

Curriculum Vitae — Nicholas F. Polys

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Faculty Appointments

Director of Visual Computing

Advanced Research Computing [<http://www.arc.vt.edu>]:
Virginia Polytechnic Institute and State University (2007-present)

Affiliate Professor

Department of Computer Science:
Virginia Polytechnic Institute and State University (2007-present)

Fellow

Center for Nuclear Femtography: Jefferson National Lab
Institute for Creativity, Arts and Technology (ICAT):
Virginia Polytechnic Institute and State University

Member

Center for Human-Computer Interaction (CHCI)
Faculty of Health Sciences (Fralin Life Sciences)
Tech for Humanity Scholar:
Virginia Polytechnic Institute and State University

Highlights

An accomplished and recognized international researcher and producer in Visual Computing, Immersive Analytics, AI, and HPC:

- **Innovator:** Designed the world-class Immersa Deck; Volume rendering methods, remote rendering methods; Senior Advisor to NIH and DoD projects still online and running
- **Collaborative:** PI/Co-PI > \$23M creating and enabling new science, education, and outreach with Web3D graphics across disciplines, domains, and audiences
- **Leader:** ARC, International Standards community for 3D Web graphics (Web3D, W3C, Metaverse Standards Forum Chair, ACM SIGGRAPH). General Chair, 30th Annual ACM Web3D Conference
- **Published:** over 135 peer-reviewed articles in HCI, VR, Web graphics, Education, and HPC/AI: (h-index = 28, i10-index = 53, cited by 2,825+); IEEE Computer Graphics & Applications Editor: @theSource Department, Special Issue on 3-D Web Technology (2026)
- **Mentor:** 40 graduate committees, Chairing 3 PhDs and 6 Masters degrees in CS; scores of undergraduates in wage and research credits as well as Capstone Projects; Instructor of Record for 12 semesters of 8 different CS classes (graduate and undergraduate)

Education

Ph.D., Computer Science – 2002-2006 Virginia Polytechnic Institute and State University

- Dissertation: “Display Techniques in Information-Rich Virtual Environments”
- Advisors: Dr. Doug A. Bowman, Dr. Chris North
- Committee: Dr. Scott McCrickard, Dr. Ken Livingston, Dr. Don Brutzman

B.A., Cognitive Science – 1992-1996 Vassar College

- Thesis: “The Universal Shaman and the Modern Mental Ontology”
- Advisor: Dr. Ken Livingston

Research Interests

- Visual Computing: from perception to world models and world models to rendering
- Scientific Visualization, including Medical Imaging, esp. Graphical and Cognitive Aspects
- Information & Interaction Architectures, especially the Web Ecology and HPC services
- Human Computer Interaction & Usability Engineering in Virtual & Augmented Reality

Honors and Awards

- **Best Poster Winner@** Council of Educators in Landscape Architecture (CELA) 2026: “Understanding Flood Risk Communication through Community Engagement Using a Digital Twin Model.” Jaeyoung Ha, Nicholas Polys, Terry Clements, and David Sample
- 2025 installation at the *Venice Architecture Biennale*: [IAWA: 40x40](#) in Palazzo Bembo (European Commission Time Space Existence Exhibit; w Zoellner, International Archive of Women Architects)
- 2025 Web3D Tools Competition Winner: *Grand Prize, 1st, 2nd, and 3rd place* results from research
- 2023 exhibit at SIGGRAPH (LA): [The Time Tunnel](#) - [Computer Graphics Timeline: from 1974 to 2023](#)
- 2020 Web3D Humanoid Animation Contest winner (*1st Place*; Korean Graphics Society)
- **Best Paper Winner@** ACM Web3D 2020
- **Best Paper Finalist @** IEEE VR Journal Track (TVCG) 2020
- 2019 ACM *SIGGRAPH Featured Member*
- 2018 *SEGD Global Design Merit Award winner for Installation: Wing It!* (w/ Katie Meaney)
- DAAD-Sponsored *German Science Tour* 2014 – Artificial Intelligence and Visual Computing
- *ACM Service Awards* for the Web3D Conference:
 - General Chair (2008, 2014, 2019, 2025), Program Chair (2007, 2010)
- *Outstanding Graduate Research Award*, VT Computer Science Department: 2006
- *Gamma Beta Phi* Honor Society, 2005; *Upsilon Pi Epsilon* Computer Science Honor Society, 2004
- Winner: Web3D Universal Media “*World Altering Contest*,” 1998
- Advanced Placement Scholar with Distinction, 1992

In The News

- VT News story [From Blacksburg to Venice: International Archive of Women in Architecture celebrates 40 years of global impact](#) (2025)
- CHCI Feature about contributions to the [2025 IEEE VR conference](#)
- VT News story [Data visualization aids Virginia Tech cancer researcher’s quest for better brain tumor treatment](#) (2024)
- Visionarium News Spotlight: [Spotlight on ARC and Visionarium Lab](#); full story on [hci.vt.edu](#) (2024)
- VT News [Spotlight ARC Report: the SIGGRAPH 2023 conference](#)
- Featured in “[Teacher Spotlight](#)” in [VT Engineer’s Forum](#) magazine (Fall 2022)
- An article about USDA online 3D Forestry Courseware: [NASP Training program deployed](#) (2022)
- [VT Magazine article about our water research](#) (2021)
- About our [VA CCI collaboration on wireless spectrum sharing](#) (2021)
- CHCI Features: [Web3D 2020](#), [Siggraph 2018](#)
- Blog about my [invited visit to the US White House in 2014](#) as part of the 1st Annual Makers’ Fair
- Visionarium Graphics: Virginia Tech Football Half-Time Commercials 2012, 2016
- 3D Graphics: 2015 Microsoft Azure International Commercial w/ Wu Feng (short and long versions)
- CASC Annual Brochure : Immersive HPC images (2023, 2021, 2016, 2014, 2010)
- VT News Stories (28 total) dating back to 2007

Professional and Research Experience

2007-present Virginia Polytechnic Institute and State University – Blacksburg, VA

Director of Visual Computing, Advanced Research Computing (IT),

Affiliate Professor of Computer Science

- Conduct research to improve visual analysis methods and informatics services for high-performance computing (see ***Funded Research > \$ 17 million, Publications below***)
- Develop and deploy Visual Computing solutions with faculty across the university
- Design, build, manage and develop cutting-edge visualization hardware and software stack (***The Visionarium Lab***; Viscube upgrades in 2007, 2010, 2016, 2024)
- Manage projects, staff, and budgets for ARC's *Visionarium Lab*
- Build partnerships to improve the competency and impact of High Performance Computing and Visualization through immersive and Web3D technologies

Selected Visual Computing and HCI Topics:

- Scientific visualization and analysis: medical imaging and volume rendering, molecular dynamics, fluid dynamics, geospatial & geophysics data including lidar point clouds, reality capture; scaling with cluster and remote rendering, 3D printing; InfoVis; perception, 3D world models, and AI
- Wireless Spectrum Visualization: Web3D visualization interfaces for students (NSF IUSE, ONR)
- Fusality / Mirror Worlds: Sensors and Web3D visualization used for environmental monitoring and planning; flipped labs and Digital Twins (3D Blacksburg, Stream Lab)
- Network visualization: cell-signaling pathways, ontologies, immersive analytics
- Structural engineering: Web3D-based architectural design, BIM + GIS Digital Twins
- Publications and applications driven by faculty collaborations, funded research, and class projects; international installations and global distinction

2006 – 2007 Virginia Polytechnic Institute and State University – Blacksburg, VA

Postdoctoral Associate: Research Computing

- Developed Visual Computing solutions for computational scientists, engineers, and designers
- Ran faculty and graduate development tutorials and workshops for 3D visualization and Virtual Reality

Selected Projects:

- Mathematics - generated VR, images, and movies of large space structure energetics simulations
- Biochemistry - generated VR, images, and movies of Myoglobin Oxygen transport mechanism (molecular dynamics simulations published in PNAS)

2005 – 2006 Virginia Polytechnic Institute and State University – Blacksburg, VA

Graduate Research Assistant

- Virtual Reality Assessment of Independent Living Skills and Mild Cognitive Impairment in Elderly Populations - Interface and Content Developer: built stimuli and testbed system for immersive Virtual Reality (CAVE) assessment tool (Carilion Biomedical Institute funding)

Selected Projects:

- Personal Memex – expert interviews and prototype for personal digital memory system for high-functioning and disabled populations

- Intelligent Document Filtering - implemented multiple AI evaluators for machine learning in text retrieval

2003 – 2005 Virginia Bioinformatics Institute – Blacksburg, VA

Graduate Research Assistant

- PathSim project - Visualization and Deployment Lead: designed and developed data processing and information-rich virtual environment interfaces for a large, agent-based immunological simulation (NIH funding)
- Mblast – Software Engineer: analyzed and optimized a Formal Concept Lattice Algorithm for gene expression analysis

Selected Projects:

- STKE Cellular Signaling – Project Lead, Interface Programmer: designed and developed graphical interface for direct manipulation of Boolean queries using Java Swing and MySQL database populated by web crawler agent
- Usability Engineering project for design of an online notification system; highest user subjective evaluations among class projects

1998-2002 VirtuWorlds LLC – New York, NY; Amsterdam, NL

Chief Technical Officer, Founder

- Designed and implemented content management and delivery systems for Web3D assets and experiences
- Technology adapted and used by Merck, Pfizer, and Georgia State U.
- Editor-In-Chief the *3D-eZine* online Web3D industry portal

2000-2001 Yoe Studio – Peekskill, NY

Web Programmer, Designer

- Implemented and maintained commercial, data-driven, personalized websites from Guess Jeans and Spy Kids to Yoe

1996-1999 Transcendent Recordings – Poughkeepsie, NY

Vice-President of Production, Webmaster

- Led digital productions for numerous artists w/ independent record label

1992-1996 Vassar College Computer Center – Poughkeepsie, NY

Information Technology Consultant

- Worked with faculty, staff, and students to support computing and networking on campus

Invited Speaker (Speaker, Judge, Panelist) _____

- Invited Expert: **NIH** “Workshop on Vertical Interoperability” (Summer 2026)
- Invited Talk: **Coalition for Advanced Academic Visualization (CAAV)** Annual Meeting 2025: “*The Virginia Tech Immersa Deck*”
- Invited Talk: **SIGGRAPH** August, 2024 - Birds of a Feather (BOF): *Carto (-graphic visualization), Web3D Ecosystem and the Metaverse, Metaverse Standards Forum*
- Invited Talk: **SIGGRAPH** August, 2023 - Birds of a Feather (BOF): *Carto (-graphic visualization), Web3D Ecosystem and the Metaverse, Metaverse Standards Forum*
- Invited Talk: Speaker Series “*Information-Rich Virtual Environments: Research and Applications*”. CAAV, the **Campus Alliance for Advanced Visualization** February, 2023
- **Keynote: Web3D 2022** “What’s behind the Metaverse? ... and what’s ahead?”

