KAELIE TETZLAFF

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CURRENT POSITION

Associate Professor of Computer Science
Department of Mathematics, Statistics, and Computer Science
University of Wisconsin – Stout Polytechnic

EDUCATION

University of Minnesota, Twin Cities
Department of Computer Science, Ph.D. — May 2019
Dissertation: *Image-Based Relighting of 3D Objects from Flash Photographs*
Committee: Gary Meyer (Chair), Victoria Interrante, Stephen Guy, Joseph Talghader

Department of Computer Science, M.S. — February 2016
Minor Field: Mathematics
Advisor: Gary Meyer

Bethel University, St Paul
Department of Computer Science, B.S. — May 2013
Department of Physics, B.A.
Minor Field: Mathematics
Honors: *summa cum laude*, Honors Program, Dean's List 2009-2013

RESEARCH INTERESTS

Interactive computer graphics; physically and empirically based rendering; photogrammetry; computer graphics for cultural heritage and digital archiving; user experience research, design, and implementation; game design and development; undergraduate research.

EXPERIENCE SUMMARY

Associate Professor; Mathematics, Statistics and Computer Science, UW-Stout Polytechnic 2025–present
Assistant Professor; Mathematics, Statistics and Computer Science, UW-Stout Polytechnic 2019 – 2025
Research & Teaching Assistant; Computer Science, University of Minnesota 2013 – 2019

PUBLICATIONS AND PRESENTATIONS

Ferguson, C., Kosharek, M., and **Tetzlaff, M.** "Advancing a User-Centered, Open-Source Infrastructure for 3D Heritage Digitization with Kintsugi 3D." *IS&T Archiving Conference.* 2026, 115-120.

Walbridge, C. and **Tetzlaff, M.** "Kintsugi 3D: Photogrammetry Technique and Open-Source Software for Heritage." *2and3D Photography,* Rijksmuseum. 2026.

Tetzlaff, M. "Shedding light on global illumination techniques in Unreal Engine 5." *IGDA – Twin Cities*, April 2026.

Walbridge, C. and **Tetzlaff, M.** Kintsugi 3D: specularity and better color in photogrammetry." *IS&T Grab-a-Cup*, December 2025.

Tetzlaff, M. "Shedding light on global illumination techniques in Unreal Engine 5." *MDEV* 2025.

Tetzlaff, M. "Kintsugi 3D: Emerging software for realistic specular photogrammetry." *MDEV* 2025.

Brown, L.; Walbridge, C.; **Tetzlaff, M.** "Kintsugi 3D: An Empirically-Based Photogrammetry Production Pipeline." *IS&T Archiving Conference.* 2024, 76-80.

Williams, A.; Lovejoy, C.; **Tetzlaff, M.** "Specularity and cultural heritage 3D models." *96th Annual Meeting of the Midwestern Psychological Association (MPA)*, 2024.

Tetzlaff, M. "High-Fidelity Specular SVBRDF Acquisition from Flash Photographs." *IEEE Transactions on Visualization and Computer Graphics (TVCG)*, vol. 30, no. 4. 2024, pp. 1885-1896. Certified by the Graphics Replicability Stamp Initiative (GRSI).

Berrier, S.; Koehle, K.; Loken, K.; **Tetzlaff, M.;** Thomas, T. "Interdisciplinary Project-Driven Learning in Game Design and Development." *Journal of Computing Sciences in Colleges*. 2022, *38*(4), 61-66.

Garcia, T.; Lyu, Z.; **Tetzlaff, M.;** "An Online Model Viewer for Cultural Heritage in Unity 3D." *IS&T Archiving Conference.* 2022, 50-55.

Leger, J.; Hashemi, C.; Haupt, J.; Lin, D.; Luo, T.; Sambasivan, A.; Sasaki, T.; Talghader, J.; Meyer, G.; **Tetzlaff, M.**; Paxman, R.; Grossman, E. "3D Imaging from Passive Scattered Light Using Plenoptic Information." *Imaging and Applied Optics Congress 2022*, Optica Publishing Group. 2022, 3Tu4A.

Bissell, B.; Morris, M.; Shaffer, E.; **Tetzlaff, M.;** Berrier, S. "*Vessel*: A Cultural Heritage Game for Entertainment." *IS&T Archiving Conference.* 2021, 1-6.

Tetzlaff, M. "Levenberg-Marquardt Optimization of a Normalized 3D Vector." *88th Annual Meeting of the Mathematical Association of America, Wisconsin Section*. 2021.

Tetzlaff, M.; Meyer, G.; Kautz, A. "IBRelight: An Image-Based 3D Renderer for Cultural Heritage." *IS&T Archiving Conference.* 2018, 93-98.

