

# Sarah Kushner, PhD

GEOMETRY · ANIMATRONICS · HUMAN COMPUTER INTERACTION · COMPUTATIONAL FABRICATION

Harold Frank Hall, UC Santa Barbara, California, US

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## Education

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### University of Toronto

PHD IN COMPUTER SCIENCE – GEOMETRY, ANIMATION & FABRICATION

Advised by Daniel Wigdor and Paul H. Dietz  
Thesis: *Techniques for Physical Storytelling*

Toronto, ON, Canada

2017 - 2024

### Institut polytechnique de Grenoble (Grenoble INP)

MS IN INFORMATICS – GRAPHICS, VISION & ROBOTICS SPECIALTY

Advised by Marie-Paule Cani and Rémi Ronfard  
Thesis: *The Sketch-Based Posing and Animation of Multiple Characters: Animation of Dancing Couples*

Grenoble, France

2016 - 2017

### Drexel University

BS IN COMPUTER SCIENCE, MINOR IN DIGITAL MEDIA

Magna Cum Laude, Pennoni Honors College

Philadelphia, PA, USA

2012 - 2016

## Experience

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### University of California, Santa Barbara

POSTDOCTORAL RESEARCHER IN THE GEOMETRIC INTELLIGENCE LAB

Project on visualization and geometric shape analysis of 3D women's brain data

Santa Barbara, CA, USA

2025 - present

### University of California, Santa Barbara

VISITING PHD STUDENT IN THE GEOMETRIC INTELLIGENCE LAB

Project on interpolating 3D rigged animations on  $SO(3)$  using geometric statistics

Santa Barbara, CA, USA

October 2022 - March 2023

### Inria Grenoble Rhône-Alpes

RESEARCH INTERN

Project on sketch-based animation techniques and numerical methods to animate multiple characters

Montbonnot-Saint-Martin, France

February 2017 - June 2017

### Drexel University

RESEARCH ASSISTANT

Project on designing a course on Knowledge Representation and Reasoning and Privacy

Philadelphia, PA, USA

March 2015 - August 2015

### Applied Informatics Group

RESEARCH SOFTWARE ENGINEER CO-OP

Project on building a robust intelligent system to answer cybersecurity queries

Philadelphia, PA, USA

September 2014 - March 2015

## Publications, Posters & Demos

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### Interpolation of Animated Characters on Lie groups

GEOMETRIC SCIENCE OF INFORMATION (GSI)

Sarah Kushner, Vismay Modi, Nina Miolane

Saint-Malo, France

October 2025

### Paper Animatronics Workshop 2025

SIGGRAPH LABS

Paul H. Dietz, Sarah Kushner, Catherine Dietz, Jennifer Ginger Alford, Elliot Mueller

Vancouver, BC, Canada

August 2025

### Papertronic Puppets: Teaching STEM and Storytelling Through Creative Construction

IEEE FRONTIERS IN EDUCATION (FIE)

Sarah Kushner, John Kanji, Paul H. Dietz, Daniel Wigdor

Washington D.C., USA

October 2024

## **Interactive 3D Zoetrope with a Strobing Flashlight (Demo)**

USER INTERFACE SOFTWARE AND TECHNOLOGY (UIST)

Sarah Kushner, Paul H. Dietz, Alec Jacobson

[Bend, OR, USA](#)

October 2022

## **Levitating Rigid Objects with Hidden Rods and Wires**

EUROGRAPHICS

Sarah Kushner, Risa Ulinski, Karan Singh, David I.W. Levin, Alec Jacobson

[Vienna, Austria \(remote\)](#)

May 2021

## **Example-Based Print Preview for Laser Cutting (Poster)**

GRAPHICS INTERFACE

Sarah Kushner, Alec Jacobson

[Toronto, ON, Canada](#)

May 2018

## **Ontology-Driven Data Semantics Discovery for Cyber-Security**

PRACTICAL ASPECTS OF DECLARATIVE LANGUAGES

Marcello Balduccini, Sarah Kushner, Jacquelin Speck

[Portland, OR, USA](#)

June 2015

## **Talks**

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### **Developing a Digital Twin of the Maternal Brain**

MINISYMPOSIUM AT 14TH EUROPEAN CONFERENCE ON MATHEMATICAL & THEORETICAL BIOLOGY

[Graz, Austria](#)

July 2026

### **Techniques for Physical Storytelling**

INVITED TALK FOR THE COLLEGE OF COMPUTING AT DREXEL UNIVERSITY

[Philadelphia, CA, USA](#)

June 2026

### **Modelling the Maternal Brain (and its challenges)**

GRADUATE SIMULATION SEMINAR SERIES AT UC SANTA BARBARA

[Santa Barbara, CA, USA](#)

August 2025

### **Review of Linear Statistical Methods**

GEOMETRIC INTELLIGENCE LAB AT UC SANTA BARBARA

[Santa Barbara, CA, USA](#)

July 2025

### **Using shape deformations to predict postpartum depression**

GEOMETRIC INTELLIGENCE LAB AT UC SANTA BARBARA

[Santa Barbara, CA, USA](#)

