Yushan Han
Email: yushanh1@math.ucla.edu

Professional Summary

I'm a fifth-year PhD candidate in Applied Mathematics at UCLA, under the guidance of Prof. Joseph Teran. My primary research focus lies at the intersection of physics-based simulation and machine learning, with a special emphasis on the simulation of human soft tissues. My recent works include numerically solving nonlinear partial differential equations, computing biomechanically correct muscle inverse dynamics, and training neural networks for real-time correctives on character rigs. Additionally, I'm a research intern at Epic Games, where I am actively involved in the development of Chaos Flesh within the Unreal Engine framework.

Education

- **Ph.D. in Applied Mathematics** - University of California, Los Angeles (UCLA), Expected June 2024
    - Research interest: physics-based simulation, inverse dynamics, numerical methods for PDE, machine learning.
- **B.S. in Mathematics** - University of California, Irvine (UCI), September 2015 – June 2019
    - Minor in Statistics

Work Experience

- **Research Intern** - Epic Games, June 2021 – Present
    - Developed a comprehensive simulation pipeline for human soft tissues, enhancing the realism of biomechanical models.
    - Innovated a muscle contraction methodology incorporating biomechanically accurate inverse dynamics, improving the fidelity of musculoskeletal simulations.
    - Engineered and trained machine learning neural networks to implement real-time corrective adjustments to character rigs, streamlining the animation process.
- **Graduate Teaching Assistant** - UCLA, January 2021 – Present
    - Teaching assistant for Numerical Analysis, Algorithms, Mathematical Imaging, and Machine Learning.
- **Graduate Research Intern** - Lawrence Berkeley National Lab, June 2020 – September 2020
    - Investigated deep learning models and probabilistic graphical models for image segmentation.

Skills & Abilities

- Proficient in C++, Python, MATLAB, Houdini, Maya, Unreal Engine.

Publications

- Coming Soon: Recently Submitted First Author Paper

- Y. Chen, Y. Han, J. Chen, S. Ma, R. Fedkiw, and J. Teran, "Primal Extended Position Based Dynamics for Hyperelasticity," in *Proceedings of the ACM SIGGRAPH Conference on Motion, Interaction and Games*, 2023. DOI: 10.1145/3623264.3624437.
- S. Gagniere, Y. Han, Y. Chen, D. Hyde, A. Marquez-Razon, J. Teran, and R. Fedkiw, "A Robust Grid-Based Meshing Algorithm for Embedding Self-Intersecting Surfaces," *Computer Graphics Forum*, 2023. DOI: 10.1111/cgf.14986.
- A. Marquez Razon, Y. Chen, Y. Han, S. Gagniere, M. Tupek, and J. Teran, "A Linear and Angular Momentum Conserving Hybrid Particle/Grid Iteration for Volumetric Elastic Contact," *Proceedings of the ACM on Computer Graphics and Interactive Techniques*, 2023. DOI: 10.1145/3606924.
- Y. Jin, Y. Han, Z. Geng, J. Teran, and R. Fedkiw, "Analytically Integratable Zero-restlength Springs for Capturing Dynamic Modes unrepresented by Quasistatic Neural Networks," in *ACM SIGGRAPH 2022 Conference Proceedings*, 2022. DOI: 10.1145/3528233.3530705.

Awards

- NSF MENTOR Fellowship - $34,000, September 2019 – September 2020.
- Howard Tucker Award, University of California, Irvine, June 2019.

References

Available upon request.