Tetzlaff, M. and Meyer, G. "Image-Based Relighting using Environment Maps. *IS&T Archiving Conference.* 2017, 23-27.

Tetzlaff, M. and Meyer, G. "Using Flash Photography and Image-Based Rendering to Document Cultural Heritage Artifacts. *Eurographics Workshop on Graphics and Cultural Heritage.* 2016, 137-146.

Berrier, S.; **Tetzlaff, M.**; Ludwig, M.; Meyer, G. "Improved Appearance Rendering for Photogrammetrically Acquired 3D models." *Digital Heritage International Congress.* 2015, 255-262.

Ludwig, M.; Berrier, S.; **Tetzlaff, M.**; Meyer, G. "3D Shape and Texture Morphing Using 2D Projection and Reconstruction." *Computers & Graphics.* 2015, *51*, 146-156.

GRANTS

WiSys Spark Grant, "Design and Implementation of 'Human-in-the-Loop' User Experience for Kintsugi 3D Builder" (T250039). Principal Investigator. $10,000. 2025.

National Endowment for the Humanities (NEH), "Digital archiving and distribution of 3D heritage objects with robust material fidelity" (PR-290101-23). Principal Investigator. $74,961. 2023-2024.

MENTORED STUDENT PRESENTATIONS

Kosharek, M. "Expanding Cultural Heritage Digital Curation and Dissemination Using Kintsugi 3D Viewer," *National Conference on Undergraduate Research (NCUR) 2026.* Richmond, VA.

Denney, L. "Kintsugi 3D Builder: User Experience Design & Implementation," *National Conference on Undergraduate Research (NCUR) 2025.* Pittsburgh, PA.

Denney, L. "Kintsugi 3D Builder: User Experience Design & Implementation," *Research in the Rotunda 2025.* Madison, WI.

Smith, I. "Kintsugi 3D Viewer: User-Centric Design for Cultural Heritage Accessibility," *National Conference on Undergraduate Research (NCUR) 2024.* Long Beach, CA.

Smith, I. "Kintsugi 3D Viewer: User-Centric Design for Cultural Heritage Accessibility," *Research in the Rotunda 2024.* Madison, WI.

MENTORING / RESEARCH ADVISING

McNair Scholars Faculty Advisor 2021, 2023

Mentored two students through the completion of a research project, including a literature review, a full research paper, and a presentation of the research.

NSF / WiscAMP Minority Student Research Grant Advisor 2022-2025

Mentored six student research projects culminating in public poster presentations.

UW-Stout Polytechnic Student Research Grant Advisor 2024 – present

Mentored eight students on research projects culminating in public poster presentations.

PEER REVIEWS / PROFESSIONAL SERVICE

ACM Journal of Computing and Cultural Heritage 2026

Reviewer for three papers through two rounds of review for the Graphics and Cultural Heritage (GCH) 2026 special issue.

IS&T Archiving 2025, 2026

Reviewer for four papers in 2025 and three papers in 2026.

Springer Nature 2025, 2026

Reviewer for three papers for various journals (Scientific Reports, Multimedia Systems, Discover Artificial Intelligence).

National Endowment for the Humanities, Division of Preservation and Access 2024

Reviewer for Digital and Media Preservation Panel under the Research & Development grant program.

IEEE Transactions on Visualization and Computer Graphics 2020

Reviewed one paper through two rounds of reviews.

CONFERENCE WORKSHOPS PRESENTED

"Capturing Specularity with Kintsugi 3D and Camera-mounted Flash"

Archiving 2026 Short Courses, Archiving 2024 Short Courses, 2and3D Photography 2024.

TEACHING EXPERIENCE

University of Wisconsin – Stout Polytechnic

Department of Mathematics, Statistics, and Computer Science

CS 347 / 347: Shader Programming and Procedural Modeling Fall 2024; Spring 2026

Designed and taught a completely new course on shader programming and procedural modeling, with a focus on applications using industry-standard tools for technical artists. Sections consisted of up to 24 undergraduate and graduate students majoring in Computer Science (B.S.), Game Design and Development – Art (B.F.A.), Animation Design (B.F.A), and Design (M.F.A). Topics included physically based rendering, procedural and parametric textures, surface shaders in a deferred lighting architecture, post-processing shaders, transparency and blending, lighting and global illumination, and procedural content generation. Class meets for 85 minutes, three times a week.

