Wylliam Cantin Charawi, CEP, B.Eng

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Education

Fast-track Doctorate of Engineering | Computer Vision & Graphics — Montreal, QC
Multimedia Lab & LIVIA | École de Technologie Supérieure (ÉTS) — *Expected Graduation December 2028*

Bachelor of Software Engineering — Montreal, QC
École de Technologie Supérieure (ÉTS) — *Graduated August 2024*

Experience

Computer Vision and Graphics Researcher — May 2024 – Present
CVG Kawasaki Laboratory, Kyushu University | Multimedia Lab & LIVIA, ÉTS — *Fukuoka, Japan & Montreal, QC*

- Submitted a paper to **3DV** introducing **Differentiable Clipped Centroidal Voronoi Tessellation (DCCVT)**, a novel framework for paving Voronoi diagrams with differentiable clipped centroids to extract high-quality meshes from implicit surfaces using **Pytorch**, outperforming SotA marching tetrahedra and Voronoi-based extraction methods.

Computer Vision Research Developer — May 2023 – August 2023
Zebra Technologies | Matrox Imaging Industrial Research Chair, LIVIA — *Montreal, QC*

- Developed a **Python** pipeline tool to augment bar codes data-sets using **C++** and Matrox Imaging Library to create test files and run benchmarks on different AI models and algorithms, saving 1500% costs
- Captured real-world hazmat label data, built and augmented a dataset, and trained an **RTMDet/YOLO** model to accurately recognize labels in video feeds with 98.2% accuracy.

Analyst Programmer — January 2022 – April 2022
Loto-Québec, Technologies Nter — *Montreal, QC*

- Developed and improved the performance of several **Vue.JS** components, which led to a fluid and responsive UI
- Proposed a **Bootstrap** and **CSS** solution for the site typography, resulting in a responsive and dynamic UX
- Implemented improvements to the Agile practices within the team, leading to the use of story points

Junior Developer — May 2021 – August 2021
Vokeso - Gold Microsoft Partner — *Montreal, QC*

- Developed and customized **MC Dynamics 365 Business Central** extensions and reports
- Developed a website using **HTML**, **CSS**, **React.JS**, **PHP**, **Postman API** and **MSSQL**
- Compartmentalized database and processes using **Docker** and multiple Azure VMs

Software Engineering Representative Administrator — September 2021 – May 2024
ÉTS Student Association, AÉÉTS — *Montreal, QC*

- Sat on AÉÉTS board of directors and managed a 1M$ budget
- Organized social and technical activities for software engineering students

Projects

Voronoify | *Python, CUDA C++, Rust* — October 2025

- Engineered multiple high-performance implementations of a Voronoi image generator, targeting CPU, multi-core CPU, and GPU architectures to analyze performance trade-offs.
- Developed a native CUDA C++ solution using the Jump Flooding Algorithm (JFA) for labeling and a custom parallel reduction kernel for color averaging, eliminating host-device transfer bottlenecks.
- Built a memory-safe, parallel version in Rust with Rayon, providing an alternative for systems without a GPU.

Rendering Engine – Monte Carlo Path Tracer | *Rust* — September 2025 – Present

- Built a physically based Monte Carlo path tracer in Rust, covering the full pipeline from ray generation and geometric intersections to global illumination with Multiple Importance Sampling (MIS).
- Developed BSDFs with Fresnel effects, cosine-weighted sampling, and analytical PDF evaluation.
- Integrated direct and indirect lighting via modular path tracing with emitter sampling, hierarchical light selection, and variance reduction through MIS.

Numerical Simulation | *C++* — Fall 2022

- Designed and implemented a full C++ linear algebra library with templates, operator overloading, memory management (stack vs heap), and unit testing.
- Developed a 2D mass-spring particle simulation engine with numerical integration (implicit Euler), stiffness/mass matrix assembly, and custom linear solvers (Gauss-Seidel, graph-colored Gauss-Seidel, Cholesky).