

THOMAS J. MARRINAN, PhD

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SUMMARY

Computational Scientist – I live at the intersection of Human-Centered and High-Performance Computing, with interests in visualization, and virtual reality, computer-supported cooperative work, and human-computer interaction. I believe in inspiring the next generation of computer scientists through hands-on learning and a flexible teaching style tailored to individual classrooms. My research focuses on enhancing frameworks to better enable scientific analysis of large-scale data.

EDUCATION

University of Illinois at Chicago (UIC), Chicago, IL

2010 – 2016

Doctor of Philosophy – Computer Science

- Dissertation: "*Data-Intensive Remote Collaboration using Scalable Visualizations in Heterogeneous Display Spaces*" advised by Prof. Andrew E. Johnson

GPA – 3.91 / 4.00

Drake University, Des Moines, IA

2006 – 2010

Bachelor of Science – Computer Science

Bachelor of Arts – Graphic Design

GPA – 3.76 / 4.00

TEACHING EXPERIENCE

University of St. Thomas, Assistant Professor in Computer and Information Sciences

2017 – Present

- Taught computer science concepts to undergraduate students using a variety of active learning techniques
- Integrated best practices to enhance diversity, equity, and inclusion in the classroom
- Developed a knowledge equivalence exam for students entering college with prior programming experience
- Mentored undergraduate students on research projects

Argonne National Laboratory, Postdoctoral Appointee

2015 – 2017

- Collaborated with a team of computer scientists and educational professionals to create curriculum for a weeklong coding boot camp for high-school students to learn introductory Python programming
- Gave lectures to 26 high-school students and provided one-on-one assistance to students who had questions or required extra assistance during the coding boot camp
- Mentored 2 undergraduate students during summer internships

UIC, Teaching Assistant

2011 – 2012

- Improved prior curriculum by implementing project templates to provide clearer instructions and enable students to successfully learn course concepts
- Evaluated student written code and provided one-on-one assistance during office hours
- Prepared lessons and gave lectures to 20-30 upper-level undergraduate and first-year graduate students
- Assisted professors teaching courses in computer graphics and compiler construction

UIC, Course Grader

2010

- Evaluated undergraduate student homework assignments and course examinations

RESEARCH EXPERIENCE

University of St. Thomas, Assistant Professor in Computer and Information Sciences

2017 – Present

- Developed an asymmetric virtual reality collaboration technique for enabling data sharing between large-scale displays and immersive headsets
- Experimented with leveraging different technologies to transfer large-scale data between high-performance computing resources in real-time
- Integrated GPU-based image compression for faster compositing in distributed rendering applications
- Investigated classroom technologies/methodologies for teaching parallel and distributed computing concepts

Argonne National Laboratory, Assistant Computer Scientist**2020 – Present**

- Adapted the Cinema image-based interactive visualization technique to work with panoramic image databases for use in virtual reality applications
- Developed a real-time stereoscopic 360° surround-view panoramic rendering technique for immersive viewing
- Investigated the use of interactive notebooks for in situ analysis of large-scale scientific simulations

Argonne National Laboratory, Postdoctoral Appointee**2015 – 2017**

- Developed flexible in-transit analysis code and real-time visualization streaming from remote supercomputers
- Researched using multiple display technologies in conjunction with one another to enhance scientific discovery and data dissemination
- Organized advanced visualization demonstrations for the 2016 Open House, preparing material ahead of time and giving presentations during the Open House to groups of 50-100 at a time

Electronic Visualization Laboratory (UIC), Research Assistant**2011 – 2015**

- Developed SAGE2™, a democratic multi-user windowing environment for displaying and interacting with content on large ultra-high-resolution displays
- Conducted a user study involving 44 volunteers to compare three data synchronization techniques for group-to-group remote collaboration
- Collaborated with a team of bioengineers to develop high-performance computing and visualization applications suited for simulating and analyzing blood flow in the human cerebral vascular system
- Led demonstrations and laboratory tours for CS Open Houses, Chicago Ideas Week, prospective collaborators, and high school and middle school student groups

Accenture, Research Intern**2011**

- Collaborated with a research team to identify and prevent SQL database deadlock
- Developed a database resource identifier to convert SQL transactions into Petri Net models

Drake University, Research Assistant**2009 – 2010**

- Developed a multi-dimensional data visualization tool that led to more efficient identification of chromatography systems used for modifying the selectivity of the separation in complex chemical mixtures
- Developed a tool for volumetric visualization of data from the Hubble Space Telescope in order to help astronomers understand the kinematics of ionized gas in the nuclear regions of Seyfert galaxies
- Presented weekly updates in front of a group of Professors and other Research Assistants

