

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 Architecture, Advanced Mathematics

RESEARCH AND WORK EXPERIENCE

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

- Enhanced the accuracy and efficiency of traditional computational fluid dynamics and thermodynamics 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 stable FEniCS code for large-scale Boussinesq and compressible flow based on parallel computing
- Simulated hot air balloon physics based on Material Point Method (MPM)
- Studied diffusion model-based 3D shape generation under different 3D representations

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

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

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, MATLAB, JavaScript

Tools & Frameworks: CUDA, PyTorch, JAX, OpenGL, Houdini, COMSOL, FEniCS, Mathematica, Unity, Blender

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.