family School of Communications Design
University of Baltimore

Kathryn Summers
Division of Science, Information Arts and Technologies
University of Baltimore

Giovanni Vincenti
Division of Science, Information Arts and Technologies
University of Baltimore

Cheryl Wilson
Klein Family School of Communications Design
University of Baltimore

Artistic and Scientific Committee Members and Coordinators

Steve Abbott
Department of Mathematics
Middlebury College, Vermont, USA
Experimental Theater

Robert Bosch
Department of Mathematics
Oberlin College, Ohio, USA
Short Movie Festival

Robert W. Fathauer
Tessellations Company
Phoenix, Arizona, USA
Art Exhibition Organizer

Kristóf Fenyvesi
Jyväskylä University
Jyväskylä, Finland
Family Day

Sarah Glaz
Department of Mathematics
University of Connecticut, USA
Mathematical Poetry Event

Vi Hart
Bridges Informal Music Night
San Francisco, California, USA
Music Event

Tiffany C. Inglis
Technische Universität München
Munich, Germany
Webmaster

Nathan Selikoff
Digital Awakening Studios
Orlando, Florida, USA
Technical Support

Thomas James O'Donnell
Klein Family School of Communications Design
University of Baltimore
Conference Designer

Sujan Shrestha
Division of Science, Information Arts and Technologies, University of Baltimore
UB Faculty Coordinator and Co-coordinator for Movie Festival

Proceedings Program Committee

Abdalla G. M. Ahmed
Khartoum, Sudan

Mara Alagic
Department of Curriculum and Instruction
Wichita State University
Wichita, Kansas, USA

Javier Barrallo
School of Architecture
The University of the Basque Country
San Sebastian, Spain

Robert Bosch
Department of Mathematics
Oberlin College, Ohio, USA

Anne Burns
Long Island University
New York, USA

Christopher Carlson
Graphics and Typesetting
Wolfram Research, IL, USA

Scott Carter
Department of Mathematics
University of South Alabama
Mobile, Alabama

David Chappell
Department of Physics
University of La Verne
La Verne, CA

Darrah Chavey
Dept. of Mathematics and Computer Science
Beloit College, Wisconsin, USA

Kelly Delp (Chair)
Department of Mathematics
Cornell University, New York, USA

Neil Dodgson
Graphics & Imaging
University of Cambridge, UK

Douglas Dunham
Department of Computer Science
University of Minnesota, Duluth, USA

Kristóf Fenyvesi
Jyväskylä University
Jyväskylä, Finland

Gwen Fisher
beAd Infinitum
USA

Robert W. Fathauer
Tessellations Company
Phoenix, Arizona, USA

Paul Gailiunas
Newcastle, England
UK

Susan Gerofsky
Department of Curriculum Studies
University of British Columbia, Canada

Sarah Glaz
Department of Mathematics
University of Connecticut, USA

Susan Goldstine
Department of Mathematics and CS
St. Mary's College of Maryland, MD, USA

Gary Greenfield
Mathematics and Computer Science
University of Richmond, USA

George W. Hart
Stony Brook University
New York, USA

Kevin Hartshorn
Mathematics and Computer Science
Moravian College, Pennsylvania, USA

Andrea Hawksley
Communications Design Group
San Francisco, California

Tiffany Inglis
Computer Science
Technical University of Munich, Germany

Robert Krawczyk
Illinois Institute of Technology
Chicago, IL, USA

Penousal Machado
Department of Informatics Engineering
University of Coimbra, Portugal

Kerry Mitchell
Mosaic Arts Center
Phoenix, AZ USA

Michael Naylor
Norwegian Tech. and Science University
Trondheim, Norway

Rinus Roelofs
The Foundation Passages
Hengelo, The Netherlands

Radmilla Sazdanovic
Department of Mathematics
University of Pennsylvania, USA

Henry Segerman
Mathematics and Statistics
University of Melbourne, Australia

Donald Spector
Hobart & William Smith Colleges
Geneva, New York

David Swart
Waterloo
Ontario, Canada

Bruce Torrence
Randolph-Macon College
Ashland, Virginia, USA

Patrick Honner
Brooklyn Technical High School
New York City, NY, USA

Craig S. Kaplan
Cheriton School of Computer Science
University of Waterloo, Canada

