Patrick Ribas

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Objective

Hard-working fourth-year Computer Science student looking for a co-op or research opportunity in computer graphics or scientific simulation during the summer or fall of 2022.

Education

Rochester Institute of Technology

- Bachelor and Master of Science in Computer Science (Dual Degree), Minor in Math
- 3.89 GPA, Dean's List, Expected Graduation May 2023

Work Experience

Algorithm Development Co-op (Full Time), Spectral Sciences, Spring 2020 — Summer 2021

- Wrote Python and C++ code to automatically determine initialization points for in-house fluid simulation software
- Implemented numerical methods to evaluate physically relevant quantities (i.e. gradients) over a mesh that stored relevant data
- Worked with the C++ library Qhull to assist in geometry processing work such as generating a convex hulls or quadtrees
- Used Boost.Python to interact with existing library bindings for C++ code, and to compile C++ to Python
- Navigated Python's tkinter library for a different project to display the results of rocket simulation software

Sustainability Research Assistant (Full Time), RIT, Summer 2020

- Worked with existing and novel mathematical models to predict methane production of anaerobic lagoons on large farms
- Used numerical and statistical methods to evaluate models, along with the uncertainties and sensitivities of their parameters
- Methods include forward Euler, Monte Carlo simulations, Latin Hypercube Sampling, and Sobol' sensitivity analysis
- Wrote Python code to parse data, evaluate models, reproduce findings of existing papers, and verify statistical methods

Skills

- **Programming Languages:** Python, C, C++, Java/C#, Three.js, WebGL, Vulkan (learning)
- **Software Development:** Git, Unix, Agile
- **Other:** LaTeX, Research, Paper Reading, Public Speaking, Communication

Projects

Particle-based Fluid Simulation

- Implemented part of Müller et al. to build a real-time fluid simulation for an animation class
- Used Marching Cubes to render a fluid-like surface, and evaluated smoothing kernels over a set of particles
- Built the system in Three.js to show the simulation online

Procedural Terrain Generator

- Wrote a program to render an infinite 3D landscape in Three.js
- Learned Fractional Brownian Motion to generate points that represent terrain heights
- Used Delaunay Triangulation algorithm to generate a mesh for rendering the terrain and to walk through it in real-time
- Generated simplified terrain using Perlin noise when results were unsatisfactory

Ray/Path Tracer in C/C++

- Created an offline ray tracer from scratch in C/C++ to render spheres
- Researched and applied methods in Linear Algebra and Probability fundamental to ray tracing
- Implemented random variables for material properties, sampling for anti-aliasing, and matrix/vector transformations

Courses (bottom row is Spring 2022)

Computer Animation Algorithms	Computational Geometry	Computer Graphics	Stochastic Processes
Parallel and Distributed Systems	Introduction to AI	Analysis of Algorithms	Software Engineering
Advanced GPU Programming in Vulkan	Global Illumnation	Geographic Visualization	Climate Change

Other

- **Website:** https://patribas.github.io/
- **RIT eSports:** Current DOTA 2 team manager, organize scrims and weekly games; former broadcaster/shoutcaster for DOTA 2 team, minor experience in stream production; acclimated to a fast-paced, communication-heavy environment
- **piRIT:** member of RIT's SIAM chapter
- **Athletics:** Former springboard diver, 3-time Pittsford triathlon finisher (pre-Covid)