- Invited Talk: **SIGGRAPH** July, 2022 - Birds of a Feather (BOF): *Carto (-graphic visualization), Web3D Ecosystem and the Metaverse, Immersive Visualization*
- Invited Talk: **SIGGRAPH** July, 2021 - Birds of a Feather (BOF): *Carto (-graphic visualization), Web-wide Interactive 3D*
- Invited Talk: **SIGGRAPH** July, 2020 - Birds of a Feather (BOF): *Carto (-graphic visualization), Immersive Visualization*
- Invited Talk: *"Visualization for Femtography"*, **Center for Nuclear Femtography, Jefferson National Lab** (2020)
- Invited Presentation: Hitt, N.P., C. Snyder, J. Young, K. Rogers, **N. Polys**, and C.A. Dolloff. 'New approaches linking trout abundance to headwater stream flow'. **American Fisheries Society Annual Meeting** 2019. Reno, NV.
- Invited Talk: *"Perspectives on Visualization and Science: Communication and Discovery"*. **Jefferson National Lab** (June 2019)
- Organizer, Presenter: **SIGGRAPH** July, 2019 - Birds of a Feather (BOF): *Carto (-graphic visualization), Immersive Visualization*
- Invited Talks: "Visualization of Femtoscale Dynamics", "Next-Generation Visual Analysis Workspace for Multidimensional Nuclear Femtography Data", **Center for Nuclear Femtography, SURF** (2019)
- Contributed Presentation: Hitt, N.P., K. Rogers, C. Snyder, **N. Polys**, and C.A. Dolloff. "New method for trout abundance estimation with video sampling". East Coast Trout VI (2019), Frostburg, MD.
- **Keynote:** *"Fulfilling the Mandate of Durability and Access"* [Born to Be 3D: Library of Congress](#) (Nov 2018)
- **Keynote:** *"Interactive 3D Visualization in the Wide Web of Health"*, **32nd Annual HL7 Plenary Meeting** (October 2018)
- Invited Talk: *"Immersive Visualization at Virginia Tech"* **SIGGRAPH** 2017, 2018, 2019 Immersive Visualization in Research, Science, and Art BOF
- Invited Talks: *"Visualizing Place across Data and Platforms with X3D"*, "Immersive Cartography", **SIGGRAPH** 2017, 2018, 2019, 2020 **Carto BOF**
- Panelist: *"The Future of Web3D"* (**Web3D** 2018)
- Invited Talk: *"Lidar Pipelines for Immersive and Web3D Visualization"* **Silvilaser** 2017
- Invited Talk: *"Immersive Analytics: New Approaches to Scaling High-Performance Visualization"* **Los Alamos National Laboratory** (August 2017)
- Panelist: *"The Future of the VR Web"* (**Web3D** 2016)
- Invited Talk: *"High-Performance Visualization and Human Design"* **ITAM University** invited lecturer, Mexico City March 2016
- Invited Talk: *"Real and Virtual Spaces"* Federal In-Service Training, **The Hirshhorn Museum Smithsonian** Washington, DC 2016
- Invited Talk: *"Reproducibility in the Digital Age: Challenges and Opportunities for Progress"*. **Science in 3D: NIH/NIAID** Bioinformatics Festival 2015
- Panelist: ACM **Web3D** 2015: *"Trends and Future of 3D on the Web"*
- Judge: **VR Hackathon** (San Francisco, 2015)
- Invited Talk: *"My Take on Villareal"* **Moss Art Center** (2015)
- Invited Talk: **1st Annual Maker Faire, The White House** Washington, DC 2014
- Invited Talk: OSEHRA: **Veteran's Administration** Opensource Health Record Summit 2014
- Invited Talk: VisTech Workshop @ **SuperComputing** 2014: *"High-Performance Visualization"*

- Judge: Bay Area **VR Hackathon** @ Gray Area, San Francisco 2014
- Invited Talks: **Web3D** Conference (2010-2014): “*Virtual Worlds on the Web*”, “*Volume Visualization and Medical Applications*”, “*Scientific Visualization*”, “*Augmented and Mixed Reality*”
- Invited Talk: **TERATEC** 2011: “*High-Performance Visualization*” (Paris, France)
- Invited Talk & Panelist: **Supercomputing** 2009: “*3D Internet*” (w Intel)
- Panelist: NSF-sponsored panel “*Making a Career in VR*” **IEEE VR** 2006
- Invited Talks: **ACM SIGGRAPH Local Chapters Speaker**: Boston, NY, DC, San Francisco (2001-present)
- Invited Talk, “*Techniques of Perception in VRML97*”; Judge: VR Art: **Stuttgarter Filmwinter MultiMedia Festival** (2000)

Professional & Community Activities

Director

- **Web3D Consortium** (501c6; web3d.org)
 - President (elected 2010-2025), Secretary (elected 2007-2009)
 - Board of Directors (elected 2000-2025)
- **NSF IUCRC Center for e-Design** (2011-2013); VT Site (2011-2014)
 - Co-Director with Prof. Richard Goff, Engineering Education

Chair

- Web3D Consortium **Working Groups**
 - Medical (2010-present)
 - Extensible 3D (X3D) (2017-present)
 - User Interface (2006-2009; 2019-present)
- **Metaverse Standards Forum**
 - 3D Web Interoperability Domain Group (Now *Spatial Computing* group; 2022-present)
- **Conferences**
 - **General Chair**: ACM Web3D 2008, 2014, 2019, 2025
 - **Program Chair**: ACM Web3D 2007, 2010, 2011
 - **Workshops / Tutorials Chair**: IEEE Virtual Reality 2007; Web3D 2006, 2013
 - **Publicity Chair**: IEEE Virtual Reality 2008
 - **Finance Chair**: IEEE Virtual Reality 2009, 2010; Web3D 2016

Editorial Board

- IEEE Computer Graphics and Applications
 - **Department Editor: @theSource** (2023-present)
 - **Special Issue on Web3D** (forthcoming, 2026)
- Frontiers in Virtual Reality (2018-present)
- Virtual Reality Journal (Springer, 2017-present)
- Virtual Reality in Industry (Frontiers, 2019-present)

Steering Committee

- ACM SIGGRAPH Web3D Conference (2009-present)

- Center for Nuclear Femtography (2019-2024)

Official Liaison

- DICOM medical imaging standards (WGs 11, 17, 23): 2006-2016
- Health Level 7 (HL7) : 2017-2022

Key Contributor

- ISO/IEC Extensible 3D: X3D 3.0-4.1 Specification (2002-present)
- MOSS Arts Center: *Living Landscapes DA* Exhibition, *IAWA 40x40* Showcase (2025)
- 2018 ARC project highlight videos: <https://vimeo.com/visionarium2018>
- VTR-Net (NSF) grant author and Co-PI bringing 10 Gig to 12 buildings on campus
- NIH 3D Print Exchange 3d.nih.gov – *Senior Advisory Board and system architect (2013-2017)*
- The Zebrafish Brain Atlas and Browser -zbbrowser.com
- NSF MirrorWorlds Human-Building Interface at Moss Arts Center
- ISO/IEC Reference Model for Mixed Reality Continuum (JTSC1) (2013-2015)
- ISO/IEC Extensible 3D (X3D) 3.x Specification, esp. the Volume rendering and Event Utilities Components. www.web3d.org (2000-present)
- Web3D Medical Working Group (2006-present)
- Virginia Tech 3D Interaction Research Group (2003-2016)
- Web3D Software Development Kit (SDK) (2000-2002)

Reviewer

Conferences

(2002-present): Web3D, VIS, VAST, InfoVis, 3DUI, VR, VRST, SVR, Pacific Vis, SIGGRAPH, CHI, Graphics Interface, ISMAR, GRAPP, IVAPP, AMIA

Journals

(2004-present): International Journal of Human-Computer Studies, Virtual Reality, Computer Graphics and Applications, Computers & Graphics, Computer Graphics Forum, Information Visualization, Computer-Aided Civil and Infrastructure Engineering (Special Issue), Transactions on Applied Perception, Transactions of Computer Graphics and Visualization

Funding Panels

NSF Smart and Connected Communities (2025), Commonwealth Cyber Initiative (2022), NSF SBIR (2017)

International Workshop Organizer & Facilitator

- *Generative AI for 3D content, 3D Web Interoperability for the Metaverse* (Web3D 2025)
- *World Wide Webiverse* (SIGGRAPH and Web3D 2024)
- *Web3D Geospatial Summit, Web3D User Experience, SIGGRAPH History Model Archive* (Web3D 2021)
- *Web3D User Experience* (Web3D 2020)
- *Birds-Of-A-Feather (BOF) Sessions on Web3D topics: Web-wide Interactive 3D, Medical, CAD, AR/MR, Cultural Heritage, GIS* (SIGGRAPH 2008-2018)
- *Image Segmentation and Visualization Tools* (Web3D 2016)
- *Web3D Cultural & Natural Heritage* (Web3D 2014, 2015)

- *Extending Extensible 3D (X3D) from Haptic-based Medical Training to Clinical Applications* (Medicine Meets Virtual Reality (MMVR) 2014)
- *Medical Virtual Environments* (IEEE VR 2010; Web3D Tutorials 2012, 2013)
- *Parallel Realities? The Requirements of Web3D and Immersive VR, and Future Standards for Immersive VR* (IEEE VR 2007, 2008)
- *X3D User Interfaces* (ACM Web3D 2004, 2005)
- *Medical X3D* (ACM Web3D 2005)
- *Portable Information Spaces* (HCI International 2004)

Member

- ACM SIGGRAPH **Special Conferences Committee**: (2016-present), ACM (2003-present)
- Web3D Consortium (2000-present)
- IEEE (2004-present)
- ASEE (2013-present)
- SIGGRAPH Online Committee (2000, 2001)

Teaching Experience

Courses Taught

Virginia Polytechnic Institute and State University,

Instructor of Record:

- 2022, 2016 : CS 4784, *HCI Capstone* (CS Seniors)
- 2021, 2019, 2008 : CS 5764, *Information Visualization* (CS Graduate Level)
- 2016 (2 sections), 2013: CS 5754, *Virtual Environments* (CS Graduate Level)
- 2014: Chair, CyberArts PhD Qualifier Exam
- 2010: CS 3724, *GUI & Graphics Programming* (CS Junior/Senior)
- 2007: CS 2984, *Media Computation* (CS Freshman/Sophomore Level)
- 2006: CS 3724, *Introduction to Human-Computer Interaction* (CS Junior/Senior Level)
- 2002: Teaching Assistant for CS 2204 *UNIX* for sophomore CS majors

Short Courses and Conference Tutorials,

Instructor:

- *Web3D Quickstart: IEEE VR 2020, 2017; AMIA 2018; Web3D 2019, 2021, 2024, 2025*
- *Web3D Master Class*, World Bank Land and Poverty Conference (2015)
- AOE 5984, *Introduction to Parallel Computing* (Team taught, 2014)
- *High Performance Visualization, Visualization Zoo, Virtual Reality Zoo, Deep Media, Web3D Publishing*; Virginia Tech Faculty Development Institute (2006-2019)
- *New Dimensions in eLearning* NSF Research Experience for Teachers (RET 2012)
- *High Performance Computing Summer Bootcamp* (w/ UVa 2008-2010)
- Graduate short course (GEDI): *Introduction to Computational Science* (2007)
- Web3D & SIGGRAPH: *Engineering Virtual Environments with X3D, Techniques of Perception with X3D* (2003-2005); *X3D Architecture & Overview, Web3D Graphics Publishing with X3D* (2000-2002); *Introducing X3D* (2000)

Mentoring

- **Ph.D. Advising and Committees:**

1. Mai Dashan (2021, *Chair: "Making Sense of High Dimensional Ensembles"*); Assistant Professor at University of Virginia
2. Ayat Mohammed (2017, *Chair: "High-dimensional Data in Scientific Visualization: Representation, Fusion and Difference"*); Computational Scientist at Virginia Tech
3. Peter Radics (2016, *Chair: "A Novel Approach to Modeling Contextual Privacy Preference and Practice"*); leader in a private company in NoVA
4. Ph.D. Committees: Ryan McMahon (2012, *"Exploring the Effects of Higher-Fidelity Display and Interaction for Virtual Reality Games"*), Kriti Sensharma (2013, *"Compressed Sensing based Micro-CT Methods and Applications"*), Bireswar Laha (2014, *"Immersive Virtual Reality and 3D Interaction for Volume Data Analysis"*), Felipe Bacim (2015, *"Increasing Selection Accuracy and Speed through Progressive Refinement"*), Patrick Butler (2015, *"Knowledge Discovery in Intelligence Analysis"*), Mahdi Nabiyoumi (2016, *"How Does Interaction Fidelity Influence User Experience in VR Locomotion?"*), Mohammed Seyam (2016, *"Multifaceted Approach for Teaching Mobile Software Development: Class Experiences With Lectures, Tutorials, and Pair Programming"*), Andrew Reach (2017, *"Smooth Interactive Visualization"*), Wallace Lages (2018, *"Walk-Centric User Interfaces for Mixed Reality"*), Run Yu (2019, *"Designing Coherent Interactions for Virtual Reality"*), John Wenskovitch (2019, *"Dimension Reduction and Clustering for Interactive Visual Analytics"*), Michael Rhodes (2020, *"Composing Holochoric Visual Music: Interdisciplinary Matrices"*), Sogand Mohammadhasanzadeh (2020, *"Worker's Behavioral Adaptation to Safety Interventions and Technologies: Empirical Evidence and Theoretical Considerations Through The Case of Simulated Residential Roofing Task"*), Lee Liles (2022, *"Immersive Space to Think: Immersive Analytics for Sensemaking with Non-Quantitative Datasets"*), Xiaolong Li (*"3D Deep Learning for Object-Centric Geometric Perception"*), Kylie Davidson (2024, *"Sensemaking in Immersive Space to Think: Exploring Evolution, Expertise, Familiarity, and Organizational Strategies"*), Wei Liu (2026, *"Interactive Semantic Workspaces: Explaining and Steering Embedding Projections for Visual Analytics"*)

- **Masters Advising and Committees:**

1. Sheeban Mohd (2022, *Chair: "Sonification of the Scene in the Image Environment and Metaverse Using Natural Language"*)
2. Yanshen Sun (2020, *Chair: "The Scalability of X3D4 PointProperties: Benchmarks on WWW Performance"*)
3. Jooyoung Whang (2020, *Chair: "Improving the Perception of Depth of Image-Based Objects in a Virtual Environment"*)
4. Cedrick Ilo (2019, *Chair: "Feed Me: an in-situ Augmented Reality Annotation Tool for Computer Vision"*)
5. Faiz Abidi (2016, *Chair: "Remote High Performance Visualization of Big Data for Immersive Science"*)
6. Ankit Singh (*Chair, 2012: "A Novel Level-of-Detail Technique for Virtual City Environments: Design and Evaluation"*)
7. Masters Committees: Shyam Visamsetty (2010), Andy Wood, Nikhita Sharakhov (2014, *"Web-Based Data Visualization with 3D Portrayals for Communications Applications"*), Jacob Dennis (2015, *"On Quaternions and Activity Classification Across Sensor Domains"*), Adam Binford (2016, *"A Bidirectional Pipeline for Semantic Interaction in Visual Analytics"*), Xin Chen (2016, *"Be the Data: Embodied Visual Analytics"*), Siddarth Narayan (2016, *"Cinemacraft: Exploring Fidelity Cues in Collaborative Virtual World Interactions"*), Bharambe, Sachin (2017, *"Smart Environment Based On Real-Time Human Position Tracking For Remote Presence And Collaboration"*), Lawrence Warren (2018, *"The Effect of Interaction Fidelity on User Experience in Virtual Reality Locomotion"*), Tom Phan (2020, *"Integrating Traditional Tools to Enable Rapid Ideation in an Augmented Reality Virtual Environment"*), Kalyani Gadgil (2020, *"Performance Benchmarking Software-Defined Radio Frameworks: GNURadio and CRTSv.2"*), Chongyu He (2020, *"Deep Learning Approach for Cell Nuclear Pore Detection and Quantification over High Resolution 3D Data"*), Payel Bandyopadhyay

(2020, “Immersive Space to Think: the Role of 3D Immersive Space in Sensemaking of Textual Data”), Wang Ming (2020, “Bridging Cognitive Gaps Between User and Model in Interactive Dimension Reduction”)

- Scores of graduate and undergraduate interns, CS independent study / undergraduate research, and capstone students in the Visionarium Lab; *three award-winning teams @ VTURCS Symposium*
- Mentor for AOE, ECE, CMDA Senior Capstone teams (10 project teams 2021-present)
- NIH summer undergraduate interns in the Burgess Lab created the internationally-recognized resource called the **Zebrafish Brain Browser in Web3D** (<http://vis.arc.vt.edu/projects/zbb/>)

Sponsored Research _____ PI / Co-PI in over \$ 23 million to date _____

- **NASA University Leadership Initiative: Certification Driven Aircraft Design Under Uncertainty;** \$6,489,000 (2025-2029) with Sarojini; responsible for 15%
- **US Congress (NIST): Nuclear Energy: Enhancing the Safety of Reactors through Artificial Intelligence;** \$999,973 (2026-2029) with Ali Haghighat, Jonathan Link; responsible for 20%
- **Center for Advanced Innovation in Agriculture (CAIA): Advancing aquaponics workforce development through sociotechnical games;** \$25,000 (2025) with Bell, Engelke; responsible for 40%
- **Center for Nuclear Femtography (Jefferson National Lab): Paths of Discovery;** \$15,000 (2024); responsible for 100%
- **NSF IUCRC (CaseRM): Visual Analytics in 3D and Image spaces;** \$65,000 (2024) PI w R Pollyea, L House; responsible for 80%
- **NSF IUSE:** Visualization-enhanced Undergraduate Wireless Engineering Education through Problem- and Project-based Learning Approaches (\$399,948; 2024-2027) PI Dhillon and co-PI with Dietrich, Tripathi, Pitterson; responsible for 20%
- **ICAT SEAD Grant: Immersive virtual environment designed for flood risk communication;** \$25,000 (2024) PI Jaeyoung Ha and CoPI with Junghwan Kim, David Sample, and Terry Clements; responsible for 25%
- **NSF IUCRC (CaseRM) Visual Analytics in 3D and Image spaces;** \$65,000 (2023) PI w R Pollyea, L House; responsible for 80%
- **NSF IUCRC Phase II+ Virginia Tech: Center for Mining and Mineral Engineering (MME)** with Colorado School of Mines; \$780,000; PI with Westman, Hole (2023-2028); responsible for 20%
- **Center for Nuclear Femtography (Jefferson National Lab) Paths of Discovery** with Christopher Newport U, and George Washington U; \$65,000 (2022); responsible for 40%
- **NSF IUCRC (CaseRM) Integrating sequential simulation and visual ensemble analytics for applications in the mining sector** \$65,000 (2022) PI w R Pollyea, L House, Gramacy, Westman; responsible for 80%
- **NSF Nets: Implications of Receiver RF Front End Nonlinearity on Network Performance: Fundamentals, Limitations, and Management Strategies ;** \$1.5 million with Reed, Dietrich, et al.; responsible for 4%
- **Center for Nuclear Femtography (Jefferson National Lab) Paths of Discovery** with Christopher Newport U, and George Washington U; \$65,000 (2021); responsible for 40%
- **Commonwealth Cyber Initiative (CCI): Open-source, Multi-band, Multi-dimensional Spectrum Access system with Interfaces to Wireless Testbeds and Network Simulation Software;** \$ 89,920 (2021) with Cong Shen (UVA) & Dietrich; responsible for 30%
- **ICAT SEAD (internal) Virtual Watersheds: An Immersive Experience at the Confluence of Water and Society;** \$25,000 (2021) with Hession, Sforza, Draper; responsible for 50%
- **NSF IUCRC (CaseRM) Integrating sequential simulation and visual ensemble analytics for applications in the mining sector** \$100,000 (2020, 2021) w R Pollyea, L House, Gramacy; responsible for 40%

