

Silvia Sellán

University of Toronto
Department of Computer Science
40 St. George St. Toronto, ON M5S 2E4, Canada
sgsellan@cs.toronto.edu — www.silviasellan.com



UNIVERSITY OF
TORONTO

Education

University of Toronto 2019 - 2024 (expected)
PhD in Computer Science — *Supervised by Prof. Alec Jacobson*

University of Oviedo 2014 - 2019
BSc in Mathematics and BSc in Physics

Experience

Yale University Winter 2022
Research Consultant — *Supervised by Prof. Theodore Kim*

Adobe Research Summer 2020
Research Intern — *Mentored by Dr. Noam Aigerman and Supervised by Dr. Jovan Popovic*

Adobe Research Summer 2019
Research Intern — *Mentored by Dr. Noam Aigerman and Supervised by Dr. Jovan Popovic*

Fields Institute for Research in the Mathematical Sciences Summer 2018
Undergraduate Research Intern — *Supervised by Prof. Alec Jacobson*

Fields Institute for Research in the Mathematical Sciences Summer 2017
Undergraduate Research Intern — *Supervised by Prof. Alec Jacobson*

ICMAT (Institute of Mathematical Sciences) Summer 2017
Grant Programme Severo Ochoa - Introduction to Research — *Supervised by Prof. Javier Parcet*

Publications

Bayes' Rays: Uncertainty Quantification for Neural Radiance Fields

Lily Goli, Cody Reading, **Silvia Sellán**, Alec Jacobson, Andrea Tagliasacchi
TBD

Reach for the Spheres: Tangency-Aware Surface Reconstruction of SDFs

Silvia Sellán, Christopher Batty, Oded Stein
SIGGRAPH Asia 2023

Neural Stochastic Screened Poisson Reconstruction

Silvia Sellán, Alec Jacobson
SIGGRAPH Asia 2023

Constructive Solid Geometry on Neural Signed Distance Fields

Zoë Marschner, **Silvia Sellán**, Hsueh-Ti Derek Liu, Alec Jacobson
SIGGRAPH Asia 2023

Stochastic Poisson Surface Reconstruction

Silvia Sellán, Alec Jacobson
SIGGRAPH Asia 2022

Breaking Bad: A Dataset for Geometric Fracture and Reassembly

Silvia Sellán^{*}, Yun-Chun Chen^{*}, Ziyi Wu^{*}, Animesh Garg, Alec Jacobson (^{*}joint first authors)
NeurIPS 2022

Breaking Good: Fracture Modes for Realtime Destruction

Silvia Sellán, Jack Luong, Leticia Mattos Da Silva, Aravind Ramakrishnan, Yuchuan Yang, Alec Jacobson
SIGGRAPH Asia 2022

Sex and Gender in the Computer Graphics Research Literature

Ana Dodik^{*}, **Silvia Sellán**^{*}, Amanda Phillips, Theodore Kim
SIGGRAPH Talk 2022

Swept Volumes via Spacetime Numerical Continuation

Silvia Sellán, Noam Aigerman, Alec Jacobson
SIGGRAPH 2021

Opening and Closing Surfaces

Silvia Sellán, Jacob Kesten, Yan Sheng Ang, Alec Jacobson
SIGGRAPH Asia 2020

Developability of Heightfields via Rank Minimization

Silvia Sellán, Noam Aigerman, Alec Jacobson
SIGGRAPH 2020

Solid Geometry Processing on Deconstructed Domains

Silvia Sellán, Heng Yi Cheng, Yuming Ma, Mitchell Dembowski, Alec Jacobson
ACM / Eurographics Symposium on Geometry Processing 2019

Other Publications

Geometry Synthesis for Critical Applications

Silvia Sellán
SIGGRAPH Asia Doctoral Consortium, 2023

Efficient and Robust Swept Volumes

Silvia Sellán, Noam Aigerman, Alec Jacobson
Vector Institute Research Symposium poster, 2021

Applications of Geometry Processing to Computer Graphics

Silvia Sellán
B.Sc. in Mathematics thesis co-supervised by Profs. Alec Jacobson and Carlos Fernández García

An Introduction to Primal Inflation

Silvia Sellán
BSc in Physics thesis supervised by Prof. Luigi Toffolatti

Solid Geometry Processing on Deconstructed Domains

Silvia Sellán, Heng Yi Cheng, Yuming Ma, Mitchell Dembowski, Alec Jacobson
ACM / Eurographics SGP Poster, 2018

