ZIQIU ZENG

+65 8458 2715 | Email: zzeng@nus.edu.sg
Homepage: https://ziqiu-zeng.github.io/homepage/

EDUCATION

University of Strasbourg — Strasbourg, France
Ph.D. in Computer Graphics — Sept. 2019 – Sept. 2023
- Research Interests: Physics-Based Simulations (Deformation, Contact and Friction, Cutting); Finite Element Method; Real-Time Simulations; Medical Images; GPU-based Parallelization
- Ph.D. Thesis: ***Towards real-time performance in large-scale physics-based simulations***

University of Technology of Troyes — Troyes, France
Engineering Degree in Automation — Sept. 2016 – Mar. 2019
- Control System; Modeling, Manipulation and Programming of Robots; Signal Processing and Data Science

University of Shanghai — Shanghai, China
Bachelor Degree in Computer Science — Sept. 2013 – Sept. 2017
- Applied Mathematics; Algorithm and Programming; Electronic Engineering; Embedded Techniques

PUBLICATIONS

1. Fast But Accurate: A Real-Time Hyperelastic Simulator with Robust Frictional Contact. *SIGGRAPH 2025 & ACM Transaction on Graphics*. (First Author)
2. Real-Time FE simulation for Large-Scale Problems using Precondition-Based Contact Resolution and Isolated DOFs Constraints, *Computer Graphics Forum 2022*. (First Author)
3. Dynamic Cutting Simulation using Elastic Snapping for Mesh Quality Optimization, *Computer Graphics Forum 2025*. (First Author)
4. Efficient Needle Insertion Simulation using Hybrid Constraint Solver and Isolated DOFs. *Eurographics 2023*.
5. SOFA++: A Real-Time GPU-based Surgical Robotics Simulator with Robust Frictional Contact. *ICRA 2025 Workshop.*

RESEARCH EXPERIENCE

Human-Centered Robotic Lab (HcRL)
National University of Singapore — Singapore
Research Manager — July. 2025 – Now
Learning World Model with Differentiable Physics
*Differentiable Simulation is useful and order extra gradient information for robotics control and learning. We designed high-performance and high-fidelity differentiable simulator for **rigid-soft dynamics** and **interactions**, applying on real robot tasks, such as navigation, locomotion and manipulation.*

Center of Artificial Intelligence and Robotics (CAIR)
Hong Kong Institute of Science & Innovation — Hong Kong, China
Assistant Professor — Oct. 2023 – June. 2025
Real-Time Simulator Development for Medical Applications
*We develop a **GPU-optimized framework** for real-time implicit simulation of elastic materials with frictional contacts, solving nonlinear and non-smooth challenges through a parallel-friendly solver with fast convergence. Our method, based on efficient matrix operations, handles large deformations, complex contacts, and various hyperelastic models while maintaining **simplicity, robustness, and scalability.***

University of Strasbourg
INRIA Mimesis Team & ICube Laboratory — Strasbourg, France
Ph.D. Student Researcher (Supervisor: Dr. Hadrien Courtecuisse) — July. 2019 – Sept. 2023
Performance improvement in large-scale physics-based simulations
*Physics-based medical simulations face a key challenge: balancing accuracy and speed for real-time deformable object modeling. We enhance computational performance for **large-scale real-time simulations** through improved numerical resolution methods.*

INVITED TALKS

Talk at ETH CRL Seminar
"Fast but Accurate: The Next-Generation Physics Engine for Soft Body Simulations?"   April. 2025

ABILITIES

Programming: C/C++; CUDA; MATLAB; Python; XML

Computer Graphics: Physics-Based Simulations; Finite Element Methods; Differentiable Physics; Real-Time Simulations; Parallel Programming; Geometry Processing

Applied Mathematics: Optimization Theory; Linear Algebra; Numerical Analysis; Control Theory