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Electronic Visualization Lab
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Research Overview

Research into automated techniques and computational representations for scientific modeling and data visualization.

Education

Ph.D., Computer Science, Brown University, 2007.

Data-Driven Predictive Modeling of Diarthrodial Joints

Research in computer graphics and visualization for biological applications. Created novel computational modeling, visualization, and analysis tools which are needed to model anatomical joints and their variation with disease progression.

Sc.M., Computer Science, Brown University, 2001.

Estimating Ligament Lengths from Bone Kinematics and Surfaces

M.S., Computer Science & Electrical Engineering, Politehnica University, Romania, 1998.

KQML – Communication among Intelligent Agent Systems

B.S., Computer Science & Electrical Engineering, Politehnica University, Romania, 1997.

Time-delay Neural Network System for Speech Recognition

Experience and Appointments

Current:

Associate Professor, Department of Computer Science, University of Illinois at Chicago,
Jan 2015 – current.

Computational research into robust, scalable and effective computer science and visualization tools to solve problems in science and engineering. Specific research projects include visualization of large scale vector-valued and tensor-valued fields, visual integration of spatial and non-spatial information, visualization and cross-registration of large-scale, multivariate data, intelligent algorithms for automated tracking of orthopaedic data, geometric tools for tissue modeling and simulation.

Project management, fund raising, grant management, interdisciplinary collaboration, public communication, results dissemination, software engineering, software deployment, teaching, advising and mentoring.

Past:

Visiting Faculty, Robotics Institute, Carnegie Mellon University, May 2014 – Dec 2014.
Computational modeling research to help solve problems in robotics and computer animation.

Assistant Professor, Department of Computer Science, University of Pittsburgh, July 2007 – Sept 2014.

Founder and Director of the [Interdisciplinary Visualization Lab](#). Raised over \$2.7M in federal grants for research. Twice Pitt Faculty Honoree for most outstanding research accomplishments. NSF CAREER Award. Three Outstanding Paper awards; one NSF Graduate Fellowship to my student. Six Teaching Awards, five based on student feedback and one at the Provost level. Founder and advisor to the Pitt Women in CS student organization; outreach activities. [Thanks, Pitt, I quit](#). (<http://visualizlab.org/people/marai/thankspitt.html>).

Computational research into robust, scalable and effective computer science and visualization tools to solve problems in science and engineering. Project management, lab management and directing, fund raising, grant management, interdisciplinary collaboration, public communication, results dissemination, software engineering, software deployment, teaching, advising and mentoring.

Joint Assistant Professor, Department of Computational and Systems Biology, University of Pittsburgh School of Medicine, Secondary Appointment, 2009 – 2014.
Visualization, modeling and simulation for rule-based biochemical systems.

Adjunct Assistant Professor of Computer Science, Robotics Institute, Carnegie Mellon University, 2007 – 2014.

Computational modeling research to help solve problems in robotics and computer animation.

Research Assistant, Brown University, 2000 – 2007.

Interdisciplinary work in articulation modeling and visualization (CS, Bioengineering, Orthopedics, Evolutionary Biology).

CS Faculty-Graduate Liaison, Brown University, 2003 – 2005.

Lobbied and raised funding for grad student interests.

Instructor, Brown University, 2004.

“Interactive Computer Graphics”, full class responsibility together with fellow graduate students M. McGuire and T. Moscovich

Teaching Assistant, Brown University, 2003.

“Interactive Computer Graphics”. Led seminars and help-sessions, guest-lectured, mentored final projects.

Research intern, Philips Research, Netherlands, Summer 1998.

Designed and implemented a geometry compression engine for video-games.

Lab instructor, Politehnica University, Romania, 1997 – 1999.

Introductory Programming, Data Structures and Algorithms, Scientific Computing, Parallel Processing. Taught seminars and labs, designed and graded assignments and independent-study projects.

Intern, Electromagnetica Ltd, Romania, Summers 1992, 1994.

Programmed parts of a VLSI-circuit design project.

Honors and Awards

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- 2013 **IEEE Biology Visualization Data Contest Visualization Award**, IEEE BioVis 2013
 - 2013 Pitt CS Teaching Award Nomination, Graduate seminar level
 - 2012 **IEEE Large Data Analysis and Visualization Honorable Mention** (Best-Paper Runner-Up Award), IEEE LDAV 2012
 - 2012 Desire2Learn Edge Challenge shortlist (\$25K teaching-industry competition)
 - 2012 **Computing Research Association-W Advanced Career Mentoring Workshop Travel Award**
 - 2012 Pitt CS Teaching Award, Graduate course level
 - 2011 **IEEE Biology Visualization Best Paper Award**, IEEE BioVis 2011; Pitt faculty honoree
 - 2011 Pitt CS Teaching Award, Upper-level undergraduate course
 - 2010 Pitt CS Teaching Award, Upper-level undergraduate course, top 4% in School of A&S
 - 2010 **National Science Foundation CAREER Award**; Pitt faculty honoree
 - 2009 Pitt Speaking in the Disciplines Fellowship
 - 2009 Pitt CS Teaching Award, Graduate course, top 4% in School of A&S
 - 2009 **Innovation in Education Award**, Pitt Provost's Advisory Council on Instructional Excellence
 - 2008 Pitt CS Teaching Award, Graduate seminar
 - 2004 **ACM SIGGRAPH Student Research Competition semifinalist** – twice, first nomination with students Peter Sibley and Phil Montgomery; and second with students Ethan Bromberg and Arni Jonsson. Brown University Travel Grant and **ACM Travel Awards**.
 - 2001 **Pixar Fellowship**
 - 2000 **Microsoft Fellowship**
 - 1999 **Brown University Fellowship**
 - 1997,1996 **Romanian National 'Scholar Merit' Fellowship**
 - 1996 **Best Paper Award** at the Politehnica Bioengineering'96 Scientific Session

Pitt CS Teaching Awards reward most-effective teaching at specific levels during the previous academic year; measured using the University-conducted student-evaluations of courses and instructors.