CS 343: Computer Graphics Ten semesters from Fall 2020 – present

Instructor for an upper-level computer science course on interactive computer graphics with about 24 students per section, mostly computer science majors with a concentration in game design and development. Topics include the interactive graphics pipeline (vertex and fragment shaders), matrix transformations, textures, and lighting / shading, with interactive graphics programming projects in C++ and GLSL using the openFrameworks API. Class meets for three hours a week.

CS 141: Introduction to Programming — Fall 2024, Spring 2025, Fall 2026

Instructor for a general education introductory computer science course intended for non-majors with about 26 students per section. Topics include procedural programming / basic algorithms, variables, functions, conditions and logic, loops, arrays, and object-oriented programming. Class meets for 55 minutes, three times a week.

GDD 450: Game Development Capstone I — Fall 2019, Fall 2021, Fall 2022
CS 450: Game Software Design and Development Capstone I — Fall 2024, Fall 2025

Instructor for a senior-level capstone project for up to 24 students majoring in game design and development (as artists or programmers). Served in the role of "executive producer" for two or three teams of students (per section) developing 3D computer games, to be presented as prototypes at an expo in December. First semester of a two-semester sequence. Class meets in 185-minute sessions, twice a week.

GDD 451: Game Development Capstone II — Spring 2020, Spring 2022, Spring 2023
CS 451: Game Software Design and Development Capstone II — Spring 2024, Spring 2025, Spring 2026

Instructor for a senior-level capstone project for up to 24 students majoring in game design and development (as artists or programmers). Served in the role of "executive producer" for two or three teams of students (per section) completing 3D computer games that had been prototyped the previous semester, to be presented as finished games at an expo in May. Second semester of a two-semester sequence. Class meets in 185-minute sessions, twice a week.

GDD 325: Exploratory Game Design & Development — Seven semesters from Spring 2021 – present

Instructor for a project-based course for about twenty junior-level students per section, majoring in game design and development (either as artists or programmers). Served in the role of "executive producer" for two to four teams of students (per section) developing 2D or 3D computer games, to be presented as finished games at an expo at the end of the semester. Each section meets for a total of six hours per week.

CS 244: Data Structures — Six semesters from Fall 2019 to Fall 2023

Instructor for a sophomore-level computer science course on introductory data structures and algorithms with about 28 students per section, including computer science majors and non-majors. Topics include fundamental data structures (arrays and linked lists, stacks and queues, binary trees, hash tables) and algorithms (searching, sorting, recursion), with an emphasis on object-oriented programming projects in C++. Class meets for 55 minutes, four times a week.

CS 290: Professional Seminar — Fall 2021, Spring 2022

Instructor for an asynchronous online course typically taken by sophomores on professional skills, with about 28 undergraduate students per section. Topics include resume writing, job search and applications, interviewing, professional portfolios, and professional ethics.

University of Minnesota, Twin Cities
Department of Computer Science

CSCI 1933: Introduction to Data Structures and Algorithms — Summer 2018

Primary instructor for a freshman-level computer science course on introductory data structures and algorithms with about forty undergraduate computer science majors. Topics included fundamental data structures (arrays and linked lists, stacks and queues, binary trees, hash tables) and algorithms (searching, sorting, recursion), with an emphasis on object-oriented programming projects in Java. Class met for 160 minutes, twice a week.

CSCI 2033: Elementary Computational Linear Algebra Fall 2016

Primary instructor for a class on linear algebra with about eighty undergraduate computer science majors. Topics included Gaussian elimination, linear transformations, matrix invertibility, matrix factorization, eigenvalues and eigenvectors, and orthogonality, as well as applications that included programming projects in MATLAB. Class met for 50 minutes, three times a week.

PROFESSIONAL DEVELOPMENT

University of Wisconsin – Stout Polytechnic

Acquiring Talent Workshop Fall 2020

Topics included: Policies and procedures, diversity and inclusivity, implicit bias, best practices for interviewing.

First-Year Instructor Program 2019-2020

Sessions attended include "Using Active Learning Strategies to Produce Fully Engaged Students," "Strategies for Managing the Classroom Learning Environment," "Inclusive Pedagogy," and "Charting the Promotion / Tenure / Renewal Pathway."

New Instructor Workshop Fall 2019

Topics included the uniqueness of the UW-Stout Polytechnic student population, academic integrity, "avoiding the 10 worst teaching mistakes," universal design for learning and accessibility, student anxiety, high-impact practices, and scholarship of teaching and learning.

University of Minnesota, Twin Cities

GRAD 8200: Practicum for Future Faculty Spring 2016

Developed and delivered lectures in three class sessions of an introductory C++ programming course at Normandale Community College under observation by a faculty mentor. Participated in four class sessions with other practicum participants, discussing topics related to life as an academic professional in a faculty role.

