Bridger Herman

Ph.D. Candidate / Computer Science

bridger-herman.github.io
github.com/bridger-herman
herma582@umn.edu

Dissertation Title: *Physical Rendering Processes for More Graspable Extended Reality Data Visualizations*

Research Themes: Extended reality visualization, data physicalization, creativity support tools

Education

2018-Present	Ph.D., Computer Science › Advisor: Daniel F. Keefe	University of Minnesota – Minneapolis, MN
2018-2020	M.S., Computer Science	University of Minnesota – Minneapolis, MN
2014-2018	B.S., Computer Science › Mathematics minor	University of Minnesota – Minneapolis, MN
Spring 2017	Study Abroad › Courses: Computer Graphics, User Interface Design, New Zealand Conservation, Māori Language	University of Auckland – Auckland, New Zealand

Research and Professional Experience

2018-Present	Assistant Director for Systems and Software Interactive Visualization Lab › Created augmented reality physicalizations with medical device data and climate data › Developed and evaluated sensing techniques for multi-touch input on data physicalizations › Led a software team of graduate and undergraduate students for developing cross-platform user interfaces and graphics techniques for use by artists to create engaging data visualizations › Created a software architecture for mixed reality visualizations with artist-made visual media › Collaborated on 3 multi-disciplinary projects involving teams at the University of Minnesota Twin Cities, the University of Texas at Austin, and other universities	University of Minnesota – Minneapolis, MN
Summer 2022	R&D Engineer – Human Factors › Designed and developed new augmented reality tools for cardiac mapping software	Abbott Laboratories, Inc., Cardiac Division – St. Paul, MN
Summer 2018	Software Development Intern › Made contributions to open-source blockchain projects Hyperledger Sawtooth and Sawtooth PBFT Consensus	Bitwise IO, Inc. – Minneapolis, MN
2016-2018	Undergraduate Research Assistant Interactive Visualization Lab › Proposed a set of design guidelines for 3D printing a field of glyphs on top of a data-driven surface › Built a toolkit of Python scripts for generating 3D-printed data visualizations	University of Minnesota – Minneapolis, MN
Spring 2017	Undergraduate Research Assistant › Developed a series of scripts to automate photogrammetry of irregular 3D models and lighting	University of Auckland – Auckland, NZ

Teaching Experience

F19-23, S23 | **Teaching Assistant** — University of Minnesota – Minneapolis, MN
Course: Programming Interactive Computer Graphics and Games – CSCI 4611
- Created new assignments to reinforce course learning outcomes for 150+ students
- Graded assignments and hosted office hours

S23 | **Guest Lecturer** — University of Minnesota – Minneapolis, MN
Course: CSCI 8002 – Introduction to Research in Computer Science II
- Hosted Q&A with first-year graduate students about research topics

S22 | **Assistant Instructor** — University of Minnesota – Minneapolis, MN
Course: Visualization – CSCI 5609
- Designed and taught class sessions for 75 students in hybrid virtual/in-person mode
- Created course assignments that integrate with my own research in artist-driven visualization
- Assisted lead instructor with in-class critique for student visualization projects

F20 | **Instructor** — University of Minnesota – Minneapolis, MN
Course: Introduction to Computing and Programming Principles – CSCI 1133
- Designed and taught remote lectures for 40 students
- Created learning assessment materials
- Administered remote oral exams
- Managed a team of undergraduate TAs

F18 | **Teaching Assistant** — University of Minnesota – Minneapolis, MN
Course: Virtual Reality and 3D Interaction – CSCI 5619
- Wrote three tutorials on developing virtual reality applications with Unity and Unreal game engines
- Led aforementioned tutorials for two-hour sessions with about 50 students
- Graded student programming assignments

F15-S18 | **Undergraduate Teaching Assistant** — University of Minnesota – Minneapolis, MN
Course: Introduction to Computing and Programming Concepts – CSCI 1133
- Led lab sections of about 30 students
- Formulated new course material for labs
- Graded weekly programming assignments, quizzes, exams
- Developed collaborative Python homework-grading script

Advising

Summer 2023 Wanbo Geng, University of Minnesota.
- Project: Evaluating the efficiency of artist-created glyph-based visualizations.