Journal Publications¹

- J14. J. Aurisano, K. Reda, A. Johnson, G.E. Marai, J. Leigh, “BactoGeNIE: A Large-Scale Comparative Genome Visualization for Big Displays”, *BMC Bioinformatics Journal*, pp. 1-13, 2015. **(IF 2.58)**
- J13. J. Wenskovitch, L.A. Harris, J.J. Tapia, J.R. Faeder, G.E. Marai, “MOSBIE: A Tool for Comparison and Analysis of Rule-Based Biochemical Models”, *BMC Bioinformatics Journal*, pp. 1-21, 2014. **(IF 2.68)**
- J12. T. Luciani, J. Wenskovitch, K. Chen, D. Koes, T. Travers, G.E. Marai, “FixingTIM: Interactive Exploration of Sequence and Structural Data to Identify Functional Mutations in Protein Families”, *BMC Bioinformatics Journal*, pp. 1-10, 2014. **(IF 2.68)**
- J11. T. Luciani, B. Cherinka, S. Myers, W.M. Wood-Vasey, A. Labrinidis, G.E. Marai, “Large-Scale Overlays and Trends: Visually Mining, Panning and Zooming the Observable Universe”, *IEEE Transactions on Visualization and Computer Graphics*, pp. 1-14, 2014. **(IF 2.21)**
- J10. N. Mays, C. Rosano, H. Aizenstein, R. Boudreau, G.E. Marai, A. Maries, W. Layton*, F. Thomas, K. Yaffe, L.J. Launer. A.B. Newman, “Using iterated Tikhonov regularization with the L-curve method to Quantify the Correlation Between Neuroimaging and Gait Data”, *International Journal of Computer Math* pp. 1-27, 2014 (accepted conditionally to minor review).
- J9. A. Maries, N. Mays, M. Olson Hunt, K. Wong, W. Layton, C. Rosano, R. Boudreau, G.E. Marai, “GRACE: A Visual Comparison Framework for Integrated Spatial and Non-Spatial Geriatric Data”, *IEEE Transactions on Visualization and Computer Graphics*, pp.1-10, Oct 2013. **(IF 2.21)**
- J8. Md. A. Haque, W. Anderst, S. Tashman, G.E. Marai, “Hierarchical Dynamic Model-based Tracking of Cervical Vertebrae from Fluoroscopy Images”, *Journal Medical Physics and Engineering*, 35(7): 994-1004, July 2013. **(IF 2.11)**
- J7. A.M. Smith, W. Xu, Y. Sun, J.R. Faeder, G.E. Marai, “RuleBender: Integrated Modeling, Simulation and Visualization for Rule-Based Intracellular Biochemistry”, *BMC Journal Bioinformatics*, 13 (Visualization Issue, Suppl 8):S3: 1-16, Jun 2012. **(IF 3.02)**
- J6. W. Xu, A. Smith, J.R. Faeder, G.E. Marai, “RuleBender: A Visual Interface for Rule-Based Modeling”, *Bioinformatics Journal*, 27: 1721-2, Apr 2011 **(IF 5.47)**
- J5. J.S. Albrecht, R. Hwa, G.E. Marai, “The Chinese Room: Visualization and Interaction to Understand and Correct Ambiguous Machine Translation”. *Computer Graphics Forum* 28: 1047-1054 (also in 2009 *Eurographics/IEEE Symposium on Visualization, Proceedings of*), June 2009. **(IF 1.64)**

¹ In most cases, the last author listed denotes the project leader. In rare cases where the project leader is not listed last, they are indicated with an asterisk – *. Underscores denote my advisees; IF x.xx – impact factor.

J4. G.E. Marai*, C.M. Grimm, D.H. Laidlaw, “Arthroial Joint Markerless Cross-Parameterization and Biomechanical Visualization”, *IEEE Transactions on Visualization and Computer Graphics* 13(5): 1095-1104, Sep/Oct 2007. (IF 2.22)

J3. J.J. Crisco*, D. Moore, G.E. Marai, D.H. Laidlaw, E. Akelman, A.C. Weiss, S.W. Wolfe, “Effects of Distal Radius Malunion on Distal Radioulnar Joint Mechanics—An In Vivo Study”, *Journal of Orthopedic Research* 25(4): 547-555, Jan. 2007. (IF 2.81)

J2. G.E. Marai, J.J. Crisco, D.H. Laidlaw, “Super-Resolution Registration Using Tissue-Classified Distance Fields”, *IEEE Transactions on Medical Imaging*, 25(2): 177-187, Feb. 2006. (IF 3.64)

J1. G.E. Marai, C. Demiralp, S. Andrews, C.M. Grimm, J.J. Crisco, D.H. Laidlaw, “Estimating Joint Contact Areas and Ligament Lengths from Bone Kinematics and Surfaces”, *IEEE Transactions on Biomedical Engineering*, 51(5): 790-799, May 2003 (IF 2.28)

Edited Collections

E3. *BMC Bioinformatics Biological Data Visualization Series*, G.E. Marai, S. O’Donoghue, C. Bartlett and J. Aerts, pp. 1 -100, BioMed Central, July 2014.

E2. *IEEE Third Symposium on Biological Data Visualization Proceedings*, G.E. Marai and K. Nieselt, pp. 1-130, IEEE Computer Society, Oct 2013.

E1. *Special Section on Biomedical Applications: From Data Capture to Modeling*, IEEE Computer Graphics & Applications, C. Grimm and G.E. Marai, pp. 20-80, IEEE Computer Society, Sept/Oct 2012.

Book Chapters (peer-reviewed)

B4. A. Maries, T. Luciani, P. Pesciuneri, M. Nik, S.L. Yilmaz, P. Givi, G.E. Marai, “A Clustering Method for Identifying Regions of Interest in Turbulent Combustion Tensor Fields”, *Visualization and Processing of Higher Order Descriptors for Multi-Valued Data*, pp. 1 -17, I. Hotz and T. Schultz (editors), Springer 2015.

B3. M. Hlawitschka, I. Hotz, A. Kratz, G.E. Marai*, R. Moreno, G. Scheuermann, M. Stommel, A. Wiebel, E. Zhang, “Top Challenges in the Visualization of Engineering Tensor Fields”, *Visualization and Processing of Tensors and Higher-Order Descriptors for Multi-field Data*, pp. 1 – 20, B. Burgeth, A. Vilanova and C.F. Westin (editors), Springer 2014.

B2. A. Maries, Md.A. Haque, S.L. Yilmaz, M.B. Nik, G.E. Marai, “Interactive Exploration of Stress Tensors Used in Computational Turbulent Combustion”, *New Developments in the Visualization and Processing of Tensor Fields*, pp. 137 – 156, D. Laidlaw and A. Vilanova (editors), Springer 2012.

B1. D.H. Laidlaw, G.E. Marai, K.E. Fleischer, A. Barr, “Partial Volume Segmentation and Boundary Distance Estimation with Voxel Histograms”, in Handbook of Medical Imaging: Processing and Analysis, 2nd edition, pp. 223 – 244, I.N. Bankman (editor), Academic Press 2010.

Peer-reviewed Conference Papers

C14. G.E. Marai, “Visual Scaffolding in Integrated Spatial and Nonspatial Visual Analysis”, pp. 1-5, The Sixth International Eurovis workshop on Visual Analytics EuroVA’15, May 2015

C-. J. Aurisano, K. Reda, A. Johnson, G.E. Marai, J. Leigh, “BactoGeNIE: A Large-Scale Comparative Genome Visualization for Big Displays”, pp. 1-13, The Fifth Symposium on Biological Data Visualization BioVis’15, July 2015. (also cross-listed as J14 above)
(submitted and reviewed under pseudonym)

C13. J. Wenskovitch, T. Luciani, K. Chen, G.E. Marai, “Fixing TIM: Identifying Functional Mutations in Protein Families through the Interactive Exploration of Sequence and Structural Data”, IEEE BioVis 2013 Data Competition, pp. 1–4, 2013. **IEEE BioVis’13 Data Contest Visualization Award.** (*grown into invited J12*)

C-. A. Maries, N. Mays, M. Olson, K. Wong, W. Layton, C. Rosano, R. Boudreau, G.E. Marai, “GRACE: A Visual Comparison Framework for Integrated Spatial and Non-Spatial Geriatric Data”, IEEE VIS 2013 (formerly VisWeek, formerly IEEE Visualization) SciVis, pp.1-10, Oct 2013. (also cross-listed as J9 above)

C12. Md. A. Haque, G. E. Marai, “A Semi-Automated Method for Subject-Specific Modeling of the Spinal Canal from Computed Tomography Images and Dynamic Radiographs”, The 18th International Workshop on Vision, Modeling and Visualization, pp. 1–8, Sep 2013.

