Gabriel E. Lipkowitz

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

Research interests

Technical human-computer interaction, Computational design, Computational fabrication, Spatial computing

Education

Stanford University Stanford, CA
PhD in Mechanical Engineering 2020 – Present
Research focus: Computational design for 3D printing
Coursework focuses: Robotics and sensing
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
Research focus: Numerical methods for coastal structural engineering
Advisors: Professors J.P. Latham and Eleanor Schofield

Princeton University Princeton, NJ
Bachelor of Arts, Molecular Biology 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)

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.*

Palette-PrintAR: augmented reality design and simulation for multi-color resin 3D printing
Lipkowitz, G. and Desimone, J.M.
Under revision: *Association for Computing Machinery, Conference on Human Factors in Computing Systems, 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.

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.

Demonstrating Paraflow: 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.

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*

Numerical Modelling of moisture loss during controlled drying of marine archaeological wood
Lipkowitz, G. Hennum, K.S. Piva, E. and Schofield, E.
Forests, 2022.

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.

Characterization of a 30 µm pixel size CLIP-based 3D printer and its enhancement through dynamic printing optimization
Lee B.J., Hsiao K., Lipkowitz, G., Samuelsen T., Tate L., DeSimone J.M.
Additive Manufacturing, 2022.

Long-term persistent hepatitis B virus infection in a scalable micro-well primary hepatocyte coculture system
Winer, B.Y., Huang, T.S., Pludwinski, E., Wojcik, F. Lipkowitz, G., ... Ploss, A.
Nature Communications 2017.

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.

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.

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
Presentation
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

Rapid printing of multimaterial objects 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)

Industrial work

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.

Technical Skills

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

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