

Bei Wang

Assistant Professor

School of Computing, Scientific Computing and Imaging Institute
University of Utah
72 S Central Campus Drive, Salt Lake City, UT 84112
beiwang@sci.utah.edu
<http://www.sci.utah.edu/~beiwang/>

Education

- 2010 Ph.D. in Computer Science, Duke University
Thesis: Separating Features from Noise with Persistence and Statistics
Advisor: Herbert Edelsbrunner
- 2010 Certificate in Computational Biology and Bioinformatics, Duke University
- 2004 Graduate student in Computer Science, State University of New York at Stony Brook
- 2003 B.S. in Computer Science and Mathematics, Minor in Psychology
Summa Cum Laude, University of Bridgeport

Professional Experience

- 2016 – Present Assistant Professor, School of Computing, Scientific Computing and Imaging Institute, University of Utah, Salt Lake City, UT
- 2011 – 2016 Research Computer Scientist, Scientific Computing and Imaging Institute, University of Utah, Salt Lake City, UT
- 2010 – 2011 Postdoctoral Fellow, Scientific Computing and Imaging Institute, University of Utah, Salt Lake City, UT
- 2009 – 2010 Visiting Researcher,
Institute of Science and Technology, Klosterneuburg, Austria

Research¹

Journal Publications / Book Chapters

- (J1) Critical Point Cancellation in 3D Vector Fields: Robustness and Discussion.
Primož Skraba, Paul Rosen, Bei Wang, Guoning Chen, Harsh Bhatia and Valerio Pascucci.
IEEE Transactions on Visualization and Computer Graphics (TVCG), 2016.
- (J2) Interstitial and Interlayer Ion Diffusion Geometry Extraction in Graphitic Nanosphere Battery Materials.
Attila Gyulassy, Aaron Knoll, Peer-Timo Bremer, Bei Wang, Kah Chun Lau, Michael Papka, Larry Curtiss, and Valerio Pascucci.
IEEE Transactions on Visualization and Computer Graphics (TVCG), 22(1), pages 916 - 925, 2016.
- (J3) Robustness-Based Simplification of 2D Steady and Unsteady Vector Fields.
Primož Skraba, Bei Wang, Guoning Chen and Paul Rosen.
IEEE Transactions on Visualization and Computer Graphics (TVCG), 21(8), pages 930 - 944, 2015.

¹Utah students underlined. Conference/workshop publications published identically as journal publications are marked with a star *. Undergraduate research is marked with two stars **. Authors ordered alphabetically are marked with an a.

- (J4) Local, Smooth, and Consistent Jacobi Set Simplification.
Harsh Bhatia, Bei Wang, Gregory Norgard, Valerio Pascucci and Peer-Timo Bremer.
Computational Geometry: Theory and Applications (CGTA), 48(4), Pages 311-332, 2015.
- (J5) ND2AV: N-Dimensional Data Analysis and Visualization – Analysis for the National Ignition Campaign.
Peer-Timo Bremer, Dan Maljovec, Avishek Saha, Bei Wang, Jim Gaffney, Brian K. Spears and Valerio Pascucci.
Computing and Visualization in Science (CVS), 17(1), pages 1- 18, 2015.
- (J6) Analyzing Simulation-Based PRA Data Through Traditional and Topological Clustering: A BWR Station Blackout Case Study.
Dan Maljovec, Shusen Liu, Bei Wang, Valerio Pascucci, Peer-Timo Bremer, Diego Mandelli and Curtis Smith.
Reliability Engineering & System Safety (RESS), to appear, 2015.
- (J7) Visual Exploration of High-Dimensional Data through Subspace Analysis and Dynamic Projections.
Shusen Liu, Bei Wang, Jayaraman J. Thiagarajan, Peer-Timo Bremer and Valerio Pascucci.
Computer Graphics Forum (CGF), 34(3), pages 271-280, 2015.
- (J8) Distortion-Guided Structure-Driven Interactive Exploration of High-Dimensional Data.
Shusen Liu, Bei Wang, Peer-Timo Bremer and Valerio Pascucci.
Computer Graphics Forum (CGF), 33(3), pages 101-110, 2014.
- (J9) Interpreting Feature Tracking Through the Lens of Robustness.^a
Primoz Skraba and Bei Wang.
Topological Methods in Data Analysis and Visualization III: Theory, Algorithms, and Applications, pages 19-38, 2014.
- (J10) Visualizing Robustness of Critical Points for 2D Time-Varying Vector Fields.
Bei Wang, Paul Rosen, Primoz Skraba, Harsh Bhatia and Valerio Pascucci.
Computer Graphics Forum (CGF), 32(2), pages 221-230, 2013.
- (J11) Adaptive Sampling with Topological Scores.
Dan Maljovec, Bei Wang, Ana Kupresanin, Gardard Johannesson, Valerio Pascucci, Peer-Timo Bremer.
International Journal for Uncertainty Quantification (IJUQ), 3(2), pages 119-141, 2013.
- (J12) Branching and Circular Features in High Dimensional Data.
Bei Wang, Brian Summa, Valerio Pascucci and Mikael Vejdemo-Johansson.
IEEE Transactions on Visualization and Computer Graphics (TVCG), 17(12), pages 1902-1911, 2011.
- (J13) Computing Elevation Maxima by Searching the Gauss Sphere.
Bei Wang, Herbert Edelsbrunner and Dmitriy Morozov.
ACM Journal of Experimental Algorithmics (JEA), 16, pages 1-13, 2011.
- (J14) A Computational Screen for Site Selective A-to-I Editing Detects Novel Sites in Neuron Specific Hu Proteins.
Mats Ensterö, Örjan Åkerborg, Daniel Lundin, Bei Wang, Terrence S Furey, Marie Öhman and Jens Lagergren.
BMC Bioinformatics, 11(6), 2010.