PUBLICATIONS

Conference Proceedings

- T. Marrinan, J. Tan, J. Insley, A. Kanayinkal, and M. Papka. Interactive Virtual Reality Exploration of Large-Scale Datasets Using Omnidirectional Stereo Images. In *Advances in Visual Computing; Proceedings of the 2022 International Symposium on Visual Computing (ISVC)*. 2022. **2022**
- R. Lipinski, K. Moreland, M. Papka, and T. Marrinan. GPU-based Image Compression for Efficient Compositing in Distributed Rendering Applications. In *Proceedings of the 2021 IEEE 11th Symposium on Large Data Analysis and Visualization (LDAV)*. 2021. **2021**
- L. Emerson, R. Lipinski, H. Shirey, T. Malloy, and T. Marrinan. Enabling Collaborative Interaction with 360° Panoramas between Large-scale Displays and Immersive Headsets. In *Proceedings of the 2021 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*. 2021. **2021**
- T. Marrinan, S. Rizzi, J. Insley, L. Long, L. Renambot, and M. Papka. PxStream: Remote Visualization for Distributed Rendering Frameworks. In *Proceedings of the 2019 IEEE 9th Symposium on Large Data Analysis and Visualization (LDAV)*. 2019. **2019**
- T. Marrinan, S. Rizzi, J. Insley, B. Toonen, W. Allcock, and M. Papka. Transferring Data from High-Performance Simulations to Extreme Scale Analysis Applications in Real-Time. In *Proceedings of the 2018 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*. 2018. **2018**
- T. Franczak, A. Nkansah, T. Marrinan, and M. Papka. A Path from Serial Execution to Hybrid Parallelization for Learning HPC. In *Proceeding of the 2017 Workshop on Education for High-Performance Computing (EduHPC)*. 2017. **2017**
- V. Doshi, S. Tuteja, K. Bharadwaj, D. Tantillo, J. Patton, T. Marrinan, and G. Marai. StickySchedule: An Interactive Multi-user Application for Conference Scheduling on Large-scale Shared Displays. In *Proceedings of the ACM International Symposium on Pervasive Displays (PerDis)*. 2017, article 2. **2017**

- [T. Marrinan](#), J. Insley, S. Rizzi, and M. Papka. Automated Dynamic Data Redistribution. In *Proceedings of the 2017 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*. 2017, pp. 1208-1215. **2017**
- [T. Marrinan](#), L. Renambot, J. Leigh, A. Forbes, S. Jones, and A. Johnson. Mixed Presence Collaboration using Scalable Visualizations in Heterogeneous Display Spaces. In *Proceedings of the 2017 ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW)*. 2017, pp. 2236-2245. **2017**
- [T. Marrinan](#), A. Nishimoto, J. Insley, S. Rizzi, A. Johnson, and M. Papka. Interactive Multi-Modal Display Spaces for Visual Analysis. In *Proceedings of the 2016 ACM International Conference on Interactive Surfaces and Spaces (ISS)*. 2016, pp. 421-426. **2016**
- [T. Marrinan](#), L. Renambot, J. Leigh, A. Forbes, S. Jones, and A. Johnson. Synchronized Mixed Presence Data-Conferencing Using Large-Scale Shared Displays. In *Proceedings of the 2016 ACM International Conference on Interactive Surfaces and Spaces (ISS)*. 2016, pp. 355-360. **2016**
- [T. Marrinan](#), J. Aurisano, A. Nishimoto, K. Bharadwaj, V. Mateevitsi, L. Renambot, L. Long, A. Johnson, and J. Leigh. SAGE2: A New Approach for Data Intensive Collaboration Using Scalable Resolution Shared Displays. In *Proceedings of the IEEE International Conference on Collaborative Computing: Networking, Applications and Worksharing (CollaborateCom)*. 2014, pp. 177-186. **2014**
- [T. Marrinan](#) and A. Linninger. In *Food, Pharmaceutical and Bioengineering Division 2013 - Core Programming Area at the 2013 AIChE Annual Meeting: Global Challenges for Engineering a Sustainable Future (AIChE)*. 2013, pp. 706-708. **2013**
- T. Urness, [T. Marrinan](#), A. Johnson, and M. Vitha. Multivariate Visualization of Chromatographic Systems. In *Proceedings of SPIE-IS&T Electronic Imaging*. 2011, vol. 7868. **2011**