C11. Md.A. Haque, G.E. Marai, “Image to Mesh: Spinal Ligament 2D Surface Models from Bone Volume Images and Dynamic Radiographs”, MICCAI 2013 Workshop on Mesh Processing in Medical Image Analysis, pp. 1-12, Sept 2013.

C10. M. Liang, J. Guerra, G.E. Marai, P. Brusilovsky, “Collaborative E-Learning through Open Social Student Modeling and Progressive Zoom Navigation”, The 8th IEEE International Conference on Collaborative Computing: Networking, Applications and Worksharing, pp. 1-10, Oct 2012.
Desire2Learn Edge Challenge shortlist.

C9. T. Luciani, S. Myers, B. Sun, B. Cherinka, W.M. Wood-Vassey, A. Labrinidis, G.E. Marai, “Panning and Zooming the Observable Universe with Prefix-Matching Indices and Pixel-Based Overlays”, IEEE Large-scale Data Analysis and Visualization Symposium, pp. 1-8, Oct 2012. **Best-Paper Runner-Up Award.** (*grown into J11*)

- C8. P. Neophytou, R. Gheorghiu, R. Hachey, T. Luciani, B. Sun, A. Labrinidis, G.E. Marai, P. K. Chrysanthis, “AstroShelf: Understanding the Universe through Scalable Navigation of a Galaxy of Annotations”, SIGMOD 2012 System Demonstrations, pp. 1-4, May 2012.
- C7. A.M. Smith, W. Xu, Y. Sun, J.R. Faeder, G.E. Marai, “RuleBender: Integrated Visualization for Biochemical Rule-Based Modeling”, IEEE Visualization 2011, IEEE BioVis: Symposium on Biological Data Visualization, pp.1-8, Oct 2011. **Best Paper Award.**
- C6. W. Xiong, D. Litman, G.E. Marai, “Analyzing Prosodic Features and Student Uncertainty using Visualization”, Association for the Advancement of Artificial Intelligence Fall Symposium (AAAI-FS’09), pp. 1-6, Nov 2009.
- C5. G.E. Marai, J.J. Crisco, D.H. Laidlaw, “Development of a Kinematic 3D Carpal Model to Analyze In Vivo Soft-Tissue Interaction Across Multiple Static Postures”, IEEE 31st Conf. of the Engineering in Medicine and Biology Society (EMBC’09), pp. 7176–7179, Sept. 2009. (Podium)
- C-. J.S. Albrecht, R. Hwa, G.E. Marai, “The Chinese Room: Visualization and Interaction to Understand and Correct Ambiguous Machine Translation”, Eurographics/IEEE Symposium on Visualization, Proceedings of, pp. 1-8, June 2009, *also in Computer Graphics Forum Journal.*
- C4. J. Albrecht, R. Hwa*. G.E. Marai, “Correcting Automatic Translations through Collaborations between MT and Monolingual Target-Language Users”, EACL 2009, 12th Conference of the European Chapter of the Association for Computational Linguistics, pp. 60-68, Mar. 2009.
- C3. G.E. Marai, J.J. Crisco, D.H. Laidlaw, “A Kinematics-Based Method for Evaluating the Stabilizing Role of Ligaments in the Carpal Joint”, 16th Annual Symposium on Computational Methods in Orthopaedic Biomechanics, Computational Modeling track, pp. 1-4, Mar. 2008 (Podium).
- C2. G.E. Marai, J.J. Crisco, D.H. Laidlaw, “A Kinematics-Based Method for Generating Cartilage Maps and Deformations in the Multi-Articulating Wrist Joint From CT Images”, IEEE 28th Conf. of the Engineering in Medicine and Biology Society (EMBC’06), pp. 2079-2082, Sept. 2006.
- C1. G.E. Marai*, A. Ivan, “Neural Networks versus Fuzzy Logic”, Politehnica Bioengineering Scientific Session, pp. 1-10, Politehnica University of Bucharest, pp. 1-10, May 1996. **Best paper award.**

Peer-reviewed Conference Short Papers, Abstracts and System Demonstrations

- S21. T. Luciani, A. Maries, M. Nik, L. Yilmaz, G.E. Marai, “Visualization of Tensor Quantities Used in Computational Turbulent Combustion”, American Physical Society, Division of Fluid Dynamics (APS DFD) Conference 2013, pp. 1-1, Nov 2013.
- S20. J. Wenskovitch, L. Harris, J. Faeder, G.E. Marai, “A Journaling System for Rule-Based Biochemical Models”, IEEE BioVis Posters Compendium, pp. 1–1, Oct 2013. (*grown into J13*)

- S19. T. Luciani, A. Maries, H. Tran, M. Nik, S.L. Yilmaz, G.E. Marai, “A Novel Method for Tracking Tensor-based Regions of Interest in Large-Scale, Spatially-Dense Turbulent Combustion Data”, IEEE Visualization 2012, Poster Abstracts with System Demonstration, pp. 1-2, Oct 2012. (*grown into B4*)
- S18. Md. A. Haque, W. Anderst, S. Tashman, G.E. Marai, “Validation of a Non-invasive Automated Hierarchical Method to Precisely Measure Lumbar Spine Movement”, The 2012 Annual Meeting of the Orthopaedic Research Society, Image Processing track, pp. 1, March 2012. (*grown into J8*)
- S17. T. Luciani, R. Hachey, D.Q. Oliphant, B.A. Cherinka, G.E. Marai, “Pixel-based Overlays for Navigating a Galaxy of Observations”, IEEE Visualization 2011, Large-scale Data Analysis and Visualization Symposium, Poster Abstracts with System Demonstration, pp. 1-2, Oct 2011.
- S16. A. Maries, S. Mandayam, C. Rosano, G.E. Marai, “Visual Analysis of Brain/Gait Correlations”, IEEE Visualization 2011, Poster Abstracts with System Demonstration, pp. 1-2, Oct 2011. (*grown into J10*)
- S15. S.D. Rothenberger, J.E. Wenskovitch, G.E. Marai, “Pexel and Heatmap Visual Analysis of Multidimensional Gun/Homicide Data”, IEEE Visualization 2011, Visual Analytics Science and Technology, Poster Abstracts with System Demonstration, pp. 1-2, Oct 2011.
- S14. A. Smith, W. Xu, J.R. Faeder, G.E. Marai, “Scalable Global Views for Biological Rule-Based Modeling”, IEEE Visualization 2011, InfoVis Poster Abstracts with System Demonstration, pp. 1-2, Oct 2011. (*grown into J7*)
- S13. Md. A. Haque, A. Maries, S.L. Yilmaz, M.B. Nik, G.E. Marai, “Tensor Visualization in Computational Turbulent Combustion: A Case Study”, IEEE Visualization 2010, Poster Abstracts with System Demonstration, pp. 1-2, Oct 2010. (*grown into B2*)
- S12. G.E. Marai, J.J. Crisco, D.H. Laidlaw, “Estimation of Optimal Carpal Contact in the Human Wrist from Multiple Static Articulation Postures”, 2009 Biomedical Engineering Society (BMES) Annual Meeting, Computational Modeling track, pp.1, Oct 2009 (Podium).
- S11. G.E. Marai, “MyWorld4D: Introduction to Computer Graphics with a Modeling and Simulation Twist”, ACM SIGGRAPH 2009, Education Talks Track, pp. 1, Aug. 2009.
- S10. A.M. Smith, J.J. Geiger, G.M. Kapfhammer, M. Renieris, G.E. Marai, “Interactive Coverage Effectiveness Multiplots for Evaluating Prioritized Regression Test Suites”, IEEE Visualization 2009, Poster Abstracts with System Demonstration, pp. 1-2, Oct 2009.
- S9. J.S. Albrecht, R. Hwa, G.E. Marai, “The Chinese Room – Understanding and Correcting Machine Translation”, IEEE Information Visualization 2008, Poster Abstracts with System Demonstration, pp. 1-2, Oct. 2008. (*grown into J5*)
- S8. G.E. Marai*. D.H. Laidlaw, “Markerless inter-subject bone shape matching using 2D projections”, Medical Image Computing and Computer Assisted Intervention (MICCAI) 2005, pp. 1-2, 2005. (*grown into J4*)
- S7. G.E. Marai, C. Demiralp, S. Andrews, D.H. Laidlaw, “JointViewer – an interactive system for exploring orthopedic data”, IEEE Visualization 2004, Poster Abstracts with System Demonstration, pp. 1-2, 2004.
- S6. E. Bromberg, A. Jonsson, G.E. Marai*, M. McGuire, “Hybrid Billboard Clouds for Model Simplification”, ACM SIGGRAPH Poster Compendium, pp. 1-2, 2004. **ACM Student Research Competition semifinalist.**