- (J15) Two Proteins for the Price of One: The Design of Maximally Compressed Coding Sequences.
Bei Wang, Dimitris Papamichail, Steffen Mueller and Steven Skiena.
Natural Computing, 6(4), pages 359-370, 2007.
- (J16) Experimental Robot Musicians.**
Tarek M. Sobh, Bei Wang and Kurt W. Coble.
Journal of Intelligent and Robotic System (JIRS), 38(2), pages 197-212, 2003.
- (J17) A Mobile Wireless and Web-based Analysis Tool for Robot Design and Dynamic Control Simulation from Task Points Description.**
Tarek M. Sobh, Bei Wang and Sarosh Patel.
Journal of Internet Technology, 4(3), pages 153-161, 2003.
- (J18) Web Based Remote Surveillance of Mobile Robot.**
Tarek M. Sobh, Rajeev Sanyal and Bei Wang.
Journal of Internet Technology, 4(3), pages 179-184, 2003.

Conference Publications

- (C1) Convergence between Categorical Representations of Reeb Space and Mapper.^a
Elizabeth Munch and Bei Wang.
International Symposium on Computational Geometry (SOCG), 2016.
- (C2) Kernel Partial Least Squares Regression for Relating Functional Brain Network Topology to Clinical Measures of Behavior.
Eleanor Wong, Sourabh Palande, Bei Wang, Brandon Zielinski, Jeffrey Anderson and P. Thomas Fletcher.
International Symposium on Biomedical Imaging (ISBI), 2016.
- (C3) Grassmannian Atlas: A General Framework for Exploring Linear Projections of High-Dimensional Data.
Shusen Liu, Peer-Timo Bremer, Jayaraman J. Thiagarajan, Bei Wang, Brian Summa and Valerio Pascucci.
Eurographics Conference on Visualization (EuroVis), 2016.
- (C4) Exploring Persistent Local Homology in Topological Data Analysis.^a
Brittany T. Fasy and Bei Wang.
Special session on Topological Methods in Data Science and Analysis,
IEEE International Conference on Acoustics, Speech and Signal Process (ICASSP), 2016.
- (C5) Critical Point Cancellation in 3D Vector Fields: Robustness and Discussion.
Primoz Skraba, Paul Rosen, Bei Wang, Guoning Chen, Harsh Bhatia and Valerio Pascucci.
Proceedings IEEE Pacific Visualization (PacificVis), 2016.
Best Paper Award.
- (C6) Topology-Inspired Partition-Based Sensitivity Analysis and Visualization of Nuclear Simulations.
Daniel Maljovec, Bei Wang, Paul Rosen, Andrea Alfonsi, Giovanni Pastore, Cristian Rabiti and Valerio Pascucci.
Proceedings IEEE Pacific Visualization (PacificVis), 2016.
- (C7) Geometric Inference on Kernel Density Estimates.^a
Jeff M. Phillips, Bei Wang and Yan Zheng.
International Symposium on Computational Geometry (SOCG), 2015.