2020-2021 Maxwell J. Omdal, University of Minnesota.
- Project: Optimizing image tracking layouts for augmented reality visualizations.

Summer 2020 Claire Weissman, Whitman College (REU).
- Project: Automatic generation of data legends for multivariate artist-created visualizations.

Summer 2019 Clara Richter, Mt. Holyoke College (REU).
- Project: Multi-touch input detection for data physicalizations.

Fall 2018 Irwin Sowah, University of Minnesota.
- Project: Designing spatial input devices for precise selection and manipulation.

Publications

Peer Reviewed Publications

2022 D. F. Keefe, **B. Herman**, J. W. Nam, S. Johnson, and D. Orban, "Hybrid Data Constructs: Interacting with Biomedical Data in Augmented Spaces," in *Making Data: Materializing Digital Information*, pp. 169–182, Bloomsbury Publishing Plc, first ed., 2022

2021 **B. Herman**, M. Omdal, S. Zeller, C. A. Richter, G. Abram, F. Samsel, and D. F. Keefe, "Multi-touch querying on data physicalizations in immersive AR," in *Proceedings on Human Computer Interaction*, ACM, 2021

2020 **B. Herman**, F. Samsel, A. Bares, S. Johnson, G. Abram, and D. F. Keefe, "Printmaking, puzzles, and studio closets: Using artistic metaphors to reimagine the user interface for designing immersive visualizations," in *Transactions on Visualization and Computer Graphics*, IEEE, 2020

2019 S. Johnson, F. Samsel, G. Abram, D. Olson, A. J. Solis, **B. Herman**, P. J. Wolfram, C. Lenglet, and D. F. Keefe, "Artifact-based rendering: Harnessing natural and traditional visual media for more expressive and engaging 3d visualizations," *IEEE Trans. on Visualization and Computer Graphics*, vol. 11, no. 1, pp. 492–502, 2019

Workshop Papers and Posters

2022 M. L. Turner, **B. Herman**, M. Broske, and K. D. F., "Poster: Linked spatial and temporal normalization for analysis of cyclical 4d skeletal motion data." IEEE VIS Posters, 2022

2020 C. Weissman, **B. Herman**, S. Zeller, F. Samsel, and D. F. Keefe, "Poster: Automatic generation of data legends for multi-variate artist driven visualizations." IEEE SciVis Posters, 2020. SciVis Best Poster Award

2018 **B. Herman** and D. F. Keefe, "Workshop paper: Boxcars on potatoes: Exploring the design language for tangible visualizations of scalar data fields on 3d surfaces." Toward a Design Language for Data Physicalization: Workshop at IEEE VIS 2018, 2018

Presentations

Conference Presentations

November 2021 ACM Interactive Surfaces and Spaces Talk: *Multi-Touch Querying on Data Physicalizations in Immersive AR*. Łódź, Poland, virtual.

October 2020 IEEE VIS Arts Program Talk: *Printmaking, Puzzles, and Studio Closets: Using artistic metaphors to reimagine the user interface for designing immersive visualizations*. Salt Lake City, Utah, USA, virtual.

October 2019 IEEE VIS Poster: *Linked View Visualization Using Clipboard-Style Mobile VR: Application to Communicating Forestry Data*. Vancouver, British Columbia, Canada.

October 2018 IEEE VIS Workshop Lightning Talk: *Boxcars on potatoes: Exploring the design language for tangible visualizations of scalar data fields on 3d surfaces*. Berlin, Germany.

Workshops and Tutorials

July 2021 WeTeach_CS Summit Tutorial: *Sculpting Vis: A Puzzle-piece approach to teaching scientific visualization*. Austin, Texas, USA, virtual.

October 2020 IEEE VIS Workshop: *Artifact-Based Rendering: VR Visualization by Hand* . Salt Lake City, Utah, USA, virtual.

Reviewing

2022 IEEE Conference on Virtual Reality and 3D User Interfaces
2020 IEEE Transactions on Visualization and Computer Graphics

Volunteering

2019-2023 | **Instructor, Audio Engineer, Board Member, Transport. Coord.** **Minnesota Brass, Inc. – St. Paul, MN**
› Class A CDL License