

Zachary Ferguson

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RESEARCH INTERESTS	Computer graphics, simulation, physically-based animation, collision detection and response, digital fabrication, geometric modeling, geometry processing
EDUCATION	<p>New York University, New York, NY Fall 2017–Spring 2023 <i>Doctor of Philosophy</i> in Computer Science Advisor: Daniele Panozzo Thesis: <i>Provably Robust and Accurate Methods for Rigid and Deformable Simulation with Contact</i></p> <p>George Mason University, Fairfax, VA Fall 2013–Spring 2017 <i>Bachelor of Science</i> in Computer Science; minor in Mathematics Honors: <i>summa cum laude</i> (GPA: 3.96/4.00)</p>
EMPLOYMENT	<p>CLO Virtual Fashion, Research Scientist July 2024–Present • Research in physically-based animation, simulation, and geometry processing</p> <p>Massachusetts Institute of Technology Postdoctoral Associate Fall 2023–Spring 2024 Supervisor: Mina Konaković Luković, Algorithmic Design Group (ADG) • Research in physical simulation and metamaterial design published as “Data-Efficient Discovery of Hyperelastic TPMS Metamaterials with Extreme Energy Dissipation” at <i>SIGGRAPH 2025</i> • Supervised Ph.D. students on research projects related to computer graphics</p> <p>New York University Assistant Research Scientist Summer 2023 Graduate Research Assistant Fall 2017–Spring 2023 Advisor: Daniele Panozzo, Geometric Computing Lab (GCL) • Researched algorithms for computer graphics, physically-based animation, simulation, geometry processing, and collision detection • Led the development of several open-source including the IPC Toolkit and PolyFEM • Collaborated with team members across universities to conduct cutting-edge research • Supervised masters and undergraduate students on research projects related to computer graphics and physical simulation</p> <p>Adobe, Research Scientist Intern Summer 2018 & 2022 Mentors: Danny Kaufman and Qingnan Zhou • Implemented adaptive meshing algorithms for improved physical simulation results and performance; published as “In-Timestep Remeshing for Contacting Elastodynamics” in <i>ACM Transactions on Graphics</i></p> <p>Carbon, Computational Geometry Intern Summer 2021–Spring 2022 Supervisors: Weixiong Zheng and Hardik Kabaria • Researched and implemented simulation systems for physically validating lattice structures with contact</p>

George Mason University, Undergraduate Research Assistant Fall 2015–Summer 2017
Advisor: Yotam Gingold, Creativity and Graphics Lab (CraGL)

- Research published as “Seamless: Seam erasure and seam-aware decoupling of shape from mesh resolution” in *ACM Transactions on Graphics*

PUBLICATIONS

- 1 Data-Efficient Discovery of Hyperelastic TPMS Metamaterials with Extreme Energy Dissipation. Maxine Perroni-Scharf*, **Zachary Ferguson***, Thomas Butrille, Carlos M. Portela, and Mina Konaković Luković. In *ACM SIGGRAPH 2025 Conference Proceedings*, 2025
([project page](#), [paper](#), [code](#))
- 2 Geometric Contact Potential. Zizhou Huang, Max Paik, **Zachary Ferguson**, Daniele Panozzo, and Denis Zorin. *ACM Transactions on Graphics (Proceedings of SIGGRAPH)*, 44(4), 2025
([project page](#), [paper](#), [video](#))
- 3 Differentiable solver for time-dependent deformation problems with contact. Zizhou Huang*, Davi Colli Tozoni*, Arvi Gjoka, **Zachary Ferguson**, Teseo Schneider, Daniele Panozzo, and Denis Zorin. *ACM Transactions on Graphics*, 43(3), 2024. Presented at *SIGGRAPH 2024*
([paper](#), [video](#))
- 4 A systematic comparison between FEBio and PolyFEM for biomechanical systems. Liam Martin, Pranav Jain, **Zachary Ferguson**, Torkan Gholamalizadeh, Faezeh Moshfeghifar, Kenny Erleben, Daniele Panozzo, Steven Abramowitch, and Teseo Schneider. *Computer Methods and Programs in Biomedicine*, 244:107938, 2024
([paper](#))
- 5 In-Timestep Remeshing for Contacting Elastodynamics. **Zachary Ferguson**, Teseo Schneider, Danny M. Kaufman[†], and Daniele Panozzo[†]. *ACM Transactions on Graphics (Proceedings of SIGGRAPH)*, 42(4), 2023
([project page](#), [paper](#), [video](#), [code](#), [data](#))
- 6 High-Order Incremental Potential Contact for Elastodynamic Simulation on Curved Meshes. **Zachary Ferguson**, Pranav Jain, Denis Zorin, Teseo Schneider, and Daniele Panozzo. In *ACM SIGGRAPH 2023 Conference Proceedings*, 2023
([project page](#), [paper](#), [video](#), [code](#), [data](#))
- 7 LibHip: An open-access hip joint model repository suitable for finite element method simulation. Faezeh Moshfeghifar, Torkan Gholamalizadeh, **Zachary Ferguson**, Teseo Schneider, Michael Bachmann Nielsen, Daniele Panozzo, Sune Darkner, and Kenny Erleben. *Computer Methods and Programs in Biomedicine*, 226:107140, 2022
([paper](#), [data](#))
- 8 Open-Full-Jaw: An open-access dataset and pipeline for finite element models of human jaw. Torkan Gholamalizadeh, Faezeh Moshfeghifar, **Zachary Ferguson**, Teseo Schneider, Daniele Panozzo, Sune Darkner, Masrour Makaremi, François Chan, Peter Lampel Søndergaard, and Kenny Erleben. *Computer Methods and Programs in Biomedicine*, 224:107009, 2022
([paper](#), [data](#))