GRAD 8101: Teaching in Higher Education Fall 2015

Completed course on teaching at the university level. Topics included active learning, class discussions, group learning, classroom dynamics, inclusivity, course design, and assessment. Developed a teaching philosophy, lesson plan, course syllabus, and capstone assignment.

ACADEMIC SERVICE

University of Wisconsin – Stout Polytechnic

Educational Activities Committee (EAC)	**2021 – Present**
Vice-chair, EAC	**2023 – 2026**
Advising Model Implementation Team	2025 – Present
GDD joint advisory committee	2022 – Present
eSports advisory committee	2022 – Present
Mathematics, Statistics, and Computer Science sharing community	2022 – Present
M.S. Applied Computer Science development committee	2023 – 2025
Mathematics, Statistics, and Computer Science department name committee	2023 – 2024
2D Animation search committee	2023 – 2024
Textbook committee – CS 244	2022
Curriculum revision committee – CS 343	2021
Computer Science search committee	2021
Textbook committees – CS 343 and CS 244	2020

PROFESSIONAL MEMBERSHIPS

Association for Computing Machinery (ACM) 2023 – Present
Higher Education Video Game Alliance (HEVGA) 2022 – Present

AWARDS

Outstanding Educator Award, College of Science, Technology, Engineering, Mathematics, and Management, University of Wisconsin – Stout Polytechnic 2023

SOFTWARE DEVELOPMENT

Kintsugi 3D, Lead developer

A platform for empirically based rendering of cultural heritage artifacts, including specular and translucent materials. Platform consists of two software applications: Kintsugi 3D Builder, a tool that extends a flash-on-camera photogrammetry pipeline to calculate specularity and textures for use either within Kintsugi 3D or other online platforms, and Kintsugi 3D Viewer, an online 3D object viewer for desktop, mobile and web that supports advanced material representations produced by Kintsugi 3D Builder. The Kintsugi 3D software platform has been used at museums around the world including the Minneapolis Institute of Art (Mia), the National Gallery of Art (NGA) in Washington, D.C., the Cleveland Museum of Art (CMA), the Museum of Modern Art (MoMA), the Yale University Art Gallery, the Museum of Cultural History, Oslo, and the Rijksmuseum in Amsterdam.
https://kaelie-tetzlaff.github.io/Kintsugi3DBuilder/
https://github.com/kaelie-tetzlaff/Kintsugi3DBuilder
https://github.com/UWStout/Kintsugi3DViewer

IBRelight, Primary developer

Predecessor to Kintsugi 3D; real-time image-based rendering and relighting for photogrammetrically acquired objects.
https://sites.google.com/view/ibrelight/

Unstructured Light Field (ULF) Renderer, Co-developer with Seth Berrier

Predecessor to IBRelight; light field renderer for photogrammetrically acquired objects.

PROGRAMMING LANGUAGES

C / C++ / C# / Java / GLSL / GDScript / HTML / CSS / JavaScript / SQL / MATLAB

OTHER PROFESSIONAL EXPERIENCE

University of Minnesota, Twin Cities

Department of Computer Science, Research Assistant, Meyer Graphics Lab 2013-2019

Studied methods of determining the spatially varying color appearance of shiny 3D objects from photos, especially for cultural heritage applications. Supported the DARPA REVEAL project in the role of determining the reflectance of an unknown surface from backscattering flash photographs. Accomplishments include a modern image-based rendering implementation, the novel use of backscattering flash photographs to measure specular appearance, the development of new image-based relighting algorithms that use these photographs to generate faithful renderings of an object under novel point or environment illumination, and a fidelity metric to evaluate the sufficiency of a collection of flash photographs for documenting color appearance.

Computer Scientist in Residence, Minneapolis Institute of Arts Summer 2015

Consulted with the Visual Resources department on 3D photography and photogrammetry and developed software to support the goals of the Visual Resources department. Worked with

photographers to develop a workflow for scanning and processing objects. Assisted with the configuration of existing photogrammetry software so that it could run on a server, requiring less computational time.

Software Development Intern, Edmentum (formerly PLATO Learning) Summer 2014, 2011

Completed two projects, one in the Summer of 2011 and the other in the Summer of 2014. Developed web-based tools using the ASP.NET MVC framework. Designed back-end database tables and wrote stored procedures for querying the database. Created front-end user interfaces using HTML5, CSS, JavaScript, and JQuery.

Firmware Intern, Seagate Summer 2012

Supported the development of firmware for a high-end solid-state drive product.

References available upon request. Last updated 10/30/2026.