Keven **Villeneuve**

Graphics Software Engineer

Montréal, QC, Canada

keven.villeneuve@gmail.com | kevenv.github.io | kevenv | kevenv | @keven_v

Skills

Languages C++, C, Python, JavaScript, GLSL, x86 assembly, MATLAB, Mathematica, LaTeX

Libraries OpenGL, SDL, GLFW, TBB, CUDA, WebGL, Three.js, Qt, Boost, STL, OpenCV, PyTorch, numpy, sklearn

Tools Visual Studio, VTune, Renderdoc, Git, Perforce, Maya, Cinema4D, 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*

- Part of EMUS (Electric Motorcycle of the Université de Sherbrooke)

Work Experience

Maxon Computer

Montréal, Canada

Software developer — *June 2019 - Present*

- 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

Montréal, Canada

Engine programmer, Intern — *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)

Longueuil, Canada

Software engineer, Intern — *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

Ray Tracing Research

C++, Python, Mathematica, WebGL *May 2017 - Present*

- 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).

Ray 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.

Courses

ECSE 689	**Realistic Image Synthesis**, Derek Nowrouzezahrai, McGill University.
COMP 559	**Fundamentals of Computer Animation**, Paul Kry, McGill University.
COMP 557	**Fundamentals of Computer Graphics**, Paul Kry, McGill University.
ECSE 683	**Computational Photography**, James Clark, McGill University.
COMP 551	**Applied Machine Learning**, Joelle Pineau, McGill University.
GEI 792	**Artificial Intelligence**, Jean Rouat, Université de Sherbrooke.
GEI 781	**Digital Signal Quantization**, Philippe Gournay, Université de Sherbrooke.
GIF 443	**Digital Signal Processing**, Éric Plourde, Université de Sherbrooke.