S5. P. Sibley, P. Montgomery, G.E. Marai, “Wang Cubes for Video Synthesis and Geometry Placement”, ACM SIGGRAPH Poster Compendium, pp. 1-2, 2004. **ACM Student Research Competition semifinalist.**

S4. J.J. Crisco*, G.E. Marai, D.H. Laidlaw, D. Moore, E. Akelman, “Kinematic and mechanical changes in the distal radioulnar joint (DRUJ) of patients with malunited distal radius fractures”, 49th Annual Meeting of the Orthopaedic Research Society, Computational Modeling track, pp. 1, 2003. (*grown into J1*)

S3. G.E. Marai, D.H. Laidlaw, J.J. Coburn, M.A. Upal, J.J. Crisco, “A 3D Method for Segmenting and Registering Carpal Bones from CT Volume Images”, Annual Meeting of the American Society of Biomechanics, Medical Imaging track, pp. 1, 2003. (*grown into J2*)

S2. G.E. Marai, D.H. Laidlaw*, C. Demiralp, C. Grimm, J.J. Crisco, D. Moore, and E. Akelman, “Contact Areas and Ligament Lengths are Abnormal in Patients with Malunited Distal Radius Fracture Despite Normal Radioulnar Kinematics”, 4th World Congress Biomechanics, Computational Modeling track, pp.1-2, 2002.

S1. C. Demiralp, G.E. Marai, S. Andrews, D.H. Laidlaw*, J.J. Crisco, C. Grimm, “Modeling and Visualization of Inter-Bone Distances in Joints”, IEEE Visualization 2001, Work in Progress Proceedings, pp. 24-25, 2001.

Other Publications

O5. J. Aerts, G.E. Marai, K. Nieselt, C. Nielsen, M. Streit, D. Weiskopf. **Highlights from the 5th Symposium on Biological Data Visualization: Part 1.** *BMC Bioinformatics* 2015, **16**(Suppl 11):S1 (13 August 2015)

O4. J. Aerts, G.E. Marai, K. Nieselt, C. Nielsen, M. Streit, D. Weiskopf. **Highlights from the 5th Symposium on Biological Data Visualization: Part 2.** *BMC Proceedings* 2015, **9**(Suppl 6):S1 (13 August 2015)

O3. D.Q. Oliphant, G.E. Marai, “Real Time Ray Tracing in a Space Limited Environment”, Technical Report TR-2011-03, University of Pittsburgh, Computer Science Department, 2010.

O2. A.M. Smith, W. Xu, Y. Sun, J.R. Faeder, G.E. Marai, “Visual Tools for Modeling and Simulation of Cell Signaling Networks”, Carnegie Mellon Bioimaging Informatics Symposium, Sep 2010.

O1. G.E. Marai, “Geometry Compression of DirectX Files”, Technical Report 322/98, Philips Research, September 1998 (company-restricted distribution).

Patents

Intelligent algorithms for tracking three-dimensional skeletal movement from dynamic stereo-radiographic image sequences, S. Tashman; G.E. Marai; Md.A. Haque; provisional filing 02603/March 2012.

Software

Created, maintained, deployed and/or freely distributed

RuleBender: a free visual tool for constructing, debugging, simulating and analyzing rule-based biological models. Distribution for Windows, Linux and OSX, 32 bit and 64 bit. More than 1,000 downloads in 2012 alone.

<http://www.rulebender.org>

GRACE: a visual comparison tool for integrated spatial and non-spatial geriatric data. Distribution for Linux and OSX, commissioned by and deployed to the Pitt Graduate School for Public Health. Described as their “Dream Tool” by the user.

Fixing TIM: a visual mining and analysis tool to help identify protein mutations across family structural models, and to help discover the effect of these mutations on protein function. Linux distribution, currently in beta-release. IEEE BioVis 2013 Data Contest Visualization Award.

<http://visualizlab.org/fixingTIM>

MOSBIE: an interactive model exploration system for tracking the features and development history of a family of biochemical models, and for identifying similarities and differences between biochemical models.

<http://visualizlab.org/mosbie>

Astroshef: a “Scientific Google Sky”, designed and implemented from scratch; its power and flexibility enables it to serve the needs of the scientific astronomy community. The front-end of this visual computing infrastructure uses the web technologies WebGL and HTML5 to enable cross-platform, web-based functionality. Currently in beta-release. IEEE LDAV 2012 Best Paper Runner-Up.

<http://astro.cs.pitt.edu/beta>

Hierarchical Spine Tracking: a project for automatically, accurately and reliably determining the 3D motion of the cervical spine from a series of stereo or biplane radiographic images. The software has led to a reduction in labor-time by a factor of 12; the project has been deployed at the UPMC Biodynamics Lab. Patent filed.

Distance-field Computed-Tomography Registration: a project for accurately tracking 3D motion of orthopaedic data from sequences of CT volumes. Accuracy improvements of over 74% compared to the previous state of the art. Project deployed at Brown University.

Research Grants and Awards

“NSF CAREER Data-driven Bottom-Up Humanoid Articulations”, NSF CAREER IIS-1541277, PI, \$280,000, Oct 2014 - Apr 2016.

“NSF CDS&E: Data Management and Visualization in Petascale Turbulent Combustion Simulation”, NSF CBET-1250171, Co-PI (P. Givi PI; other co-Pis L. Yilmaz, A. Labrinidis, P. Chrysanthis), \$500K (*\$352K direct*), Sept 2012 – August 2015.

“NSF CDI-Type II: Understanding the Universe through Scalable Navigation of a Galaxy of Annotations”, NSF OIA-1028162, Co-PI (A. Labrinidis, PI; other Co-Pis P. Chrysanthis, J. Newman, M. Wood-Vasey), \$1.6M (*\$1.1M direct*), Sept 2010 – Sept 2014.

“NSF CAREER: Data-Driven Bottom-Up Humanoid Articulations”, NSF CAREER Award IIS-0952720, PI, \$546K (*\$385K direct*), April 2010 – March 2015.