Peter J. Lu
Department of Physics
Harvard University, MA, USA

Douglas McKenna
Mathemaesthetics Inc.
Boulder, Colorado, USA

Teresa Moore
Ithaca College
Ithaca, New York, USA

Douglas Norton
Department of Mathematical Sciences
Villanova University, PA, USA

Reza Sarhangi
Department of Mathematics
Towson University, Maryland, USA

Karl Schaffer
Mathematics Department
De Anza College, California, USA

Carlo H. Séquin
Computer Science Division
University of California, Berkeley, USA

John Sullivan
TU Berlin
Germany

B. G. Thomas
University of Leeds
Leeds, West Yorkshire, England

Eve Torrence
Randolph-Macon College
Ashland, Virginia, USA

Godfried T. Toussaint
Department of Computer Science
New York University Abu Dhabi
Abu Dhabi, UAE

Tom Verhoeff
Eindhoven University of Technology
The Netherlands

Phil Webster
Phil Webster Design
Scotts Valley, California, USA

Luke Wolcott
Department of Mathematics
Lawrence University, Wisconsin, USA

Carolyn Yackel
Mercer University
Atlanta, Georgia, USA

Art Exhibition and Catalog Program Committee

Anne Burns
Long Island University
Brookville, New York, USA

Conan Chadbourne
San Antonio
Texas, USA

Robert W. Fathauer
Tessellations Company
Phoenix, Arizona, USA

Nathaniel Friedman
University at Albany
Albany, New York, USA

Katie McCallum
Brighton
England, the UK

Nathan Selikoff
Digital Awakening Studios
Orlando, Florida, USA

Reza Sarhangi
Department of Mathematics
Towson University, Maryland, USA

Sujan Shrestha
Division of Science, Information Arts and Technologies
University of Baltimore

Contents

Preface ..... *xix*

Regular Papers

Folding Pseudo-Stars that are Cyclicly Hinged 1
Greg N. Frederickson

The Concept of Elevation applied to Flat Tiling Patterns 9
Rinus Roelofs

2-Manifold Sculptures 17
Carlo H. Séquin

The Geometric Studies of Some Mosaic Design Compositions and Puzzles Presented in a Historical Treatise 27
Reza Sarhangi

Can Human Assistance Improve a Computational Poet? 37
Carolyn E. Lamb, Daniel G. Brown and Charles L.A. Clarke

Curved Islamic Star Patterns of Medieval Egypt and Syria 45
B. Lynn Bodner

Three Families of Mitered Borromean Ring Sculptures 53
Tom Verhoeff and Koos Verhoeff

Modular Origami Halftoning: Theme and Variations 61
Zhifu Xiao, Robert Bosch, Craig S. Kaplan and Robert J. Lang

Permutations of the Octagon: An Aesthetic-Mathematical Dialectic 69
James Mai

Laser-Cut Plywood and Cable-Tie Sculptures 77
George Hart

Double Strip Patterns: Between Strip Patterns and Wallpaper Patterns 85
Darrah Chavey, Monica Menzies Meissen, Todd O'Bryan and Glenn Terry

A Divine Error 93
Dirk Huylebrouck

Highly Unlikely Triangles and Other Impossible Figures in Bead Weaving 99
Gwen L. Fisher

Real-World Tessellations 107
Robert W. Fathauer

The Platonic Solids: a Three-Dimensional Textbook 113
Martin Levin

Figurative Tours and Braids 121
Robert Bosch and Tom Wexler

A Theoretical Framework to Represent Narrative Structures for Visual Storytelling 129
Ergun Akleman, Stefano Franchi, Devkan Kaleci, Laura Mandell, Takashi Yamauchi and Derya Akleman

Math Bugs 137
Mike Naylor

Nonplanar expansions of polyhedral edges in Platonic and Archimedean solids 143
David A. Reimann

Soccer Ball Symmetry 151
David Swart

The Golden Spiral: The Genesis of a Misunderstanding 159
Paul Gailiunas

Nested polytopes with non-crystallographic symmetry induced by projection 167
Briony Thomas, Reidun Twarock, Motiejus Valiunas and Emilio Zappa

Fun with Whirls 175
Kerry Mitchell

Fractal Wallpaper Patterns 183
Douglas Dunham and John Shier

"In an Ocean of Ashes": Order and Chaos in Mathematics and Literature 191
Katharine Ahrens

A Skeleton Key for the Platonic Solids 199
Karl Schaffer

3D-Dithered Ortho-Pictures: 3D Models from Independent 2D Images 207
Gershon Elber

Knotology Baskets and Topological Maps 215
James Mallos

A Novel Line Fractal Pied de Poule (Houndstooth) 223
Loe M.G. Feijs and Marina Toeters

