Henry Segerman *Curriculum Vitae*

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Employment

- **Oklahoma State University**: Assistant Professor, 2013–present.
- **University of Melbourne**: Research Fellow, 2010–2013.
- **University of Texas at Austin**: Lecturer, 2007–2010.
- **Stanford University**: Graduate student, 2001–2007.

Research Interests

- Three-manifolds and triangulations
- Hyperbolic geometry
- Mathematical visualisation, 3D printing, virtual and augmented reality

Education

- **Stanford University**, Ph.D. in Mathematics under Steven Kerckhoff. Thesis (2007): *Incompressible Surfaces in Hyperbolic Punctured Torus Bundles are Strongly Detected*
- **University of Oxford**, Master of Mathematics (MS), 2001

Grants

- **NSF grant DMS-1708239**, *Three- and Four-Dimensional Triangulations and Mathematical Visualization*, 2017–2020.
- **Simons Collaboration Grants for Mathematicians-519114**, *Triangulations and visualizations*, 2017–2022 (declined due to acceptance of NSF award).
- **NSF grant DMS-1463957**, for the 2015 Redbud Geometry / Topology conference, with Danielle O'Donnol and Sean Bowman, 2015.

Fellowships & Awards

- **Tech Fee Award**, for construction of a *3D Printing Laboratory for the Mathematics of 3D Design*, award from the College of Arts and Sciences at Oklahoma State University, with Lisa Mantini, 2015.
- **Dean's Award for Excellence in Engagement (Outreach/Science Communication)**, University of Melbourne, June 2013.
- **Research Fellowship** under Australian Research Council grant DP1095760, University of Melbourne and University of Queensland, 2010–2013.
- **RTG Postdoctoral Fellowship**: University of Texas at Austin, 2007–2010.
- **Stanford University Centennial Teaching Assistant award**, June 2007.

Patent

- *Apparatus for Branched Scissor Linkage and Associated Auxetic Mechanisms*, patent pending, application number 62/503,431, May 2017.

Publications & Preprints

- **Book**
  - *Visualizing Mathematics with 3D Printing*, Johns Hopkins University Press, July 2016, 186 pages, 150 figures. This is a popular mathematics book, with the innovation that most of the figures in the book are photographs of 3D printed models. These models are available for readers to download and 3D print themselves, or order online, or explore virtually on the book's website 3dprintmath.com.
- **Geometry and Topology**
  - *Connectivity of triangulations without degree one edges under 2-3 and 3-2 moves*, *Proc. Amer. Math. Soc.* **145** (2017), no. 12, pp. 5391–5404, 14 pages, 15 figures.

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– *Non-geometric veering triangulations*, with Craig D. Hodgson and Ahmad Issa, *Experimental Mathematics*, **25**, (2016), no. 1, pp. 17–45, 29 pages, 24 figures.

– *Triangulations of 3-manifolds with essential edges*, with Craig D. Hodgson, J. Hyam Rubinstein, and Stephan Tillmann, *Annales de Mathématiques de Toulouse*, **24**, (2015), no. 5, pp. 1103-1145, 43 pages, 14 figures.

– *1-efficient triangulations and the index of a cusped hyperbolic 3-manifold*, with Stavros Garoufalidis, Craig D. Hodgson and J. Hyam Rubinstein, *Geometry & Topology* **19**, (2015), pp. 2619–2689, 71 pages, 28 figures.

– *Triangulations of hyperbolic 3-manifolds admitting strict angle structures*, with Craig D. Hodgson and J. Hyam Rubinstein, *Journal of Topology* **5** (2012), no. 5, pp. 887–908, 22 pages, 9 figures.

– *A generalisation of the deformation variety*, *Algebraic and Geometric Topology* **12** (2012), no. 4, pp. 2179–2244, 66 pages, 26 figures.

– *Pseudo-developing maps for ideal triangulations I: Essential edges and generalised hyperbolic gluing equations*, with Stephan Tillmann, *Topology and Geometry in Dimension Three: Triangulations, Invariants, and Geometric Structures (Proceedings of the Jacofest conference)*, AMS Contemporary Mathematics **560** (2011), pp. 85–102, 18 pages, 8 figures.

– *Veering triangulations admit strict angle structures*, with Craig D. Hodgson, J. Hyam Rubinstein and Stephan Tillmann, *Geometry & Topology* **15** (2011), pp. 2073–2089, 17 pages, 9 figures.

– *Incompressible surfaces in handlebodies and boundary compressible 3-manifolds*, with João Miguel Nogueira, *Topology and its Applications* **158** (2011), no. 4, pp. 551-571, 21 pages, 14 figures.

– *Detection of incompressible surfaces in hyperbolic punctured torus bundles*, *Geometriae Dedicata* **150** (2011), no. 1, pp. 181–232, 52 pages, 25 figures.

– *On spun-normal and twisted squares surfaces*, *Proc. Amer. Math. Soc.* **137** (2009), pp. 4259–4273, 15 pages, 13 figures.

· **Mathematical Visualization, Art and Exposition**

– *Conformally correct tilings*, published as *Pavages effectivement conformes* with Saul Schleimer, *Objets mathématiques* (2017), CNRS Editions, pp. 140–147, 6 pages, 7 compound figures.

