

Purvi Goel

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Education

Brown University

Providence, RI

MASTERS OF SCIENCE IN COMPUTER SCIENCE, CONCENTRATION GPA: 4.0/4.0

Class of 2020

- **Current Coursework** — Advanced Computer Vision, Deep Learning

BACHELOR OF SCIENCE IN COMPUTER SCIENCE, CONCENTRATION GPA: 4.0/4.0

Class of 2019

- **Awards** — Senior Prize; Brown Research Symposium Honorable Mention; Sigma Xi Honor Society
- **Relevant Coursework** — Advanced Computer Graphics, Computer Vision, Computational Photography, Software Engineering, User Interfaces, Linear Algebra, Image Understanding, Design & Analysis of Algorithms, Computer Systems
- **Mentorship** — Women in Computer Science; Mosaic+ Transition Program for Underrepresented Minorities

Research and Projects

Differentiable Rendering for Joint Shape and Appearance Construction

- Using a differentiable pathtracer to recover shape, topology, and material properties of objects in 3-D scenes from a set of 2-D images towards simultaneous texture and shape estimation. Supports materials difficult for traditional shape from shading approaches like mirrors and SVBRDFs.
- Built a coarse-to-fine pipeline for that includes multi-view stereo, adaptive remeshing, and mesh colors.

Single-Image Material Editing

- Implemented "Image-Based Material Editing" (SIGGRAPH 2005), "Depicting Procedural Caustics in Single Images" (SIGGRAPH 2008), and "Interactive Design of All-Frequency Lighting" (Pacific Graphics 2007) with a team, allowing users to change material properties of objects in single HDR photographs
- Final application included environment map optimization, precomputed radiance transfer, estimating and replacing the BxDF and texture of objects, and simulating visually convincing caustics with log-Gabor kernels.

Rendering

- **Pathtracer** (C++) with PSS-Metropolis Light Transport, russian roulette path termination, several materials, and BRDF importance sampling.
- **Raytracer** (C++, OpenGL) handling shadows, occlusion, reflective materials, and texture mapping techniques.
- **Deferred Shading** (Javascript, WebGL) online demo with interactive texture buffers and 1000 moving point lights.

Technical Experience

Facebook (AI Research)

Menlo Park, CA

SOFTWARE ENGINEERING INTERN

June 2019 - August 2019

- Implemented state-of-the-art neural models for protein prediction tasks from papers to benchmark FAIR's BERT model. The models were trained on large datasets of protein sequences to recover properties like protein function and folding behavior.
- Built an optimization pipeline for protein structure prediction using gradient descent to minimize the potential energy of molecular structures.

Amazon (SmartHome)

Sunnyvale, CA

SOFTWARE ENGINEERING INTERN

June 2018 - August 2018

- Created a device-to-device communication API for Amazon Echo and Dot devices using the MQTT messaging protocol. The project included a leader-election algorithm to detect when important SmartHome devices disconnected from the home network.

Google (Cloud-Stadia)

Waterloo, ON

SOFTWARE DEVELOPMENT INTERN

January 2018 - April 2018

- Implemented a software implementation of the graphics rendering pipeline for Google's cloud gaming service Stadia. This allowed teams to debug vertex and fragment shaders and included texture sampling, rasterization, and visualization with XCB.

Amazon (Lab126 Devices-Cameras)

Menlo Park, CA

SOFTWARE ENGINEERING INTERN

June 2017 - August 2017

- Developed Amazon Cloud Camera infrastructure for server-side communication to Amazon servers in time for the products' launch. This allowed cameras to synchronize settings and servers to quickly control data flow between different devices

Teaching Experience

Brown University Department of Computer Science (Teaching Assistant)

- **Advanced Computer Graphics (Head TA, '20)** – Topics Covered: Pathtracing, Mesh Operations, Linear Optimization, Simulation
- **Computer Graphics ('19)** – Topics Covered – Real-time Rendering, Raytracing, GPU Graphics Pipeline, Procedural Generation
- **Computer Vision ('19)** – Topics Covered – Image Filtering, Feature Matching, SIFT, Neural Networks, Camera Calibration
- **Writing3D ('17)** – Topics Covered: Text-based experiences in Virtual Reality
- **Introduction to Object Oriented Programming ('16)** – Topics Covered: Polymorphism, Interfaces, Inheritance, JavaFX, GUI

Skills

Languages and Technologies Away From Keyboard

Sparse Solvers, OpenGL/GLSL, C++, Eigen, Tensorflow, Pytorch, Mantaflow

Triathlon (most recently Ironman 70.3 Augusta), Powerlifting, Watercolor, Composting, and Coffee. Lots of coffee.