Ethan Lipson

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EDUCATION

Columbia University in NYC, School of Engineering and Applied Sciences '26
Stuyvesant High School '22 (GPA 93/100)

TECHNICAL SKILLS

Highly parallel GPU programming

- CUDA (CUDA C), OpenGL compute shaders (C++)
- Emulated WebGL compute shaders using per-pixel computations (JS)

Physics simulation

- Incompressible fluid simulation using density constraints
- Rigid bodies using distance constraints

Computer graphics

- OpenGL 4.6 (C++)
- WebGL 2.0, Three.js (JavaScript)

Web applications

- Sleek web applications rivaling native performance using GPU compute
- React and NextJS to create responsive UIs, knowledge of HTML, CSS, JS

Machine learning

- PyTorch (Python)
    - Deep neural networks

Cloud

- AWS
- GCP (Firebase)

EXPERIENCE

Heights Labs **Summer '22**

Helped track movement of illicit cryptocurrency funds in cooperation with the government using OCR to scan for crypto addresses

RELEVANT COURSES

Columbia University - Linear Algebra (MATH 2010 UN) **January '21 - April '21**
Received an A- in a Junior level linear algebra course. Topics covered include row reduction, linear subspaces, change of basis, eigenvectors and eigenvalues, eigenbases, determinants, abstract vector spaces, and representation of generic linear operators as matrices.

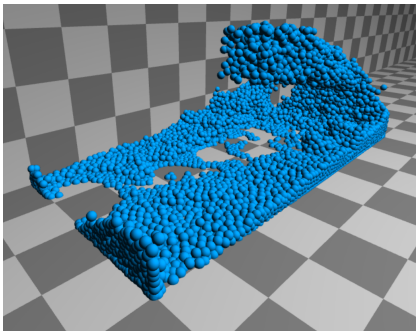
Columbia University - Data Structures (COMS 3134 W) **July '20 - August '20**
Received an A in a Sophomore level data structures course. Topics covered include general-purpose algorithms and associated data structures, such as sorting, graphs, heaps, trees, hashmaps, and sets, as well as applications.

SELECTED PROJECTS

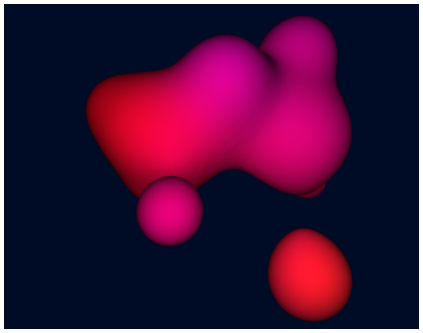
Position Based Fluids (https://ethanlipson.com/demos/fluid)
Implemented *Position Based Fluids* by Macklin and Müller, 2013. Performs calculation for 15,000 particles at 60 FPS on the GPU using space partitioning.

Open Source Ultrasound Project (https://github.com/ethanlipson/DensityMap)
Created the density field visualization for the Open Source Ultrasound Project at Columbia University, providing affordable ultrasound hardware and software to people around the world. The specification required updating a 200x200x200 grid 30 times/second, sending the updated data to the GPU every frame.

PyLX-16A (https://github.com/ethanlipson/PyLX-16A) 18 stars, 12 forks on GitHub
Created a Python library to control HiWonder's LX-16A hobby servos. The library is thoroughly documented and includes features expected of a complete library, including exception handling and a PyPI package.



https://ethanlipson.com/demos/fluid



https://ethanlipson.com/demos/metaballs-3d