Keven **Villeneuve**

GRAPHICS SOFTWARE ENGINEER

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Skills

Languages	C++, C, Python, JavaScript, GLSL, HLSL, x86 assembly, RISC-V, MATLAB, Mathematica, LaTeX
Libraries	OpenGL, Vulkan, DirectX 12, TBB, CUDA, WebGL, Three.js, Qt, STL, OpenCV, PyTorch, numpy, sklearn
Tools	Clion, Visual Studio, VTune, Renderdoc, PIX, Git, Perforce, Maya, Bifrost, Arnold, Mitsuba, PBRT

Education

McGill University
Montréal, Canada

M.ENG. COMPUTER ENGINEERING (GPA: 3.94)   *Jan. 2017 - May 2019*

- Thesis: Importance Sampling Polygonal Lights in Participating Media (Advisor: Derek Nowrouzezahrai)
- Graduate Excellence Fellowship 2017 & 2018

Université de Sherbrooke
Sherbrooke, Canada

B.ENG. COMPUTER ENGINEERING (GPA: 3.40)   *Sep. 2012 - Dec. 2016*

- Specialization in Digital Signal Processing & Compression
- Part of EMUS (Electric Motorcycle of the Université de Sherbrooke)

Work Experience

Electronic Arts (SEED)
Montréal, Canada

SOFTWARE DEVELOPER   *Mar. 2020 - Present*

- Develop a GPU implementation (HLSL) of Direct Delta Mush, a cutting edge real-time skinning animation technique and collaborate on major improvements leading to a SIGGRAPH paper (pending).
- Implement GGX environment prefiltering in Halcyon, SEED's research renderer.
- Implement 4D mesh streaming in Halcyon to support ongoing research on hyper-realistic characters in video games.

Maxon Computer
Montréal, Canada

SOFTWARE DEVELOPER   *June 2019 - Mar. 2020*

- Develop new features in *Cinema4D* to improve various 3D modeling workflows.

Autodesk
Montréal, Canada

SOFTWARE DEVELOPER, INTERN   *Jan. 2019 - May 2019*

- Develop a new plugin to provide support of the upcoming *Bifrost* procedural generation system in the Monte Carlo ray tracing renderer *Arnold*.
- Integrate the plugin into the Arnold development pipeline.
- Create a suite of unit tests to validate the correctness of the plugin.

McGill University
Montréal, Canada

TEACHER ASSISTANT (TA), REALISTIC & ADVANCED IMAGE SYNTHESIS (ECSE 446/546)   *Sep. 2018 - Dec. 2018*

- Develop a hybrid offline and real-time renderer (deferred shading + shadow mapping + SSAO + baked GI).
- Prepare assignments and the final exam.
- Hold tutorials and office hours.

Autodesk
Montréal, Canada

SOFTWARE DEVELOPER, INTERN   *Fall 2014-2015, Summer 2016*

- Develop a new tool using a skinning decomposition algorithm in *Maya*, based on a paper published at SIGGRAPH.
- Optimize the FBX importer of Maya using the Intel VTune profiler, giving 6x performance improvement.
- Generalize the animation curves name function to the hardware accelerated context using OpenGL.
- Develop an automated test suite in python to detect performance and usability regressions.
- Optimize a module in Maya using hardware accelerated graphics (OpenGL), giving 4x performance improvement.
- Develop and debug various features in the very large C++ codebase of Maya.

Ubisoft
ENGINE PROGRAMMER, INTERN

Montréal, Canada
Jan. 2014 - Apr. 2014

- Develop and debug features of *Assassin's Creed Unity*'s game engine according to the demands of production.
- Collaborate with a team consisting of hundreds of developers, artists and producers.
- Document the features of the engine in a way that could be easily understood by users.

Canadian Space Agency (CSA)
SOFTWARE ENGINEER, INTERN

Longueuil, Canada
May 2013 - Aug. 2013

- Develop the network layer of the simulator used to train astronauts to manipulate the space station's robotic arm (*CANADARM*).
- Improve the design of the multithreaded software to allow for better flexibility and better integration of future features.

Projects

Master's Thesis
C++, PYTHON, MATHEMATICA, WEBGL

May 2017 - Jan. 2021

- Develop a new importance sampling scheme to improve the rendering efficiency of scenes involving polygonal lights in participating media.
- Importance sample the geometric and transmittance terms of a finite set of oriented point lights at the surface of a polygonal light.
- In collaboration with Derek Nowrouzezahrai (thesis advisor) and Iliyan Georgiev (Arnold's lead research scientist).

Path Tracer
C++, PYTHON

May 2017 - Present

- Develop a surface & volumetric unbiased Monte Carlo path tracer accelerated using a BVH.
- Add support for area and mesh lights with adequate multiple importance sampling (MIS) techniques.
- Implement diffuse, Phong, mirror, glass and dielectric BSDFs.
- Implement bidirectional light transport algorithms such as progressive photon mapping, volumetric VPLs and volumetric Lightcuts.

3D Cloth Collisions Simulator
C++, IRRLICHT

Mar. 2017 - May 2017

- Develop a physically-based 3D cloth collisions solver by implementing a SIGGRAPH paper.
- Extend the Irrlicht 3D engine to support 3D cloths.
- Develop a free fly camera compatible with Irrlicht.

GameBoy Emulator
C++

Feb. 2016 - June 2016

- Implement the CPU of the Nintendo GameBoy (8-bit 4 MHz Z80) and simulate the power up sequence.
- Implement the MMU to emulate the memory mapping of the CPU with the other components.
- Implement loading of simple ROM cartridges.

Real-Time Strategy Game
C++, OPENGL

Oct. 2014 - Aug. 2015

- Design and develop a clone of Age of Empires using our custom entity/component engine.
- Develop a 2D isometric renderer using modern OpenGL.
- Collaborate with a friend on a network serialization and replication system (client/server architecture).

Additional Experiences

2018	**Organizer**, McGill's computer graphics papers reading group.		*Montréal, Canada*
2017	**Grader**, ECSE 689: Realistic Image Synthesis, McGill University.		*Montréal, Canada*
2017	**Grader**, ECSE 222: Digital Logic, McGill University.		*Montréal, Canada*
2016	**Student Volunteer**, SIGGRAPH 2016.		*Los Angeles, USA*
2015	**Mentor**, Electronic and programming at the GYBO robotics hackathon.		*Toronto, Canada*

Awards

2018	**Graduate Excellence Fellowship (GEF)**, Electrical & Computer Engineering, McGill University.
2018	**Winner of "Most retro hack"**, McHacks: video game using Myo hand gestures controller.
2017	**2nd place**, McGill Physics Hackathon: 3D waves simulator in Three.js.
2017	**Graduate Excellence Fellowship (GEF)**, Electrical & Computer Engineering, McGill University.
2014	**2nd place**, Startup Weekend Montréal: Android app as an "Airbnb" for parking spots.