“Geriatric Research in Ambulatory and Cognitive Excellence (GRACE)”, University of Pittsburgh Research Council’s Multidisciplinary Small Grant Program, Co-PI (C. Rosano PI; other co-PI W. Layton), \$150K (*\$150K direct*), July 2009 – June 2012.

“Immersive Software Engineering”, Pitt Provost’s Advisory Council on Instructional Excellence (ACIE) Innovation in Education grant, PI, \$16K (*\$16K direct*), May 2009 – April 2010.

Funded Research Experiences for Undergraduates (REU) and Workshops

“CRA CREU-W Collaborative Research Experience for Undergraduates”, Computing Research Association, \$10.5K, Sept 2015–Apr 2016.

“WORKSHOP: Doctoral Colloquium at IEEE VIS 2015”, NSF IIS-1540159, PI, \$20.8K (*\$20.8K direct*), Apr 2015–Apr 2016.

“REU – CAREER: Data-Driven Bottom-Up Humanoid Articulations”, NSF IIS-1340866, PI, \$12.8K (*\$12.8K direct*), April 2013–May 2014.

“REU – CAREER: Data-Driven Bottom-Up Humanoid Articulations”, NSF IIS-1241554, PI, \$16K (*\$13K direct*), May 2012–May 2013.

“WORKSHOP: Doctoral Colloquium at IEEE VisWeek 2011”, NSF IIS-1139350, Co-PI (R. Kosara, PI; other co-Pis E. Zhang, T.J. Jankun-Kelly), \$20K (*\$20K direct*), Aug 2011–Aug 2012.

“REU – CAREER: Data-Driven Bottom-Up Humanoid Articulations”, NSF IIS-1130458, PI, \$16K (*\$13K direct*), Apr 2011–Apr 2012.

Outreach

- 2013-2014 Over 200 hours of service spent identifying (and documenting in two memoranda) bias-prone, diversity-unfriendly aspects of the Pitt A&S Promotion and Tenure procedures. These procedures enable the administration to overturn, with no scholarship or collegiality-related justification, departmental positive tenure and promotion recommendations. Joint work with Pitt faculty across multiple Schools, and with Women in Science and Engineering interest and support groups outside Pitt. Sept 2013-July 2014.
- 2013 Organized and ran a Hands-On-Science Animation Bootcamp workshop for 20 under-represented and under-privileged high-school students; excellent reviews, May
- 2012 Organized and ran the Pitt Women in Computer Science “Mentoring Lunch”, 14 participants (20% participation rate), Oct
- Co-Organized the “Lunch with the Industry and National Labs” event at IEEE VisWeek’12, 100 participants, Oct
- Co-organized and ran the “Lunch with the Mentors” event at IEEE VisWeek’12, 100 participants, Oct
- Scientific Visualization outreach presentation (w/ VisLab), Pittsburgh Academy for Science and Technology, 100 participants, Jan
- 2011 Created and organized the “Lunch with the Mentors” mentoring system at IEEE VisWeek’11, 150 participants, Oct
- 2010 Created, organized and ran the Technology Leadership Initiative VideoGame Design and Implementation workshop (w/ VisLab) for 18 under-represented and under-privileged elementary school students; excellent reviews, Feb
- Created, organized and ran the Tech Divaz Build a Computer workshop (w/ Women in Computer Science) for the Technology Leadership Initiative; 18 participants, excellent reviews, June
- 2009 Worked with the Technology Leadership Initiative organizer, T. Groover, to revise a Google RISE small grant proposal to support a diversity summer camp, March; awarded (\$5K).
- Visualization and Computational Modeling for Science and Engineering presentation, Technology Leadership Initiative, 25 participants, May
- 2008 Visualization and Computational Modeling for Science and Engineering presentation, Technology Leadership Initiative (Pitt CS Diversity program, reaching to under-represented African-American elementary and highschool students), 25 participants, May
- 2005 Women in Computer Science coordinator, Brown University; launched and coordinated the
– 2007 graduate student arm of the organization, 20 graduate members, Feb

Popular Press Recognition

CS Degree Hub's "The 50 Most Innovative Computer Science Departments in the U.S." (for my group's work in biology visualization while at Pitt), Y. Laher, December 2014.

<http://www.computersciencedegreehub.com/50-innovative-computer-science-departments/>

"VisWeek 2011: New Compass Activities for New Researchers", A. Tarbox, Conduit Vol. 21(1), May 2012

"Pitt scientists get grant to catalog space data", D. Erdley, Pittsburgh Tribune-Review, July 2011

"Pitt Researchers Tackle Flood of Space Data With \$1.6 Million Project", M.Kelly, University of Pittsburgh University Times, May 2011

"Comp sci adds another CAREER award", University of Pittsburgh University Times, Apr 2010

"Rethinking Computer Science education", M. Lane-Ogden, University of Pittsburgh Teaching Times, Sept 2009

"Making moves: Pitt experiment tracks body shifts", M. Cronin, Pittsburgh Tribune-Review, March 2009

"Transformational Research through Modeling and Simulation: Pitt Researchers Tackle Some of the Most Complex Issues of Our Times in New Center", R. Frazier, Pitt Center for Simulation and Modeling Inaugural Brochure, October 2008

"CS224 Final Projects Win @ ACM SIGGRAPH '04", S. Howe, Conduit Vol 13(1), Aug 2004

Invited Presentations

2015 NSF/NIH SAMSI Workshop (20% acceptance), Raleigh, NC, July
"SANSI DMS Project: SMART"

BioVis'15, Dublin, Ireland, July
"BioVis'15 Awards Ceremony and Closing Remarks"

- EuroVA, Sardinia, Italy, May
“Visual Scaffolding in Integrated Spatial and Nonspatial Visual Analysis”
- UIC Bioengineering Seminar, Feb
“Geometric Modeling and Visualization for Science”
- 2014 **Dagstuhl** Scientific Visualization Seminar, Germany, June
- ...
- Dagstuhl** Tensor Visualization Symposium, Germany, Feb
- University of Maryland Baltimore County, Department of Information Systems, Jan
- University of Maryland College Park, Department of Computer Science, Jan
- 2013 Virginia Tech, Department of Computer Science, Nov
- IEEE VIS SciVis 2013, Atlanta, GA, Oct
- ATR Institute, Robotics Seminar, Nara, Japan, Sept
- MICCAI MedMesh 2013, Nagoya, Japan, Sept
- EuroGraphics VMV 2013, Lugano, Switzerland, Sept
- New York University Poly, Department of Computer Science, May
- Tufts University, Department of Computer Science, March
- 2012 University of Pittsburgh, Department of Biomedical Informatics, Oct
- University of Maryland, Baltimore County, Oct
- Pittsburgh Academy for Science and Technology (w/ VisLab), Pittsburgh PA, Jan
- CHIA Dataverse Colloquium (w/ cs1630 students), Pittsburgh PA, Mar
- 2011 **Dagstuhl** Tensor Symposium, Germany, Dec (prestigious, invitation-only CS workshop sponsored by the German federal government)
- IEEE VisWeek 2011, Providence, RI, Oct
- AEGIS Colloquium (w/ students T. Luciani and R. Hachey), Pittsburgh PA, July
- 2010 Carnegie-Mellon Bioimaging Day, Pittsburgh PA, March
- Tech Divaz camp, Technology Leadership Initiative, Pittsburgh PA, June