- (C8) Interstitial and Interlayer Ion Diffusion Geometry Extraction in Graphitic Nanosphere Battery Materials.*
Attila Gyulassy, Aaron Knoll, Peer-Timo Bremer, Bei Wang, Kah Chun Lau, Michael Papka, Larry Curtiss, and Valerio Pascucci.
Proceedings IEEE Visualization Conference (VIS), 2015.
- (C9) Visualizing High-Dimensional Data: Advances in the Past Decade.
Shusen Liu, Dan Maljovec, Bei Wang, Peer-Timo Bremer and Valerio Pascucci.
Eurographics Conference on Visualization (EuroVis), State-of-the-Art Report (STAR), 2015.
- (C10) Visual Exploration of High-Dimensional Data through Subspace Analysis and Dynamic Projections.*
Shusen Liu, Bei Wang, Jayaraman J. Thiagarajan, Peer-Timo Bremer and Valerio Pascucci.
Eurographics Conference on Visualization (EuroVis), 2015.
- (C11) Approximating Local Homology from Samples.^a
Primož Skraba and Bei Wang.
Proceedings 25th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA), pages 174-192, 2014.
- (C12) 2D Vector Field Simplification Based on Robustness.
Primož Skraba, Bei Wang, Guoning Chen and Paul Rosen.
IEEE Pacific Visualization (Pacific Vis), 2014.
Best Paper Award.
- (C13) Multivariate Volume Visualization through Dynamic Projections.
Shusen Liu, Bei Wang, Jayaraman J. Thiagarajan, Peer-Timo Bremer and Valerio Pascucci.
IEEE Symposium on Large Data Analysis and Visualization (LDAV), 2014.
- (C14) Analyzing Simulation-Based PRA Data Through Clustering: a BWR Station Blackout Case Study.
Dan Maljovec, Shusen Liu, Bei Wang, Valerio Pascucci, Peer-Timo Bremer, Diego Mandelli and Curtis Smith.
Probabilistic Safety Assessment & Management conference (PSAM), 2014.
- (C15) Overview of New Tools to Perform Safety Analysis: BWR Station Black Out Test Case.
Diego Mandelli, Curtis Smith, Tom Riley, Joseph Nielsen, John Schroeder, Cristian Rabiti, Andrea Alfonsi, Joshua Cogliati, Robert Kinoshita, Valerio Pascucci, Bei Wang and Dan Maljovec.
Probabilistic Safety Assessment & Management conference (PSAM), 2014.
- (C16) Distortion-Guided Structure-Driven Interactive Exploration of High-Dimensional Data.*
Shusen Liu, Bei Wang, Peer-Timo Bremer and Valerio Pascucci.
Eurographics Conference on Visualization (EuroVis), 2014.
- (C17) Visualizing Robustness of Critical Points for 2D Time-Varying Vector Fields.*
Bei Wang, Paul Rosen, Primož Skraba, Harsh Bhatia and Valerio Pascucci.
Eurographics Conference on Visualization (EuroVis), 2013.
- (C18) Exploration of High-Dimensional Scalar Function for Nuclear Reactor Safety Analysis and Visualization.
Dan Maljovec, Bei Wang, Valerio Pascucci, Peer-Timo Bremer, Michael Pernice, Diego Mandelli and Robert Nourgaliev.
Proceedings International Conference on Mathematics and Computational Methods Applied to Nuclear Science & Engineering (M&C), pages 712-723, 2013.
- (C19) Adaptive Sampling Algorithms for Probabilistic Risk Assessment of Nuclear Simulations.
Dan Maljovec, Bei Wang, Diego Mandelli, Peer-Timo Bremer and Valerio Pascucci.

International Topical Meeting on Probabilistic Safety Assessment and Analysis (PSA), 2013.
First runner-up for the Best Student Paper Award.