- **USDA Forest Service** National Advanced Silviculture Program (NASP) - Session 4 Advanced Silviculture Module for NASP 14; \$120,365 (2020-2021) with Munsell; responsible for 10%
- **USDA National Institute for Food and Agriculture Beginning Farmer and Rancher Development Program:** *Seeded and Growing: Sustaining Appalachian Beginning Forest Farmer Education and Engagement*; \$593,056 (2020-2021) with Munsell; responsible for 10%
- **NASA Space Grant Consortium** *Portable Antenna Range for STEM* w Dietrich; \$20,000 (2020, 2021); responsible for 80%
- **Center for Nuclear Femtography (Jefferson National Lab)** *Paths of Discovery* with Christopher Newport U and George Washington U; \$55,000 (2020); responsible for 40%
- **USGS CDI** *Enabling AI for citizen science in fish ecology* \$75,000 (2020) with Hitt; responsible for 10%
- **Council on Library and Information Resources (CLIR):** *Digitizing Hidden Collections Application: Entomo-3D: Digitizing Virginia Tech's Insect Collection* \$244,752 (2020-2023) with Hall, Marek; responsible for 20%
- **ONR STEM training for Dynamic Spectrum Access** \$1.5 million (2018-2021) with Allen, Dietrich, Goff; responsible for 25%
- **VT Global Change Center** (internal): *Innovative particle tracking to quantify soil erosion and sediment transport processes under global change* \$15,000 (2019-2020) with Stewart, McGuire, Hession; responsible for 25%
- **ICAT SEAD** (internal): *Translating a Smithsonian Exhibit for Learning*; \$3,000 (2019) with Meaney, Nguyen, Commer; responsible for 45%
- **Center for Nuclear Femtography (Jefferson National Lab)** *Visualizing Femtoscale Dynamics; New Workspaces for Nuclear Femtography* \$ 75,000 (2019); responsible for 100%
- **ICAT SEAD** (internal): *Visualizing Global Health and Policy*; \$3,000 (2018) with Kraak, Coupey, Meaney; responsible for 85%
- **MITRE** *Designing EM Visualizations*; \$ 40,000 with Dietrich (2017-2018); responsible for 75%
- **VT-CSC** (internal): *Seasonal Drone-based Lidar Acquisition and Analysis* with Hession, Taylor, Munsell, Sforza \$ 10,000 (2017, 2018); responsible for 20%
- **VT-Cider** (internal): *Immersive Design for Public Exhibits* with Meaney; \$ 2,000 (2017); responsible for 75%
- **NSF CC*DNI: A Campus Research Network and Distributed Science DMZ** (lead author) with Midkiff, Dingus, Barrett, Herdman; \$ 489,589 (2016); responsible for 20%
- **Microsoft HoloLens Site** with J. Gabbard \$ 100,000 (2016); responsible for 20%
- **General Dynamics:** *Computer-Human Interaction in The Analytic* co-PI with North, Lehman, House, Ramakrishnan; \$ 500,000 (2016, 2017); responsible for 20%
- **ICAT SEAD** (internal): *Belle II Detector* with Pillonen, Webster \$ 25,000 (2016-2017)
- **ICAT SEAD** (internal): *Fusality for Field and Stream* PI with Sforza, Hession, Kim, Munsell \$ 25,000 (2015-2016); responsible for 33%
- **ISCE** (internal) *Visualizing Water Services for Decision Making in Burkino-Faso* co-PI with Hall, Sforza, Wenzel, Burbey \$ 30,000 (2015); responsible for 20%
- **AFRL:** *APIs for Test & Evaluation to Accelerate Spectrum Sharing / Cognitive Radio Network* co-PI with Dietrich, Fowler \$ 53,833 (2015); responsible for 20%
- **Extension** Innovation Grant: *extension Geo-Citizens Design Forest Farms* co-PI with Munsell, Sforza \$ 97,185 (2015-2016); responsible for 33%
- **NSF IUOE:** *Wireless Testbeds for Authentic STEM Learning* with Carl Dietrich, Vuk Marojevic, Teayoung Yang, Mike Beuhrer; \$626,655; (2014); responsible for 20%

- **NSF** Computing Research Infrastructure (CRI II-New): *Living Lab for Asynchronous and Synchronous Investigation of Virtual and Real Environments* with Ben Knapp, Yong Cao, James Ivory, and Doug Bowman; \$ 585,510; (2013); responsible for 25%
- **NSF** Research Experience for Teachers (RET) *New Dimensions in e-Learning* with Richard Goff; \$ 25,000; (2012); responsible for 50%
- **NSF** Fundamental Research: *Visual Interfaces for Engineering Innovation* (2011-present) PI w/ Sundar Krishnamurty, UMass Amherst; \$ 165,000; responsible for 50%
- **NSF IUCRC National Center for eDesign** Co-Director (2010-2012), with Janis Terpenney and Richard Goff \$ 563,000; responsible for 50%
- **NSF Virtual Environments to Enhance Structures Understanding of Architects** (2009-2012) co-PI with Medhi Setareh, Brett Jones ; \$ 500,000; responsible for 35%
- The **U.S. Department of Energy** Hub: *Energy Efficient Buildings* (2010-2013); John Burns, Jeff Borgaard, Terry Herdman; \$ 5,000,000; responsible for 5%
- **CISCO Tele e-Design** (2011); \$ 30,000; responsible for 100%
- **ICTAS** (internal) *A Visual Interface for Smart Vehicle Networks* (2008); \$ 65,000; responsible for 100%
- **Center for Community Security and Resilience** (2010-2011 w/ IBM Research) co-PI with Peter Sforza \$ 15,000; responsible for 30%
- **US ARMY TATRC: Medical X3D** (2007); \$ 120,000; responsible for 10%
- **Naval Postgraduate School: An X3D Loader for OpenSceneGraph** (2007) \$ 6,000; responsible for 100%

Publications _____ *h-index* = 28 , *i10-index* = 53 , *cited by* 2825+ _____

Book Chapters

- 5] Hamza-Lup, **Polys**, Malamos, John. "Medical 3D Graphics with X3D". In: *Recent Advances in 3D Imaging, Modeling, and Reconstruction*. IGI Publishing, 2020. ISBN: 9781522552956, 1522552952
- 4] Malamos, Flotynski, Brutzman, Mouton, **Polys**, Hamza-Lup. "Recent Advances in Web3D Semantic Modeling". In: *Recent Advances in 3D Imaging, Modeling, and Reconstruction*. IGI Publishing, 2020. ISBN: 9781522552956, 1522552952
- 3] **Polys, Nicholas F.**, Sforza, Peter, Munsell, John. "PlantShoe: Botanical Detectives". In: *The HCI of Technology on The Trail*, (eds.) McCrickard et al. Springer. 2020. https://doi.org/10.1007/978-3-030-45289-6_6
- 2] **Polys, Nicholas F.** "Information Visualization in Virtual Environments: Tradeoffs and Guidelines". In: *Handbook of Virtual Environments, Second Edition* (eds.) Kelly Hale and Kay Stanney. CRC Press, 2014. <https://doi.org/10.1080/0144929X.2015.1013791>
- 1] **Polys, Nicholas F.** "Publishing Paradigms with X3D". In: *Information Visualization with SVG and X3D*, (eds.) Chanomei Chen and Vladimir Geroimenko, Springer-Verlag, 2005. ISBN: 9781852337902, 1852337907

Peer-Reviewed Journals

- 32] **Nicholas F. Polys**, Ayat Mohammed, Ben Sandbrook; Scaling to Perception: Challenges and Opportunities for Large-Scale Immersive Visualization Facilities. *PRESENCE: Virtual and Augmented Reality* 2025; 34 97–117. doi: https://doi.org/10.1162/pres_a_00442

- 31] Dahshan M, **Polys N**, House L, North C, Pollyea RM, Turton TL, Rogers DH. "Human-machine partnerships at the exascale: exploring simulation ensembles through image databases". Journal of Visualization. 2024 May 17:1-9. <https://doi.org/10.1007/s12650-024-00999-7>
- 30] V.D. Burkert, L. Elouadrhiri, A. Afanasev, J. Arrington, M. Contalbrigo, W. Cosyn, A. Deshpande, D.I. Glazier, X. Ji, S. Liuti, Y. Oh, D. Richards, T. Satogata, A. Vossen, H. Abdolmaleki, A. Albataineh, C.A. Aidala, C. Alexandrou, H. Avagyan, A. Bacchetta, M. Baker, F. Benmokhtar, J.C. Bernauer, C. Bissolotti, W. Briscoe, D. Byers, Xu Cao, C.E. Carlson, K. Cichy, I.C. Cloet, C. Cocuzza, P.L. Cole, M. Constantinou, A. Courtoy, H. Dahiyah, K. Dehmelt, S. Diehl, C. Dilks, C. Djalali, R. Dupré, S.C. Dusa, B. El-Bennich, L. El Fassi, T. Frederico, A. Freese, B.R. Gamage, L. Gamberg, R.R. Ghoshal, F.X. Girod, V.P. Goncalves, Y. Gotra, F.K. Guo, X. Guo, M. Hattawy, Y. Hatta, T. Hayward, O. Hen, G.M. Huber, C. Hyde, E.L. Isupov, B. Jacak, W. Jacobs, A. Jentsch, C.R. Ji, S. Joosten, N. Kalantarians, Z. Kang, A. Kim, S. Klein, B. Kriesten, S. Kumano, A. Kumar, K. Kumericki, M. Kuchera, W.K. Lai, Jin Li, Shujie Li, W. Li, X. Li, H.-W. Lin, K.F. Liu, Xiaohui Liu, P. Markowitz, V. Mathieu, M. McEneaney, A. Mekki, J.P.B.C. de Melo, Z.E. Meziani, R. Milner, H. Mkrtchyan, V. Mochalov, V. Mokeev, V. Morozov, H. Moutarde, M. Murray, S. Mtingwa, P. Nadel-Turonski, V.A. Okorokov, E. Onyie, L.L. Pappalardo, Z. Papandreou, C. Pecar, A. Pilloni, B. Pire, **N. Polys**, A. Prokudin, M. Przybycien, J.-W. Qiu, M. Radici, R. Reed, F. Ringer, B.J. Roy, N. Sato, A. Schäfer, B. Schmookler, G. Schnell, P. Schweitzer, R. Seidl, K.M. Semenov-Tian-Shansky, F. Serna, F. Shaban, M.H. Shabestari, K. Shiells, A. Signori, H. Spiesberger, I. Strakovsky, R.S. Sufian, A. Szczepaniak, L. Teodorescu, J. Terry, O. Teryaev, F. Tassarotto, C. Timmer, Abdel Nasser Tawfik, L. Valenzuela Cazares, A. Vladimirov, E. Voutier, D. Watts, D. Wilson, D. Winney, B. Xiao, Z. Ye, Zh. Ye, F. Yuan, N. Zachariou, I. Zahed, J.L. Zhang, Y. Zhang, J. Zhou.
- "Precision studies of QCD in the low energy domain of the EIC". Progress in Particle and Nuclear Physics, Volume 131, 2023, 104032, ISSN 0146-6410, <https://doi.org/10.1016/j.pnpnp.2023.104032>
- 29] BJ Andonian, N Hardy, A Bendelac, **N Polys**, WE Kraus. (2021). "Making Cardiopulmonary Exercise Testing Interpretable for Clinicians". Current sports medicine reports, 2021. 20 (10), 545-552. <https://doi.org/10.1249/JSR.0000000000000895>
- 28] Andonian BJ, Hardy N, Bendelac A, **Polys N**, Kraus WE. (2021). "A Simplified And Intuitive Visualization For Cardiopulmonary Exercise Testing Data": 1340. Medicine & Science in Sports & Exercise. 2021 Aug 1; 53(8S):441. <https://doi.org/10.1249/01.mss.0000764348.53989.2a>
- 27] Wang M, Wenskovitch J, House L, **Polys N**, North C (2021). "Bridging cognitive gaps between user and model in interactive dimension reduction". Visual Informatics. 2021 Jun 1; 5(2):13-25. <https://doi.org/10.1016/j.visinf.2021.03.002>
- 26] Hasanzadeh, Sogand; **Polys, Nicholas**, et al (2020). "Presence, Mixed Reality, and Risk-Taking Behavior: A Study in Safety Interventions". Transactions on Visualization and Computer Graphics. IEEE VR Journal Edition 2020. <https://doi.org/10.1109/TVCG.2020.2973055> *** Best Paper Finalist: TVCG Journal track!!**
- 25] Dashan, **Polys**, Pollyea, Jayne (2019). "Making Sense of Scientific Simulation Ensembles with Semantic Interaction" Computer Graphics Forum. Eurographics. <https://doi.org/10.1111/cgf.14029>
- 25] Rincón-Gallardo Patiño, Rajamohan, Meaney, Coupey. Serrano, Hedrick, da Silva Gomes, **Polys**, Kraak. (2019). "Development of a Responsible Policy Index to Improve Statutory and Self-Regulatory Policies that Protect Children's Diet and Health in the America's Region". International Journal of Environmental Research and Public Health, 17 (2), 495, <https://doi.org/10.3390/ijerph17020495>
- 24] Zhou, M.; Rajamohan, S.; Hedrick, V.; Rincón-Gallardo Patiño, S.; Abidi, F.; **Polys, N.**; Kraak, V. (2019) . "Mapping the Celebrity Endorsement of Branded Food and Beverage Products and Marketing Campaigns in the United States, 1990–2017". Int. J. Environ. Res. Public Health, 16, 3743. <https://doi.org/10.3390/ijerph16193743>
- 23] Richard Skarbez, **Nicholas F. Polys**, J. Todd Ogle, Chris North, Doug A. Bowman. (2019) "Immersive Analytics: Theory and Research Agenda". Frontiers in Robotics and AI, 6, 82. <https://doi.org/10.3389/frobt.2019.00082>
- 22] Dowling, M., Wycoff, N., Mayer, B., Wenskovitch, J., House, L., **Polys, N.**, North, C. and Hauck, P. (2019). "Interactive Visual Analytics for Sensemaking with Big Text". Big Data Research, 16, pp.49-58. <https://doi.org/10.1016/j.bdr.2019.04.003>

