Gabriel E. Lipkowitz

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Portfolio   **Personal website**   **Scholar**

Research and teaching interests	Computational design, Computational fabrication, Spatial computing / Extended reality, Human-computer interaction, Parametric / Generative design, Architectural robotics

Education

Stanford University	Stanford, CA
PhD in Mechanical Engineering	2020 – Present
Research focus: Computational design and fabrication	
Coursework focus: Robotics	
Teaching focus: Parametric and Generative Design	
Advisors: Professors Joseph DeSimone and Eric S.G. Shaqfeh	
Anticipated graduation: June 2024	

Imperial College London	London, UK
MSc in Applied Computational Science and Engineering	2019 – 2020
Graduated with highest honors	
Advisors: Professors J.P. Latham and Eleanor Schofield	

Princeton University	Princeton, NJ
Bachelor of Arts	2015 – 2019
Graduated summa cum laude	

Awards and Fellowships

Fulbright Scholarship (US/UK Fulbright Commission)	2019-2020
NSF Graduate Research Fellowship	2020 - Present
Solid Freeform Fabrication Symposium NSF Student Award	2022, 2023
Data Science Institute Fellow (University of Virginia)	2019
Sigma Xi thesis award, Princeton University	2019

Research Publications (Conferences)

Palette-PrintAR: augmented reality design and simulation for multi-color resin 3D printing
Lipkowitz, G., Shaqfeh, E.S.G., and DeSimone, J.M.
Accepted: *Association for Computing Machinery, Conference on Human Factors in Computing Systems, Full Paper, 2024.*

Palette-PrintAR: an augmented reality fluidic design tool for multicolor resin 3D printing
Lipkowitz, G., Shaqfeh, E.S.G., and DeSimone, J.M.
Association for Computing Machinery, Symposium on User Interface Software and Technology, Late-Breaking Work, 2023.

Paraflow: A Computational Design Tool for Support-free Multimaterial 3D Printing
Lipkowitz, G., Shaqfeh, E.S.G. and DeSimone., J.M.
Association for Computing Machinery, Conference on Human Factors in Computing Systems, Late-Breaking Work, 2023.

Printing atom-efficiently: faster fabrication of farther unsupported overhangs by fluid dynamics simulation
Lipkowitz, G., Krishna, N. Coates, I., Shaqfeh, E.S.G., and DeSimone, J. M.
Association for Computing Machinery, Symposium on Computational Fabrication, Full paper, 2023.

Interactive Fluid Dynamics Simulation with Real-time Visualization for Augmented Resin 3D Printing
Lipkowitz, G., DeSimone, J.M.
International Solid Freeform Fabrication Symposium, Full Paper, 2023.

Generative co-design for microfluidics-accelerated 3D printing
Lipkowitz, G., Shaqfeh, E.S.G., DeSimone, J.M.
Association for Computing Machinery, Symposium on Computational Fabrication, Demonstration track, 2022.

Fluidics-Informed Fabrication: A Novel Co-design for Additive Manufacturing Framework
Lipkowitz, G., Shaqfeh, E.S.G. and DeSimone, J.M.
International Conference on Human-Computer Interaction, Full Paper, 2023.

Digital Microfluidic Design for Injection Continuous Liquid Interface Production of 3D Objects
Lipkowitz, G., ..., Shaqfeh, E.S.G., DeSimone, J.M.D
International Solid Freeform Fabrication Symposium, Full Paper, 2022.

Research Publications (Journals)	**Injection continuous liquid interface production of 3D objects** Lipkowitz, G., Samuelsen, T., Hsiao, K., Lee, B., Dulay, M. T., Coates, I., ... DeSimone, J. M. *Science Advances, 2022.*
	Growing three-dimensional objects with light Lipkowitz, G.*, Saccone, M.*, ..., and DeSimone, J.M. * Authors contributed equally to this work. Revision stage: *Proceedings of the National Academy of Sciences*
	Bioinspired fluidic design for additive manufacturing Lipkowitz, G., Krishna, N., Coates, I., Shaqfeh, E.S.G., and DeSimone, J.M. Under review: *Nature*
	Single-digit-micrometer-resolution continuous liquid interface production Hsiao, K., Lee, B. J., Samuelsen, T., Lipkowitz, G., Kronenfeld, J. M., Ilyn, D., ..., DeSimone, J. M. *Science Advances, 2022.*
Teaching	**CS11SI: How to Build VR - An Introduction to Virtual Reality Design and Development** Fall 2023 *Student-initiated course project advisor* Stanford University This course exposes students to the basics of designing for virtual reality technologies.
	CEE 220C: Parametric Design and Optimization Spring 2022 *Teaching assistant* Department of Civil and Environmental Engineering, Stanford University This course explores tools and techniques for computational design and parametric modeling as a foundation for design optimization.
	CEE 220A: Building Modeling for Design Summer 2022 *Head teaching assistant* Department of Civil and Environmental Engineering, Stanford University The foundational Building Information Modeling course introduces techniques for creating, managing, and applying of building information models in the building design and construction process.