– *Numerically Balanced Dice*, with Robert Bosch and Robert Fathauer, *The Mathematics of Various Entertaining Subjects: Research in Games, Graphs, Counting, and Complexity, Volume 2* (2017), pp. 253–268, 16 pages, 10 figures.

– *Non-euclidean virtual reality I: explorations of* $\mathbb{H}^3$, with Vi Hart, Andrea Hawksley, and Elisabetta A. Matsumoto, *Proceedings of Bridges 2017: Mathematics, Music, Art, Architecture, Culture* (2017), pp. 33–40, 8 pages, 9 figures.

– *Non-euclidean virtual reality II: explorations of* $\mathbb{H}^2 \times \mathbb{E}$, with Vi Hart, Andrea Hawksley, and Elisabetta A. Matsumoto, *Proceedings of Bridges 2017: Mathematics, Music, Art, Architecture, Culture* (2017), pp. 41–48, 8 pages, 7 figures.

– *Magnetic sphere constructions*, with Rosa Zwier, *Proceedings of Bridges 2017: Mathematics, Music, Art, Architecture, Culture* (2017), pp. 79–86, 8

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pages, 10 figures.

– *Visualizing Hyperbolic Honeycombs*, with Roice Nelson, *Journal of Mathematics and the Arts*, **11** (2017), no. 1, pp. 4–39. 36 pages, many figures.

– *Squares that Look Round: Transforming Spherical Images*, with Saul Schleimer, *Proceedings of Bridges 2016: Mathematics, Music, Art, Architecture, Culture* (2016), pp. 15–24, 10 pages, 9 figures with many subfigures.

– *Puzzling the 120-cell*, with Saul Schleimer, *Notices of the American Mathematical Society* **62** (2015), no. 11, pp. 1309–1316, 8 pages, 16 figures. A more detailed version is available at arXiv:1310.3549 [math.GT].

– *Hypernom: Mapping VR Headset Orientation to S^3*, with with Vi Hart, Andrea Hawksley and Marc ten Bosch, *Proceedings of Bridges 2015: Mathematics, Music, Art, Architecture, Culture* (2015), pp. 387–390, 4 pages, 3 figures.

– *The Quaternion Group as a Symmetry Group*, with Vi Hart, *Proceedings of Bridges 2014: Mathematics, Music, Art, Architecture, Culture* (2014), pp. 143–150, 8 pages, 8 figures. **Republished in *The Best Writing on Mathematics 2015*** (2015), Princeton University Press.

– *Developing fractal curves*, with Geoffrey Irving, *Journal of Mathematics and the Arts* **7** (2013), no. 3–4, pp. 103–121. 19 pages, 22 figures.

– *Triple gear*, with Saul Schleimer, *Proceedings of Bridges 2013: Mathematics, Music, Art, Architecture, Culture* (2013), pp. 353–360, 8 pages, 19 figures.

– *How to print a hypercube*, *Math Horizons* **20** (Feb 2013), no. 3, pp. 5–9, 5 pages, 9 figures.

– *3D printing for mathematical visualisation*, *Math. Intell.* **34** (2012), no. 4, pp. 56–62, 7 pages, 9 figures.

– *Sculptures in S^3*, with Saul Schleimer, *Proceedings of Bridges 2012: Mathematics, Music, Art, Architecture, Culture* (2012), pp. 103–110, 8 pages, 9 figures.

– *Recent 3D printed sculptures*, *Hyperseeing*, 2011 Fall/Winter, 10 pages, 11 figures.

– *Fractal graphs by iterated substitution*, *Journal of Mathematics and the Arts* **5** (2011), no. 2, pp. 51–70, 20 pages, 20 figures.

– *The Sunflower Spiral and the Fibonacci Metric*, *Proceedings of Bridges 2010: Mathematics, Music, Art, Architecture, Culture* (2010), pp. 483–486, 4 pages, 4 figures.

– *Autologlyphs*, with Paul-Olivier Dehaye, *Mathematical Intelligencer* **26** (2004), no. 2, cover art and pp. 37–39, 3 pages, many figures.

– *100 prisoners and a lightbulb*, with Paul-Olivier Dehaye and Daniel Ford, *Mathematical Intelligencer* **25** (2003), no. 4, pp. 53–61, 9 pages, 3 figures.

Conferences organised

· **Illustrating Mathematics semester**, ICERM, Brown University, RI, with Kelly Delp, David Dumas, Saul Schleimer, Rich Schwartz, and Laura Taalman (lead organisers), Jayadev Athreya, David Bachman, Keenan Crane, Ellen Eischen, Sarah Koch, Alex Kontorovich, and Katherine Stange, to run Fall 2019.

· Fall 2016 Redbud Triangulations conference, Oklahoma State University, OK, with Neil Hoffman, November 2016.

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- Illustrating Mathematics workshop, ICERM, Brown University, RI, with Kelly Delp, Saul Schleimer, and Laura Taalman, June 2016.
- Spring 2015 Redbud Geometry / Topology conference, Oklahoma State University, OK, with Danielle O'Donnol and Sean Bowman. Supported by NSF award DMS-1463957.