Algorithmic Quilting 231
Christopher Carlson, Nina Paley and Theodore Gray

Integrating Origami Art with Mathematics in a College General Studies Course 239
Norma Boakes

Self-Avoiding Random Walks Yielding Labyrinths 247
Gary R. Greenfield

Yvon-Villarceau Circle Equivalents on Dupin Cyclides 253
Francesco De Comité

Galaxies Containing Infinite Worlds*: Poetry from Finite Projective Planes* 259
Daniel May and Courtney Huse Wika

From Stippling to Scribbling 267
Abdalla G. M. Ahmed

Magnetic Circle Packing in Creative Outreach and Refreshment 275
Robin Linhope Willson

Julia Randall's Poetic Finitude: Mapping the Infinite onto a Poem 283
Emily Grosholz

A View of Music 289
Ellen Gethner, Shannon Steinmetz and Joseph Verbeke

The Stomachion in Wonderland 295
Stanley Spencer

Ordinal-Contextual Dissimilarity for Analysis of Heros in Tragedies 301
Bahman Afsari, Katayun Mazdapour and Bruno Jedynak

Designing 2D Ordinary Differential Equations To Obtain Abstract Paintings, Illustrations and Animations 309
Ergun Akleman and Hüseyin Koçak

The Curious Creativity of John Horton Conway 317
Siobhan Roberts

The Musical Canon Inside Differential Equations 323
Donald Spector

Short Papers

Eight-Pointed Star and Precise Construction of 7x7 Square Grid 331
Dmitri Kozlov

Introducing the Möbius-Twisted Turk's Head Knot 335
Carlo H. Séquin and Lorenzo Larrucea

Exploring the Manifold of Image Patches 339
Yevgen Matviychuk and Shannon M. Hughes

Flowing, Organic Forms Using Adaptive Line-Drawing Agents 343
David Chappell

Chains of Antiprisms 347
Tom Verhoeff and Melle Stoel

Programmable Mathe-Musical Boxes 351
Rachel Wells Hall

Two-Frame Animations in Conway's Game of Life 355
Robert Bosch

Gallery Layout in Borges' Library of Babel 359
Jonathan K. Millen

Visualizing Rhyme Patterns in Sonnet Sequences 363
Hartmut F. W. Höft

A Pattern Tracing System for Generating Paper Sliceform Artwork 367
Yongquan Lu and Erik D. Demaine

The "Φ"TOP: A Golden Ellipsoid 371
Kenneth Brecher

The Geometric Structure of Scribal Variation among Manuscripts of Langland's Piers Plowman 375
Roger Bilisoly

Surfaces with Natural Ridges 379
David Brander and Steen Markvorsen

Unexpected Beauty Hidden in Radin-Conway's Pinwheel Tiling 383
Douglas G. Burkholder

Hypernom: Mapping VR Headset Orientation to S^3 387
Vi Hart, Andrea Hawksley, Henry Segerman and Marc ten Bosch

Large, Symmetric, "7-Around" Hyperbolic Disks 391
Sean Jeng Liu, Young Kim, Raymond Shiau and Carlo H. Séquin

Katzengold: Pyrite, Plato, and a Polynomial 395
Stephan Klaus and Bianca Violet

Infinite Rhythmic Tiling Canons 399
Clifton Callender

A Concept Map for Book 1 of Euclid's Elements 403
Alexander Boxer and Justace Clutter

A Musical Scale Generated from the Ratio of Consecutive Primes 407
Reginald Bain

Geometric Visual Instruments Having Pinnate Forms 411
Shunsuke Akimoto and Akihiro Matsuura

Design Anamorphosis in the Math Class! 415
Kristóf Fenyvesi and Markus Hähkiöniemi

Cayley Cubic and the Visual Arts 419
Jean Constant

Fractal Tiling Illustrations of Geometric Series 423
Lorelei Koss

Nature as a Strategy for Pattern Formation in Art 427
Irene Rousseau

Monte Carlo Art Using Scratch 431
Patrick Honner

The Paradigm Poem 435
Kazmier Maslanka

Random Walks on Vertices of Archimedean Tilings 439
Vincent J. Matsko

Perspectives on Borges' Library of Babel 443
CJ Fearnley and Jeannie Moberly

Geometry in the Pocket 447
Mehrdad Garousi

From Mathematical Curves to Decorative Ornaments 451
Susan McBurney

Building Polyhedra from Polygons with Colored Edges 455
Ioana Browne and Mircea Draghicescu