- (C20) Analyze Dynamic Probabilistic Risk Assessment Data through Clustering.
Dan Maljovec, Bei Wang, Diego Mandelli, Peer-Timo Bremer and Valerio Pascucci.
International Topical Meeting on Probabilistic Safety Assessment and Analysis (PSA), 2013.
- (C21) Local Homology Transfer and Stratification Learning.
Paul Bendich, Bei Wang and Sayan Mukherjee.
Proceedings 23rd Annual ACM-SIAM Symposium on Discrete Algorithms (SODA), pages 1355-1370, 2012.
- (C22) Topological Analysis and Visualization of Cyclical Behavior in Memory Reference Traces.
A.N.M. Imroz Choudhury, Bei Wang, Paul Rosen and Valerio Pascucci.
IEEE Pacific Visualization (Pacific Vis), 2012.
- (C23) Branching and Circular Features in High Dimensional Data.*
Bei Wang, Brian Summa, Valerio Pascucci and Mikael Vejdemo-Johansson.
Proceedings IEEE Visualization Conference (VIS), 2011.
- (C24) Computing Elevation Maxima by Searching the Gauss Sphere.*
Bei Wang, Herbert Edelsbrunner and Dmitriy Morozov.
Proceedings 13th International Symposium on Experimental Algorithms (SEA), 2009.
Lecture Notes in Computer Science (LNCS), 5526, pages 281-292, 2009.
- (C25) Spatial Scan Statistics for Graph Clustering.
Bei Wang, Jeff M. Phillips, Robert Schrieber, Dennis Wilkinson, Nina Mishra and Robert Tarjan.
Proceedings 8th SIAM International Conference on Data Mining (SDM), 2008.
- (C26) A Framework for Modeling DNA Based Molecular Systems.
Sudheer Sahu, Bei Wang and John H. Reif.
Proceedings 12th International Meeting on DNA Computing (DNA), 2006.
Lecture Notes in Computer Science (LNCS), 4287, pages 250-265, 2006.
- (C27) Two Proteins for the Price of One: The Design of Maximally Compressed Coding Sequences.*
Bei Wang, Dimitris Papamichail, Steffen Mueller and Steven Skiena.
Proceedings 11th International Meeting on DNA Computing (DNA), 2005.
Lecture Notes in Computer Science (LNCS), 3892, pages 387-398, 2006.
- (C28) Web Enabled Robot Design and Dynamic Control Simulation Software Solutions from Task Points Description.**
Tarek M. Sobh, Bei Wang, and Sarosh H. Patel.
Proceedings 29th Annual International Conference of the IEEE Industrial Electronics Society (IECON), 2003.

Workshop Publications

- (W1) Reeb Space Approximation with Guarantees.^a
Elizabeth Munch and Bei Wang.
25th Annual Fall Workshop on Computational Geometry (FWCG), 2015.
- (W2) Morse-Smale Analysis of Ion Diffusion for DFT Battery Materials Simulations.
Attila Gyulassy, Aaron Knoll, Kah Chun Lau, Bei Wang, Peer-Timo Bremer, Michael E. Papka, Larry A. Curtiss and Valerio Pascucci.
Topology-Based Methods in Visualization (TopoInVis), 2015.

- (W3) Interpreting Feature Tracking Through the Lens of Robustness.^a
 Primoz Skraba and Bei Wang.
Topology-Based Methods in Visualization (TopoInVis), 2013.
- (W4) A Comparative Study of Morse Complex Approximation Using Different Neighborhood Graphs.
 Dan Maljovec, Avishek Saha, Peter Lindstrom, Peer-Timo Bremer, Bei Wang, Carlos Correa, and Valerio Pascucci.
Topology-Based Methods in Visualization (TopoInVis), 2013.
- (W5) Kernel Distance for Geometric Inference.^a
 Jeff M. Phillips and Bei Wang.
22nd Annual Fall Workshop on Computational Geometry (FWCG), 2012.
- (W6) Adaptive Sampling with Topological Scores.*
 Dan Maljovec, Bei Wang, Ana Kupresanin, Gardard Johannesson, Valerio Pascucci, Peer-Timo Bremer.
Working with Uncertainty Workshop at IEEE VisWeek, 2011.
- (W7) Towards Stratification Learning through Homology Inference.^a
 Paul Bendich, Sayan Mukherjee and Bei Wang.
AAAI Fall Symposium on Manifold Learning and its Applications (AAAI), 2010.