- Diversity Workshop (w/ VisLab), Technology Leadership Initiative, Pittsburgh PA, Feb
- 2009 Georgia Tech & Carnegie-Mellon University Graphics Retreat, Pittsburgh PA, Nov
- BMES 2009, Pittsburgh PA, Oct
- University of Minnesota, Computer Science, Graphics Group Seminar, Sept
- EMBC 2009, Minneapolis MN, Sept
- ACM SIGGRAPH Talks, New Orleans LA, August
- Dagstuhl** Tensor Symposium, Germany, July (prestigious, invitation-only CS workshop sponsored by the German federal government)
- Eurographics/IEEE Symposium on Visualization, Berlin, Germany, June
- University of Pittsburgh, Center for Simulation and Modeling, January
- Carnegie Mellon University, Graphics Group Seminar, March
- 2008 San Francisco University, Pre-Orthopaedic Research Society Symposium, March
- University of Pittsburgh – Carnegie Mellon University, Bioengineering and Bioinformatics Summer Institute, June
- Pitt CS Technology Leadership Initiative, July
- University of Pittsburgh – Carnegie Mellon University, Computational Biology Program, November
- 2007 Carnegie Mellon University, Robotics Institute Faculty Lunch Meeting, November
- University of New Hampshire, Computer Science, April

Professional Service

- 2016 Conference General Co-Chair, BioVis 2016
- 2015 Doctoral Colloquium Co-Chair and Organizing Committee, IEEE VIS 2015
- Short Papers Program Committee, EuroVis 2015

- Program Committee, EuroVis 2015
- Conference General Co-Chair, BioVis 2015
- Keynote Session Chair, BioVis 2015
- External paper reviewer, IEEE VIS SciVis 2015, IEEE VIS InfoVis 2015, IEEE VIS VAST 2015
- NSF Panelist
- 2014 Program Co-Chair, BioVis 2014
- Associate Editor, BMC Bioinformatics
- SciVis Publicity Chair, Organizing Committee, IEEE VIS 2014
- Program Committee, IEEE VIS 2014
- Program Committee, EuroVis 2014
- Program Committee, CompImage 2014
- Program Committee, IADIS International Conference on Computer Graphics, Visualization, Computer Vision and Image Processing
- 2013 Program Co-Chair, IEEE BioVis 2013
- Program Committee, IEEE SciVis 2013
- Papers Session Chair, IEEE SciVis 2013
- Program Committee and Organizing Committee, IEEE BioVis 2013
- Program Committee, MICCAI Workshop on Mesh Processing
- Program Committee, IADIS International Conference on Computer Graphics, Visualization, Computer Vision and Image Processing
- Paper reviewing for IEEE TVCG, IEEE Vis, IEEE InfoVis, EuroVis
- NSF Graphics & Visualization Panel
- NSF Panel Ad-hoc Reviewer (external)
- Scholarship Application Committee, Grace Hopper Celebration of Women in Computing Conference 2013
- 2012 Guest-Editor, IEEE Computer Graphics and Applications, Special Issue, Biomedical Applications: From Data Capture to Modeling
- Program Committee and Organizing Committee, IEEE SciVis (Vis) 2012

- Papers Session Chair, IEEE SciVis (Vis) 2012
- Chair, Compass Committee (see 2011) IEEE VisWeek 2012
- Organizing Committee, IEEE BioVis 2012
- Co-Chair, Industry Committee IEEE BioVis 2012
- Program Committee, IADIS International Conference on Computer Graphics, Visualization, Computer Vision and Image Processing
- Program Committee, MICCAI Workshop on Mesh Processing
- Scholarship Application Committee, Grace Hopper Celebration of Women in Computing Conference
- Paper reviewing for IEEE TVCG, IEEE Vis, IEEE InfoVis, EuroVis, IEEE Computer Graphics and Applications, PacificVis
- 2011 Co-Chair, Doctoral Colloquium, IEEE VisWeek 2011; co-run the Doctoral Colloquium Workshop
 - Organizing Committee, IEEE VisWeek 2011; beside O.C. duties, created and organized the Compass activities, a highly successful set of networking events for visualization researchers and practitioners.
 - Panel Organizer, IEEE VisWeek 2011
 - NSF Graphics & Visualization Panel
 - Paper reviewing for IEEE Vis
- 2010 NSF Graphics & Visualization Panel
 - ACM SIGGRAPH Bioengineering Jury
 - Paper reviewing for Journal of Biomechanics, IEEE Vis
 - Scholarship Application Committee, Grace Hopper Celebration of Women in Computing
- 2009 Paper reviewing for IEEE Vis, IEEE Trans. On Biomedical Engineering
 - Scholarship Application Committee, Grace Hopper Celebration of Women in Computing
- 2008 Paper reviewing for ACM SIGGRAPH, Journal of Biomechanics
 - External proposal reviewing for NSF
 - Scholarship Application Committee, Grace Hopper Celebration of Women in Computing
- 2007 Scholarship Application Committee, Grace Hopper Celebration of Women in Computing

Paper reviewing for IEEE Trans. On Medical Imaging, IEEE Trans. On Visualization and Computer Graphics, ACM SIGGRAPH, Journal of Biomechanics

pre-2007 Paper reviewing for IEEE Trans. On Medical Imaging, IEEE Trans. On Visualization and Computer Graphics, ACM SIGGRAPH (Sketches and Posters), Journal of Biomechanics

ACM International Programming Competition'97, S-E European Regional Organizing Committee

Teaching and Research Advising

Current Graduate Advisees	Timothy Luciani (doctoral, first year at UIC, NSF Graduate Research Fellow) Ashwin Venkataraman (masters, 2 nd year) Directed study: Chihua Ma (doctoral, 4 th year)
Ph.D. Graduates	Abed Haque, 2014 (Mathworks)
M.Sc. Graduates	John Wenskovitch, 2014 (Virginia Tech & Allegheny College) Sean Myers, 2014 (Amazon) Adrian Maries, 2013 (UPMC Montefiore) Rebecca Hachey, 2013 (Pitt Learning Research and Development Center) Adam Smith, 2012 (GDVis) Wen Xu, 2011 (Microsoft)
B.Sc. Graduates (thesis/project)	Mary Letera 2014 (Philips) Zach Sadler 2014 (Adknowledge) Sean Myers 2013 (Pitt CS grad program) Tim Luciani 2011 (NSF Graduate Research Fellowship , Pitt CS) Daniel Oliphant 2010 (Google) Victor Powell 2010 (YinzCam) Matthew Seiler 2010 (Bechtel Corporation) Matthew Czarnek 2010 (Czarnek and Orkin Labs) Stephen Lauck 2009 (Force and Form) John Conomikes 2008 (CMU Entertainment Technology Center)
Graduate Research Advising	
2013 –2014, at Pitt	Abed Haque (doctoral, 6 th year), Tim Luciani (doctoral, 2 nd year), John Wenskovitch (doctoral, 3 rd year), Sean Myers (masters)
2012 – 2013	Abed Haque (doctoral, 5 th year), Adrian Maries (medical transfer to MSc program), Tim Luciani (doctoral, 2 nd year), John Wenskovitch (doctoral, 2 nd year), Sean Myers (masters) Directed study: Xiaoming Fan (doctoral 1 st year), Koonwah Chen (SIS masters)