Turing Patterns in Photoshop 459
Andrew Werth

Inspire Math-Girls-Women (perhaps with poems) 463
Jo Anne Growney

Emergent Orange 467
Jim Bumgardner

Expandohedra: Modeling Structural Transitions of a Viral Capsid 471
Adam Arstall, Briony Thomas, Reidun Twarock and Emilio Zappa

An Exhibition of Exponential Sums: Visualizing Supercharacters 475
Paula Burkhardt, Gabriel Currier, Stephan Ramon Garcia, Mathieu de Langis,
Bob Lutz and Hong Suh

A New Way to See Inside Black Holes 479
Richard Conn Henry, James Overduin and Kielan Wilcomb

Algorithms for Morphing Escher-Like Tessellations 483
Kevin Lee

Theory of Intersection 487
Karl Kattchee

Schematic Drawings of the Polychora 491
Taneli Luotoniemi

A Successful Belgian Art & Math Exhibition with Workshops 495
Gisèle De Meur and Samuel Verbiese

Bridges Exhibits as Incentives to Collaborative Artworks 499
Anusch Bayens, Carlo De Pauw, Carmen Geens, Seniz Karaman, Mark Pieters,
André Thomas, Alex Van Bogaert, Samuel Verbiese, Rudi Willaert and Nico Willemsens

Linguistic Oddities: An Artist Explorer at Mathematics Conferences 503
Katie McCallum

3D Lenticular Imaging for Art 507
Yitzhak Weissman

The Shapes of Our Souls and Other Student Concerns: Poems about the Course "Mathematics in Literature" 511
Marion Deutsche Cohen

Into the Shadows: Approximating Images by Orthogonal Projection 515
Kelly Delp and Sam Lloyd

Workshop Papers

Exploring Ratios and Sequences with Mathematically Layered Beverages 519
Andrea Johanna Hawksley

Math-Infused Art Lessons, Art-Infused Math Lessons 525
Rachelle Guernsey

The Aesthetics of Scale: Weaving Mathematical Understandings 533
Eva Knoll, Wendy Landry, Tara Taylor, Paul Carreiro and Susan Gerofsky

The Shape Snacker: a Bite of Origami and Math 541
Alan Russell

Lissajus Curves: an Experiment in Creative Coding 549
Lali Barrière

Square Seeds and Round Paths: Exploring Patterns within the Art of Classical Labyrinths . . . 555
David Thompson and Diana Cheng

Thinking like a Pianist/Mathematician/Potter-Designer: Strategies for Tuning Ocarinas 559
Elizabeth Paley

Use of RangoLee Art in Elementary Mathematics Education 563
Madhuri Bapat

A Workshop Using the Log Cabin Quilt For Teaching Math Concepts and Patterns 567
Cristina Padlan Packard

Composing Mathematical Poetry 571
Carol Dorf

Mathematics Through the Lens of a Kaleidoscope: A Student Centered Approach to Building Bridges between Mathematics and Art 573
Gail Kaplan, Rachael Gross and Kim McComas

Hearing Math and Seeing Music: a Workshop on Pitch Perception and Temperament 581
Evelyn Lamb

Unit Origami: Star-Building on Deltahedra 585
Heidi Burgiel

Connecting with the Sierpinski Tetrahedron 589
Alice Petillo

Author Index 593

Preface

This year, we are pleased to bring the Bridges Conference to the city of Baltimore, Maryland for the first time. Also known as "Charm City", Baltimore is full of treasures and wonderful sightseeing spots: The George Peabody Library, Baltimore Symphony Orchestra, Walters Art Museum, American Visionary Art Museum, Maryland Science Center, Baltimore Museum of Art, and National Aquarium are all just a short distance from conference venue.

According to the American Institute of Economic Research, Baltimore ranks in the top 10 in a study of large U.S. cities that are the best places to attend college. The city provides an inspiring academic environment, good quality of life, and many professional opportunities for college students of all types. The University of Baltimore (UB), comprising the public undergraduate, graduate, and professional universities, is also located in the heart of Baltimore. UB's schools and colleges provide real-world education in business, law, public affairs and the applied arts and sciences.