Manuscripts

- (M1) Topology-Based Active Learning.
 Dan Maljovec, Bei Wang, John Moeller and Valerio Pascucci.
SCI Technical Report UUSCI-2014-00, 2014.

Invited/Contributed Talks

Selected Invited Talks

- Pacific Northwest National Laboratory, 2015.
- SAMSI workshop on Topological Data Analysis, research program on Low Dimensional Structure in High Dimensional Systems, 2014.
- Computer Science Department, Ohio State University, 2014.
- Computer Science Department Colloquium, University of Connecticut, 2013.
- Colloquium Series in School of Engineering, University of Bridgeport, 2013.
- IMA Workshop on Modern Applications of Homology and Cohomology, 2013.
- PSA Technical Workshop on Topological Data Analysis and Visualization for Large-Scale and High-Dimensional Science Discovery (Organizer and Speaker), 2013.
- SIAM Conference on Applied Algebraic Geometry (AG), Mini-symposium on Applied and Computational Topology, 2013.
- AMS-MAA Joint Mathematics Meeting (JMM), special session on Computational and Applied Topology, 2012.
- Theory Lunch, School of Computer Science, Carnegie Mellon University, 2012.
- Applied Math Seminar, Department of mathematics, University of Utah, 2012.
- Yaroslavl international conference Discrete Geometry dedicated to centenary of A.D.Alexandrov, Russia, 2012.
- Summer school of the Delaunay Laboratory, Russia, 2012.

- ACM Symposium on Computational Geometry (SOCG) Workshop on Computational Topology, 2012.
- Fields Institute for Research in Mathematical Sciences, Thematic Program on Discrete Geometry and Applications, Workshop on Computational Topology, 2011.

Selected Conference Presentations

- IEEE Pacific Visualization (PacificVis), 2016.
- IEEE Pacific Visualization (PacificVis), 2014.
- Topology-Based Methods in Visualization (TopoInVis), 2013.
- 22nd Annual Fall Workshop on Computational Geometry (FWCG), 2012.
- 23rd Annual ACM-SIAM Symposium on Discrete Algorithms (SODA), 2012.
- AAAI Fall Symposium on Manifold Learning and its Applications (AAAI), 2010.
- 13th International Symposium on Experimental Algorithms (SEA), 2009.
- SIAM International Conference on Data Mining (SDM), 2008.
- 11th International Meeting on DNA Computing (DNA), 2005.

Awards

- Best Paper Award at IEEE Pacific Visualization (PacificVis), 2016.
- Best Paper Award at IEEE Pacific Visualization (PacificVis), 2014.
- First runner-up for the Best Student Paper Award at International Topical Meeting on Probabilistic Safety Assessment and Analysis (PSA), 2013.
- Best Teaching Assistant, Department of Computer Science, Duke University, 2007.
- The Honor Society of Phi Kappa Phi Award of Excellence, 2003-2004.
- President's Award, Student Leadership Award, University of Bridgeport, 2003.
- Dean's Award, School of Engineering, University of Bridgeport, 2003.
- Academic Achievement in Computer Science (B.S.), School of Engineering, University of Bridgeport, 2003.
- Honorable Mention, Student Paper Contest, New England Section of the American Society for Engineering Education, 2003.
- Charles Reed Award for superior scholarly achievements, School of Engineering, University of Bridgeport, 2002.
- Student Leadership Award: Outstanding Involvement by a Junior, University of Bridgeport, 2002.
- Sigma Xi Grant-in-Aid of Research recipient, 2002
- Upsilon Pi Epsilon Microsoft Scholarship Award, 2002
- University Dean's List, University President's List, 2001-2002
- Certificate of Achievement, ACM Programming Contest Northeast Regional Preliminary Western New England College Site, 2001.