2011 – 2012	Abed Haque (doctoral, 4 th year), Adrian Maries (doctoral, 4 th year), Adam Smith (masters), Tim Luciani (doctoral, 1 st year), Rebecca Hachey (masters) Directed study: John Wenskovich (doctoral, 1 st year, co-advised)
2010 – 2011	Abed Haque (doctoral, 3 rd year), Adrian Maries (doctoral, 3 rd year), Adam Smith (masters), Wen Xu (masters) Directed study: Callen Shaw (masters), Andrew Conn (masters)
2009 – 2010	Abed Haque (doctoral, 2 nd year), Adrian Maries (doctoral, 2 nd year), Yao Sun (doctoral, 2 nd year; <i>masters 2012, Amazon</i>), Wen Xu (masters)
2008 – 2009	Abed Haque (doctoral, 1 st year), Sriranjani Mandayam (doctoral, 1 st year, <i>masters 2010 School of Information Sciences</i>), Yao Sun (doctoral, 1 st year) Directed study: Wenting Xiong, David Krebs, Adrian Maries
2007 – 2008	Yinglin Sun (doctoral, 2 nd year, <i>masters 2011, N/A</i>) Directed study: Michael Lipschultz
Pre-2007	Directed study: Peter Sibley (Brown University), Phil Montgomery (Brown University)

Undergraduate Research Advising

2015, at UIC	Joshua Rodriguez (senior, NSF REU, co-advised w/ Lance Long, EVL) Carlos Uribe (senior, startup) Kamil Piekutowski (senior, NSF REU) Brook Habtegiorgis (junior, NSF REU) Evan Kreft (senior, NSF REU) Peter Hanula (senior, NSF REU) (total: six REUs, two Hispanic, one African American).
2013 -- 2014	Mary Letera, Tyler Raborn
2012 – 2013	Sean Myers, Zach Sadler
2011 – 2012	Tim Luciani, Daniel Walker, Jordan Sawyer, Sean Myers, Ben Steele
2010 – 2011	Daniel Oliphant, Victor Powell
2009 – 2010	Daniel Oliphant, Matthew Seiller

2008 – 2009	Stephen Lauck, Victor Powell, Jackie Kircher
2007 – 2008	Matthew Czarnek, John Conomikes
Pre-2007	Ethan Bromberg (Brown University), Arni Jonsson (Brown University)

Examiner/Reader (Comprehensive Examinations, Thesis Committees)

2015, at UIC	Tomas Gerlich (PhD Prelim) Multi-Motion Segmentation and Epi-Flow Estimation with a Static Camera Shreya Gosh (WCP) Analyzing Importance of Node Based on Node Deletion and Node Contraction Darya Filippova (CMU, PhD), July 2015 Algorithms for identification, visualization, and compression of prominent substructures in biological data
2013 – 2014	Xiang Xiao, Qinglan Li, Adrian Maries, Abed Haque, Sean Myers, Tim Luciani, Darya Fillipova (CMU)
2012 – 2013	Becca Hachey, Patrick Dudas, Yingze Wang, Eric Heim
2011 – 2012	Abed Haque, Michal Valko, Roxana Gheorghiu, Yingze Wang, Iyad Batal
2010 – 2011	Wen Xu, Abed Haque, Adrian Maries, Mike Lipschultz, Michal Valko, Roxana Gheorghiu
2009 – 2010	Ricardo Villamarin
2008 – 2009	Michal Valko, Ricardo Villamarin, Tomas Singliar
2007 – 2008	Tomas Singliar, Qinglan Li

Courses Taught at UIC

CS422 User Interface Design and Programming (2015)

CS522 Human Computer Interaction (2015)

- 2015 CS522 Human Computer Interaction. Class full with 35 students enrolled.
- 2015 CS422 User Interface Design and Programming. Class full with 45 students enrolled.
Evaluations: 4.42/5 grad section, 4.13/5 undergrad section
Enrollment: 45 enrolled, 42 retained (14/15 grad, 28/30 undergrad).
Redesigned the syllabus, assignments, projects and exams to encourage interdisciplinary collaboration, teamwork, and service to the campus. 15 successful final projects with campus clients.

Courses Taught at Pitt

- CS2620 Interdisciplinary Modeling and Visualization (2009, 2011, 2012, 2014)
CS1566 Introduction to Computer Graphics (2008, 2009, 2010, 2011, 2012, 2013)
CS3610 Special Topics in Computer Graphics (2008, 2010, 2013)
CS1699 Special Topics in CS: Software Engineering and Project Management (2010)
CS1666 Principles of Videogame Design and Implementation (2011, 2013, 2014)
CS1630 Software System Design and Management (2012)

- 2013 – 2014 CS1666 Principles of Videogame Design and Implementation. Content further extended to accommodate English majors interested in creating content for videogames. The students work in interdisciplinary teams.

CS1566 Introduction to Computer Graphics. Class full with 48 students enrolled. Class format modified to allow in-class student skits on Computer Graphics select topics. Content further extended to include GPU programming.

CS2620 Interdisciplinary Modeling and Visualization. Class full with 18 students enrolled.

- 2012 – 2013 CS3610 Advanced Topics in Computer Graphics. Seminar-level course in Visualization, class full with 17 graduate students enrolled and one auditing. One final project leads to an IEEE BioVis 2013 Data Contest Visualization Award in Oct 2013. Pitt CS **Teaching Award Nomination**.

CS1666 Principles of Videogame Design and Implementation. Content further extended to accommodate usage of the Unity game engine, and the enrollment of undergraduate students interested in creating Visual Art for videogames. Continued collaboration with English majors interested in creating media content for videogames.

CS1566 Introduction to Computer Graphics. Content further extended to accommodate a virtual camera programming assignment. Outstanding final projects. Highest OMET scores and evaluations since class first taught.

2011 – 2012 CS2620 Interdisciplinary Modeling and Visualization. One of the final interdisciplinary projects makes the shortlist in the [Desire2Learn Edge Challenge](#) (\$25K industry competition challenging developers to build apps that improve the experience of teachers, students and administrators), and another one grows into a system demonstration at IEEE Visualization 2012. Pitt CS **Teaching Award**.

CS1630 Immersive Software-System Design and Management. Two large scale software projects resulted from this edition of the course: a prototype system for mining history, disease and climate data (commissioned by the Pitt History Department, successfully demonstrated at the CHIA Dataverse Colloquium'12), and an automated homework submission and grading system for the Pitt Academy of Science and Technology (product described as “perfect” by the commissioner.)

CS1566 Introduction to Computer Graphics. Content further extended to accommodate a ray-tracing programming assignment. For the first time ever, Pitt students were able to complete a simple *ray-tracer* (cornerstone of computer graphics education, featuring complex math and programming) as part of their coursework. Impressive final projects.

2010 – 2011 CS2620 Interdisciplinary Modeling and Visualization. Four short papers and system demonstrations resulting from interdisciplinary projects in this class were accepted into IEEE VisWeek 2011.

CS1666 Principles of Videogame Design and Implementation. I redesigned this course from scratch to emphasize the cross-disciplinarity of videogame design (artistic design, creative writing, and computer science). Pitt CS **Teaching Award**.

CS1566 Introduction to Computer Graphics. Updated the course with a speaking component: 5-minute student-pitches each class. Excellent final projects, followed by increased enrollment in the Videogame course CS1666.