Biodesign collaborative associate   Spring 2022 - Present
Byers Center for Biodesign, Stanford University
Mentored post-graduate students in computer-aided design and digital fabrication workflows using 3D printers, laser cutters, and 3D scanners.

Graduate teaching assistant   Spring 2023 - Present
Uytengsu Undergraduate Teaching Lab, Stanford University
Mentored undergraduates in CAD practices and installed 3D printers for use in undergraduate courses and extracurricular projects.

CS12SI: Spatial Computing Workshop   To be offered Spring 2024
Student-initiated course instructor
Stanford University
Course to expose students to the basics of Apple Vision Pro development using principles of spatial design and visionOS, including using SwiftUI and Unity PolySpatial workflows.

Exhibits   **G-code is my love language**
San Jose State University   November 2023 - February 2024
Fabrication lead
Fabricated and helped to design invited artists' pieces for 3D printing, and contributed augmented reality-based exhibit tool.

Industrial work   *Stanford XR Project Incubator*
Organizer (Winter 2023 - Present)
Mentored by members of Apple's Vision Products Group (VPG), translating XR design academic research conducted at Stanford into prototype visionOS application for deployment to Apple Vision Pro.

Immerse the Bay Hackathon
Organizer (Fall 2023)
With Stanford XR and external contributors, mentors, and judges from Apple, Unity, ShapesXR, Foundary, and other AR/VR companies, helped to organize a XR hackathon with 300 hackers (largest in Bay Area history).

Layer Construction
Chief Technology Officer (2022-Present)
Start-up (stealth mode) focusing on mobile 3D printing for concrete construction. My role focuses on developing computer vision machine learning models for robot navigation in unstructured environments.

Methods and Systems for Making Polymeric Microstructures
Patent issued (2023)
Lipkowitz, G. Dulay, M., Samuelsen, T. Shaqfeh, E.S.G., DeSimone, J.M.

Polymeric Structures having a Micro-void space and Methods for Making the Same
Patent pending
Coates, I. Lipkowitz, G. DeSimone, J.M.

External Talks & Presentations	*Printing atom-efficiently: faster fabrication of farther unsupported overhangs by fluid dynamics simulation* Oral presentation ACM Symposium on Computational Fabrication New York City, NY USA, October 2023

Demonstrating Paraflow: Interactive fluid dynamics simulation with real-time visualization for augmented resin 3D printing
Oral presentation
International Solid Freeform Fabrication Symposium
Austin TX USA, August 2023

Designing data: Methods for 3D synthetic data generation for computer vision machine learning
Invited lecture
COMPSCI C8: Foundations of Data Science
UC Berkeley, August 2023

Multimaterial 3D printing by injection continuous liquid interface production
Oral presentation
eWEAR Annual Symposium
Stanford University, February 2023

Accelerated 3D printing with injection continuous liquid interface production
Presentation
Stanford Bio-X Symposium
Stanford University, August 2022

Injection continuous liquid interface production
Additive Manufacturing of Soft Materials, Gordon Research Conference
Ventura CA USA, August 2022

Digital Microfluidic Design for Injection continuous liquid interface production
Presentation at International Solid Freeform Fabrication Symposium
Austin TX USA, July 2022

Multimaterial printing by injection continuous liquid interface production
Presentation at 3D Printing-enabled Polymeric Composites and Hybrid Systems Session, American Chemical Society
San Diego CA USA, March 2022

3D Printed Buildings: Can it be green, affordable, and sustainable?
Discussion lead: CEE 132A Sustainable Architecture and Engineering Colloquium: Re:Defining Sustainability
Stanford CA USA, October 2023

Paraflow: Generative Design for 3D Printing with Fewer Supports
Applied Artificial Intelligence, Big Data, and Data Analytics Session, American Institute for Chemical Engineers
Orlando FL USA, November 7, 2023

Academic Service	Session chair, Solid Freeform Fabrication Symposium (2023)
	Peer reviewer, Nature (2023)
	Peer reviewer, Nature Communications (2022)
	Peer reviewer, Science Advances (2022-2023)
	Peer reviewer, Solid Freeform Fabrication Symposium (2023)
	Peer reviewer, ACM Symposium on Computational Fabrication (2023)
	Peer reviewer, ACM Conference on Human Factors in Computing Systems (2023)
Technical Skills	

Programming languages
Proficient in: C#, C++, Python

3D Modeling and Game Engines
Proficient in: Rhino/Grasshopper, Fusion 360, Revit/Dynamo, Blender, Unity
Familiar with: Unreal, Onshape

Selected
coursework

Stanford PhD coursework

CEE 220A: Building Modeling for Design and Construction

CEE 220B: Building Modeling Design Studio

CEE 220C: Parametric Design and Optimization

CS 221A : Introduction to Artificial Intelligence

CS 223A: Introduction to Robotics

CS 225A: Experimental Robotics

CS 327A: Topics in Advanced Robotic Manipulation

CS 274A: Principles of Robot Autonomy

ME 210: Introduction to Mechatronics

ME 220: Introduction to Sensors