Mangnike Nulixiati

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EDUCATION

Vanderbilt University **Ph.D. in Computer Science** **May 2027**

Courses Highlights: Advanced Machine Learning, Deep Learning, Numerical Methods, Advanced Computational Mechanics

Peking University **B.S. in Computer Science** **Jul 2022**

Courses Highlights: Computer Graphics, Operating Systems, Computer Vision, Advanced Mathematics

RESEARCH AND WORK EXPERIENCE

Research Assistant, ***Vanderbilt University*** **Aug 2022 - Present**

- Developing a novel way of Implicit Neural Representations for efficiently compressing 3D data
- Studied diffusion model-based 3D shape generations under different 3D representations
- Enhanced the accuracy and efficiency of traditional computational fluid dynamics through the application of deep learning techniques: proposed a physics-informed neural network model that corrects Boussinesq flow simulations by learning from the fully compressible model
- Implemented parallel and stable FEniCS codebase for generating large-scale flow simulation data for training
- Simulated and rendered hot air balloon based on Material Point Method (MPM)

Teaching Assistant, ***Vanderbilt University*** **Aug 2022 - Present**

- Principles Operating Systems - Fall 2022
- Numerical Methods - Fall 2023, Fall 2024
- Quantum Computing - Spring 2024, Spring 2025

Research Intern (remote), ***University of California, Davis*** **Jul 2021 - Dec 2021**

- Implemented elasticity simulation based on Finite Element Methods (FEM), Position-based Dynamics (PBD)
- Explored the Material Point Method (MPM) in fracture simulation with different numerical solvers

Research Intern, ***Institute of Software, Chinese Academy of Sciences*** **Jan 2021 - Dec 2021**

- Proposed a semi-analytical surface tension model for smoothed particle hydrodynamics (SPH), where cohesive and adhesive forces are unified within a surface energy framework for nonuniform systems. This model can efficiently handle complex solid boundaries with surface-tension-driven phenomena
- Applied CUDA-based parallel computing techniques to achieve real-time SPH fluid simulation
- Developed PeriDyno, a physics-based simulation engine, focusing on surface tension simulation

Undergraduate Research Assistant, ***Peking University*** **May 2020 - Dec 2020**

- Implemented mesh and topology optimization in hyper-elasticity simulation collaborating with a PhD student
- Contributed to the development of a physics-based simulation engine: PhysIKA

PUBLICATIONS

Nurshat Mangnike, David Hyde. "*Toward Improving Boussinesq Flow Simulations by Learning with Compressible Flow.*"2024 Platform for Advanced Scientific Computing. PASC, 2024.

Nurshat Menglik, H. Yao, Y. Zheng, J. Shi, Y. Qiao, X. He. "*Semi-Analytical Surface Tension Model for Free Surface Flows.*" 2022 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW). IEEE, 2022.

SKILLS

Programming Languages: C/C++, Python, C#, MATLAB, JavaScript
Tools & Frameworks: CUDA, PyTorch, TensorFlow, JAX, OpenGL, Houdini, COMSOL, FEniCS, SQL, AWS, Unity3D
Languages: Uyghur (Native), Mandarin (Fluent), English (Fluent)

AWARDS & HONORS

- **Dean's Graduate Fellowship,** ***Vanderbilt University*** **Sept 2022**
- **Russell G. Hamilton Scholar,** ***Vanderbilt University*** **Sept 2022**
- **1st Place FortyAU Award for VR Project,** ***Vanderbilt University*** **Dec 2022**
  The VR project, 'Accessibility Quest', won the 1st place award (worth $4,000) in the VR project competition. The project focuses on using VR technology to improve urban accessibility for people with disabilities, providing valuable insights for city designers.