2009 – 2010 CS1699 Immersive Software-System Design and Management. I developed this senior-level undergraduate course on software engineering in accordance with the Pitt Speaking in the Disciplines guidelines. The course emphasizes project management, usability testing, customer interviewing, specification of formal requirements, and oral communication, “soft skills” which will make our graduates more competitive in the global marketplace and less susceptible to off-shoring. Pitt CS **Teaching Award, top 4% courses in the School of A&S**.

CS1566 Introduction to Computer Graphics. Course content further extended to accommodate a ray-object intersections math and programming assignment. For the first time ever, Pitt students were able to compute ray-object intersections (complex math, and building block towards ray-tracing). Impressive gallery of final projects.

CS3610 Advanced Topics in Computer Graphics. I taught a new edition of the course, with emphasis on Visual Analytics and Human-Computer Interaction. The course follows the Pitt Speaking in the Disciplines guidelines to help students develop their oral communication skills. Student feedback indicates success.

2008 – 2009 CS2620 Interdisciplinary Modeling and Visualization. I developed and taught this graduate course for the first time in this lecture/assignments/final project format. The course emulates the process of scientific research, from a peer-reviewed proposal to a final report and presentations. Several projects resulted in publications and/or long-term interdisciplinary collaborations. **Pitt CS Teaching Award, top 4% courses in the School of A&S.**

CS1566 Introduction to Computer Graphics. I updated this undergraduate course to further emphasize modeling and simulation concepts; including a hot-topic GPU programming component. 100% student retention. The final projects were so compelling, I was asked to talk about this course at SIGGRAPH 2009.

2007 – 2008 CS3610 Advanced Topics in Computer Graphics. I developed and taught this graduate course for the first time this year. In it, students learned the basics of scientific modeling and visualization and emulated the process of doing interdisciplinary research by working in multi-disciplinary teams on scientific problems. The groups for each project were required to have participants from multiple disciplines, exposing them to many of the skills required for multi-disciplinary collaborative work. **Pitt CS Teaching Award.**

CS1566 Introduction to Computer Graphics. I gave this undergraduate course a much-needed re-haul. Updates include a completely new syllabus with sections on photorealism, video game design, image processing, color perception, and user interfaces.

Pre-2007 Interactive Computer Graphics (Brown University CS 224, 2004). I co-designed and co-taught the 2004 edition of this research-oriented graduate level class. Full class responsibility, shared with fellow graduate students Morgan McGuire and Tomer Moscovich.

Curriculum Development at Pitt

Created and proposed *Immersive Software System Design and Management* (CS 1630); approved 2010.

Proposed *Immersive Software Engineering*, Provost's ACIE award, 2009

Designed and proposed *Interdisciplinary Modeling and Visualization* (CS 2620), approved 2008.

Co-designed and co-proposed *Principles of Computer Game Design and Implementation* (CS 1666) together with Bob Daley, approved 2007.

University Service at UIC

- 2015 Undergraduate advising
 - W-ACM Women's Student ACM Chapter, Advisor
 - Graduate Admissions Committee
 - Co-Hosted Distinguished Lecturer (Tamara Munzner, UBC)
 - Organized cs422 undergraduate demos for U of Illinois new president, May 2015
 - Organized cs422 undergraduate demos for CS Advisory Board, May 2015
 - Selected, hired and supervised 6 REUs, three of which are minority students
 - Marshalled CS commencement

University Service at Pitt

- 2013 – 2014 Women in Computer Science Committee, Co-Chair; diversity advising.
 - Undergraduate Recruiting and Advising Committee; CS major advising.
 - Graduate Evaluation, Assignment and Training Committee
 - Center for Simulation and Modeling (SAM) Advisory Board
- 2012 - 2013 Women in Computer Science Committee, Co-Chair; bi-monthly events
 - Undergraduate Recruiting and Advising Committee; besides advising, paired each diversity student advised with mentors from the Women in Computer Science community
 - Graduate Evaluation, Assignment and Training Committee; recitation and lab visits, evaluation and feedback to the Graduate TAs
 - Center for Simulation and Modeling (SAM) Advisory Board
- 2011 - 2012 Women in Computer Science faculty advisor and coordinator; bi-monthly events

Center for Simulation and Modeling (SAM) Advisory Board

Hosted CS “Big Data” Colloquium speakers: James Faeder (Computational Biology), Harry Hochheiser (UPMC Bioinformatics), Peter Brusilovsky (ISP), Jeffrey Newman (Astronomy), Levent Yilmaz (Engineering), Vanathi Gopalakrishnan (UPMC Bioinformatics)

2010 - 2011 Co-Chair, Distinguished Lecture Series; raised Google funding for the series

Chair, CS Colloquium

Women in Computer Science faculty advisor and coordinator; bi-monthly events

Chair, Diversity Committee; helped recruit two Hot Metal Bridge fellowships to the CS department

2009 - 2010 Center for Simulation and Modeling (SAM) Advisory Board

Hosted Colloquium speakers: Aaron Henderson (Studio Arts), Jeff Newman (Astronomy), Michael Wood-Vasey (Astronomy), William Anderst (Orthopaedics), Chris Johnson (Utah), Claudia Mello-Thoms (UPMC Bioinformatics)

Center for Simulation and Modeling (SAM) Advisory Board

Chair, CS Colloquium; helped recruit Kitware to the Pitt CS Industry Board

CS Outreach Committee; marketing departmental accomplishments via the CS website, posters, fliers etc.

CS-Day Committee; organizer Digital Media Contest

Women in Computer Science (WiCS) faculty-coordinator; regular meetings and outreach activities

Technology Leadership Initiative Advisory Board; workshop-organizing for under-represented and under-served high-school students

Hosted CS Colloquium speakers: Marcus Hanwell (Kitware Inc), Morgan McGuire (NVIDIA)

2008 - 2009 Center for Simulation and Modeling (SAM) Advisory Board

CS Colloquium Chair; helped increase corporate support for Distinguished Lecture Series from 0 to 2

Hosted CS Colloquium speakers: Joseph Konstan (Distinguished Lecturer; U. Minnesota), Fernando DeLaTorre (CMU)

CS Graduate Admissions and Financial Aid Committee

CS-Day Committee; co-organizer Digital Media Contest

CS Outreach (ad hoc) Committee; helped with international recruiting and departmental website redesign

Women in Computer Science (WiCS) faculty-coordinator; bimonthly meetings including industry guests, and outreach activities

Hosted seminar-speakers: M. Renieris (Google), M. Friedman (Public Health), M. Hanwell (Chemistry), J. Faeder (Computational Biology), G. Mustata (Drug Discovery Institute), M. Wood-Vassey and J. Newman (Astronomy).

2007 - 2008 Center for Simulation and Modeling (SAM) Organizational Committee

Women in Computer Science (WiCS) Coordinator and founder

Bioengineering and Bioinformatics Summer Institute (BBSI) Mentor

Hosted seminar-speakers: M. Renieris (Google), S. Tashman (Pitt Medical School Orthopaedics), S. Leuba (Pitt Biophysics), G. Hutchison (Chemistry), J. Faeder (Computational Biology), and N. Ebenreuter (CMU Design)

CS Graduate Admissions and Financial Aid Committee; excellent admissions record

CS Faculty Search Committee

CS-Day Committee; co-organizer Digital Media Contest

CS Outreach (ad hoc) Committee; helped with international recruiting and departmental website redesign

Memberships

ACM, SIGGRAPH, IEEE.

Prepared Aug 2015