

# ZIQU ZENG

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Homepage: <https://ziqu-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

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- 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)*
  - 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*
  - Dynamic Cutting Simulation using Elastic Snapping for Mesh Quality Optimization.  
**Z. Zeng** and H. Courtecuisse *Computer Graphics Forum 2025*
  - Efficient Needle Insertion Simulation using Hybrid Constraint Solver and Isolated DOFs.  
C. Martin, **Z. Zeng**, and H. Courtecuisse *Eurographics 2023 Short Paper*
  - 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)**  
**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**  
**Hong Kong Institute of Science & Innovation, Chinese Academy of Science** Hong Kong S.A.R., 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.*

**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

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**ETH Zurich CRL Seminar**

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

April. 2025

## ABILITIES

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**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