Seminars & Talks

- *From veering triangulations to pseudo-Anosov flows*, Oklahoma State University, OK, November 2017.
- *Design of 3D printed mathematical art*, Caltech, CA, May 2014; **Symposium on Computational Geometry (invited plenary talk)**, Kyoto, Japan, June 2014 (Link to video); Nara Women's University, Nara, Japan, June 2014; UC Berkeley, CA, November 2014; University of Oklahoma (colloquium), OK, November 2014; Reed College, Portland, OR, February 2015; **Pixar**, CA, February 2015; Kansas State University, KS, March 2015; Park City Mathematics Institute summer session, UT, July 2015, Oklahoma State University (colloquium), OK, September 2015; 35th Annual Mathematics Symposium, (keynote speaker), Western Kentucky University, Bowling Green, KY, November 2015; Ohio State University, Columbus, OH, December 2015; Mathematical Sciences Research Institute, Berkeley, CA, February 2016; **SRI International**, Menlo Park, CA, March 2016; Georgia Tech, Atlanta, GA, March 2016; **International Geometry Summit (public lecture)**, Berlin, Germany, June 2016; Universität Heidelberg, Heidelberg, Germany, July 2016; Young Mathematicians Conference (plenary talk), The Ohio State University, Columbus OH, August 2016; Graphics Seminar, Computer Graphics and Artificial Intelligence Lab, MIT, Cambridge, MA, October 2016; Department of Physics, Oklahoma State University, OK, October 2016; IUPUI, Indianapolis, IN, February 2017; Aalto University, Helsinki, Finland, March 2017; Texas A&M University, College Station, TX, April 2017; The University of Edinburgh, Edinburgh, UK, May 2017; Universität Regensburg, Regensburg, Germany, May 2017; Center for Graphics and Geometric Computing, Computer Science Department, Technion, Haifa, Israel, June 2017; 3D Printing Workshop, Durham University, Durham, UK, June 2017; Park City Mathematics Institute summer session, UT, June 2017; 2017 SIAM Conference on Industrial and Applied Geometry (plenary talk), July 2017; **The 11th Asian Forum on Graphic Science (invited plenary talk)**, The University of Tokyo, Tokyo, Japan, August 2017; Dartmouth College, Hanover, NH, November 2017.
- *3D Shadows: Casting Light on the Fourth Dimension*, **The National Museum of Mathematics**, Math Encounters public presentation series, New York City, NY, October 2016; Department of Mathematics, MIT, Cambridge, MA, October 2016; Georgia Tech **Frontiers in Science public lecture**, Atlanta, GA, October 2016; School of the Art Institute of Chicago, Chicago, IL, January 2017; University of Central Oklahoma, College of Mathematics & Science Spring 2017 Seminar Series, Edmond, OK, February 2017; University of Michigan **Saturday Morning Physics public lecture**, Ann Arbor, MI, February 2017; IUPUI, Indianapolis, IN, February 2017; Heureka Science Centre, Helsinki, Finland, March 2017; Kentucky MAA Spring Meeting Invited Address, Berea College, Berea, KY, March 2017; Southwestern Undergraduate Mathematics Research Conference plenary talk, Northern Arizona University, Flagstaff, AZ, April 2017; Texas A&M University, College Station, TX, April 2017; Duke University Pub-

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lic Lectures Unveiling Math series, Durham, NC, April 2017; **Apple Industrial Design team**, Apple Inc., Cupertino, CA, April 2017; Israel's National Recreational Math, Games and Puzzles Festival and Conference, Davidson Institute of Science Education, Weizmann Institute of Science, Rehovot, Israel, June 2017; 3D Printing Workshop, Durham University, Durham, UK, June 2017; Tamura/Lilly public lecture, Oberlin College, Oberlin, OH, September 2017; Mount Holyoke College, South Hadley, MA, October 2017.

- *Artistic mathematics*, Global Math Project Symposium: Uplifting Mathematics for All, Courant Institute of Mathematical Sciences, New York University, New York City, NY, October 2017.
- *Non-euclidean virtual reality*, Crystal Flowers in Halls of Mirrors course, Aalto University, Helsinki, Finland, March 2017; School of Physics, University of Bristol, Bristol, UK, May 2017; Israel's National Recreational Math, Games and Puzzles Festival and Conference, Davidson Institute of Science Education, Weizmann Institute of Science, Rehovot, Israel, June 2017; Bridges conference on Mathematics and the Arts, University of Waterloo, Waterloo, Canada, July 2017; Two Sigma Investments, New York City, NY, October 2017.
- *Visualizing Mathematics with 3D Printing: Augmenting a Traditional Book with New Media, and Editing Spherical Video with Möbius (and other) Transformations*, Imaginary Conference 2016 (**invited speaker**), Berlin, Germany, July 2016; School of Simulation and Visualisation, The Glasgow School of Art, Glasgow, UK, May 2017; Society for Physics Students, Georgia Tech, September 2017.
- *Design of hinged 3D auxetic mechanisms*, Symposium on Computational Geometry, University of Queensland, Brisbane, Australia, July 2017; Soft Matter and Physics of Living Systems Seminar, School of Physics, Georgia Tech, September 2017.
- *Squares that look round: Transforming Spherical Images*, Stanford University Math Camp, Stanford, CA, July 2016; Bridges conference on Mathematics and the Arts (**plenary talk**), University of Jyväskylä, Jyväskylä, Finland, August 2016 (Link to spherical video); Oklahoma State University Math Club, OK, October 2016; MAA Contributed Paper Session on Mathematics and the Arts, Joint Mathematics Meetings, Atlanta, GA, January 2017; Media Arts & Technology Seminar Series, UCSB, Santa Barbara, CA, January 2017; Crystal Flowers in Halls of Mirrors course, Aalto University, Helsinki, Finland, March 2017; Texas A&M University, College Station, TX, April 2017; School of Simulation and Visualisation, The Glasgow School of Art, Glasgow, UK, May 2017; Israel's National Recreational Math, Games and Puzzles Festival and Conference, Davidson Institute of Science Education, Weizmann Institute of Science, Rehovot, Israel, June 2017.
- *Brilliant Geometry*, Summerhall, Edinburgh, UK, May 2017.
- *Connectivity of the set of triangulations of a 3- or 4-manifold*, Oklahoma State University, OK, April 2017; Georgia Tech, Atlanta, GA, April 2017; Duke University, Durham, NC, April 2017.
- *Visualizing Mathematics with 3D Printing*, **Shaping the Future 4 EdTech summit**, Center for Educational Technology, Tel Aviv, Israel, March 2017.
- *Visualizing hyperbolic honeycombs*, Crystal Flowers in Halls of Mirrors course, Aalto University, Helsinki, Finland, March 2017.