Teaching

- Spring 2016: Instructor for *CS 1060 - Explorations in Computer Science* (undergraduate level), School of Computing, University of Utah
- Spring 2016: Instructor for *CS 4960 - Introduction to Computational Geometry* (undergraduate level), School of Computing, University of Utah

- Fall 2015: Instructor for *CS 6210 - Advanced Scientific Computing I* (graduate level), School of Computing, University of Utah.
- Fall 2012: Guest lecturer for *CS 5630/6630: Introduction to Visualization* (graduate level), School of Computing, University of Utah.
- Summer 2012: Lecturer for the *Summer School of the Delaunay Laboratory* (graduate level), Russia
- Spring 2011: Co-Instructor for *CS 6967 - Computational Topology with Applications* (graduate level), School of Computing, University of Utah.
- Spring 2007: Teaching Assistant for CPS 102: *Discrete Mathematics for Computer Science* (undergraduate level). Department of Computer Science, Duke University. **Best Teaching Assistant**.
- Fall 2003 - Spring 2004: Teaching Assistant for *Algorithms in Computational Biology* (graduate level) and *Java Programming* (undergraduate level), Department of Computer Science, State University of New York at Stony Brook.

External Service

Program Committees

- EG/VGTC Conference on Visualization (EuroVis), Short Paper Track, 2016.
- Topology-Based Methods in Visualization (TopoInVis), 2015.

Journal/Conference Reviewing/Sub-Reviewing (for some multiple times)

- Discrete & Computational Geometry (DCG),
- Computational Geometry Theory and Applications (CGTA),
- International Journal of Computational Geometry & Applications (IJCGA),
- Journal of Computational Geometry (JoCG),
- IEEE/ACM Transactions on Computational Biology and Bioinformatics (TCBB),
- IEEE Transactions on Visualization and Computer Graphics (TVCG),
- Book chapter for AMS short course in Joint Math Meetings (JMM).
- ACM Symposium on Theory of Computing (STOC),
- ACM-SIAM Symposium on Discrete Algorithms (SODA),
- (ACM) Symposium on Computational Geometry (SOCG),
- European Symposium on Algorithms (ESA),
- SIAM Algorithm Engineering and Experiments (ALENEX),
- IEEE Conference on Visualization (VIS),
- Eurographics Conference on Visualization (EuroVis),
- Topology-Based Methods in Visualization (TopoInVis).

Other Synergistic Activities

- Founding member of Women in Visualization Mentoring Network, 2015
- Member of Women in Computational Topology Network, 2015
- Research Team Leader, Speaker, Applied Algebraic Topology Research Network, 2014-2015.
- Workshop Organizer and Speaker: Topological Data Analysis and Visualization for Large-Scale and High-Dimensional Science Discovery. International Topical Meeting on Probabilistic Safety Assessment and Analysis (PSA), 2013.
- Session Chair, Topology-Based Methods in Visualization (TopoInVis), 2013.

- Organizer for Visualization Seminar, SCI Institute, University of Utah, 2011-2012.
- Session Chair, International Conference of the IEEE Industrial Electronics Society (IECON), 2003.
- President, University Chapter, Univ. of Bridgeport, The Honor Society of Upsilon Pi Epsilon, 2003.
- Member of ACM Programming Contest team representing State University of New York at Stony Brook, 2003.
- Member of ACM Programming Contest team representing University of Bridgeport, 2001.

Students

Student Supervising

- Sourabh Palande (PhD)

Unofficial Student Supervising

- Shusen Liu (PhD, supervisor Valerio Pascucci), co-advising.
- Dan Maljovec (PhD, supervisors Valerio Pascucci, Elaine Cohen), co-advising.

Student Mentoring

- Brian Summa (PhD), research project mentoring.
- Harsh Bhatia (PhD), multiple research project mentoring.
- Yan Zheng (PhD), research project mentoring.
- Hoa Nguyen (PhD), research project mentoring.
- Wathsala Widanagamaachchi (PhD), research project mentoring.
- Liang He (MS), summer research project mentoring (summer 2012).
- Soumya S. Mishra (MS), independent study (fall 2014).
- Sam Leventhal (PhD), independent study (spring 2016).

PhD Committee

- Shusen Liu (PhD, supervisor Valerio Pascucci).
- Dan Maljovec (PhD, supervisors Valerio Pascucci, Elaine Cohen).

Advisors

Ph.D advisor: Herbert Edelsbrunner, Duke University. (2004-2010)

Postdoctoral advisor: Valerio Pascucci, Scientific Computing and Imaging Institute, University of Utah. (2010-2011)