Silvia Sellán

University of Toronto Department of Computer Science

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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 $\it CVPR~2024$

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, Herng 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, Herng 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

DiDi Graduate Student Award in Computer Science

2024

University of Toronto Department of Computer Science — 10,000 CAD

Vanier Canada Doctoral Scholarship

2021-2024

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.

Connaught International Scholarship for Doctoral Students University of Toronto School of Graduate Studies — 50,000 CAD	2019 - 2024
EECS Rising Stars	2023
Academic Career Workshop in EECS — Travel Funding	2023
HLF Ernst Abbe Grant	2023
Heidelberg Laureate Forum — Travel Funding	
Beatrice "Trixie" Worsley Graduate Scholarship in Computer Science University of Toronto Department of Computer Science — 8,000 CAD	2021, 2023
Awarded to a student who has taken an active role in promoting women in Computer Science.	
Adobe PhD Fellowship	2022
Adobe Inc. — 10,000 USD	
Dean's Doctoral Excellence Scholarship	2021
University of Toronto Faculty of Arts & Science — 25,000 CAD Awarded to a single doctoral student across all the University of Toronto Faculty of Arts & Science disciplines.	
Adobe Research Fellowship	2020 - 2021
Adobe Inc. — Honorable mention	
50th Anniversary Graduate Scholarship	2020
University of Toronto Department of Computer Science — 2,000 CAD	
Graduate Program Award University of Toronto Department of Computer Science — 10 000 CAD	2019 - 2020
University of Toronto Department of Computer Science — 10,000 CAD Recognition of Excellence Award	2019 - 2020
University of Toronto Department of Computer Science — 10,000 CAD	2019 - 2020
Adobe Women in Technology Scholarship	2019
Adobe Inc. — Honorable Mention	
SenseTime Fellowship	2019
MIT — Granted but declined	
Scholarship for Academic Excellence María Cristina Masaveu Peterson Foundation — 50,000 EUR	2014 - 2019
Academic Service —	
Summer Geometry Initiative	2023 - Present
Steering Committee Member	
ACM / Eurographics Symposium on Geometry Processing (SGP) Graduate School Chair	2024
ACM SIGGRAPH Women in Graphics Research Community Group	2022 - 2023
Executive Committee Member	
SIGGRAPH Research Career Development Committee	2021 - 2023
Committee Member (in Undergraduate Mentorship Subcommittee)	
ACM / Eurographics Symposium on Geometry Processing (SGP) Session Chair: Representation and Learning	2023
ACM / Eurographics Symposium on Geometry Processing (SGP) International Program Committee Member	2024
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	2022
Organizing Committee Member	2022

ICCV Deep Learning for Geometric Computing Program Committee Member	2021
Referee Service	
ACM SIGGRAPH Technical Papers	2024
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	2021
16 hours of paid work on processing graduate school applications	
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 University of Navarra Graphics and Vision seminar — hosted by Prof. Asier Marzo	Lyon (France) — June 2023
University of Edinburgh Geometry seminar — hosted by Prof. Amir Vaxman	Pamplona (Navarra) — June 2023 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 Bessmeltsey	Montréal (Québec) — November 2022

Johns Hopkins Graphics seminar — hosted by Prof. Misha Kazhdan Baltimore (United States) — November 2022 New York City (United States) — November 2022 Columbia University Graphics seminar — hosted by Prof. Changxi Zheng 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 2021MIT 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 University of Toronto — PhD Qualifying Exam	Virtual (originally Vienna) — May 2021 Toronto (Canada) — September 2020
Opening and Closing Surfaces	
ACM SIGGRAPH Asia — Technical Paper presentation Vi	rtual (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	
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 (or	ginally 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 — <i>Technical talk</i>	Toronto (Canada) — December 2017
Fields Institute Undergraduate Summer Research Program $-$ End-of-summer research talk	
University of Toronto DCS Summer Research Program — <i>Mid-summer research talk</i>	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 —	
What Do Food and Research Have in Common? More Than You Might Thi	nk January 2024
Spektrum.de, written by Nina Beier	
Computer graphics researcher Silvia Sellán is awarded two prestigious sch A&S News, written by Chris Sasaki	olarships July 2021
Silvia Sellán on Virtual Colloquium Planning Q&A with WiGRAPH, written by Kate Salesin	June 2021
Organizing ————————————————————————————————————	
ACM SIGGRAPH Women in Graphics Research Community group	2023
Undergraduate Outreach Coordinator	2023
CVPR Deep Learning for Geometric Computing Workshop Organizing Committee Member	2023
ACM SIGGRAPH Women in Graphics Research Community group Event Coordinator: Symposium on Geometry Processing	2022
Toronto Geometry Colloquium	2020 - 2023
Founder, organizer and art director	2020 2023
SIGGRAPH Graduate Applications Mentorship Program Founder and organizer	2022
Summer Geometry Institute Admissions committee member and session planner	2022
CVPR Deep Learning for Geometric Computing Workshop	2022
Organizing Committee Member	2022
Women in Graphics Research	2020 - 2021
Event Coordinator: Symposium on Geometry Processing	

SIGGRAPH Graduate Applications Mentorship Program Founder and organizer Summer Geometry Institute Admissions committee member and session planner Symposium on Geometry Processing (SGP) Student volunteer working on tech support full time during the conference and in Spanish-language outreach Toronto-Montreal-Waterloo Graphics Workshop (TomatoGRAPH) Student volunteer

Teaching

Summer Geometry Initiative

Summer 2021, 2022, 2023

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

Graphics Interface

Lecturer of the course Blender for Academic Papers

Symposium on Geometry Processing (SGP)

Lecturer of the SGP course Blender for Academic Papers

Symposium on Geometry Processing (SGP)

Summer 2021

Summer 2023

Summer 2022

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

2015-2018

Teaching Assistant (120 hours) for Prof. David Liu

Individual High School Tutoring

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 Sellan'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.

Fields Undergraduate Summer Research Program

Summer 2021

Graduate research mentor for a group of four undergraduate researchers.

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 Intiative, 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 April 2019

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

General election worker June 2016

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