Fanbo Xiang

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Research Summary

My research focuses on machine learning, vision, and robotics. I am currently working on simulated robotics environments. I also have solid background on software system design and HCI.

Education

University of California San Diego

Ph.D. Candidate in Computer Science *2020 - Present*

M.S. Computer Science (GPA 4.0) *2018 - 2020*

- advisor: **Prof. Hao Su**

University of Illinois Urbana-Champaign

B.S. Computer Science, B.S. Mathematics Dual Degree (with Highest Honors, GPA 3.97) *2014 - 2018*

Selected Publications

ManiSkill: Learning-from-Demonstrations Benchmark for Generalizable Manipulation Skills *San Diego, CA*

Tongzhou Mu*, Zhan Ling*, **Fanbo Xiang***, Derek Yang*, Xuanlin Li*, Stone Tao, Zhiao Huang, Zhiwei Jia, Hao Su *May 2021 - Present*

- NeurIPS 2021 Datasets and Benchmarks Track
- Research on designing a benchmark for learning to manipulate unseen objects from 3D visual inputs.
- Designed benchmark architecture, simulation environments, sensor and robot setups.

Neural Texture Mapping for Volumetric Neural Rendering *Remote*

Fanbo Xiang, Zexiang Xu, Miloš Hašan, Yannick Hold-Geoffroy, Kalyan Sunkavalli, Hao Su *June 2020 - Nov. 2020*

- CVPR 2021 (oral)
- Research on visual capturing, differentiable rendering, and 3D representation at Adobe.
- Disentangle 3D volumetric geometry and 2D appearance in volumetric scene representation.

SAPIEN: A SimulAted Part-based Interactive ENvironment *San Diego, CA*

Fanbo Xiang,Yuzhe Qin, Kaichun Mo, Yikuan Xia, Hao Zhu, Fangchen Liu, Minghua Liu, Hanxiao Jiang, Yifu Yuan, He Wang, Li Yi, Angel Chang, Leonidas Guibas, Hao Su *Jan. 2019 - Present*

- CVPR 2020 (oral)
- Leading the development of a simulation environment for robotics manipulation and learning tasks.
- Leading the construction of a large-scale articulated body dataset. Developed its annotation interface.
- Designed neural networks for motion parameter estimation.
- Designed OpenGL rasterizer and OptiX raytracer for rendering.

Academic Experience

Project on SPH fluid simulation *San Diego, CA*

Project for Physical Simulation *Mar. - June 2019*

- Implemented GPU SPH fluid simulation, including solvers for incompressible and high viscosity fluids.
- Implemented GPU marching cube, raytraced water rendering, foam and spray generation.

Music Generation with MusicVAE and GAN *San Diego, CA*

Project for Deep Learning for Sequences *Dec. 2018 - Mar. 2019*

- Implemented a symbolic music generator combining MusicVAE ang GAN networks.

Project on Denoising Ray Traced Rendering *San Diego, CA*

Project for Sampling and Reconstruction of Visual Appearance *Sept. 2018 - Dec. 2018*

- Implemented the Adaptive Rendering with Non-Local Means Filtering using Optix and CUDA.

HCI Rersearcher *Champaign, IL*

MUS-ROVER project (instructed by prof. Lav Varshney) *Dec. 2016 - Dec. 2017*

- Developed the web server for MUS-ROVER, an experimental platform for machine learning and teaching on music theory.
- Developed data visualization algorithms to interpret music theory results learned by language models.

Game Developer *Champaign, IL*

Association of Computing Machinery(ACM), SigMusic *Jan. 2015 - May. 2018*

- Led development of games that are exhibited at Engineering Open House events.
- Built games with Unreal 4, web-based game engines, Kinect sensor, and hardware designed by our group. Collaborated with electrical engineers to design games with custom hardware inputs.

Software Developer *Champaign, IL*

DISSCO Experimental Computer Music Software *Jan. - May. 2018*

- Maintained software for multi-threaded and distributed music synthesis.
- Added music synthesis methods and improved graphical interface written in GTK(C++).

Working Experience

Robotics Simulation Intern *Remote*

NVIDIA *June - Sept. 2021*

- Research on robotics and physical simulation.

Research Intern *Remote*

Adobe *June - Sept. 2020*

- Research on graphics and computer vision.
- Focus on neural capture and differentiable rendering.

GPU Software Performance Intern *Cupertino, CA*

Apple Inc. *June - Sept. 2019*

- Profiling software performance for iOS applications.
- Improving GPU workloads on iOS with machine learning using CoreML framework.
- Developing applications with Objective-C and Metal.

Software Engineer Intern *Champaign, IL*

Intelligent Medical Objects *May - July 2017*

- As a full stack engineer, developed Web API with ASP.NET(C#).
- Developed Web front-end with Angular 2. Developed mobile client with React-native/Redux.

Teaching Experience

Teaching Assistant *San Diego, CA*

Machine Learning Meets Geometry *Jan. - Mar. 2021*

- Teaching geometry, computer vision, computer graphics, 3D machine learning.

Teaching Assistant *San Diego, CA*

Computer Vision *Sept. - Dec. 2019*

- Teaching linear algebra, detection, tracking, and deep networks.

Course Assistant *Champaign, IL*

Introduction to Algorithms & Models of Computation *Aug. - Dec. 2016*

- Teaching regular languages, Turing machine, NP-completeness, graph algorithms and dynamic programming.

Other Skills

Programming	C++, Objective-C, Python, Web(NodeJs, Angular 2), GPU(Vulkan, GLSL, CUDA, Metal)
Machine Learning	PyTorch, Tensorflow, CoreML
Development	Git, Docker, Xcode, Vim
Game Engines	Unreal, Unity
Art	3D Modeling in Blender, Image Processing in GIMP, Basic Music Composition