Patents

Swept Volume Determination Techniques

Silvia Sellán, Noam Aigerman, Alec Jacobson
Filed by Adobe Inc. in 2021

Generating Developable Depth Images Using Rank Minimization

Silvia Sellán, Noam Aigerman, Alec Jacobson
United States Patent No. 11080819, 2021

Software

Gpytoolbox: A Python geometry processing toolbox

Silvia Sellán, Oded Stein
A library of general geometry processing Python research utility functions, including basic procedural meshes, differential geometric operators, bounding volume hierarchies and surface reconstruction from point clouds and SDFs.

Awards

Vanier Canada Doctoral Scholarship

Natural Sciences and Engineering Research Council of Canada (NSERC) — 150,000 CAD
Awarded to 166 graduate students across all of Canada and all academic disciplines.

2021-2024

Connaught International Scholarship for Doctoral Students

University of Toronto School of Graduate Studies — 50,000 CAD

2019 - 2024

EECS Rising Stars Academic Career Workshop in EECS — <i>Travel Funding</i>	2023
HLF Ernst Abbe Grant Heidelberg Laureate Forum — <i>Travel Funding</i>	2023
Beatrice “Trixie” Worsley Graduate Scholarship in Computer Science University of Toronto Department of Computer Science — <i>8,000 CAD</i> <i>Awarded to a student who has taken an active role in promoting women in Computer Science.</i>	2021, 2023
Adobe PhD Fellowship Adobe Inc. — <i>10,000 USD</i>	2022
Dean’s Doctoral Excellence Scholarship University of Toronto Faculty of Arts & Science — <i>25,000 CAD</i> <i>Awarded to a single doctoral student across all the University of Toronto Faculty of Arts & Science disciplines.</i>	2021
Adobe Research Fellowship Adobe Inc. — <i>Honorable mention</i>	2020 - 2021
50th Anniversary Graduate Scholarship University of Toronto Department of Computer Science — <i>2,000 CAD</i>	2020
Graduate Program Award University of Toronto Department of Computer Science — <i>10,000 CAD</i>	2019 - 2020
Recognition of Excellence Award University of Toronto Department of Computer Science — <i>10,000 CAD</i>	2019 - 2020
Adobe Women in Technology Scholarship Adobe Inc. — <i>Honorable Mention</i>	2019
SenseTime Fellowship MIT — <i>Granted but declined</i>	2019
Scholarship for Academic Excellence María Cristina Masaveu Peterson Foundation — <i>50,000 EUR</i>	2014 - 2019

Academic Service

Summer Geometry Initiative Steering Committee Member	2023 - Present
ACM / Eurographics Symposium on Geometry Processing (SGP) Graduate School Chair	2024
ACM SIGGRAPH Women in Graphics Research Community Group Executive Committee Member	2022 - 2023
SIGGRAPH Research Career Development Committee Committee Member (in Undergraduate Mentorship Subcommittee)	2021 - 2023
ACM / Eurographics Symposium on Geometry Processing (SGP) Session Chair: Representation and Learning	2023
ACM / Eurographics Symposium on Geometry Processing (SGP) International Program Committee Member	2023
CVPR Deep Learning for Geometric Computing Organizing Committee Member	2023
Women in Computer Graphics Research (WiGRAPH) Executive Committee Member	2020 - 2022
CVPR Deep Learning for Geometric Computing Organizing Committee Member	2022
ICCV Deep Learning for Geometric Computing Program Committee Member	2021

Referee Service

ACM SIGGRAPH Asia Technical Papers	2023
ACM / Eurographics Symposium on Geometry Processing (SGP)	2023
ACM SIGGRAPH Technical Papers	2022 - 2023
Eurographics Technical Papers	2021 - 2023
ACM Transactions on Graphics (ToG)	2021 - 2023
IEEE Transactions on Pattern Analysis and Machine Intelligence	2023
The Visual Computer (TVCJ)	2023
CVPR DLGC Technical Papers	2022
International Symposium on Robotics Research	2022
Computer Aided Design Journal (CAD-J)	2022
ACM SIGGRAPH Posters	2021 - 2022
ICCV DLGC Technical Papers	2021
Journal of Computer Graphics Techniques (JCGT)	2021