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- *Puzzling the 120–cell*, **MOVES Conference (plenary talk)**, Museum of Mathematics, New York, NY, August 2013 (Link to video); Gathering 4 Gardner 11, Atlanta, March 2014; New York Puzzle Party, New York, NY, February 2017.
- *Connectivity of triangulations without degree one edges under 2-3 and 3-2 moves*, Oklahoma State University, OK, September 2016; Columbia University, New York City, NY, October 2016; Quantum invariants and low-dimensional topology conference, MATRIX mathematical research institute, Creswick, VIC, Australia, December 2016; University of Michigan Geometry Seminar, Ann Arbor, MI, February 2017.
- *Navigating the three-sphere via quaternions*, AMS Special Session on Quaternions, Joint Mathematics Meetings, Atlanta, GA, January 2017.
- *Design by transformation*, MAA Invited Paper Session on Technical Tools for Mathematical 3D Printing, Joint Mathematics Meetings, Atlanta, GA, January 2017.
- *Visualizing Mathematics with 3D Printing*, Leonardo Art Science Evening Rendezvous talk, UC Berkeley, CA, October 2016.
- *Math plus 3D printing, spherical video, and virtual reality*, Samsung Accelerator, New York City, NY, October 2016.
- *How to make sculptures of 4-dimensional things*, Edison Preparatory High School visit to Oklahoma State University, OK, April 2014; **Hari Shankar Memorial public lecture**, University of Northern Iowa, IA, April 2014 (Link to video); Stillwater High School Math Club, OK, October 2014; University of Oklahoma Math Day invited speaker, OK, November 2014; University of Oklahoma Math Club, OK, January 2015; Kansas State University, KS, March 2015; Park City Mathematics Institute summer session, UT, July 2015; Geometry Labs United Conference 2015 invited speaker, UIUC, IL, August 2015; Undergraduate Mathematics Symposium invited speaker, UIC, IL, October 2015; Ohio State University, Mansfield, OH, November 2015; Exploratorium, San Francisco, CA, January 2016; Denison University, OH, February 2016, Park City Mathematics Institute summer session, UT, July 2016; George Mason University, VA, September 2016.
- *3D printed sculptures of 4D things*, Electromagnetic Field 2016, Guildford, UK, August 2016 (Link to video).
- *Rhino and Python Workshop*, Illustrating Mathematics topical session, ICERM, Brown University, RI, June 2016.
- *Two tales of Mathematical Virtual Reality*, **International Geometry Summit (invited plenary lecture)**, Berlin, Germany, June 2016.
- *Spherical image transformations and the Droste effect*, Gathering 4 Gardner 12, Atlanta, GA, March 2016.
- *Hypernom: Mapping VR Headset Orientation to S^3*, Bridges conference on Mathematics and the Arts, Baltimore, MD, August 2015 (Link to video, Link to spherical video); Joint Mathematics Meetings 2016, Seattle, WA, January 2016; Gathering 4 Gardner 12, Atlanta, GA, March 2016.
- *Realising Mathematics: Creating mathematical models through 3D printing*, with David Bachman, University of Arkansas Math Club, AR, October 2015.
- *3D Printing in Mathematics*, Kansas City Regional Mathematics Technology

Expo (invited talk), Kansas City, MO, October 2015.