April 2025

### **Exploring volume changes in the brain during pregnancy**

GEOMETRIC INTELLIGENCE WORKSHOP AT INSTITUTO DE MATEMÁTICAS UNAM (UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO)

[Mexico City, Mexico](#)

March 2025

### **Techniques for Physical Storytelling**

GEOMETRIC INTELLIGENCE LAB AT UC SANTA BARBARA

[Santa Barbara, CA, USA](#)

January 2025

### **Bringing Stories to Life: Animatronics for Education**

UNIVERSITY OF TORONTO ARIA (APPLIED RESEARCH IN ACTION) SHOWCASE

[Toronto, ON, Canada](#)

November 2024

### **Techniques for Physical Storytelling**

WiGRAPH RISING STARS RESEARCH PITCH

[Denver, Colorado, USA](#)

July 2024

### **Blender Tutorial & Interpolation of Animated Characters on Lie groups**

GEOMETRIC INTELLIGENCE LAB AT UC SANTA BARBARA

[Santa Barbara, CA, USA](#)

January 2023

### **Zoetrope Cinematography and the Timing Animation Principles**

GEOMETRIC INTELLIGENCE LAB AT UC SANTA BARBARA

[Santa Barbara, CA, USA](#)

October 2022

## **Fabricating Cinematography Techniques for 3D Printed Movies**

EUROGRAPHICS DOCTORAL CONSORTIUM

*Vienna, Austria (remote)*

*May 2021*

## **Levitating Rigid Objects with Hidden Rods and Wires**

TORONTO GEOMETRY COLLOQUIUM

*Toronto, ON, Canada*

*April 2021*

## **Levitating Rigid Objects with Hidden Rods and Wires**

UNIVERSITY OF TORONTO GRAPHICS CLUB RAPID FIRE TALKS

*Toronto, ON, Canada*

*March 2021*

## **Sneakily Staging Structurally Sound Supports**

MONTREAL TORONTO GRAPHICS WORKSHOP

*Waterloo, ON, Canada*

*November 2019*

## **Invisible Supports for 3D Zoetrope Movies**

MONTREAL TORONTO GRAPHICS WORKSHOP

*Montréal, QC, Canada*

*November 2018*

## **Realistic Example-Based Print Preview for Laser Cutting**

MONTREAL TORONTO GRAPHICS WORKSHOP

*Toronto, ON, Canada*

*November 2017*

## **Teaching**

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### **CSC 490 - Capstone Physical Computing in K-12 Education**

TEACHING ASSISTANT

Assist students with weekly assignments and mentor them through their capstone projects

*University of Toronto*

*Winter 2024*

### **CSC 317/2504 - Computer Graphics**

COURSE INSTRUCTOR

Taught the fourth year undergraduate graphics course remotely to ~70 students

*University of Toronto*

*Summer 2020*

### **CSC 419/2520 - Geometry Processing**

TEACHING ASSISTANT

Lead tutorial sessions to assist students with homework assignments, marked assignments and final projects

*University of Toronto*

*Winter 2020*

### **CSC 2521 - Topics in Computer Graphics: Seminar on Geometry and Animation**

TEACHING ASSISTANT, SUBSTITUTE LECTURER

Lead discussions on seminal research papers in graphics, assign marks for participation and quality

*University of Toronto*

*Fall 2019*

### **CSC 317/2504 - Computer Graphics**

TEACHING ASSISTANT, SUBSTITUTE LECTURER

Provided guidance to students working on the assignments, marked assignments and exams

*University of Toronto*

*Winter 2018 - Winter 2020*

### **CSC 320 - Introduction to Visual Computing**

TEACHING ASSISTANT

Created marking schemes, marked assignments and exams

*University of Toronto*

*Winter 2018*

### **CSC 318 - Interactive Computational Media**

TEACHING ASSISTANT

Created marking schemes, marked assignments and exams

*University of Toronto*

*Fall 2017*

## **Honors and Awards**

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### **Postdoctoral Researcher Award**

RECEIVED, \$73,500 USD

Ann S. Bowers Women's Brain Health Initiative to apply cutting-edge AI to advance women's brain health

*UC Santa Barbara*

*2025*

## WiGRAPH Rising Stars Program

RECEIVED, SIGGRAPH CONFERENCE FEES FOR 2023 AND 2024

Designed to encourage people of underrepresented genders to become research leaders in computer graphics

WiGRAPH

2023

## Mitacs Globalink Research Award

RECEIVED, \$6000 CAD

Supports research collaborations with partner university to conduct a 12- to 24-week research project

Mitacs

2022

## Beatrice Worsley Graduate Scholarship in Computer Science

RECEIVED, \$4000 CAD

Awarded to PhD students who have taken an active role in helping to promote women in the field of computer science

University of Toronto

2018

## Grenoble INP Fondation Bourse d'Excellence Internationale

RECEIVED, €5000 EUR

Attract talented international students with strong academic and professional potential to engineering training at Grenoble INP

Grenoble INP

2016/2017

## Fulbright Study/Research Fellowship

SEMI-FINALIST

Study/research grant to design a project to work on with advisers at foreign universities