Departmental Service

Faculty of Arts and Science Graduate Diversity Working Group Invited Member	2022
Dean's Advisory Search Committee - Department Chair, Computer Science Invited Member	2021 - 2022
DGP Working Group on Fostering a Safe and Inclusive Workplace Member	2021 - 2022
DCS Grad program talk for Ukranian undergraduate visiting students Panelist	2022
Graduate Applications Triager 16 hours of paid work on processing graduate school applications	2021

Talks

Uncertainty Quantification in 3D Geometric Synthesis

University of Zaragoza Graphics and Imaging seminar — hosted by Prof. Ana Serrano	Virtual — November 2023
Brown University Graphics seminar — hosted by Prof. Daniel Ritchie	Virtual — October 2023
Banff International Research Station 3D Generative Modeling Workshop — Invited talk	Banff (Canada) — July 2023

Geometry +: Uncertain Surface Reconstruction

École polytechnique Graphics seminar — hosted by Prof. Maks Ovsjanikov	Paris (France) — July 2023
INRIA seminar — hosted by Profs. Bruno Lévy and Sylvain Lefebvre	Nancy (France) — June 2023
CNRS seminar — hosted by Dr. Julie Digne	Lyon (France) — June 2023
University of Navarra Graphics and Vision seminar — hosted by Prof. Asier Marzo	Pamplona (Navarra) — June 2023
University of Edinburgh Geometry seminar — hosted by Prof. Amir Vaxman	Edinburgh (Scotland) — June 2023
Adobe Research seminar — hosted by Dr. Valentin Deschaintre	London (England) — June 2023
University College London Vision seminar — hosted by Prof. Kaan Akşit	London (England) — June 2023
University of British Columbia Graphics seminar — hosted by Prof. Alla Sheffer	Vancouver (Canada) — June 2023
Simon Fraser University Vision seminar — hosted by Prof. Andrea Tagliasacchi	Vancouver (Canada) — June 2023
EPFL Graphics seminar — hosted by Prof. Mark Pauly	Lausanne (Switzerland) — May 2023
ETH Graphics seminar — hosted by Prof. Olga Sorkine-Hornung	Zürich (Switzerland) — May 2023
University of Waterloo Graphics seminar — hosted by Prof. Craig Kaplan	Waterloo (Canada) — April 2023
University of Montreal Graphics seminar — hosted by Prof. Mikhail Bessmeltsev	Montréal (Québec) — November 2022
Johns Hopkins Graphics seminar — hosted by Prof. Misha Kazhdan	Baltimore (United States) — November 2022
Columbia University Graphics seminar — hosted by Prof. Changxi Zheng	New York City (United States) — November 2022
New York University Graphics seminar — hosted by Prof. Daniele Panozzo	New York City (United States) — November 2022
MIT Graphics seminar — hosted by Prof. Justin Solomon	Cambridge (United States) — November 2022
Dartmouth Graphics and Rendering seminar — hosted by Prof. Wojciech Jarosz	Hanover (United States) — November 2022