- *Veering Dehn Surgery*, Kansas State University, KS, March 2015, AMS Central Spring Sectional Meeting, Michigan State University, East Lansing, MI, March 2015, Georgia Tech, Atlanta, GA, April 2015. Moab Topology Conference, Moab UT, May 2015, Invariants in Low Dimensional Geometry Conference, Gazi University, Ankara, Turkey, August 2015.
- *Using Mathematica and Rhinoceros to produce 3D printed mathematical models* (workshop notes: Mac/Windows), EViMS: Workshop on the Effective Use of Visualization in the Mathematical Sciences, University of Newcastle, Australia, November 2012; Park City Mathematics Institute summer session, UT, July 2015; Kansas City Regional Mathematics Technology Expo, Kansas City, MO, October 2015; Ohio State University, Mansfield, OH, November 2015.
- *How to make sculptures of 4-dimensional objects*, **American Association for the Advancement of Science Annual Meeting**, San Jose, CA, February 2015.
- *Pachner moves and crushing normal surfaces*, Oklahoma State University, OK, November 2014; UC Berkeley, CA, November 2014; University of Oklahoma, OK, January 2015.
- *The quaternion group as a symmetry group*, Bridges conference on Mathematics and the Arts, Seoul, South Korea, August 2014 (Link to video); Joint Mathematics Meetings, San Antonio, TX, January 2015.
- *Rep-tiles, fractal curves, 3D printing and the 4th dimension*, Colby College, ME, October 2014 (Link to video).
- *Triangulating the figure 8 knot complement*, Colby College, ME, October 2014 (Link to video).
- *Developing fractal curves*, Bridges conference on Mathematics and the Arts, Seoul, South Korea, August 2014 (Link to video).
- *Sculpture in four-dimensions*, Simons Center for Geometry and Physics, Stony Brook University, NY, June 2014 (Link to video); The University of Edinburgh, UK, August 2014 (Link to video).
- *Structure on the set of triangulations*, Oklahoma State University, OK, February 2014; Rutgers University, NJ, March 2014, Michigan State University, MI, April 2014; Caltech, CA, May 2014; Symposium on Computational Geometry, Kyoto, Japan, June 2014; Nara Women's University, Nara, Japan, June 2014.
- *Regular triangulations and the index of a cusped hyperbolic 3-manifold*, University of Sydney, Australia, January 2013; University of Melbourne, Australia, April 2013; Oklahoma State University, OK, October 2013; University of Arkansas, AK, November 2013; AMS Fall Eastern Sectional Meeting, Temple University, Philadelphia, PA, October 2013; AMS Fall Central Sectional Meeting, Washington University, St Louis, MO, October 2013; Pitzer College, CA, November 2013; Joint Mathematics Meetings, Baltimore, MD, January 2014.
- *Triple gear*, Bridges conference on Mathematics and the Arts, Enschede, The Netherlands, July 2013 (Link to video); Joint Mathematics Meetings, Baltimore, MD, January 2014.
- *Fractal curves, 4-dimensional puzzles and unlikely gears*, Melbourne University Mathematics and Statistics Society, April 2013; Pitzer College, CA, November 2013; Davidson College, NC, November 2013; Washington and Lee University,

VA, November 2013.

- *Fractals and how to make a Sierpinski Tetrahedron*, Residential Indigenous Science Experience (RISE), University of Melbourne, Australia, November 2012.
- *Sculptures in S^3*, Bridges conference on Mathematics and the Arts, Towson University, MD, July 2012 (Link to video); OzViz, University of Western Australia, Australia, December 2012.
- *Triangulations of hyperbolic 3-manifolds admitting strict angle structures*, Australian Mathematical Society (AustMS) Meeting, University of Wollongong, Australia, September 2011; AMS Special Session on Hyperbolicity in Manifolds and Groups, Joint Mathematics Meetings, Boston, January 2012; **Oberwolfach workshop on Triangulations**, Germany, May 2012, University of Sydney Geometry Seminar, Australia, July 2012.
- *A generalisation of the deformation variety*, University of Texas Topology Seminar, May 2009; Oklahoma State University Topology Seminar, September 2009; Georgia Tech Topology Seminar, October 2009; AMS 2010 Spring Western Section Meeting, Albuquerque, NM, April 2010; AMS-SMM Eighth International Meeting, Berkeley, CA, June 2010; University of Melbourne Topology Seminar, Australia, October 2010; University of Queensland Topology Seminar, Australia, October 2010; University of Vienna, Austria, May 2012.
- *Fractal graphs by iterated substitution*, Gathering 4 Gardner 10, Atlanta, March 2012.
- *Some Mathematical Sculptures*, Temple University Geometry-Topology Seminar Special Undergraduate Talk, January 2012; New Orleans Center for Creative Arts, January 2012; Melbourne University Mathematics and Statistics Society, March 2012, Virtual Environments guest lecture, Melbourne School of Design, The University of Melbourne, March 2012 and August 2012; National Youth Science Forum, The University of Melbourne, March 2012.
- *Hyperbolic Geometry, Triangulations of 3-manifolds, and Mathematical Art*, Oklahoma State University, January 2012; Wesleyan University, February 2012.
- *Fractal graphs and Rep-tiles*, New Orleans Center for Creative Arts, January 2012.
- *When is a Knot Not a Knot?*, Oberlin College, January 2010; Davidson College, February 2010; University of Queensland, November 2010; Melbourne High School visit to the University of Melbourne, September 2011; Yass High School visit to the University of Melbourne, December 2011; Shelford Girl's Grammar School visit to the University of Melbourne, January 2013.
- *Veering triangulations admit strict angle structures*, University of Texas Topology Seminar, Dec 2010; University of Melbourne Algebra/Geometry/Topology Seminar, March 2011; University of Coimbra Topology Seminar, July 2011.
- *Geometric structures on triangulated 3-manifolds*, University of Warwick, March 2011.
- *The Sunflower Spiral and the Fibonacci Metric*, Bridges conference on Mathematics and the Arts, Pécs, Hungary, July 2010.
- *Autologlyphs: Self Referential Mathematical Typography*, Gathering 4 Gardner 9, Atlanta, March 2010.
- *The Mathfest 2009 Poster Image, Mathematical Art, Design and Education in Second Life*, Mathfest 2009, Portland, August 2009.
- *Drawing knots using computers*, Unknot Conference (Undergraduate Knot The-

ory Conference), Denison University, July 2009.