- 21] Tabor, K.M., Marquart, G.D., Hurt, C., Smith, T.S., Geoca, A.K., Bhandiwad, A.A., Subedi, A., Sinclair, J.L., Rose, H.M., **Polys, N.F.** and Burgess, H.A. (2019). "Brain-wide cellular resolution imaging of Cre transgenic zebrafish lines for functional circuit-mapping". *eLife*, 8, p.e42687. <https://doi.org/10.7554/eLife.42687>
- 20] Narayanan, S., **Polys, N.** and Bukvic, I.I. (2018). "Cinemacraft: exploring fidelity cues in collaborative virtual world interactions". *Virtual Reality*, pp.1-21. <https://doi.org/10.1007/s10055-019-00382-0>
- 19] **Polys, N. F.** (2017). "Of Standards and Herrings: Tales of Technology and Tumult". *MMTC Communications – Frontiers*. Vol. 12, No. 1. IEEE.
- 18] Mike Meyer, **Nick Polys**, Humza Yaqoob, Linda Hinnov, Shuhai Xiao (2017). "Beyond the stony veil: Reconstructing the Earth's earliest large animal traces via computed tomography X-ray imaging". *Precambrian Research*, Volume 298, Pages 341-350, ISSN 0301-9268, <https://doi.org/10.1016/j.precamres.2017.05.010>
- 17] Marquart, G. D., Tabor, K. M., Horstick, E. J., Brown, M., Geoca, A. K., **Polys, N. F.**, & Burgess, H. A. (2017). "High precision registration between zebrafish brain atlases using symmetric diffeomorphic normalization". *GigaScience* 6 (8). <https://doi.org/10.1093/gigascience/gix056>
- 16] Setareh, M., Jones, B., Ma L., Bacim, F., **Polys, N.** (2015). "Application and Evaluation of Double-Layer Grid Spatial Structures for the Engineering Education of Architects". *Journal of Architectural Engineering* 21 (3). [https://doi.org/10.1061/\(ASCE\)AE.1943-5568.0000179](https://doi.org/10.1061/(ASCE)AE.1943-5568.0000179)
- 15] **Polys, N.**, Setareh, M., Bacim, F., Jones, B. (2015). "SAFAS: Unifying Form and Structure with Interactive 3D Simulation". *Engineering Design Graphics Journal*, 79 (2); ASEE. <https://doi.org/10.18260/edgj.v79i2.511>
- 14] Xiao, S., A. Muscente, L. Chen, C. Zhou, J. D. Schiffbauer, A. D. Wood, **N. F. Polys** and X. Yuan (2014). "The Weng'an biota and the Ediacaran radiation of multicellular eukaryotes." *National Science Review* 1 (4): 498-520. <https://doi.org/10.1093/nsr/nwu061>
- 13] Jones, B. D., M. Setareh, **N. F. Polys** and F. Bacim (2014). "Application of an Online Interactive Simulation Tool to Teach Engineering Concepts Using 3D Spatial Structures." *International Journal of Web-Based Learning and Teaching Technologies (IJWLTT)* 9(3). DOI: 10.4018/ijwlтт.2014070102
- 12] Michael Bruce Meyer, David Elliott, Andrew D Wood, **Nicholas F Polys**, Matthew Colbert, Jessica A Maisano, Patricia Vickers-Rich, Michael Hall, Karl H Hoffman, Gabi Schneider, Shuhai Xiao. (2014). "Three-dimensional microCT analysis of the Ediacara fossil Pteridinium simplex sheds new light on its ecology and phylogenetic affinity." *Journal of Precambrian Research*, 249: 79-87. <https://doi.org/10.1016/j.precamres.2014.04.013>
- 11] Setareh, M., Bacim, F., Jones, B.D., **Polys, N. F.**, Geng, T., Orsa, B. (2012). "Integrating Web-based Visualization with Structural System Understanding to Improve the Technical Education of Architects." *Journal of Online Engineering Education* 3(2).
- 10] Hossain, S., Akbar, M., and **Polys, N.** (2012). "Narratives in the Network: Interactive Methods for Mining Cell Signaling Networks." *Journal of Computational Biology* 19(9): 1043-1059. <https://doi.org/10.1089/cmb.2011.0244>
- 9] **Polys, N.** and A. Wood (2012). "New Platforms for Health Hypermedia." *Issues in Information Systems* 13(1): 40-50.

- 8] **Polys, Nicholas F.**, Bowman, D.A., and North, C., (2011). "The Role of Depth and Gestalt Cues in Information-Rich Virtual Environments." International Journal of Human-Computer Studies, Volume 69, pp. 30-51, Elsevier. <https://doi.org/10.1016/j.ijhcs.2010.05.007>
- 7] **Polys, N. F.** (2011). "Recall the Lost Frontiers of Virtual Worlds". Communications of the ACM, 54(5).
- 6] **Polys, Nicholas** and Brutzman, Don and Steed, Anthony and Behr, Johannes. (2008). "Future Standards for Immersive VR: Report on the IEEE VR 2007 Workshop". IEEE Computers Graphics & Applications Vol. 28, Number 2, IEEE Computer Society, 2008. <https://doi.org/10.1109/MCG.2008.29>
- 5] D.A. Thorley-Lawson, V. H., K. Luzuriaga, A.S. Jarrah, R. Laubenbacher, K. Lee, **N.F. Polys**, E. Delgado-Eckert, M. Shapiro, K.A. Duca (2007). "A Virtual Look at Epstein-Barr Virus Infection: Biological Interpretations." PLOS Pathogens **3**(10): e137. <https://doi.org/10.1371/journal.ppat.0030137>
- 4] Shapiro, M., K. A. Duca, K. Lee, E. Delgado-Eckert, A.S. Jarrah, R. Laubenbacher, **N.F. Polys**, V. Hadinoto, D. Thorley-Lawson, (2008). "A Virtual Look at Epstein-Barr Virus Infection: Simulation Mechanism." Journal of Theoretical Biology **252**(4): 633-648. <https://doi.org/10.1016/j.jtbi.2008.01.032>
- 3] Bowman, D., Chen, J., Wingrave, C., Lucas, J., Ray, A., **Polys, N.**, Li, Q., Haciahetoglu, Y., Kim, J., Kim, S., Boehringer, R., and Ni, T. (2006). "New Directions in 3D User Interfaces". International Journal of Virtual Reality **5**, 3-14. <https://doi.org/10.20870/IJVR.2006.5.2.2683>
- 2] **Polys, N. F.**, Kim, S., and Bowman, D. A. (2007). "Effects of Information Layout, Screen Size, and Field of View on User Performance in Information-Rich Virtual Environments." Computer Animation and Virtual Worlds **18**(1): 19-38. <https://doi.org/10.1145/1101616.1101626>
- 1] **Polys, Nicholas F.** and Bowman, Doug A. (2004). "Desktop Information-Rich Virtual Environments: Challenges and Techniques." Virtual Reality **8**(1): 41-54. <https://doi.org/10.1007/s10055-004-0134-0>

Peer-Reviewed Conference Proceedings

- 81] Nikhil Narra, Rick Lentz, Don Brutzman, **Nicholas Polys**. "x3d_mcp: A Model Context Protocol Server for AI-Assisted X3D Authoring". ACM Web3D 2026 (forthcoming).
- 80] Sanjana Anem, Eden Enwiya, Darshan Sarojini, Ben Sandbrook, **Nicholas Polys**. "Interactive Web-Based Visualization for Aircraft Multidisciplinary Design, Analysis, and Exploration" ACM Web3D 2026 (forthcoming).
- 79] Holger Graf, Johannes Behr, Tracey Swales, **Nicholas Polys**. "The Web of Worlds – Towards a Referential Architecture for Open Spatial Worlds " XWORLDS Workshop: ISMAR 2026. IEEE (forthcoming).
- 78] Andrew, J. G., Pitterson, N. P., Dietrich, C. B., Talty, T. J., **Polys, N. F.**, Dahl, B., Tripathi, N. D., & Dhillon, H. S. (2026, June 21–24). "Interactive simulations to support student intuition in radio frequency and wireless communications concepts". 2026 ASEE Annual Conference & Exposition, Charlotte, NC, United States.
- 77] Andrew, J. G., Pitterson, N. P., Dietrich, C. B., Talty, T. J., **Polys, N. F.**, Dahl, B., Tripathi, N. D., & Dhillon, H. S. (2026, June 21–24). "Innovating Wireless Education: Visualization as a Catalyst for Student Engagement". 2026 ASEE Annual Conference & Exposition, Charlotte, NC, United States.