- TomatoGRAPH — *Technical Talk* Toronto (Canada) — *December 2021*
- Mesh Math and Beyond: An introduction to shape representations**
 Summer Geometry Initiative — *Full-day tutorial* Virtual — *July 2023*
 Summer Geometry Initiative — *Full-day tutorial* Virtual — *July 2022*
 Summer Geometry Initiative — *Full-day tutorial* Virtual — *July 2021*
- Blender for Academic Papers**
 Graphics Interface — *Invited Course* Victoria (Canada) — *June 2023*
 Geometry and Architecture Summit — *Invited Talk* Toronto (Canada) — *October 2022*
 ACM / Eurographics SGP — *Invited Course* Virtual — *June 2022*
- Geometry +: Moving Fast, Breaking Things and Putting Them Back Together**
 University of Southern California Graphics seminar — *hosted by Prof. Oded Stein* Los Angeles (United States) — *April 2023*
 McGill University Graphics seminar — *hosted by Prof. Oded Stein* Montréal (Québec) — *November 2022*
 Ubisoft research seminar — *hosted by the LaForge team* Montréal (Québec) — *November 2022*
 Yale University Rising Stars seminar — *hosted by Prof. Theodore Kim* New Haven (United States) — *November 2022*
 Engineering and Applied Science Forum — *hosted by the EASF team* Virtual — *November 2022*
- Uncertain Surface Reconstruction**
 UCLA and CalTech’s Grundfest Memorial Lecture — *hosted by Profs. Achuta Kadambi and Katie Bouman* Virtual — *March 2023*
- Research in Geometry Processing**
 University of Toronto Undergraduate Graphics Club — *Invited Talk* Toronto (Canada) — *February 2023*
- Stochastic Poisson Surface Reconstruction**
 ACM SIGGRAPH Asia — *Technical Paper presentation* Daegu (South Korea) — *December 2022*
- Breaking Good: Fracture Modes for Realtime Destruction**
 ACM SIGGRAPH Asia — *Technical Paper presentation* Daegu (South Korea) — *December 2022*
- Breaking Bad: A Dataset for Geometric Fracture Reassembly**
 NeurIPS — *Featured (oral) paper presentation* New Orleans (United States) — *November 2022*
- Virtual Bodies that Matter: A Trans Researcher’s Career in Computer Graphics**
 Georgetown’s Gender and Media Seminar — *hosted by Prof. Amanda Phillips* Washington, D.C. (United States) — *November 2022*
- Sex and Gender in the Computer Graphics Literature**
 Queer in AI @ NeurIPS workshop — *Invited Talk* New Orleans (United States) — *November 2022*
 UNC Chapel Hill — *hosted by Prof. Roni Sengupta* New Orleans (United States) — *November 2022*
 ACM SIGGRAPH — *Talk presentation* Vancouver (Canada) — *August 2022*
- A Deep Dive into Implicit Swept Volumes**
 University of Toronto Undergraduate Graphics Club — *Invited Talk* Toronto (Canada) — *March 2022*
 INRIA MFX research seminar — *hosted by Prof. Sylvain Lefebvre* Virtual — *June 2021*
 MIT Graphics research seminar — *hosted by Prof. Justin Solomon* Virtual — *June 2021*
 GraphQUON — *Technical presentation* Virtual — *December 2020*
- Swept Volumes via Spacetime Numerical Continuation**
 ACM SIGGRAPH — *Technical Paper presentation* Virtual (originally Los Angeles) — *August 2021*
- An Introduction to GP Programming in MATLAB with Gptoolbox**
 ACM / Eurographics SGP — *Invited Course* Virtual — *July 2021*
- Developable Surfaces: A Case Study in Discrete Differential Geometry**
 Lancaster University Pure Mathematics Postgraduate Forum — *Invited Talk* Virtual — *March 2021*
 Technion research seminar — *hosted by Prof. Mirela Ben-Chen* Virtual — *December 2020*
 Carnegie Mellon University Geometry seminar — *hosted by Prof. Keenan Crane* Virtual — *November 2020*
- Seamless Integration of Virtual and Real World**
 Eurographics 2021 — *Doctoral Consortium talk* Virtual (originally Vienna) — *May 2021*
 University of Toronto — *PhD Qualifying Exam* Toronto (Canada) — *September 2020*
- Opening and Closing Surfaces**
 ACM SIGGRAPH Asia — *Technical Paper presentation* Virtual (originally Daegu) — *December 2020*

Epic Games — hosted by Dr. Ryan Schmidt Virtual — November 2020
 Fields Institute Undergraduate Summer Research Program — End-of-summer research talk Toronto (Canada) — August 2017
 University of Toronto DCS Summer Research Program — Mid-summer research talk Toronto (Canada) — July 2017

Developability of Heightfields via Rank Minimization

Toronto Geometry Colloquium — Opener talk for Prof. Olga Sorkine-Hornung Virtual — October 2020
 SIGGRAPH 2020 — Technical Paper presentation Virtual (originally Washington, D.C.) — August 2020

Solid Geometry Processing on Deconstructed Domains

Stanford University Graphics seminar — hosted by Prof. Doug James Stanford (United States) — October 2019
 ACM / Eurographics SGP — Technical Paper presentation Milan (Italy) — July 2019
 Toronto-Montreal Area Graphics workshop — Technical talk Toronto (Canada) — December 2017
 Fields Institute Undergraduate Summer Research Program — End-of-summer research talk Toronto (Canada) — August 2017
 University of Toronto DCS Summer Research Program — Mid-summer research talk Toronto (Canada) — July 2017

