Dimitri Chrysafis

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Education

University of Wisconsin–Madison Graduating May 2027

Bachelor of Science in Computer Science **GPA: 4.0**

Open Source Contributions

Simplex Chat **12 Approved Pull Requests**

- Enhanced application performance by updating core libraries across iOS, Android, and Desktop platforms
- Contributed to 15% reduction in reported crashes and 10% improvement in load times

Taichi **8 Approved Pull Requests**

- Redesigned Apple Metal backend implementing buffer–image copy routines at GPU command list level
- Enabled direct GPU memory transfers between buffers and textures on macOS, removing CPU-side staging overhead

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Projects

High-Performance Web-Based Fractal Renderer [Blog]

- Engineered real-time fractal visualization system supporting $10^{15}\times$ magnification for Mandelbrot, Newton's, and Kleinian limit sets using GPU-accelerated WebGL fragment shaders with double-precision emulation
- Achieved **60× performance improvement** through adaptive sampling, tile-based rendering, and optimized complex arithmetic reducing computational overhead by 85%

WebGPU Ocean Fluid Simulator [Demo] [GitHub]

- Implemented **Moving Least Squares Material Point Method (MLS-MPM)** using WebGPU compute shaders for hybrid Eulerian-Lagrangian fluid simulation with 400,000+ particles
- Optimized GPU performance through workgroup optimization, bounding sphere culling, and velocity thresholds, achieving real-time interactive fluid dynamics in web browsers

Interactive Fourier Analysis Visualization Tool [GitHub]

- Built educational signal processing tool implementing **Discrete Fourier Transform** for decomposing arbitrary drawings into frequency domain representations
- Developed interactive epicycle visualization demonstrating frequency synthesis through rotating phasors, supporting 1000 frequency components with real-time coefficient adjustment using Python/NumPy

Advanced Sphere Packing Optimization Engine [Blog] [GitHub]

- Tackled NP-hard 3D sphere packing problem achieving **74% packing density** for complex geometries with 10,000+ spheres using simulated annealing with adaptive cooling schedules and Metropolis-Hastings acceptance criteria
- Improved performance by **50%** through CPU/GPU unified memory architecture, ray-sphere intersection algorithms, and spatial hashing reducing complexity from $O(n^2)$ to $O(n)$

Skills and Interests

Languages: C++, Python, Swift, Rust, Go, Java, JavaScript/TypeScript, SQL, LaTeX, CUDA, OpenCL, Bash, Git

Tools: PyTorch, TensorFlow, JAX, NumPy, scikit-learn, Metal, Docker, Kubernetes, Hugging Face, OpenCV

Interests: Competitive marathon runner and triathlete; Calisthenics, Squash