XIAO (SEAN) ZHAN

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EDUCATION

Bachelor of Science, Brown University, RI — Expected 2023
Computer Science, Applied Mathematics

High School, Cate School, CA — Sept 2015 - May 2019
Cum Laude, Graduated with Highest Honor

PUBLICATIONS

ShapeCrafter: A Recursive Text-Conditioned 3D Shape Generation Model. Rao Fu, <u>Xiao Zhan</u>, Yiwen Chen, Daniel Ritchie, Srinath Sridhar. *NeurIPS 2022.*

EXPERIENCE

Research Intern — May 2022 - Aug 2022
Pixar Research, advised by Mark Meyer — *Pixar Animation Studios, CA*

- Implemented a part-based neural skinning model to predict corrective shapes for character rigging. Outperformed linear blend skinning by an 80% increase in accuracy.
- Conducted literature review, wrote C++ code to augment data, implemented 3 neural models and 2 training pipelines, ran over 100 experiments. Learned to iterate fast and work with large codebases.

Research Assistant — Jan 2021 - Present
Brown Visual Computing — *Brown University, RI*

- **3D Character Interpolation and Generation**, advised by Daniel Ritchie
  - Designed skeleton-aware neural networks to learn implicit representation of 3D characters. Devised a novel technique to generate and pose new characters by interpolating existing characters of different mesh and skeleton topology. Aiming to submit to Siggraph 2023.
  - Experimented with IM-NET, NASA, PointNet++, DeepSDF, learned fourier features, graph neural networks.
- **Recursive Text-Conditioned 3D Shape Generation**, advised by Srinath Sridhar, Daniel Ritchie
  - Devised novel neural model for recursive text-to-shape generation: vector-quantized feature embedding for shape representation, BERT for text feature extraction, and conditional autoregressive model for recursive generation. Published at NeurIPS 2022.
  - Provided the key insight of augmenting dataset for recursive generation. Implemented various autoencoders, investigated CLIP-Forge and P-VQ-VAE, conducted experiments to evaluate autoregressive models.

Lead Full Stack Developer — Jun 2020 – Jun 2021
Boykin Lab — *Brown University, RI*

- Developed two React apps that allow researchers to study people's perception of fairness in criminal justice.
- Used MongoDB and built a Node.js backend API to integrate the two apps and Qualtrics survey tool. Used React-Redux and built an intuitive and user-friendly frontend based on researchers' feedback.

PROJECTS

Single Image Relighting (Graphics) [Python] Implemented "Generating Digital Painting Lighting Effects via RGB-space Geometry." Improved the refined lighting stage, expanded on the paper by adding specular highlights.

Path Tracer (Graphics) [C++] Implemented a path tracer with 4 basic types of BRDFs, soft shadows, Russian Roulette path termination and event splitting with BRDF importance sampling and multiple importance sampling.

Mesh Processing (Graphics) [C++] Implemented mesh subdivision, simplification, and denoising.

Finite Element Simulation (Graphics) [C++] Implemented finite element simulation with internal elastic and viscous damping forces, collision detection, and RK4 integration.

ARAP (Graphics) [C++] Dissected and implemented "As-Rigid-As-Possible Surface Modeling".

Jello Cube (Graphics) [C++] Created a jello cube simulation. Implemented various OpenGL shaders for visualizing the cube, wrote physics environment.

Style Transfer (Vision, ML) [Python] Implemented vanilla CNN-based style transfer model that transfers artworks' style onto images. Improved the vanilla model by implementing Adaptive Instance Normalization.

Stereo Vision Reconstruction (Vision) [Python] Given 3D markers and 2D point correspondence, reconstructed world coordinates of subjects by estimating cameras' projection and fundamental matrices using RANSAC.

Automated Stock Investment (ML) [Python] Created a deep reinforcement learning actor-critic agent to manage portfolio and gain profit (quadrupled initial portfolio value). Significantly improved the agent's performance by adding a lifting layer such that GRUs operate on higher dimensional space.

Fork (Software) [Java] Built Fork, a decision-making app that suggests restaurants to groups. Wrote a modular and extensible backend with Java and SQL, helped build the React.js frontend and a concurrent socket module.

Rings (Software) [React] Led Hackathon team to develop Rings, a team time management app designed for friends and coworkers. Built a fully functional frontend with React in 1.5 days.

Autonomous Drone Flight (Vision, Software) [Python] Programmed a DJI Tello drone, incorporated OpenPose to achieve autonomous flight. The drone is able to track and follow a person and respond to gestures.

ACTIVITIES

- **Teaching Assistant** - Intro to Computer Graphics, Deep Learning, Functional Programming
  Created presentations, handouts, and solutions for homework. Held weekly lab sections for students. Graded homework and projects, held 1-on-1 meetings to give students constructive feedback on assignments.

- **President '22, Treasurer '20-'21** - Chinese Student Association
  Coordinate with the Activities Office and outside venues for event planning, set per-semester goals, delegate tasks to each executive-board members and provide guidance. Increased club membership by 20% and funding by 50% compared to past years.

AWARDS

Brown University Undergraduate Research Symposium Audience Favorite	2022
Brown University Undergraduate Teaching and Research Awards	2021
Hack@Brown 2021 Winner of Contrary Capital Award (1st out of 66 projects)	2021

SKILLS

Languages	Python, C++, C, MATLAB, JavaScript, Java
Libraries	TensorFlow, PyTorch
Frameworks	React, React-Redux, Node.js, Flask
Soft Skills	Problem-solving, Communication, Team Player

COURSEWORK

Computer Graphics	Computer Vision	Deep Learning
Intro to Software Engineering	Intro to Computer Systems	Computational Probabilities
Operations Research	Applied ODEs & PDEs	Honors Calculus & Linear Algebra
Principles of Economics	Mngmt. of Indust./Nonprofit Orgs.	Global History of Art and Arch.