Journal Articles

- [T. Marrinan](#) and M. Papka. Real-Time Omnidirectional Stereo Rendering: Generating 360° Surround-View Panoramic Images for Comfortable Immersive Viewing. In *IEEE Transactions on Visualization and Computer Graphics*. 2021, vol. 27, no. 5, pp. 2587-2596. **2021**
- [T. Marrinan](#), G. Eisenhauer, M. Wolf, J. Insley, S. Rizzi, and M. Papka. Parallel Streaming Between Heterogeneous HPC Resources for Real-time Analysis. In *Journal of Computational Science*. 2019, vol. 31, pp. 163-171. **2019**
- L. Renambot, [T. Marrinan](#), J. Aurisano, A. Nishimoto, V. Mateevitsi, K. Bharadwaj, L. Long, A. Johnson, M. Brown, and J. Leigh. SAGE2: A Collaboration Portal for Scalable Resolution Displays. In *Future Generation Computer Systems*. 2016, vol. 54, pp. 296-305. **2016**
- A. Linninger, I. Gould, [T. Marrinan](#), C. Hsu, M. Chojecki, and A. Alaraj. Cerebral Microcirculation and Oxygen Tension in the Human Secondary Cortex. In *Annals of Biomedical Engineering*. 2013, vol. 41, no. 11, pp. 2264-2284. **2013**
- I. Gould, [T. Marrinan](#), M. Chojecki, M. Qader, B. Henry, M. Pervais, N. Vaicaitis, Y. Zhu, A. Rogers, and A. Linninger. Hemodynamics of Cerebral Micro Vasculature. In *Computer Aided Chemical Engineering*. 2012, vol. 31, pp. 1727-1731. **2012**
- [T. Marrinan](#), T. Urness, C. Nelson, K. Kreimeyer, and J. Mirocha. Understanding and Interpreting Multivalued Astronomical Data. In *IEEE Computer Graphics and Applications*. 2010, vol. 30, no. 5, pp. 12-17. **2010**
- A. Johnson, M. Vitha, T. Urness, and [T. Marrinan](#). System Selectivity Cube: A 3D Visualization Tool for Comparing the Selectivity of Gas Chromatography, Supercritical-Fluid Chromatography, High-Pressure Liquid Chromatography, and Micellar Electrokinetic Capillary Chromatography Systems. In *Analytical Chemistry*. 2010, vol. 82, no. 14, pp. 6251-6258. **2010**

Poster/Other Presentations

- V. Mateevitsi, N. Ferrier, J. Insley, J. Knowles, K. Ma, [T. Marrinan](#), M. Papka, and S. Rizzi. Novel Display Technologies for Accelerating Scientific Discoveries. In *Position Papers for the ASCR Workshop on Visualization for Scientific Discovery, Decision-Making, and Communication*. 2022. **2022**
- P. Savira, [T. Marrinan](#), and M. Papka. Writing, Running, and Analyzing Large-scale Scientific Simulations with Jupyter Notebooks. In *Proceedings of the 2021 IEEE 11th Symposium on Large Data Analysis and Visualization (LDAV)*. 2021. **2021**
- [T. Marrinan](#). Exploring Visualization with Jupyter Notebooks. Invited talk at the Argonne Training Program on Extreme-Scale Computing (ATPESC). **2021**
- [T. Marrinan](#), L. Emerson, T. Malloy, and H. Shirey. Mixed Reality Collaboration for Contextualizing Immersive Spaces. In *Proceedings of the 2020 Workshop on Social VR: A New Medium for Remote Communication & Collaboration (SocialVR)*. 2020. **2020**

- L. Emerson and T. Marrinan. Real-Time Compression of Dynamically Generated Images for Offscreen Rendering. In *Proceedings of the 2019 IEEE 9th Symposium on Large Data Analysis and Visualization (LDAV)*. 2019. **2019**
- T. Tracy and T. Marrinan. Web Browser Rendering and Interaction in Custom OpenGL Applications. At *Midwest Instruction and Computing Symposium (MICS)*. 2019. **2019**
- T. Marrinan, J. Insley, S. Rizzi, and M. Papka. Networking Simulation Clusters with Visualization Clusters for Real-Time Data Analysis. At *Argonne National Laboratory Postdoctoral Research and Career Symposium*. 2016. **2016**
- T. Marrinan and M. Papka. Future Outlooks for Enabling Interactive Supercomputing Frameworks. At *Greater Chicago Area Systems Research (GCASR)*. 2016. **2016**
- T. Marrinan, I. Gould, C. Hsu, and A. Linninger. Whole-Brain Vascular Reconstruction, Simulation, and Visualization. At *IEEE Scientific Visualization Conference (VisWeek)*. 2012. **2012**

Thesis

- T. Marrinan. Data-Intensive Remote Collaboration using Scalable Visualizations in Heterogeneous Display Spaces. *PhD Thesis, University of Illinois at Chicago*. 2016. **2016**

HONORS AND AWARDS

Best Journal Paper Nominee – IEEE VR **2021**

- Real-Time Omnidirectional Stereo Rendering: Generating 360° Surround-View Panoramic Images for Comfortable Immersive Viewing
IEEE Conference on Virtual Reality and 3D User Interfaces