- *Extending the deformation variety*, University of Texas Topology Seminar, November 2008.
- *Ideal Triangulations and Components of the Character Variety*, Rice University Topology Seminar, November 2007; University of Texas Topology Seminar, November 2007
- *Incompressible Surfaces in Punctured Torus Bundles, and the Ideal Points They Come From*, UC Davis Geometry/Topology Seminar, April 2006; Southern California Topology Conference, Caltech, January 2007; University of Texas Topology Seminar, March 2007; thesis defence, Stanford, April 2007.
- *When is a Knot Not a Knot?*, Educational Program for Gifted Youth, Stanford, July 2006.
- *Geometric Structures and Dehn Surgery on the Figure 8 Knot Complement*, area exam talk, Stanford, November 2004.
- *Foliation of the Figure 8 Knot Complement in S^3 (with lots of pictures)*, graduate students seminar, October 2003.
- *The Mathematics of Juggling*, graduate students seminar, March 2003; Stanford University Math Camp July 2004 and July 2006; Saturday Morning Math Group (at Texas), February 2008; Melbourne University Mathematics and Statistics Society, September 2010, New Orleans Center for Creative Arts, January 2012; Oklahoma State University Math Club, OK, October 2013; Oklahoma State University High School Math Day, October 2015.

Teaching

- **Oklahoma State University**
  - Assistant Professor (each course approx. 36 hours of class time)
    - *Calculus II* (two sections), Fall 2017
    - *Algebraic Topology* (introductory graduate course), Spring 2017
    - *Geometry & Algorithms in Three-Dimensional Modelling*, Spring 2017
    - *Geometric Topology* (introductory graduate course), Fall 2016
    - *Linear Algebra*, Fall 2016
    - *Calculus III*, Spring 2016
    - *Geometry & Algorithms in Three-Dimensional Modelling*, Spring 2016
    - *Calculus III*, Fall 2015
    - *Algebraic Topology* (introductory graduate course), Spring 2015
    - *Geometric Topology* (introductory graduate course), Fall 2014
    - *Calculus III*, Fall 2014
    - *Calculus III* (one Honours section), Spring 2014
    - *Calculus II* (two sections), Fall 2013
- **University of Texas at Austin**
  - Lecturer (each course approx. 36 hours of class time)
    - *Hyperbolic Geometry and Triangulations of 3-Manifolds*, Spring 2010
    - *Differential Calculus*, Fall 2009
    - *Real Analysis I*, Spring 2009
    - *Multivariable Calculus*, Fall 2008
    - *Introduction to Number Theory*, Spring 2008

  - *Discrete Mathematics*, Fall 2007

- **Stanford University**
  - Teaching Assistant (each course approx. 33 hours of class time)
    - *Linear Algebra and Calculus of Several Variables* (Accelerated Calculus for Engineers TA[1]), Spring 2007 and Spring 2006
    - *Calculus II*, (Accelerated Calculus for Engineers TA), Winter 2007
    - *Calculus I*, (Accelerated Calculus for Engineers TA), Fall 2006
    - *Calculus II* (Accelerated Calculus for Engineers TA), Winter 2006
    - *Linear Algebra and Calculus of Several Variables* (Administrative TA), Fall 2005
    - *Linear Algebra and Calculus of Several Variables*, Winter 2005 and Fall 2003
    - *Calculus I*, Fall 2002
  - Course Assistant (office hours only)
    - *Algebraic Topology*, Spring 2005
    - *Differential Topology*, Spring 2004
    - *Matrix Theory and Applications*, Spring 2003
    - *Modern Algebra I*, Fall 2001
- **Mathematical Sciences Center, Tsinghua University, Beijing**
  - Minicourse (11 hours of class time)
    - *Ideal triangulations of 3-manifolds and the deformation variety*, April 2012
- **New Orleans Center for Creative Arts**[2]
  - Served on the "NOCCA Advisory Council", a group convened to help guide the transition of NOCCA from a half-day arts school to a full-day diploma-granting institution covering all subjects, whilst preserving the creativity and spirit of this highly successful school, April 2009.
  - Worked with NOCCA writing the curriculum framework for their mathematics program.
- **Other**
  - **YouTube** – maintain a YouTube channel with videos of pedagogical talks and explanations of 3D printed mathematical sculptures. The channel has **over 1.9 million views**. Guest appearances on other YouTube channels have another **4.3 million views**.
  - The National Museum of Mathematics, Exhibit Design Brainstorm Meeting, New York City, NY, June 14-16 2017.
  - Stanford University Math Camp TA/Live-In Counsellor, July 2004
  - Putnam Competition Seminar, Fall 2004
  - Work on creating mathematical learning experiences based around mathematical sculptures in the virtual world Second Life, funded by the New Media Consortium[3], September 2006.