*Joint first authors

†Joint last authors

- 9 A Cross-Platform Benchmark for Interval Computation Libraries. Xuan Tang, **Zachary Ferguson**, Teseo Schneider, Denis Zorin, Shoaib Kamil, and Daniele Panozzo. In *Proceedings of the 14th International Conference on Parallel Processing and Applied Mathematics*, 2022
([project page](#), [paper](#))
- 10 Fast and Exact Root Parity for Continuous Collision Detection. Bolun Wang, **Zachary Ferguson**, Xin Jiang, Marco Attene, Daniele Panozzo, and Teseo Schneider. *Computer Graphics Forum (Proceedings of Eurographics)*, 41(2), 2022
([project page](#), [paper](#), [code](#))
- 11 A Large Scale Benchmark and an Inclusion-Based Algorithm for Continuous Collision Detection. Bolun Wang*, **Zachary Ferguson***, Teseo Schneider, Xin Jiang, Marco Attene, and Daniele Panozzo. *ACM Transactions on Graphics*, 40(5), 2021. Presented at *SIGGRAPH 2022*
([project page](#), [paper](#), [code](#), [data](#))
- 12 Intersection-free Rigid Body Dynamics. **Zachary Ferguson**, Minchen Li, Teseo Schneider, Francisca Gil-Ureta, Timothy Langlois, Chenfanfu Jiang, Denis Zorin, Danny M. Kaufman, and Daniele Panozzo. *ACM Transactions on Graphics (Proceedings of SIGGRAPH)*, 40(4), 2021
([project page](#), [paper](#), [video](#), [code](#))
- 13 DHFSlicer: Double Height-Field Slicing for Milling Fixed-Height Materials. Jinfan Yang, Chrystiano Araújo, Nicholas Vining, **Zachary Ferguson**, Enrique Rosales, Daniele Panozzo, Sylvain Lefebvre, Paolo Cignoni, and Alla Sheffer. *ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia)*, 39(6), 2020
([project page](#), [paper](#))
- 14 Incremental Potential Contact: Intersection- and Inversion-free Large Deformation Dynamics. Minchen Li, **Zachary Ferguson**, Teseo Schneider, Timothy Langlois, Denis Zorin, Daniele Panozzo, Chenfanfu Jiang, and Danny M. Kaufman. *ACM Transactions on Graphics (Proceedings of SIGGRAPH)*, 39(4), 2020
([project page](#), [paper](#), [video](#), [code](#))
- 15 Stitch Meshing. Kui Wu, Xifeng Gao, **Zachary Ferguson**, Daniele Panozzo, and Cem Yuksel. *ACM Transactions on Graphics (Proceedings of SIGGRAPH)*, 37(4), 2018
([project page](#), [paper](#), [video](#))
- 16 Seamless: Seam erasure and seam-aware decoupling of shape from mesh resolution. Songrun Liu*, **Zachary Ferguson***, Alec Jacobson, and Yotam Gingold. *ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia)*, 36(6), 2017
([project page](#), [paper](#), [video](#), [code](#))

