

# Bowen Ren

Computer Graphics and Visualization Lab · The University of Hong Kong · Hong Kong, China

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## Education

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**Tsinghua University**

*Sept. 2021 – Jun. 2025*

*B.S. in Mathematics*

- **Core courses:** Numerical Analysis(3.6), Convex Optimization(4.0), Analytic Mechanics(4.0), Physics-based Simulation(4.0), Scientific Computing with Matlab(4.0), Computer Graphics(N/A), Deep Learning(4.0), Advanced Linear Algebra(3.6, 4.0), Functional Analysis(3.6).

## Experience

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**Apply PINNs to Solve Navier–Stokes equations**

*Beijing, China*

*Course Project*

*Sept. 2023 – Jan. 2024*

- Applied Physics Informed Neural Networks (PINNs) in solving two-dimensional steady-state Navier-Stokes equations and adopted multiple methods to improve the efficiency and accuracy of the solution.
- Got the third highest score in poster presentation as the course project of deep learning.

**Physics-based Simulation of Solid Objects**

*Beijing, China*

*Advised by prof. Tao Du*

*Jun. 2023 – Jun. 2025*

- Derive the relevant formulas and implement the corresponding code, including Incremental Potential Contact, Affine Body Dynamics, actuation, Dirichlet boundary condition and the derivative in differentiable simulation
- Design experiments of differentiable simulation, including driving a jellyfish animation by optimization actuation signal, designing different hinge joint shapes by optimizing young's modulus and other evaluation experiments.

**Physics-Augmented Clothed Human Reconstruction**

*Pittsburgh, USA*

*Advised by prof. Minchen Li*

*Jun. 2024 – Sept. 2024*

- Propose an appearance reconstruction framework that jointly recovers body and garment geometry using differentiable rasterization and multiple geometric cues, including silhouettes, joint projections, surface normals, and occlusion relationships.
- Develop a physics-guided rest shape optimization framework that refines triangle rest shapes, inter-triangle rest angles, and body geometry via fixed-point iterations. This enables reconstructed garments to retain their intended shapes under physics-based simulation, supporting realistic animation and downstream physical reasoning

**Differentiable Simulation of Sewing Pattern with Graduated Optimization**

*Remote*

*Advised by prof. Minchen Li*

*Oct. 2024 – now*

- Based on differentiable simulation, apply graduated optimization for rest shape of cloth with a hierarchical representation, including different polygons and Bezier curves.
- Reproduce methods of related works, and conduct experiments on various settings and configura-

tions, including different regularization terms, representation and objectives.

### **Libuipc Development and Extension**

*Advised by prof. Taku Komura*

*Hong Kong, China*

*Nov. 2025 – now*

- Implement the core computation of IPC friction energy and gradient, and several constitutive models as well as their differentiable simulation modules.

## **Selected Awards**

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**Silver Medal, Chinese Mathematical Olympiad (CMO)**

*2020*

**First Prize, Qingli Academic Festival of Zhili College, Tsinghua University**

*2024*

## **Skills**

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**Programming:** Matlab, python, C++, CUDA