- 76] Nikhil Narra, Anuj Marisetty, Nicholas **Polys**, and Ben Sandbrook. 2025. "A Generalized Web3D API for Metaverse Bookmarks". In Proceedings of the 30th International Conference on 3D Web Technology (Web3D '25). Association for Computing Machinery, New York, NY, USA, 1–8. <https://doi.org/10.1145/3746237.3746311>
- 75] Nikhil Narra, Anuj Marisetty, Nicholas **Polys**, and Ben Sandbrook. 2025. "X3Test: A Headless Browser-Based Framework for Automated Performance Benchmarking of X3D/X3DOM Scenes". In Proceedings of the 30th International Conference on 3D Web Technology (Web3D '25). Association for Computing Machinery, New York, NY, USA, 1–5. <https://doi.org/10.1145/3746237.3746315>
- 74] **N. F. Polys**, A. Mohammed, A. Johnson and N. Roofigari-Esfahan, "The Value of Immersion in Co-Present, Collaborative Safety Review," 2025 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW), Saint Malo, France, 2025, pp. 1697-1701, <https://doi.org/10.1109/VRW66409.2025.11045961>
- 73] Nicholas **Polys**, Ayat Mohammed, and Ben Sandbrook. 2024. "Prompt Engineering for X3D Object Creation with LLMs". In Proceedings of the 29th International ACM Conference on 3D Web Technology (Web3D '24). Association for Computing Machinery, New York, NY, USA, Article 18, 1–7. <https://doi.org/10.1145/3665318.3677159>
- 72] Havele A, Gomez C, **Polys N**. "Interactive 3D Geospatial Visualization of the Port of Gulfport using X3D". In Proceedings of the 29th International ACM Conference on 3D Web Technology 2024 Sep 25 (pp. 1-3). <https://doi.org/10.1145/3665318.3680539>
- 71] Dahshan M, **Polys NF**, House L, Youssef K, Pollyea RM. "Human-Machine Collaboration for the Visual Exploration and Analysis of High-Dimensional Spatial Simulation Ensembles". In VISIGRAPP (1): GRAPP, HUCAPP, IVAPP 2024 (pp. 678-689).
- 70] Raghav Sethi, Andreas Plesch, Timo Sturm, and Nicholas **Polys**. 2023. "Integrating XR Content in X3DOM: Supporting Navigation and Custom Functions in X3D Scenes". In Proceedings of the 28th International ACM Conference on 3D Web Technology (Web3D '23). Association for Computing Machinery, New York, NY, USA, Article 19, 1–4. <https://doi.org/10.1145/3611314.3615918>
- 69] Nazila Roofigari-Esfahan, Nicholas **Polys**, Ashley Johnson, Todd Ogle, and Ben Sandbrook. 2023. "Immersive Cross-platform X3D Training: Elevating Construction Safety Education". In Proceedings of the 28th International ACM Conference on 3D Web Technology (Web3D '23). Association for Computing Machinery, New York, NY, USA, Article 23, 1–5. <https://doi.org/10.1145/3611314.3625830>
- 68] Nicholas **Polys** and Sheeban Mohd Wasi. 2023. "Increasing Web3D Accessibility with Audio Captioning". In Proceedings of the 28th International ACM Conference on 3D Web Technology (Web3D '23). Association for Computing Machinery, New York, NY, USA, Article 6, 1–10. <https://doi.org/10.1145/3611314.3615902>
- 67] Anita Havele, Nicholas **Polys**, and Johannes Behr. 2023. "Building 3D Web Interoperability for the Metaverse". In Proceedings of the 28th International ACM Conference on 3D Web Technology (Web3D '23). Association for Computing Machinery, New York, NY, USA, Article 32, 1–2. <https://doi.org/10.1145/3611314.3623584>
- 66] Ayat Mohammed, Nicholas **Polys**, Jessica Cunningham, Jenny Munson, James Chutkowski, Hun Liang, Daniel Park, Russell Rockne, Ryan Woodall, and Cora Esparza. 2023. "Enhancing Brain Flow Visualization with Automated 3D Data Processing: A Study on DCE-MRI Data from Mice with Tumors". In Proceedings of the 28th International ACM Conference on 3D Web Technology (Web3D '23). Association for Computing Machinery, New York, NY, USA, Article 24, 1–5. <https://doi.org/10.1145/3611314.3625831>

- 65] N. F. **Polys** and J. Pandey, "25 years so far: Lessons from a Large Scale Immersive Visualization Facility," 2023 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW), Shanghai, China, 2023, pp. 229-232, <https://doi.org/10.1109/VRW58643.2023.00056> .
- 65] Anita Havele, Nicholas **Polys**, William Benman, and Donald Brutzman. 2022. The Keys to an Open, Interoperable Metaverse. In Proceedings of the 27th International Conference on 3D Web Technology (Web3D '22). Association for Computing Machinery, New York, NY, USA, Article 9, 1–7. <https://doi.org/10.1145/3564533.3564575>
- 64] Nicholas **Polys**, Samridhi Roshan, Emily Newton, Muskaan Narula, and Bao-Tran Thai. 2022. "Designing for Social Interactions in a Virtual Art Gallery". In Proceedings of the 27th International Conference on 3D Web Technology (Web3D '22). Association for Computing Machinery, New York, NY, USA, Article 11, 1–9. <https://doi.org/10.1145/3564533.3564562>
- 63] Nicholas **Polys** and Noam Bendelac. 2022. "Spatial Audio Designer". In Proceedings of the 27th International Conference on 3D Web Technology (Web3D '22). Association for Computing Machinery, New York, NY, USA, Article 16, 1–4. <https://doi.org/10.1145/3564533.3564563>
- 62] Dahshan M, Turton TL, **Polys N**. "Exploration and Analysis of Image-based Simulation Ensembles". EuroVis 2022. <https://doi.org/10.2312/evp.20221128> .
- 61] Nicholas F **Polys**, Kathleen Meaney, John Munsell, and Benjamin J Addlestone. 2021. "X3D Field Trips for Remote Learning". In Proceedings of the 26th International Conference on 3D Web Technology (Web3D '21). Association for Computing Machinery, New York, NY, USA, Article 5, 1–7. <https://doi.org/10.1145/3485444.3487647>
- 60] Kinnaman, Saverot, Chen, Long, **Polys**, Nesbit, Stocker, Xiao, Hall. (2021). "3D PRESERVATION MODELS AND MODALITIES: ADVANCING RESEARCH REPRODUCIBILITY AND CAPACITY AT VIRGINIA TECH". In iPRES 2021 Proceedings.
- 59] Dietrich, C.B., **Polys, N.F.**, Reid, K., Sheridan, J.A.G., Emenonye, D.R., Gomez, X., Tolley, J., Makin, C. and Gaeddert, J., 2021, July. "Work in Progress: Interactive Introductory Online Modules on Wireless Communications and Radio-frequency Spectrum Sharing". In *2021 ASEE Virtual Annual Conference Content Access*. [Work in Progress: Interactive Introductory Online Modules on Wireless Communications and Radio-frequency Spectrum Sharing | NSF Public Access Repository](https://doi.org/10.1145/3423336.3429344)
- 58] Dietrich CB, **Polys NF**, Hearn CW, Reid K, Sheridan JA. "WIP: Collaborative Undergraduate Research Project to Develop a Remotely-Accessible, Open-Source, Portable, Software-Defined Radio-Based Antenna Range for Research, Education, and Outreach". In 2021 ASEE Virtual Annual Conference Content Access 2021 Jul 26. <https://peer.asee.org/38073>
- 57] Mai Dahshan, Leanna House, and **Nicholas Polys**. (2020). "High-dimensional spatial simulation ensemble analysis". In Proceedings of the 9th ACM SIGSPATIAL International Workshop on Analytics for Big Geospatial Data (BIGSPATIAL '20). Association for Computing Machinery, New York, NY, USA, 1–4. <https://doi.org/10.1145/3423336.3429344>
- 56] **Polys**, Heddle, Girod, Elhoudhiri, Burkert (2020). "Nuclear Femtography on the Web with X3D". In The 25th International Conference on 3D Web Technology (Web3D '20). ACM, New York, NY, USA. <https://doi.org/10.1145/3424616.3424728>
- 55] Jooyoung Whang & **Nicholas Polys** (2020). "DeepCinema: Adding Depth with X3D Image-Based Rendering". In The 25th International Conference on 3D Web Technology (Web3D '20). ACM, New York, NY, USA. <https://doi.org/10.1145/3424616.3424713>

- 54] Yanshen Sun & **Nicholas Polys** (2020). "The Scalability of X3D4 PointProperties: Benchmarks on WWW Performance". In The 25th International Conference on 3D Web Technology (Web3D '20). ACM, New York, NY, USA. <https://doi.org/10.1145/3424616.3424707> ***BEST PAPER WINNER!**
- 53] Malamos, Flotynski, Sykos, Brutzman, Hamza-Lup, **Polys**. (2019). "The Semantic Web3D: towards comprehensive representation of 3D content on the semantic web". In Proceedings of the International Conference on 3D Immersion (IC3D and Stereopsia) (Brussels) IEEE. <https://doi.org/10.1109/IC3D48390.2019.8975906>
- 52] Valerio Mascolino, Alireza Haghighat, **Nicholas Polys**, Nathan J. Roskoff, and Srijith Rajamohan. (2019). "A Collaborative Virtual Reality System (VRS) with X3D Visualization for RAPID". In The 24th International Conference on 3D Web Technology (Web3D '19). ACM, New York, NY, USA, 1-8. DOI: <https://doi.org/10.1145/3329714.3338135>
- 51] Rogers K, Hitt N, **Polys N**, Liu S. Using Crowdsourced Data to Estimate Stream Fish Abundance: Project Etrout. In American Fisheries Society & The Wildlife Society 2019 Joint Annual Conference 2019 Sep 30. AFS.
- 50] Dietrich, C., Goff, R., Dessources, D., Gomez, X., Garcia-Sheridan, J., **Polys, N.**, Buehrer, R.M., Kim, S., Marojevic, V. and Hearn, C., (2018, October). "Remote laboratory exercises and tutorials for spectrum-agile radio frequency systems". In *2018 IEEE Frontiers in Education Conference (FIE)* (pp. 1-2). IEEE. <https://doi.org/10.1109/FIE.2018.8658775>
- 49] **Nicholas Polys**, Cecile Newcomb, Todd Schenk, Thomas Skuzinski, and Donna Dunay. (2018). "The value of 3D models and immersive technology in planning urban density". In Proceedings of the 23rd International ACM Conference on 3D Web Technology (Web3D '18). ACM, New York, NY, USA, Article 13, 4 pages. DOI: <https://doi.org/10.1145/3208806.3208824>
- 48] Garcia-Sheridan, Joshua, Marojevic, Vuk, Goff, Richard, **Polys, Nicholas**, & Dietrich, Carl B. (2018). "Lessons Learned from a Radio Spectrum Coexistence Competition: A Road Map to Engagement in Informal Education of Wireless Communication". *ASEE Annual Conference Proceedings*. Retrieved from <http://par.nsf.gov/biblio/10057256>
- 47] Dowling, M., Wenskovitch, J., Hauck, P., Binford, A., **Polys, N.** and North, C., (2018). A Bidirectional Pipeline for Semantic Interaction. In *Proceedings of the Workshop on Machine Learning from User Interaction for Visualization and Analytics (IEEE VIS 2018)* (Vol. 11). <https://doi.org/10.1109/MLUI52768.2018.10075562>
- 46] Faiz Abidi, **Nicholas Polys**, Srijith Rajamohan, Lance Arsenault, and Ayat Mohammed. (2018). "Remote high performance visualization of big data for immersive science". In Proceedings of the High Performance Computing Symposium (HPC '18). Society for Computer Simulation International, San Diego, CA, USA, Article 5, 12 pages. [Remote high performance visualization of big data for immersive science | Proceedings of the High Performance Computing Symposium](https://doi.org/10.1145/3208806.3208824)
- 45] **Nicholas Polys**, Jessica Hotter, Laura Purcell, Madison Lanier, Jordan Wolf, Cully Hession, Peter Sforza and James Ivory (2017). "Finding Frogs: Using Game-Based Learning to Increase Environmental Awareness". In *Proceedings of the 22nd International Conference on 3D Web Technology* (Web3D '17). ACM, New York, NY, USA. <https://doi.org/10.1145/3055624.3075955>
- 44] Haitao Wang, Xiaoyu Chen, **Nicholas Polys** and Peter Sforza (2017). "A Web3D Forest Geo-Visualization and User Interface Evaluation". In *Proceedings of the 22nd International Conference on 3D Web Technology* (Web3D '17). ACM, New York, NY, USA. <https://doi.org/10.1145/3055624.3075956>
- 43] Ander Arbelaiz, Aitor Moreno, Luis Kabongo, **Nicholas Polys** and Alejandro García-Alonso (2017). "Community-driven Extensions to the X3D Volume Rendering Component". In *Proceedings of the 22nd International Conference on 3D Web Technology* (Web3D '17). ACM, New York, NY, USA. <https://doi.org/10.1145/3055624.3075945>