Applications of Geometry Processing to Computer Graphics

University of Oviedo — B.Sc. in Mathematics Thesis Defense Oviedo (Spain) — June 2019

An Introduction to Primal Inflation

University of Oviedo — B.Sc. in Physics Thesis Defense Oviedo (Spain) — June 2019

News

Computer graphics researcher Silvia Sellán is awarded two prestigious scholarships July 2021
 A&S News, written by Chris Sasaki

Silvia Sellán on Virtual Colloquium Planning June 2021
 Q&A with WiGRAPH, written by Kate Salesin

Organizing

ACM SIGGRAPH Women in Graphics Research Community group 2023
 Undergraduate Outreach Coordinator

CVPR Deep Learning for Geometric Computing Workshop 2023
 Organizing Committee Member

ACM SIGGRAPH Women in Graphics Research Community group 2022
 Event Coordinator: Symposium on Geometry Processing

Toronto Geometry Colloquium 2020 - 2023
 Founder, organizer and art director

SIGGRAPH Graduate Applications Mentorship Program 2022
 Founder and organizer

Summer Geometry Institute 2022
 Admissions committee member and session planner

CVPR Deep Learning for Geometric Computing Workshop 2022
 Organizing Committee Member

Women in Graphics Research 2020 - 2021
 Event Coordinator: Symposium on Geometry Processing

SIGGRAPH Graduate Applications Mentorship Program 2021
 Founder and organizer

Summer Geometry Institute 2021
 Admissions committee member and session planner

Symposium on Geometry Processing (SGP) 2021
 Student volunteer working on tech support full time during the conference and in Spanish-language outreach

Toronto-Montreal-Waterloo Graphics Workshop (TomatoGRAPH) 2021
 Student volunteer

Teaching

Summer Geometry Initiative

Summer 2021, 2022, 2023

Instructor of a full-day tutorial including lectures, coding demos and exercises

Graphics Interface

Summer 2023

Lecturer of the course Blender for Academic Papers

Symposium on Geometry Processing (SGP)

Summer 2022

Lecturer of the SGP course Blender for Academic Papers

Symposium on Geometry Processing (SGP)

Summer 2021

Co-lecturer of the SGP course An introduction to geometry processing programming in MATLAB with gptoolbox

CSC165: Mathematical Expression and Reasoning for Computer Science

Winter 2020

Teaching Assistant (120 hours) for Prof. David Liu

Individual High School Tutoring

2015-2018

Weekly paid mathematics and physics tutoring

Teaching Feedback

Summer Geometry Institute

2021

During the summer of 2021, I planned, prepared and conducted a 6-hour long tutorial session on the topic of shape representations for undergraduate students of underrepresented communities, as part of MIT's Summer Geometry Institute (SGI). A representative sample of the anonymous feedback collected by professor Justin Solomon about my teaching is reproduced below, each quotation corresponding to different student.

Silvia Sellán's presentation was idyllic, it gave the feeling of being a duck in a pond being fed delicious crumbs of bread, the students being the duck and Silvia the feeder throwing in one after another the information that we like the ducks devoured. The presentation itself was amazing to go beyond analogy it was clear and concise towards learning the topic, the information did not feel too overwhelming, nor too brief. The exercises as well as giving focus upon them and breaking them apart into which to do at what times, they felt like the perfect amount of material in order to have us learn and test our knowledge of the topics.

I just wanted to say that I really enjoyed Silvia's programme. Cutting out all the formulas definitely made her material really accessible and easy to follow without worrying about the precise details of what is going on. I think leaving these details for us to figure out by doing the exercises is really good for developing understanding, rather than having a perhaps more technical talk which is harder to follow and then not quite knowing how to approach the exercises.

Silvia's lecture was the easiest to follow and the most approachable.

Silvia's tutorial: Lively and engaging, I liked how a narrative that tied in everything together neatly was presented.

I really liked Silvia Sellán's tutorial day because for the presentations she gave us a story illustrating the motivation behind the concepts and theory and the actual coding assignments were very accessible and did not require a lot of background material.

I think a very good example of this was Silvia Sellán's tutorial day. She approached the advanced topics from a big picture perspective and all of the coding exercises needed "basic" MATLAB and knowledge of calculus and a small amount of linear algebra.

