Joey Litalien

Senior Software Engineer

Neural fields · Differentiable rendering · Generative modeling

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Core Experience

Dec 2025 to Present	**Senior Software Engineer**, Tesla Autopilot — *Simulation* Develop neural rendering algorithms for efficient simulation of autonomous vehicles
April 2023 to June 2023	**Research Intern**, Adobe Research — *AI & Graphics* Developed Monte Carlo methods for neural product important sampling using normalizing flows Mentor: Iliyan Georgiev
June 2021 to Jan 2022	**Research Intern**, Reality Labs Research, Meta — *Display Systems Research* Explored large-scale neural implicit scene representations using volume-surface differentiable rendering Mentors: Feng Liu & Lei Xiao
May 2020 to April 2021	**Research Intern**, NVIDIA Research — *AI Lab & Hyperscale Graphics* Developed the first real-time rendering algorithm for neural signed distance fields on sparse octrees Designed a hybrid differentiable renderer for single-image 3D reconstruction using spherical Gaussian priors Mentors: Sanja Fidler & Morgan McGuire

Academic Experience & Service

2024	**Program Committee**, AAAI
2018–Present	**Reviewer**, SIGGRAPH, CVPR, ICCV, ECCV, EG, TVCG, Computer & Graphics, and Pacific Graphics
Dec 2022	**Guest Lecturer**, *Photorealistic Image Synthesis*, ÉTS, Montréal
Nov 2019	**Guest Lecturer**, *Fundamentals of Computer Graphics*, McGill University
2018–2019	**Teaching Assistant**, *Realistic Image Synthesis*, McGill University

Education

Jan 2019 to Dec 2024	**Doctor of Philosophy (Ph. D.)**, Electrical & Computer Engineering, McGill University Conducted research at the intersection of image synthesis and machine learning for 3D content creation Thesis: *Statistical and Learning-based Methods for High-performance Rendering* Advisor: Derek Nowrouzezahrai
Jan 2017 to Dec 2018	**Master of Engineering (M. Eng.)**, Electrical & Computer Engineering, McGill University Thesis: *Learning Visibility in Ray Space* Advisor: Derek Nowrouzezahrai
Sep 2012 to Dec 2015	**Bachelor of Science (B. Sc.)**, Mathematics & Computer Science, McGill University Joint Honours

Publications

2024	**Neural Product Importance Sampling via Warp Composition** **J. Litalien**, M. Hašan, F. Luan, K. Mullia & I. Georgiev *ACM SIGGRAPH Asia* (*Conference Proceedings*), December 2024
2021	**DIB-R++: Learning to Predict Lighting and Material with a Hybrid Differentiable Renderer** W. Chen, **J. Litalien**, J. Gao, Z. Wang, C. Fuji Tsang, S. Khamis, O. Litany & S. Fidler *Neural Information Processing Systems* (*NeurIPS*), May 2021

Publications (continued, * denotes equal contribution)

2021 | **Neural Geometric Level of Detail: Real-time Rendering with Implicit 3D Shapes**
T. Takikawa*, **J. Litalien***, K. Yin, K. Kreis, C. Loop, D. Nowrouzezahrai, A. Jacobson, M. McGuire & S. Fidler
Computer Vision and Pattern Recognition (*CVPR*), Oral, January 2021

2020 | **Delayed Rejection Metropolis Light Transport**
D. Rioux-Lavoie*, **J. Litalien***, A. Gruson, T. Hachisuka & D. Nowrouzezahrai
ACM Transactions on Graphics (*TOG*), 39(3), May 2020

Softwares

2022 | **Kaolin Wisp,** *a PyTorch library and engine for neural fields research*
T. Takikawa, O. Perel, C. Fuji Tsang, C. Loop, **J. Litalien**, J. Tremblay, M. Shugrina & S. Fidler

Fellowships & Awards

2022 | **Meta Research Ph. D. Fellowship** (AR/VR Computer Graphics) (Top 1.5%)
2021 | Facebook Fellowship Award (AR/VR Computer Graphics) – *Finalist* (Top 3.5%)
2019 | Natural Sciences & Engineering Research Council of Canada (NSERC) – Postgraduate Scholarship
2019 | McGill Engineering Doctorate Award / Hydro-Québec Doctoral Fellowship in Engineering
2017–2018 | Graduate Excellence Fellowship Awards

Talks & Leadership

Mar 2024 | **Neural Materials: A New Paradigm for Photorealistic Appearances**, ÉTS, Montréal
Keynote / Invited by Montreal ACM SIGGRAPH

June 2022 | **Real-time Rendering of Neural Implicit 3D Shapes**, EPFL, Lausanne, Switzerland
Talk / Invited by Wenzel Jakob

Nov 2017 to Present | **GRAPHQUON,** *an annual graphics research seminar*, East Coast, Canada
Organized virtual colloquium (2020) and contributed technical talks (2017/18/19/23)

Aug 2017 | **ACM SIGGRAPH Student Volunteer Program,** Los Angeles, USA
Supported the conference by ensuring the smooth functioning of operations (talks & main exhibitions)

Sep 2013 to Mar 2016 | **Seminars in Undergraduate Mathematics in Montreal,** *a nonprofit student organization*
Organized weekend-long seminars where students (≈100) can share and discuss mathematical research

Skills

Programming | Python 3 · C++ / C · Bash — Familiarity with CUDA · GLSL · OpenGL
Frameworks | PyTorch · Mitsuba 3 · pybind11 / nanobind · Warp · Kaolin — Familiarity with TensorFlow · JAX
Tools | Linux · git · CMake · Docker · slurm · Visual Code · Photoshop / Illustrator · Blender · LaTeX
Languages | English (full professional proficiency) · French (mother tongue)