- 42] Ayat Mohammed, **Nicholas Polys**, Vuk Marojevic, Richard Goff and Carl Dietrich (2017). "Evaluating Multi-View Representations of a Web3D Streaming Server". In *Proceedings of the 22nd International Conference on 3D Web Technology* (Web3D '17). ACM, New York, NY, USA. <https://doi.org/10.1145/3055624.3075957>
- 41] Jagathshree Iyer, **Nicholas Polys** and Lance Arsenault (2017). "Text Density and Display Bandwidth: Evaluating Scalability by Model and Experiment". In *Proceedings of the 22nd International Conference on 3D Web Technology* (Web3D '17). ACM, New York, NY, USA. <https://doi.org/10.1145/3055624.3075958>
- 40] Jessie Mann, **Nicholas Polys**, Rachel Diana, Manasa Ananth, Brad Herald, Sweetuben Platel. "Virginia Tech's study hall: A virtual method of loci mnemotechnic study using a neurologically-based, mechanism-driven, approach to immersive learning research", 2017 IEEE Virtual Reality (VR). 383-384, 2017. <https://doi.org/10.1109/VR.2017.7892337>
- 39] **Polys, N.**, Mohammed, A., Iyer, J., Radics, P., Abidi, F., Arsenault, L., & Rajamohan, S. (2016, March). "Immersive analytics: Crossing the gulfs with high-performance visualization". In *IEEE VR 2016 Workshop on Immersive Analytics (IA)* (pp. 13-18). IEEE. <https://doi.org/10.1109/IMMERSIVE.2016.7932376>
- 38] **Polys**, Sforza, Hession, Munsell (2016) "Extensible Experiences: Fusality for Stream and Field". In *Proceedings of the 21th International Conference on 3D Web Technology* (Web3D '16). ACM, New York, NY, USA. <https://doi.org/10.1145/2945292.2945320>
- 37] **Polys, N.** and Gurjarpadhye, A. (2016). "Tradeoffs in Multi-Channel Microscopy Volume Visualization: An Initial Evaluation". In *Proceedings of the 21th International Conference on 3D Web Technology* (Web3D '16). ACM, New York, NY, USA. <https://doi.org/10.1145/2945292.2945323>
- 36] **Polys**, Sforza, & Singh (2016). "A Novel level-Of-Detail Technique for Virtual City Environments". In *Proceedings of the 21th International Conference on 3D Web Technology* (Web3D '16). ACM, New York, NY, USA. <https://doi.org/10.1145/2945292.2945322>
- 35] Brown, **Polys**, Bevan, and Mohammed (2016). "Insights into Alzheimer's Disease: Molecular Dynamics (MD) Simulations of Peptide-Membrane Interactions". In: *Proceedings of the 5th Annual Extreme Science Engineering Discovery Environment* (XSEDE'16), <https://doi.org/10.1145/2949550.2952773>
- 34] Ayat Mohammed, Faiz Abidi, Sriji Rajamohan, **Nicholas Polys**, (2016). "High Performance Visualization Pipeline for LiDAR Point Cloud Data". In: *Proceedings of the 5th Annual Extreme Science Engineering Discovery Environment* (XSEDE'16), p. 59. ACM.
- 33] Ji-Sun Kim, **Nicholas Polys**, and Peter Sforza. (2015). "Preparing and evaluating geospatial data models using X3D encodings for web 3D geovisualization services". In *Proceedings of the 20th International Conference on 3D Web Technology* (Web3D '15). ACM, New York, NY, USA, 55-63. DOI=<http://dx.doi.org/10.1145/2775292.2775304>
- 32] **Nicholas F. Polys**, Benjamin Knapp, Matthew Bock, Christina Lidwin, Dane Webster, Nathan Waggoner, and Ivica Bukvic. (2015). "Fusality: an open framework for cross-platform mirror world installations". In *Proceedings of the 20th International Conference on 3D Web Technology* (Web3D '15). ACM, New York, NY, USA, 171-179. DOI=<http://dx.doi.org/10.1145/2775292.2775317>
- 31] Marojevic, V., & Goff, R. M., & Dietrich, C. B., & Yang, T., & Hearn, C. W., & **Polys, N. F.**, & Buehrer, R. M. (2015, June), "Wireless Communication Testbed and Tools for Authentic STEM Learning" Paper presented at 2015 ASEE Annual Conference and Exposition, Seattle, Washington. <https://peer.asee.org/25079>

- 30] Peter J. Radics, **Nicholas F. Polys**, Shawn P. Neuman, and William H. Lund. (2015). "OSNAP! Introducing the open semantic network analysis platform", *Proc. SPIE 9397, Visualization and Data Analysis 2015*, 939707 (February 8, 2015); <https://doi.org/10.1117/12.2077834>
- 29] Nikita Sharakhov, Vuk Marojevic, Ferdinando Romano, **Nicholas Polys**, and Carl Dietrich. (2014). "Visualizing real-time radio spectrum access with CORNET3D". In *Proceedings of the Nineteenth International ACM Conference on 3D Web Technologies (Web3D '14)*. ACM, New York, NY, USA, 109-116. <https://doi.org/10.1145/2628588.2628598>
- 28] Apostolellis, P., Bortz, B., Peng, M., **Polys, N.**, Hoegh, A. (2014). "Exploring the Integrality and Separability of the Leap Motion Controller for Direct Manipulation 3D Interaction". *IEEE Symposium on 3D User Interfaces (3DUI) 2014*, 153-154. <https://doi.org/10.1109/3DUI.2014.6798866>
- 27] Zeitz, K., Zeitz R., Tao, C., **Polys, N.** (2014). "A Comparative Study of Metaphors for Investigating Augmented Reality Artifacts". *IEEE Symposium on 3D User Interfaces (3DUI)*, 179-180. <https://doi.org/10.1109/3DUI.2014.6798879>
- 26] Nikita Sharakhov, Nicholas **Polys**, and Peter Sforza. (2013). GeoSpy: a Web3D platform for geospatial visualization. In *Proceedings of the 1st ACM SIGSPATIAL International Workshop on Map Interaction (MapInteract '13)*. ACM, New York, NY, USA, 30-35. <https://doi.org/10.1145/2534931.2534947>
- 25] Hyungil Kim, Xuefang Wu, Joseph L. Gabbard, and **Nicholas F. Polys**. (2013). "Exploring head-up augmented reality interfaces for crash warning systems." In *Proceedings of the 5th International Conference on Automotive User Interfaces and Interactive Vehicular Applications*, pp. 224-227. ACM. <https://doi.org/10.1145/2516540.2516566>
- 24] **Nicholas F. Polys**, Felipe Bacim, Mehdi Setareh, and Brett Jones. (2013). "Building novel Web3D user interfaces: a case study from architecture and structural engineering". In *Proceedings of the 18th International Conference on 3D Web Technology (Web3D '13)*. ACM, San Sebastian ES, 135-138. <https://doi.org/10.1145/2466533.2466554>
- 23] F. Bacim, E. Ragan, S. Serbo, M. Setareh, B. D. Jones, **N. Polys**. (2013). "The Effects of Display Fidelity, Visual Complexity, and Task Scope on Spatial Understanding of 3D Graphs." *Proceedings of Graphics Interface*, Regina, 2013. ISBN: 9781482216806.
- 22] Nikita Sharakhov, **Nicholas Polys**, and Peter Sforza. (2013). "SpeedSpy: a mobile Web3D platform for visualizing broadband data". In *Proceedings of the 18th International Conference on 3D Web Technology (Web3D '13)*. ACM, New York, NY, USA, pg. 208. <https://doi.org/10.1145/2466533.2466566>
- 21] **Polys, N.** (2012). "Publishing the Greatest Common Denominator." *CEUR-WS 869 Proceedings of the 1st International Workshop on Declarative 3D for the Web Architecture (Dec3D @ WWW 2012)*.
- 20] Tilden, D., A. Singh, **N. F. Polys**, and P. Sforza. (2011). "Multimedia mashups for mirror worlds", *Web3D '11, Proceedings of the 16th International Conference on 3D Web Technology*, Paris, ACM. <https://doi.org/10.1145/2010425.2010453>
- 19] Ullrich, S., T. Kuhlen, **N. F. Polys**, D. Evestedt, M. Aratow, and N. W. John, (2011). "Quantizing the Void: Extending Web3D for Space-Filling Haptic Meshes", *Medicine Meets Virtual Reality (MMVR)*, vol. 163, Newport Beach CA, USA, IOS Press, pp. 670-676.
- 18] Bacim, F., **Polys, N.**, Chen, J., Setareh, M., Li, J., and Ma, L. (2010). "Cognitive scaffolding in Web3D learning systems: a case study for form and structure". In *Proceedings of the 15th international Conference on Web 3D Technology* (Los Angeles, California, July 24 - 25, 2010). Web3D '10. ACM. <https://doi.org/10.1145/1836049.1836063>