Best Paper – CollaborateCom **2014**

- SAGE2: A New Approach for Data Intensive Collaboration Using Scalable Resolution Shared Displays
IEEE International Conference on Collaborative Computing: Networking, Applications and Worksharing

Cover – Physics Today **2013**

- My research on visualizing the human cerebral vascular system in the CAVE2™ Hybrid Reality System and I are depicted on the cover of the July 2013 issue of the *Physics Today* journal

NSF Highlighted Project **2013**

- NSF named my research as one of its twelve highlighted projects for the year in its *Budget Request to Congress* with a short description about how our “State-of-the-Art Virtual Reality System is the Key to Medical Discovery”

Best Poster Honorable Mention – VisWeek **2012**

- Whole-Brain Vascular Reconstruction, Simulation, and Visualization
IEEE Scientific Visualization Conference

1st Place – UIC: The Images of Research **2012**

- Artificially Created Cortical Functional Blood Unit
UIC annual interdisciplinary exhibit competition that showcases the breadth and diversity of research

Outstanding Student in Computer Science – Drake University **2010**

- Annual award given to the most outstanding computer science student
Drake University College of Arts and Sciences Awards Ceremony

Outstanding Chapter President – Drake University **2010**

- Annual award given to the most outstanding chapter president of a fraternity or sorority
Drake University Greek Gala Awards

PROFESSIONAL ACTIVITIES

Outreach

- Represented the Computer and Information Sciences department at University of St. Thomas' Tommie Days to speak with prospective students and their families about Computer Science and Applied Statistics
- Created introductory programming curriculum and teach an annual weeklong coding boot camp for high-school students at Argonne National Laboratory

- Served as a mentor for Argonne National Laboratory's Introduce a Girl to Engineering Day, where 8th grade girls spent the day learning about the STEM careers
- Led visualization laboratory tours for Open Houses at both the Electronic Visualization Laboratory (UIC) and Argonne National Laboratory

Conferences Attended

- International Symposium on Visual Computing (ISVC). 2022.
- Vis / VisWeek. 2021, 2019, 2015, 2012.
- International Symposium on Mixed and Augmented Reality (ISMAR). 2021.
- Special Interest Group on Computer Graphics and Interactive Techniques (SIGGRAPH). 2021.
- Virtual Reality and 3D User Interfaces (VR). 2021.
- Conference on Human Factors in Computing Systems (CHI) – Social VR workshop. 2020.
- International Parallel and Distributed Processing Symposium (IPDPS). 2018, 2017.
- High Performance Computing, Networking, Storage, and Analysis (SC). 2017, 2016, 2015, 2014.
- Pervasive Displays (PerDis). 2017.
- Computer-Supported Cooperative Work & Social Computing (CSCW). 2017.
- Interactive Surfaces and Spaces (ISS). 2016.
- Greater Chicago Area Systems Research (GCASR). 2016.
- Collaborative Computing: Networking, Applications and Worksharing (CollaborateCom). 2014.

Grant Writing Experience

Funded

- Diversity, Equity, and Inclusion grants (2022, 2021, and 2019). PI / Co-PI for program from the University of St. Thomas Vice Provost's office in partnership with the HHMI STEM Inclusive Excellence program.
- NSF Campus Cyberinfrastructure grant (2018). Support Letter for bringing high-bandwidth, research-grade networks to the University of St. Thomas.

Not Funded

- NSF CAREER (2022). Real-time Collaborative Analysis of Large-scale Data using Virtual Reality. PI.
- NSF CAREER (2021). Real-time Collaborative Analysis of Large-scale Data using Virtual Reality. PI.
- DOE Early Career Research Program (2021). Real-time Collaborative Analysis of Large-scale Data using Virtual Reality. PI.
- Mozilla Responsible Computer Science Challenge (2019). Computer Science for the Common Good. PI.
- NIH R21 (2012). Stereoscopic 4D Modeling and Interactive Virtual Exploration of Cerebral Vasculature. Co-PI.

TECHNICAL SKILLS

Programming Languages

- C / C++
- Python
- HTML / CSS
- JavaScript
- Java

Parallel Programming Models

- MPI
- Pthreads / C++ std::thread
- CUDA
- CUDA
- OpenGL / GLSL

Image / Video Generation and Editing

- ImageMagick
- FFmpeg
- Photo Editing (e.g. PhotoShop, GIMP)
- Video Editing (e.g. iMovie, Shotcut)
- 3D Modeling and Animation (e.g. Blender)

PROFESSIONAL MEMBERSHIPS

ACM – Association for Computing Machinery