Fulbright U.S. Student Program

2016/2017

## James B. Maginnis Award

RECEIVED, \$500 USD

Presented to an upper division student majoring in computer science in recognition of academic excellence

Drexel University

Winter 2016

## SuperNova Undergraduate Research Fellow

RECEIVED

Engaged in progressively demanding undergraduate research experiences, courses and projects

Drexel University

2016

## Franklin Institute Laureate Liaison

RECEIVED

Liaison to visiting scholars (Edmund Clarke) recognized at the Franklin Institute

Franklin Institute, Drexel University

Fall 2017

## STAR Scholar Summer Research Program

RECEIVED, \$4000 USD

Students Tackling Advanced Research Program

Drexel University

2013

## Activities

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### LEADERSHIP

#### DCS Women

STUDENT ORGANIZER

Helped organize and run events for graduate students in the Department of Computer Science

University of Toronto

September 2021 - August 2022

#### University of Toronto Department of Computer Science

GRADUATE APPLICATION TRIAGER

16 hours of paid work on processing graduate school applications

University of Toronto

December 2021

#### Symposium on Geometry Processing Conference

STUDENT VOLUNTEER

Provided Zoom support, created and moderated the Discord server, and ran Trivia Night

Toronto, ON (remote)

July 2021

#### HER CODE CAMP

DIRECTOR OF MARKETING, DIRECTOR OF MENTORSHIP

Helped organize Python workshops to high school students in the Toronto area who are women or non-binary

Affiliated with University of Toronto

September 2019 - August 2020

### MENTORING UNDERGRADUATES & HIGH SCHOOL STUDENTS

#### Priyanka Durai

DATA SCIENCE RESEARCH MENTOR

Statistics project on correlations between brain shapes and pregnancy data

UC Santa Barbara

November 2025 - present

## Graduate Application Assistance Program (GAAP)

MENTOR

Advising undergraduate and masters students to improve their CVs and statements for grad school applications

[University of Toronto](#)

October 2021 - October 2022

## Nikoleta Grujic

ENGINEERING SCIENCE CAPSTONE MENTOR

Engineering science capstone project on audio in interactive zoetropes

[University of Toronto](#)

September 2023 - June 2024

## Evelyn Pan

COMPUTER SCIENCE RESEARCH MENTOR

Computer science capstone project on zoetrope kits for educational purposes

[University of Toronto](#)

September 2023 - December 2023

## Anqi Li

SUMMER PROJECT MENTOR

Mechanical engineering of large scale zoetropes

[University of Toronto](#)

April 2021 - August 2021

## Cindy Zhu and Kevin Huang

MENTOR

Project on viewing meshes in VR  
Cindy is now studying computer science at Carnegie Mellon University

[\(visiting\) Unionville High School](#)

April 2018 - June 2020

## Arjun Chhabra

ENGINEERING SCIENCE SUMMER PROGRAM MENTOR

Project on visualization tools for laser cutting  
Arjun is now a Mechanical and Aerospace Engineering PhD Student at Princeton University

[University of Toronto](#)

June 2018 - September 2018

## Undergraduate Research Leaders

MENTOR

Guided undergraduate students who wanted to be involved in research

[Drexel University](#)

September 2015 - June 2016

## REVIEWING

### 2026

REVIEWER

IEEE Frontiers in Education (FIE) Full Papers and Work in Progress Papers

### 2025

REVIEWER

SIGGRAPH Technical Papers  
Conference on Tangible, Embedded and Embodied Interaction (TEI) Work in Progress Papers

### 2024

REVIEWER

Conference on Human Factors in Computing Systems (CHI)  
IEEE Frontiers in Education (FIE) Work in Progress Papers

## MEMBERSHIPS

**ACM SIGGRAPH, Upsilon Pi Epsilon, University of Toronto DCS Women, United States Parachute Association**

## Skills

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### Programming Languages

Python, C++, Matlab, HTML, CSS, Bash, LaTeX, Javascript, OpenGL, GLSL

### Software

3D Software: Blender, Autodesk Maya, Fusion 360, 3D printing slicers  
2D Software: Adobe Photoshop, Illustrator, AfterEffects, Google Slides, Apple Keynote, iMovie, Microsoft PowerPoint, Excel, Word  
IDEs: Visual Studio, Visual Studio Code, Arduino, MPLAB X, Jupyter notebooks  
iPad: ProCreate

**Hardware**

Machines: 3D printing (Bambu, Prusa, Stratasys, Ultimaker), laser cutting (Versalaser, Trotec), CNC milling, motion capture (Vicon, Noraxon)  
Electronics: Arduino, Raspberry Pi, PICkit, M5Stack, basic circuit design (EasyEDA), LEDs, IMUs, stepper motors, IR sensors, photo interrupters, inductive proximity sensors, triggerable cameras, servo motors  
Building: Soldering, jigsaw, drill press, aluminum extrusion design and assembly

**Art**

Painting: watercolour, acrylic, oil painting, silkscreen  
Drawing: graphite, pen, charcoal, chalk pastel  
Digital: graphic design, iPad drawing, web design