AWARDS

Outstanding Doctoral Dissertation Award , ACM SIGGRAPH	2024
Doctoral Dissertation Award , Symposium on Computer Animation	2024
Adobe Research Fellowship , Adobe Inc.	2022
Dean's Dissertation Fellowship , New York University	2022
Jacob T. Schwartz Ph.D. Fellowship , New York University	2021
Henry M. MacCracken Fellowship , New York University	2017
Distinguished Academic Achievement Award , George Mason University	2017
PEC Solutions Endowed Scholarship , George Mason University	2016

SELECTED TALKS	<p>Conquering Contact: Provably Robust Simulation with Contact August 2024 Symposium on Computer Animation (SCA)</p> <p>Towards Robust and Accurate Simulation of Contacts August 2022 International Conference on Multibody Systems, Nonlinear Dynamics, and Control (MSNDC)</p>
TEACHING	<p>Summer Geometry Initiative, Project Mentor</p> <ul style="list-style-type: none"> – Project: Global Intersection Analysis Summer 2024 – Project: Intrinsic Mollification Summer 2023 <p>New York University, Teaching Assistant Special Topics: Computer Graphics (CSCI-UA.0480) Fall 2019</p> <p>iD Tech, Instructor Game Programming for Apple iOS and Android with Unity Summer 2015</p>
COURSES	Contact and Friction Simulation for Computer Graphics. Sheldon Andrews, Kenny Erleben, and Zachary Ferguson . In <i>ACM SIGGRAPH 2022 Courses</i> , 2022. (course content)
TECHNICAL SKILLS	<p>Programming Languages:</p> <ul style="list-style-type: none"> – Expertise in C/C++, Python (including experience using Pybind11 for C++ bindings), CUDA for parallel computing, and JavaScript – Familiar with Java, MATLAB, OCaml, and Common Lisp <p>Core Technologies:</p> <ul style="list-style-type: none"> – Graphics & Simulation: OpenGL (including GLSL, HLSL, and Slang shading languages), Vulkan (with experience in Kompute for GPU compute), finite element method, physics-based animation, elastodynamics, and cloth simulation – Build & Version Control: CMake, Git, Visual Studio – Linear Algebra & Numerical Methods: Eigen, numerical optimization techniques – Testing: Catch2 for unit and integration testing – Machine Learning: PyTorch for deep learning in computer vision <p>Domain-Specific Skills:</p> <ul style="list-style-type: none"> – Physics Engines: Experienced with NVIDIA PhysX, Bullet Physics, Box2D, and Project Chrono for rigid body dynamics and simulations – Game Development: Unity (C# scripting), Phaser (JavaScript framework for 2D games) – Web Development: Front-end development using HTML, CSS, and JavaScript – 3D Modeling & Simulation Tools: Blender for 3D modeling and animation, Marvelous Designer and CLO for digital garment creation, ParaView for scientific data visualization, Fusion 360 for CAD/CAM
OPEN-SOURCE PROJECTS	<p>I have created, developed, and maintained several open-source projects for physical simulation. Through this work, I seek to democratize physical simulation tools and enable others to leverage the power of our algorithms.</p> <ul style="list-style-type: none"> • IPC Toolkit (C++ and Python, ★288) • IPC (C++, ★666) • Rigid IPC (C++, ★180) • PolyFEM (C++, ★606) • Tight-Inclusion CCD (C++, ★154)

PROFESSIONAL ACTIVITIES	ACM Transactions on Graphics , Reviewer	2026
	ACM SIGGRAPH , Reviewer	2020, 2022–2026
	ACM SIGGRAPH Asia	
	– Conflict of Interest Coordinator	2026
	– Reviewer	2022–2024
	Eurographics	
	– International Program Committee	2025, 2026
	– Reviewer	2024
	Symposium on Geometry Processing , International Program Committee	2025
	Symposium on Computer Animation , International Program Committee	2025
	ACM Motion, Interaction and Games , Posters Chair	2024
	Computer Graphics Forum , Reviewer	2024
	Pacific Graphics , Reviewer	2024
	Computer-Aided Design , Reviewer	2021, 2023, 2024
	Journal of Computer Graphics Techniques , Reviewer	2024
	Computers & Graphics , Reviewer	2018, 2021
	Computer Aided Geometric Design , Reviewer	2020