The Bridges Organization is grateful that the University of Baltimore has opened its doors to the Bridges Conference for this year. The mission of the Bridges Organization and of this conference is to expose, discuss, and popularize the many connections between mathematics and other elements of art and culture, including fine arts, architecture, music, dance, poetry, origami, puzzles, and the sciences. It attracts a diverse audience of mathematicians, artists, educators, musicians, writers, dancers, weavers, model builders, architects, and computer scientists. This inspiring mix is reflected again in this years proceedings and in the various special activities integrated into the conference, such as the art exhibition, the public lectures, the short movie festival, the music, theater, and poetry sessions, and Family Day. Our thanks go to Robert Bosch, Andrea Hawksley, Mike Naylor and Sujan Shrestha, who served as the jury for the movie festival, and to Kristof Fenyvesi for organizing Family Day.

This year's Bridges Program Chair is Kelly Delp. She coordinated an international Program Committee of over 50 experts who provided extensive reviews and editorial comments on submissions. Kelly also served as chair of the regular paper track. Douglas M. McKenna acted as chair of the short papers track with strong support from Carlo Séquin. For the first time this year, we also formed a full committee of reviewers to examine Workshop submissions. Craig S. Kaplan served as chair, and recruited 13 members from the program committee. Many thanks go to the members of the Program Committee who reviewed the large number of papers received.

The 2015 edition of the Bridges Proceedings includes 43 regular papers, 47 short papers, and 14 workshop papers. A wide range of topics are explored in this publication; you will find new work on fractals, patterns, poetry, polyhedra, weaving, origami, sculpture, visualization, image processing, outreach and education, and more. Also, you will find papers in which authors describe the novel ways they are exploring the connections between culture and mathematics: we have a virtual reality game where a player explores 4-dimensional polytopes by changing the orientation of their head in 3-space, a workshop that gives participants a gustatory experience of ratios and sequences, and perhaps the first ever collaboration between a computer scientist and a cowboy. We thank all of the authors and reviewers for their generous contributions to this year's proceedings. We would also like to acknowledge the efforts of Mara Alagic, Paul Gailiunas, George Hart, Craig Kaplan, Douglas M. McKenna, Reza Sarhangi, and Carlo Séquin who provided extra support.

An exhibition of mathematical art has been an annual feature of Bridges since 2001. This years exhibition could well be the largest exhibition of mathematical art ever assembled, with over 150 artists taking part.

More than twenty countries and more than half the states in the U.S. are represented. A wide variety of artistic media are included in the exhibition, including 2D and 3D digital prints, painting, beadwork, ceramics, wood, metal, quilting, and folded paper. Artists drew inspiration from the mathematics of fractals, polyhedra, non-Euclidean and four-dimensional geometry, tiling, knot theory, number theory, and more. This year Katie McCallum and Robert Fathauer served as co-curators of the exhibition, and were joined by Chris Bartlett, Nat Friedman, and Sujan Shrestha to make up the jury. The print catalog was prepared by Conan Chadbourne, and the art submission website was created and administered by Nathan Selikoff. Leading up to the Bridges Conference, Chris Bartlett is taking primary responsibility for a month-long gallery exhibition that will be held at the College of Fine Arts Gallery at Towson University. That exhibition, and a subsequent exhibition at the Centennial MAA MathFest in Washington, D.C., will showcase of a subset of the artworks shown at Bridges.

We would also like to thank faculty from the University of Baltimore who have provided substantial contributions to Bridges Baltimore 2015. In particular, we thank Sujan Shrestha for his leadership in this regard. Design faculty member Thomas James O'Donnell played a key role in designing the Bridges poster and banner, as well as the covers of the proceedings and art catalog. In addition, Joseph Achille Fioramonti, Jonathan L. Shorr, Jeffery Hoover and Sujan Shrestha worked on the Bridges Baltimore 2015 announcement movie. Our sincere thanks to all faculty from the Division of Science, Information Arts and Technology and to the Klein Family School of Communication Design for their collaboration and participation in this conference. We would also like to acknowledge Monica Queen, Michael Zemarel, Peter Toran, Chris Hart, Terry Stumpf and all other staff members at the University of Baltimore who have put a considerable amount of time and effort into organizing this conference. Our sincere thanks to Provost Joseph S. Wood and Dean Laura Bryan for agreeing to host and support the conference. And finally, Kathryn Summers and Division Chair Deborah Kohl have been key in providing logistical support to Sujan Shrestha, who is also the main conference organizer and faculty coordinator at the University of Baltimore.

Once again, welcome to Bridges 2015. We hope you enjoy the conference and find inspiration in this wonderful collection of new ideas.

The Bridges Organization Board of Directors
www.bridgesmathart.org