

Kyle Lukaszek

I'm a Master's student in Computer Science researching high-performance rendering for perceptual colourspace visualization with experience in GPU computing (CUDA, Metal, WebGPU, Vulkan). My work spans graphics rendering, ML systems, and scientific computing with applications to colour reproduction and colour vision deficiency. I'm seeking opportunities in graphics, deep learning, AR/VR, and large-scale computation.

Research Interests

Graphics, Deep Learning, Mechanistic Interpretability, Perceptual Computing, Scientific Visualization, High Performance Computing.

Skills

GPU APIs: CUDA, WebGPU, Metal, Vulkan, OpenGL, OpenCL

Languages: C, C++, Python, Rust, Haskell, TypeScript, Swift, WGSL, MSL, HLSL, Slang

Libraries: PyTorch, NumPy, SciPy, OpenMP, MPI, Pthreads, Warp, SlangPy, BlenderPy

Tools: RenderDoc, NSight, GDB, Valgrind, lldb, leaks, Perf, Unity, Git, Nix, Blender

Other: SQL, WASM, FFI development

Spoken: English, French (Immersion, DELF B2)

Publications

GI 2024 **Modelling The Effects of Bright Environments on Colour Perception**, *Graphics Interface 2024*, Halifax, NS

○ Co-authored with Dr. Denis Nikitenko and Dr. David Flatla's lab. Presented at GI 2024.

○ DOI: [10.1145/3670947.3670959](https://doi.org/10.1145/3670947.3670959) ([open access](#))

Education

05/25 – **Master of Science in Computer Science**, *University of Guelph*

- 06/27* ○ Research focus: perceptual colour science and high-performance tools for research software quality.
○ Supervised by Dr. Denis Nikitenko and Dr. David Flatla.
○ Coursework: Scientific Computing, Artificial Intelligence.

09/20 – **Honours Bachelor of Computing**, *University of Guelph*

- 09/25 ○ Area of Application in Mathematics. Deans list 2023 & 2024. Average: 78%
○ Coursework: Algorithms, Compilers, Deep Learning, Computer Graphics, Graph Theory, Differential Equations 2, Operating Systems, Parallel Programming.

Selected Projects

High-Performance WebGPU Rendering Systems **Real-time GPU-accelerated rendering and visualization at scale**

- Mesh renderer with working scene graph and material support.
○ Compute-based LiDAR point cloud renderer achieving real-time visualization of 100M+ points with interactive frame rates.
○ Physically-correct 3D colourspace renderer supporting various colourspaces with real-time interactivity at full resolution.
○ Implemented optimized compute shaders for colour space transformations, gamut mapping, and massive point cloud splatting.
○ Built from scratch using WebGPU for cross-platform deployment.

- Comparing The Performance of 3D Classification Models**
- Research and implementation of 3D classification models on voxelized data
 - Co-researched, implemented, and tested various 3D classification models on voxelized 3D objects.
 - Developed partially-novel CNN architecture for binary voxel classification, achieving competitive accuracy on ShapeNet while maintaining mobile-friendly model size.
 - Evaluated and optimized models using standardized benchmarks: ShapeNet, ModelNet40, and Toys4K.
 - Final project for CIS*4780 Computational Intelligence.
- SDL3 Haskell Bindings**
- Type-safe Haskell bindings for the SDL3 Native Application Library
 - Enables functional programming access to SDL3's complete API with zero-cost abstractions.
 - Performant type-safe wrappers over SDL3's C interface maintaining low-level control.
 - 30+ cross-platform examples including GPU rendering demos.
 - Supports DirectX12, Vulkan, and Metal for cross-platform application development.

Experience

Ongoing Projects & Research

- Prototyping portable compute-based 3D Gaussian splatting solutions for efficient point cloud rendering across multiple GPU backends.
 - Kiln: safe, zero-copy Rust bindings for Metal providing modern GPU programming interface.
 - Exploring neural rendering techniques and differentiable graphics pipelines for scientific visualization.
- 01/24 – **Research Assistant, Human-Computer Interaction, University of Guelph**
- 01/25
- Developed cross-platform C driver and CLI tool for JETI SpectraVal 1501 spectrometer, replacing Windows-only FTDI solution.
 - Reduced measurement latency and setup time by over 50%, enabling seamless integration into HCI and perceptual testing pipelines.
 - Integrated iOS SensorKit proof-of-concept for evaluating environmental luminance values in perceptual studies.
 - Contributed to peer-reviewed paper accepted to Graphics Interface 2024.
- 05/23 – **Research Assistant, Machine Learning, University of Guelph**
- 09/23
- Trained a variety of custom BERT models on a large Twitter corpus using PyTorch and SKLearn.
 - Developed parallel data pre-processing pipelines achieving significant speedup over the CPU baselines.
 - Applied quantitative analysis methods for social media data processing and hate speech detection research.
 - Work later supported [IEEE T-CSS publication](#) on online hate detection systems.

Teaching Assistance

- 09/25 – **Teaching Assistant, CIS*3090 Parallel Programming, University of Guelph**
- 12/25
- Supporting instruction in Pthreads, OpenMP, OpenCL, CUDA, and Nvidia Warp.
 - Leading labs to teach students parallel programming concepts and performance optimization techniques.
 - Hosting weekly office hours and mentoring students in debugging and reasoning about concurrent and parallel code.
- 01/25 – **Teaching Assistant, CIS*2750 Software Systems Development, University of Guelph**
- 04/25
- Supported instruction in C systems development, SQL, and FFI integration for TUI development.
 - Mentored class of 300+ undergraduate students in intermediate-advanced programming concepts.
 - Graded assignments and provided detailed technical feedback on software design and implementation.

References

Available upon request.