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

- World leader in 3D Web methods and systems, applications, and international standards
- Strong publication record with *h-index = 26, i10-index = 53; Department Editor for IEEE CG&A*
- Collaborative, multidisciplinary researcher: *PI / Co-PI in over $ 15 million to date*
- Instructor, supervisor, and mentor for dozens of projects, students, and topics in HCI and Interactive and Immersive 3D

Honors and Awards

- 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

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

- Scientific Visualization, including Medical Imaging, esp. Graphical and Cognitive Aspects
- Information & Interaction Architectures, especially the Web Ecology
- Human Computer Interaction & Usability Engineering in Virtual & Augmented Reality

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 > $ 8.3 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 point clouds, cluster and remote rendering
- Wireless Spectrum Visualization: Web3D visualization interfaces for students (NSF IUSE)
- Fusality / Mirror Worlds: Sensors and Web3D visualization used for environmental monitoring and planning; flipped labs
- Network visualization: cell-signaling pathways, ontologies
- Structural engineering: Web3D-based architectural design, BIM + GIS
- Publications and applications driven by faculty collaborations, funded research, and class projects

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, vis 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 environments
- 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

Professional & Community Activities

Director

- **Web3D Consortium** (501c6; web3d.org)
  - President (elected 2010-2025)
  - Secretary (elected 2007-2009)
  - Board of Directors (elected 2000-2024)
- **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 (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-present

Key Contributor

- ISO/IEC Extensible 3D: X3D 4.0 Specification (2002-present)
- MOSS Arts Center: *Living Landscapes DA* Exhibition, *IAWA 40x40 S*howcase (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 **3dprint.nih.gov** – *Senior Advisory Board and system architect (2013-2017)*
- 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)

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)

Invited Speaker (Speaker, Judge, Panelist)

- 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, SURA** (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)

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"*), Jessie Mann, 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")*

- **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"*), Liu, Wei (2026)
- Scores of graduate and undergraduate interns, CS independent study / undergraduate research, and capstone students in the Visionarium Lab [vis.arc.vt.edu]; three award-winning teams @ VTURCS Symposium
- 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 $ 15 million to date* _____

- **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; $750,000; 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** IUSE: *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 Terpenny 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 = 26 , i10-index = 53 , cited by 2663

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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.

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.

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.

1] **Polys, Nicholas F. "**Publishing Paradigms with X3D". In: *Information Visualization with SVG and X3D*, (eds.) Chanomei Chen and Vladimir Geroimenko, Springer-Verlag, 2005.

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

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"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.ppnp.2023.104032.

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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

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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

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