- 17] Henry, James A.G. and **Polys, Nicholas**. (2010). "The Effects of Immersion and Navigation on the Acquisition of Spatial Knowledge of Abstract Data Networks". *Proceedings of the International Conference on Computational Science*. *Procedia Computer Science*, Volume 1, Issue 1, pp. 1737-1746, Elsevier. <https://doi.org/10.1016/j.procs.2010.04.195>
- 16] Hossain, S., Akbar, M., **Polys, N.** (2009) "Storytelling and Clustering for Cellular Signaling Pathways". *Proceedings of International Conference on Information and Knowledge Engineering (IKE)*, Las Vegas, NV. 2 Volumes. CSREA Press 2009, ISBN 1-60132-116-3
- 15] **Polys, Nicholas F.**, Visamsetty, S., Battarechee, P. Tilevich, E. (2009). "The Value of Patterns in Deep Media Scenegraps". SEARIS Workshop, *IEEE Virtual Reality 2009*, Shaker-Verlag. ISBN 978-3-8322-8393-3
- 14] **Polys, Nicholas F.**, Visamsetty, S., Battarechee, P., Tilevich, E. (2009). "Design Patterns in Componentized Scenegraps". SEARIS Workshop, *IEEE Virtual Reality 2009*, Shaker-Verlag. ISBN 978-3-8322-8393-3
- 13] Shyam Visamsetty, Puranjay Bhattacharjee, and **Nicholas Polys**. (2008). "Design patterns in X3D toolkits". In *Proceedings of the 13th international symposium on 3D web technology (Web3D '08)*. ACM, New York, NY, USA, 101-104. <https://doi.org/10.1145/1394209.1394230>
- 12] N.W. John, M. Aratow, J. Couch, D. Evestedt, A.D. Hudson, **N. Polys**, R.F. Puk, A. Ray, K. Victor, Q. Wang. (2008). "MedX3D: Standards Enabled Desktop Medical 3D." *Medicine Meets VR (MMVR)*.
- 11] **Polys, Nicholas F.**, Shapiro, Michael, Duca, Karen. (2007). "IRVE-Serve: A Visualization Framework for Spatially-Registered TimeSeries Data". *The Web3D 2007 Symposium*, ACM SIGGRAPH. <https://doi.org/10.1145/985040.985042>
- 10] **Polys, Nicholas F.**, & Ray, Andrew, (2006). "Supporting Mixed-Reality Interfaces through X3D Specification". Workshop on Mixed-Reality Interface Specification, *Proceedings of IEEE Virtual Reality*, IEEE Press.
- 9] Murthy, U., Burbey, I., Kwon, G., **Polys, N.**, Vincent, P., and Pérez-Quiñones, M. (2006). "Re-finding from a Human Information Processing Perspective". *SIGIR Workshop on Personal Information Management*, Seattle. <http://pim.ischool.washington.edu/pim06>
- 8] **Polys, Nicholas F.**, Kim, S., Bowman, D.A. (2005). "Effects of Information Layout, Screen Size, and Field of View on User Performance in Information-Rich Virtual Environments." *Proceedings of ACM Virtual Reality Software and Technology 2005*. Monterey, CA: ACM SIGGRAPH. <https://doi.org/10.1145/1101616.1101626>
- 7] McCrickard, S., Wahid, S., Lee, J., **Polys, N.** (2005). "Use and Reuse in Information and Interaction Design." *Proceedings of HCI-International 2005*, Las Vegas, Nevada. LEA Associates.
- 6] **Polys, Nicholas F.**, Bowman, Doug A., North, Chris. (2004). "Information-Rich Virtual Environments: Challenges and Outlook". *Proceedings of NASA Virtual Iron Bird Workshop* (Day 2, paper, ppt & video), NASA Ames. <http://ic.arc.nasa.gov/vib/>
- 5] **Polys, Nicholas F.**, Bowman, D., North, C., Laubenbacher, R., Duca, K. (2004). "PathSim Visualizer: An Information-Rich Virtual Environment for Systems Biology". *Proceedings of the Web3D 2004 Symposium*, ACM SIGGRAPH. <https://doi.org/10.1145/985040.985042>
- 4] **Polys, Nicholas F.**, North, C., Bowman, D., Ray, A., Moldenhauer, M., Dandekar, C. (2004). Snap2Diverse: Coordinating Information Visualizations and Virtual Environments". *Proceedings of Visualization and Data Analysis*, International Society for Optical Engineering (SPIE). <https://doi.org/10.1117/12.539236>

- 3] Bowman, D., North, C., Chen, J., **Polys, N.**, Pyla, P., and Yilmaz, U. (2003). "Information-Rich Virtual Environments: Theory, Tools, and Research Agenda". In *Proceedings of ACM Virtual Reality Software and Technology*. 2003. Osaka, Japan: ACM SIGGRAPH. <https://doi.org/10.1145/1008653.1008669>
- 2] **Polys, Nicholas F.** (2003). "Stylesheet Transformations for Interactive Visualization: Towards a Web3D Chemistry Curricula". *Proceedings of the Web3D 2003 Symposium*, ACM SIGGRAPH. <https://doi.org/10.1145/636593.636606>
- 1] Brutzman, Don, Kass, Michael, **Polys, Nicholas F.** (2001). "X3D Content Examples, Editing, Conformance Suite and Software Development Kit". Sketches and Applications, *ACM SIGGRAPH*.

Posters

- 6] Mohammed, A., **Polys, N.**, Sandbrook, B., Cunningham, J. (2024) "Enhancing Brain Flow Visualization" *The Art of HPC. Supercomputing 2024*. Atlanta, GA.
- 5] Dashan, Mai & Polys, **Nicholas F.** (2018) Making Sense of Scientific Simulation Ensembles. *SuperComputing 2018*
- 4] Rincón-Gallardo Patiño S, Kraak V, Rajamohan S, **Polys N**, Ramesh A, Meaney K, Coupey E. "Development of a Responsible Food and Beverage Marketing Index for National Governments to Implement and Evaluate Policies to Restrict the Marketing of Unhealthy Food and Beverage Products to Children". *International Society for Behavioral Nutrition and Physical Activity* (ISBNPA). Hong Kong, China, 3-6 June 2018. Abstract 013949.
- 3] Peter Radics, Peter Sforza, Brian Farrell, Joseph Newman, **Nicholas Polys**, Azam Mosaavi, Bethany Sutherland, Haitao Wang, Laura Roghair, Matthew Pierson and Matthew Bock (2015) "Vineyard Site Assessment and Simulation of Grape Varieties in the Eastern U.S." The 4th Annual *Extreme Science Engineering Discovery Environment Conference 2015* (XSEDE'15), At St. Louis, MO
- 2] **Polys, N.F.**, Duca, K.A., North, C., Bowman, D., Laubenbacher, R. (2005). "Information-Rich Virtual Environments for Biomedicine." Poster. *Computational Cell Biology*, Lennox MA.
- 1] **Polys, N. F.**, Duca, K. A., Laubenbacher, R., Bowman, D. A., North, C. (2003). "Interactive Visualization of Biological Databases using Information-Rich Virtual Environments", Poster. *Digital Biology: The Emerging Paradigm*, NIH.

Other Publications

- 15] Yoo, T. S., & **Polys, N. F.** (2026, May). Insight Into the Insight Toolkit. *IEEE Computer Graphics and Applications*, 46(3), 141–148. <https://doi.org/10.1109/MCG.2026.3676215>
- 14] Jourdain, S., O'Leary, P., Schroeder, W., & **Polys, N. F.** (2025, March 1). Trame: Platform Ubiquitous, Scalable Integration Framework for Visual Analytics. *IEEE Computer Graphics and Applications*, 45(2), 126–134. <https://doi.org/10.1109/MCG.2025.3540264>
- 13] **Polys, N. F.** (2024, May 1). @theSource: Welcome. *IEEE Computer Graphics and Applications*, 44(3), 69–73. <https://doi.org/10.1109/MCG.2024.3384728>
- 12] **Polys NF.**, David Heddle, Bill Briscoe, Izzy Illari. (2023) [Paths of Discovery: A Problem Oriented Approach to the CNF Ecosystem](#) Virginia Tech Technical Reports.

- 11] Ayat Mohammed, **Nicholas F Polys**, Duncan Farrah. (2020). [Visualize This: Lessons from the Front-lines of High Performance Visualization](#). Virginia Tech Technical Reports.
- 10] V Burkert, L Elouadrhiri, FX Girod, D Heddle, **N Polys**, P Schweitzer, M Vanderhaeghen. (2020). [“Visualizing Femto-Scale Dynamics–Final Report”](#). Virginia Tech Technical Reports.
- 9] **Nicholas Polys**, Markus Diefenthaler, Srijith Rajamohan, JooYoung Whang, Dmitry Romanov, Mai Dahshan. (2020) [“High-Dimensional Visual Analytics of Particle Kinematics”](#). Virginia Tech Technical Reports.
- 8] Schutt, K., **Polys, N.** and Sforza, P. (2013). “Accessing Parallel Computing Resources from ArcGIS 10.0”. Processing Large Datasets session. *ESRI International User Conference*, San Diego, CA.
- 7] **Polys, N. F.**, Wood, A., Ullrich, S., Evestedt, D., & Aratow, M. (2013). A fresh look at Immersive Volume Rendering: Challenges and Capabilities, in IEEE VR Workshop on Immersive Volume Rendering 2013: Orlando. https://www.academia.edu/download/123287621/Wivi2013_print_v21.pdf
- 6] **Polys, N. F.**, A. Singh, P. Sforza (2012). “Extended LOD Concept for X3D, 3DBlackburg”. [3D Portrayal Interoperability Experiment \(3DPIE\) Final Report](#), Eds. Schilling, Hagedorn & Coors. The Open Geospatial Consortium (OGC) Public Engineering Reports. <http://www.opengeospatial.org/standards/per>
- 5] **Polys, Nicholas F.**, Shupp, Lauren, Volpe, J., Glina, V. and North, Chris. (2006). “The Effects of Task, Task Mapping, and Layout Space on User Performance in Information-Rich Virtual Environments”. Technical Report TR-06-12, Computer Science, VT. <http://hdl.handle.net/10919/20363>
- 4] Burbey, I., Kwon, G., Murthy, U., **Polys, N.** and Vincent, P. (2005). “Human Information Processing with the Personal Memex”, CORR (The Computing Research Repository): <http://arxiv.org/abs/cs.HC/0606107> .
- 3] Harris, Sally. (2004). “PathSim: Scientists model interaction of viruses and immune system”, Virginia Tech Research Magazine Fall. <http://www.research.vt.edu/resmag/fall2004/PathSim.html> .
- 2] **Polys, Nicholas F.** “Techniques of Perception in VRML”, “European Web3D- Company Profiles” “The X3D Initiative”. 3DeZine, 2000-2001.
- 1] **Polys, Nicholas F.** (1999). “Supplying your XML Toolkit” – IBM DeveloperWorks (online feature article)

Technical skills

- **Certified by:** VT IRB board for Human Subjects Research and Ethics
- **Fluent in:** X3D, VRML, Java, C++, Perl, UNIX/Linux, SQL, OpenGL/WebGL
XML & XSLT, (x)HTML, PHP, Python, ECMA/Javascript,
numerous commercial and open-source applications
for interactive 3D modeling and visualization on the WWW and MR

Personal Information

- Happily married to Katherine Mills Polys since 1996

- Performing musician and songwriter since 1992: guitar, banjo, vocals
- Hobbies: fly-fishing, canoeing, hiking, camping
- Other Interests: mathematics of natural forms, evolutionary computation, the neuroscience of presence

References Available Upon Request