[1]The Accelerated Calculus for Engineers program is one of a number of recruitment and retention programs run by Stanford's School of Engineering, geared towards increasing breadth and diversity in engineering.

[2]NOCCA, the New Orleans Center for Creative Arts, is a pre-professional arts training center that offers secondary school-age children intensive instruction in dance, media arts, music, theatre arts, visual arts and creative writing.

[3]The New Media Consortium is an international 501(c)3 not-for-profit consortium of nearly 200 leading colleges, universities, museums, corporations, and other learning-focused organizations dedicated to the exploration and use of new media

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Students Advised

- **Oklahoma State University**
  - Mitchell Gampper, Undergraduate student, 2017–present.
  - Jesse Berry, Undergraduate student, *Combinatorics of the Fidgitz puzzle*, 2017–present.
  - Andreas Giannopoulos, Graduate student, 2016–present.
  - Austin Warner, Senior Honors Thesis, *A Group-Theoretic Interpretation of Margolus Neighborhood Cellular Automata on Tori*, 2016.
  - Nick Nelsen, Wentz Research Grant, *Characteristics of Space-Filling Trees*, 2016. Nick presented a poster on his work at the 2017 Joint Mathematics Meetings, which was awarded a prize for being in the top 15% of posters. He has since been awarded a Goldwater Scholarship (April 2017).
  - Pengcheng Xu, Graduate student, *Pants Block Decompositions of 3-Manifolds*, 2015–2016.
  - Jimmy Hartford, Senior Honors Thesis, *Visualization of Hyperbolic 3-Manifolds*, 2015.
- **University of Melbourne**
  - Rosa Zwier, summer undergraduate research project, *Magnetic sphere constructions*.

Math Art Exhibitions

- Bridges conference[4] 2017 General Exhibition, University of Waterloo, Waterloo, Canada, July 27-30, 2017: Tetrahedral racks and Borromean racks (both with Saul Schleimer).
- **Brilliant Geometry: An interactive exhibition**, Summerhall, Edinburgh, UK, 13 May – 4 June 2017, solo exhibition with Saul Schleimer, Peter Reid, Mark Reynolds and Sabetta Matsumoto.
- Joint Mathematics Meetings 2017, Atlanta, GA, January 4-7, 2017: Tetrahedral racks, and Borromean racks (both with Saul Schleimer).
- *Mysterium Tremendum: collecting curiosity*, CU Art Museum, University of Colorado, Boulder, CO, August 9 - December 17, 2016: Round Möbius strip (with Saul Schleimer), Developing terdragon curve.
- *The Mobile: Composition in Motion*, The Carrack Gallery, Durham, NC, November 9 – 19, 2016: Mobile 4.1, Quaternary Tree Mobile (Level 5), Mobile 1, (all with Marco Mahler).
- Bridges conference 2016, University of Jyväskylä, Jyväskylä, Finland, August 9-12, 2016: Klein Quartic, (with Saul Schleimer), and in the short movie festival: Spherical Droste video, and Illuminating hyperbolic geometry (with Saul Schleimer).
- *Illustrating Mathematics*, Mathematical Sciences Research Institute, Berkeley, CA, February 25 – March 6, 2016: 10 pieces (with Saul Schleimer and Will Segerman).
- Joint Mathematics Meetings 2016, Seattle, WA, January 6-9, 2016: Klein quartic, and (2,3,5) triangle tiling (with Saul Schleimer); Stereographic projection (grid).

and new technologies.

[4]The Bridges conference is an annual international meeting on connections between art and mathematics, featuring invited speakers, full and short paper presentations, educational workshops, and a juried art exhibition.

