Karl-Étienne Bolduc

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EDUCATION

University of Montreal — Montreal, Canada
Master's degree, Computer Graphics - Advisors: Pierre Poulin - GPA: 4.3/4.3 — *2021 - 2023 (Expected)*

University of Montreal — Montreal, Canada
Bachelor's degree, Double Majors in Computer Science and Physics - Graduated with Excellence Mention - GPA: 4.14/4.3 — *2018 - 2021*

Collège de Maisonneuve — Montreal, Canada
Computer Science and Mathematics - Cote R: 34.1 — *2016 - 2018*

PUBLICATIONS

[1] Eugène Sanscartier, Félix Saint-Denis, **Karl-Étienne Bolduc**, and Normand Mousseau. "Evaluating approaches for on-the-fly machine learning interatomic potentials for activated mechanisms sampling with the activation-relaxation technique nouveau". In: *The Journal of Chemical Physics* (June 2023).

AWARDS/GRANTS/SCHOLARSHIPS

UDEM	Writing Grant	5,500$	2022
UDEM	Merit Scholarships from Graduate and Postdoctoral Studies	5,000$	2022
NSERC-USRA	Undergraduate Student Research Awards	5,000$	2020
IVADO	Undergraduate Research Initiation Grants [Declined]	6,000$	2020
FRQNT	Supplements of the NSERC Undergraduate Student Research Awards	1,500$	2020
World Strides	Special Invitation to play at Carnegie Hall with our high school orchestra [Only 2 selected in Canada to participate] - Double Bass	....	2016

RESEARCH EXPERIENCE

Generalist Programmer Intern R&D at Ubisoft Montreal - La Forge — May 2022 - October 2022

- Prototyped and explored cutting-edge techniques in **Computer Graphics** to improve the fluid simulation's computation speed based on prior research for arbitrary surfaces using **C++** and **Python** with **CUDA**, **Libtorch**, and **Libigl**.
- Created showcases of my findings and maintained detailed research documentation in a **blog**. [Under NDA]

Researcher Intern at University of Montreal - Physics Departments — May 2020 - August 2020

Conducted research on accelerating interatomic computation using **machine learning** which led to a publication. Received a scholarship from NSERC and FRQNT. Advised by Normand Mousseau throughout my internship.

- Implemented a **Neural Network** using descriptors to reduce latent space complexity with **PANNA** (built on top of **TensorFlow 1.5**) and accelerated interatomic potential computation **by an order of 10**.
- Developed tools in **Python** that dispatch **hundreds of** hyperparameters - training configurations in **SLURM** on national supercomputer based on resource availability, significantly improving our experimentation efficiency.
- Created a synthetic dataset of interatomic configuration with **Quantum Expresso**.

Apprenticeship at Collège de maisonneuve - LRIMA — January 2018 - June 2018

Developed solutions for organizing and optimizing parking spaces in dense areas with autonomous vehicles as a research assistant.

TEACHING

Teaching Assistant at University of Montreal — September 2022 - December 2022

IFT3355: Computer Graphics

- Prepared classroom exercises and In-Class demonstrations.
- Created and graded assigment 2 - Raytracing in C++.

Teaching Assistant at University of Montreal — September 2021 - January 2021

IFT1016: Programming 1 (Neuroscience)

- Prepared classroom exercises and In-Class demonstrations.
- Created and graded assignments.

Assistant at University of Montreal — February 2019

Hackathon 2019 competition

- Prepared the competition.
  - Supported students in difficult tasks.
  - Explained relevant concepts for the competition to students.

Mathematic Tutor at College de maisonneuve   January 2018 - May 2018
  - Offered quality support and tailored study guides in math.

Volunteering

Co-organizer for Quart de nuit   March 2020 - May 2020
  - Organized an event bringing together several members in person in order to promote group games through social media like Instagram, and Facebook.
  - Created a digital platform for member registration and payment using VueJS, Laravel, and Stripe.
  - Cancelled due to the pandemic. Impossibility of taking place in person.

Waiter for Robin des Bois   June 2016
  - Coordination of multiple tasks under pressure.

Guide for Vélo Québec - Tour de l'île   June 2016
  - Collaboration, guidance, and support of participants.

Waiter for Opération Père Noël   November 2015
  - Quality verification of Christmas toys.
  - Christmas Toy Quality Checking and Christmas Toy Packing for families in need.

Guide for Vélo Québec - Tour de l'île   June 2015
  - Collaboration, guidance and support of participants.

Competition

Hackethon 2017 & 2018   Montréal
University of Montréal   *February 2017 & 2018*