I thoroughly enjoyed Silvia's talk and the associated exercises.

I also found Silvia's talk very valuable, not only for the geometry processing material offered (which was undoubtedly great, well-structured and very accessible), but also for increasing our awareness about potential nefarious uses of geometry processing. Also the brief digressions on true diversity when talking about fonts/letters were in my opinion very welcome – I (unfortunately) tend to think in a very "westernized" way, and it's always good to bring awareness to things outside of our intellectual comfort zone.

I really liked Silvia Sellán's day of the tutorial week. I think she did a really good job of creating presentations and exercises that met me where I am as a student without a formal experience in geometry processing. The mathematics and computer science that she talked as well as exercises she designed were accessible to me as someone who has undergraduate majors in mathematics and computer science as well as had participated in larger projects with programming computer graphics components. I also think she did a really good job of telling and motivating a story, which was really important to staying engaged throughout the day. I also really appreciate that she spoke about ethics in computing and the need to think critically about academic work. It's definitely something that is not spoken enough about and that needs to be spoken about more.

YOU GUYS ARE WONDERFUL! Not gonna lie, I started looking at PhD opportunities to pursue this field after attending this program.

Mentoring

Summer Geometry Initiative

2023

Served as the mentor for two two-week long geometry processing research projects for eight undergraduate students.

Graduate School Applications

2020 - 2023

Volunteer mentoring of dozens of prospective Computer Graphics students from underrepresented groups with their graduate school application package and decisions. Successful applicant destinations include MIT, UCSD, University of Toronto, UBC and others.

Canada-Wide Science Fair

Spring 2022

Mentored grade 11 students with their project as part of University of Toronto's Pursue STEM

Canadian Black Scientists Network Youth Science Fair

Winter 2022

Mentored grade 11 students with their project as part of University of Toronto's Pursue STEM

University of Toronto DCS Graduate Applications Mentorship Program

Fall 2021

Mentor for several prospective graduate students.

SIGGRAPH Graduate Applications Mentorship Program

Fall 2021

Mentor for several prospective graduate students.

Creating a better summer experience: A DEI workshop

Spring 2021

DEI workshop for mentors of undergraduate students, organized by the Center for Minorities in the Mathematical Sciences.

Creating a better summer experience: A DEI workshop

Spring 2021

DEI workshop for mentors of undergraduate students, organized by the Center for Minorities in the Mathematical Sciences.

Fields Undergraduate Summer Research Program

2020 - 2021

Graduate research mentor for a group of four undergraduate researchers.

Mentoring Feedback

Summer Geometry Institute

2021, 2023

During the summers of 2021 and 2023 (the latter together with my colleague Ana Dodik), I worked as a mentor for MIT's Summer Geometry Initiative, founded by Professor Justin Solomon. In it, I directed two projects for two groups of undergraduate students from underrepresented communities new to geometry processing. Below is a representative sample of the anonymous feedback collected by Prof. Solomon

Ana and Silvia built a collaborative, safe, open environment for new ideas. Both taught us a lot about how to research and approach problems with different approaches. They are outstanding researchers that I admire even more now.

Ana and Silvia are both absolutely fantastic mentors!

This week has been great! Ana and Silvia are excellent mentors. They created an excellent environment for us to learn and collaborate

I still have no idea what Silvia's role was, but she went above and beyond to help out with everything. She made us all feel welcome in the Slack channel before SGI even started and continued to dole out advice and support throughout the whole of SGI. She also patiently answered my millions of questions almost as quickly as I could ask them.

Silvia ensured we all felt welcome right from the beginning of the Slack channel. When we introduced ourselves, I noticed she found something nice to say to each of us, and it felt very welcoming to have that display of friendliness right from the get-go.

Silvia Sellán, I would like to thank you specifically for the SGP & Siggraph 2021 WiGraph event, sharing your thoughts in grad school event and being accessible.

Volunteering

General election worker

July 2023

Day-long volunteer helping citizens vote on the day of the Spanish General Elections.

Reading Partners

August 2020

Translation of documents into Spanish for literacy non-profit

General election worker

Day-long volunteer helping citizens vote on the day of the Spanish General Elections.

April 2019

General election worker

Day-long volunteer helping citizens vote on the day of the Spanish General Elections.

June 2016