

ZIQUI ZENG

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EDUCATION

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- 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 and Programming of Robots · Signal Processing · 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

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1. Fast But Accurate: A Real-Time Hyperelastic Simulator with Robust Frictional Contact.
Z. Zeng, S. Luo, F. Shi, and Z. Zhang *ACM Transactions on Graphics (Proc. ACM SIGGRAPH 2025)*
 2. Real-Time FE simulation for Large-Scale Problems using Precondition-Based Contact Resolution and Isolated DOFs Constraints.
Z. Zeng, S. Cotin, and H. Courtecuisse *Computer Graphics Forum 2022*
 3. Dynamic Cutting Simulation using Elastic Snapping for Mesh Quality Optimization.
Z. Zeng and H. Courtecuisse *Computer Graphics Forum 2025*
 4. Efficient Needle Insertion Simulation using Hybrid Constraint Solver and Isolated DOFs.
C. Martin, **Z. Zeng**, and H. Courtecuisse *Eurographics 2023 Short Paper*
 5. SOFA++: A Real-Time GPU-based Surgical Robotics Simulator with Robust Frictional Contact.
S. Luo, **Z. Zeng**, and F. Shi *ICRA 2025 Workshop*

RESEARCH EXPERIENCE

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- Human-Centered Robotic Lab (HcRL)** Singapore
National University of Singapore July. 2025 – Now
Research Manager (Principal Investigator: Dr. Fan Shi)
- 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** Hong Kong S.A.R., China
Hong Kong Institute of Science & Innovation, Chinese Academy of Science Oct. 2023 – June. 2025
Assistant Professor
- 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**.*

INRIA Mimesis Team & ICube Laboratory

University of Strasbourg

Ph.D. Student Researcher (Supervisor: Dr. Hadrien Courtecuisse)

Strasbourg, France

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

ETH Zurich CRL Seminar

"Fast but Accurate: The Next-Generation Physics Engine for Soft Body Simulations?"

April. 2025

GRANTS & AWARDS

NVIDIA Academic Grant 2025

Awarded for "Adaptive Fault-Tolerant Safe Locomotion with Differentiable Simulation" with Dr. Fan Shi

June. 2025

Swiss AI Initiative Small Grant 2025

Grant supporting "Learning Deformable Contact Dynamics for 4D Spatial Intelligence" with Dr. Fan Shi

July. 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