Mingxuan Liu

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EDUCATION

Tsinghua University   Beijing, CN
Bachelor's of Software Engineering, School of Software   *Aug 2022 — Jun 2026*
- Cumulative GPA: 3.7/4.0
- Relevant Coursework: Discrete Mathematics, Linear Algebra, Calculus A, Probability and Statistics, Data Structures, Introduction to Algorithms, Formal Language and Automata, Machine Learning, Software Engineering, ***Physics-Based Simulation***, ***Algorithms and Techniques in Computer Animation***

RESEARCH EXPERIENCE

Penetration-free Elastoplastic Simulation of B-Spline Thin Shells in Arbitrary Shape   Jul 2025 — Present
Intern RA in CSD, Carnegie Mellon University with Prof. Minchen Li & Prof. Tao Du   *Pittsburgh, PA*
- Developing a thin shell simulator based on a B-spline FEM for cloth simulation. Key contributions include applying cubic bending energy for curved rest shapes, enforcing C0/C1 continuity constraints across surface patches to assemble free-form shapes, and integrating the Incremental Potential Contact (IPC) energy over the B-spline surface, instead of the rendered triangle mesh, for robust self-collision and contact handling.
- Individually working on the design and validation of linear continuity constraints for non-conforming surfaces.
- The research paper is anticipated for publication in December 2025.

Improvement on Differentiable Cloth Simulation   Jul 2025 — Present
Intern RA in IIIS, Tsinghua University with Prof. Tao Du & Prof. Minchen Li   *Beijing, CN*
- Developing a high-fidelity algorithm for differentiable cloth simulation based on diff-libuipc. This work includes a novel framework for reconstructing sewing patterns and garment meshes from static images and 3D scans.
- Primary responsibilities include literature reviews and experimental validations.

Multi-view Clothed Human Reconstruction   Oct 2024 — Jun 2025
Intern RA in IIIS, Tsinghua University with Prof. Tao Du & Prof. Minchen Li   *Beijing, CN*
- Designed and implemented a framework to reconstruct clothed humans from multi-view static images, generating simulation-ready 3D garment meshes with plausible textures. We learned the garment mesh from input images and prevented it from colliding with the initial body mesh. Meanwhile, we applied a modified 2D Gaussian method for texture mapping.
- Contributed to implementation and experimentation, with a focus on 2D/3D Gaussian Splatting, Animatable Gaussians, etc.

PROJECTS

Co-developer, A Simple FEM-Based Shell Solver (Physics-Based Simulation Final Project)   May 2025 — Jun 2025
- In this project, we built a FEM-based solver for simulating the elastic deformation of thin shells, centered around the Discrete Shells framework introduced by E. Grinspun. Our solver focused on capturing isometric deformations and exploring a range of material models, allowing us to model a broad spectrum of physical behaviors.
- Primarily responsible for implementing the hinged bending energy and various pre-conditioners, and conducting validation of the solver.
- Course score: 100/100

Backend developer, Tsingping Yue (Software Engineering Final Project)   Oct 2024 — Jan 2025
- Developed a WeChat mini-program for composing traditional Chinese poetry. The application leverages LLMs to provide users with stylized compositional assistance.
- Worked on backend development and led the database design, implementing the system using Golang and MongoDB.
- Course score: 91/100

Co-developer, Breath Of Life   Feb 2024 — Jun 2024
- Developed a serious game controlled by the pace of breathing, aiming to help the users release stress and relax.
- Collaborated on the core game logic design and independently implemented several key game-play mechanics.
- Recipient of the "Best Innovation Social Value Award" at the 4th China Game Innovation Competition.

Scholarships & Awards

Comprehensive Excellence Scholarship   Nov 2025
Tsinghua University   *Amount 8000¥*

Friends of Tsinghua University - Zulong Scholarship   Oct 2024
School of Software, Tsinghua University   *Amount 5000¥*

The 4th China Game Innovation Competition   Aug 2024
China Audio-video and Digital Publishing Association   *Best Innovation Social Value Award*

Skills

- **Languages**: Mandarin Chinese, English (TOEFL 107), Japanese (JLPT N2)
- **Programming Languages**: *Python*, *C/C++*, Golang, C#, JavaScript
- **Others**: Git, PyTorch, Taichi, CUDA, Docker, MongoDB, Unity

About Me

- *A highly motivated researcher and developer* specializing in computer graphics, with a deep passion for physics-based simulation and photorealistic rendering. Possesses extensive hands-on experience in 3D reconstruction and simulating cloth/thin shells with FEM, alongside a strong understanding of other simulation paradigms.
- *Proven software engineering skills* in C++ and Python, with proficiency in high-performance computing and ML frameworks such as PyTorch, CUDA, and Taichi.
- *Good command of English* (TOEFL 107), proficient in academic writing and technical communication.
- *A proactive self-learner*, demonstrated by independently developing a C++ ray tracer based on the "Ray Tracing in One Weekend" series and conducting in-depth research on differentiable rendering. Continuously expanding knowledge through advanced resources like Physically Based Rendering (pbrt).
- *A collaborative team player* committed to delivering high-quality results and continuously exploring emerging technologies.
- **Research Interests**: Physics-Based (Diff) Simulation, Computer Animation, 3D Reconstruction, Physics-Based (Diff) Rendering.
- **Seeking a Ph.D. position in Computer Graphics.**