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- *In the Realm of Forms*, Pearl Conard Art Gallery, Ohio State University, Mansfield Campus, OH, October 7 – November 20, 2015: Conformal Chmutov, Seifert surface for (2,2) torus link, Seifert surface for (2,2) torus link with fibers, Seifert surface for (3,3) torus link, Seifert surface for (3,3) torus link with fibers (all with Saul Schleimer), November 9 – December 8, 2015.
- *MathThematic: a fine art exhibition*, Esther Klein Gallery, Philadelphia, PA: Quaternary Tree Mobile (Level 5), (with Marco Mahler).
- Bridges conference 2015: Hypernom, (with Vi Hart, Andrea Hawksley and Marc ten Bosch), Monkey See, Monkey Do (with Vi Hart, Andrea Hawksley, Will Segerman and Marc ten Bosch), Hyperbolic Catacombs and $\{\infty, \infty, \infty\}$ (with Roice Nelson), and in the short movie festival: Torus knots and Seifert surfaces (both with Saul Schleimer).
- Joint Mathematics Meetings 2015: Hilbert Sphere (with David Bachman and Robert Fathauer), Hyperbolic Catacombs and Regular $\{4,6,4\}$ $\mathbb{H}^3$ Honeycomb (with Roice Nelson) and More fun than a hypercube of monkeys (with Will Segerman).
- *MoSAIC*[5] exhibition of mathematical art: Triple gear (with Saul Schleimer).
- Bridges conference 2014: Developing Fractal Curves, More fun than a hypercube of monkeys (with Will Segerman), "Buckyball" Buckyball (with Rosa Zwier).
- **Illustrating Geometry Art Exhibition**, ***Simons Center for Geometry and Physics***, Stony Brook, NY, solo show with Saul Schleimer, 19 June – 1 August 2014. Catalog (26 pieces), Posters, Walkthrough video.
- Joint Mathematics Meetings 2014: Triple gear (with Saul Schleimer).
- *First Annual Museum of Mathematics Gala*, The National Museum of Mathematics, New York, NY, October 2013, 49 colour 3D prints designed as table centerpieces.
- Bridges conference 2013: Triple gear (with Saul Schleimer; won the "Most Innovative" People's Choice Award, one of four awards given), Seifert surfaces for (3,3) and (4,4) torus links (with Saul Schleimer), "Bunny" Bunny (with Craig S. Kaplan).
- *Edinburgh International Science Festival, City Art Centre Exhibition 2013*: ten sculptures.
- *Joint Mathematics Meetings 2013*: Seifert surfaces for torus knots and links (with Saul Schleimer), Developing Fractal Curves.
- Bridges conference 2012: Dual Half 120- and 600-Cells (with Saul Schleimer; won the "Most Effective Use of Mathematics" People's Choice Award, one of four awards given.)
- Joint Mathematics Meetings 2012: Round Möbius strip, Round Klein bottle (with Saul Schleimer).
- Bridges conference 2011: Space filling graph 1, Octahedron fractal graph, Cuboctahedral fractal graph.
- Bridges conference 2010: Sphere autologlyph, Torus autologlyph.

[5] MoSAIC is a series of interdisciplinary mini conferences and festivals on mathematical connections in science, art, industry, and culture, held in colleges and universities around the United States and abroad. MoSAIC is sponsored and funded by MSRI (Mathematical Sciences Research Institute) and administered by the Bridges organization.

Henry Segerman *Curriculum Vitae*

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Math Art Installations

- *Department of Mathematics, Colby College*, Glass interest panel depicting a space filling curve based on the pinwheel tiling, 2014.
- *Department of Mathematics and Statistics, The University of Melbourne*, Five large 3D printed sculptures, of surfaces and 4–dimensional polytopes in S^3, 2012.

Mathematical Illustration

- My two-dimensional design illustrating the Hopf fibration appears in *Visions of the Universe: A Coloring Journey Through Math's Great Mysteries*, by Alex Bellos and Edmund Harriss, published November 2016.
- A chapter heading for *Playing with Math*, edited by Sue VanHattum, features a photograph of my sculpture "Hopf Fibration 1", published March 2015.
- A photograph of a sculpture of a tesseract, by Saul Schleimer and me, was featured in *50 Visions of Mathematics*, edited by Sam Parc, published July 2014.
- The cover of *Maths in 100 Key Breakthroughs* by Richard Elwes, features a design of mine (the second "0"), published December 2013.
- Cover image for the November 2013 issue of the *College Mathematics Journal*, supporting the Mathematics of Planet Earth initiative, MPE 2013.
- The cover of *L'impression 3D*, by Mathilde Berchon and Bertier Luyt features a photograph of my sculpture (with Craig S. Kaplan), "Bunny" Bunny, published June 2013.
- Cover image and all illustrations for *Blast into Math!*, by Julie Rowlett, published January 2013.
- Cover image for *Number Theory Through Inquiry*, by David C. Marshall, Edward Odell & Michael Starbird, published December 2007.
- Cover design and some illustrations for *A Mathematical Mosaic: Patterns & Problem Solving (Revised Edition)*, by Ravi Vakil, published October 2007.

Service

- **Associate Editor** for the *Journal of Mathematics and the Arts*, 2012–present.
- Program Committee member for the Bridges 2012 – 2017 conferences.
- Program Committee member for the Shape Modeling International 2012, 2013, 2015 – 2017 conferences.
- Oklahoma State University Mathematics Department Graduate Comprehensive Review Committee, 2016–2017.
- Oklahoma State University Mathematics Department Graduate Committee, 2015–2016.
- Oklahoma State University Mathematics Department Hiring Committee, 2014–2015.
- Oklahoma State University Mathematics Department Undergraduate Committee, 2013–2014.
- Oklahoma State University Math Club Committee, 2013–present.
- University of Melbourne Department of Mathematics and Statistics Recruitment Publicity Committee, 2012–2013.

Other Activities

- *The Dice Lab*, a collaboration with Robert Fathauer to commercially produce mathematically interesting dice designs. Articles on our 120-sided die appeared

in The New Yorker, Wired, and Speigel Online. We are also consulting for **Callaway Golf** on golfball dimple designs, 2016–present.

- Various graphic design/art/math crossover projects. Of particular interest: *3D printed sculpture*, *Escher's Printgallery at Stanford*, *Book Covers and Posters*, *T-shirts* and *"Autologlyphs."*
- **University of Melbourne**
  - *Melbourne University Mathematics and Statistics Society*, 2010–2013.
- **University of Texas at Austin**
  - *UT Math Club*, 2007–2010.
  - *Texas Juggling Society*, 2007–2010.

Personal

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