

Xiaoyu Xiong

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Research Interests

I focus on **Physical AI** that understands, generates, and acts in the physical world through simulation and learning.

Education

Institute for Interdisciplinary Information Sciences, Tsinghua University 2023.09–2027.06
B.S. Candidate in Computer Science; Major GPA: 3.93/4.00 Beijing, China

- A+ in *Physics Simulation* (also selected as the best course project) and *Computer Graphics*

Standardized Tests

TOEFL **6.0** (new scale; approximately 118 on the former scale); GRE **336**

Publications

- Text2Sim: Agentic Physics-Based Simulation Generation with Distilled Expertise* **under review**
Xiaoyu Xiong, Tsun-Hsuan Wang, Yi-Ling Qiao, Tao Du, Minchen Li.
- Learning to Reconfigure: Configuration-Control Co-optimization of Reconfigurable Robots for Heterogeneous Locomotion* **ICML 2026**
Xiaoyu Xiong, Kehan Liu, Huiyi Yan, Shengjie Wang, Yang Gao, Tao Du.
- Learning to Control Free-Form Soft Swimmers* **NeurIPS 2025**
Changyu Hu, Yanke Qu, Qian Yang, **Xiaoyu Xiong**, Kui Wu, Wei Li, Tao Du.
- TopoGaussian: Inferring Internal Topology Structures from Visual Clues* **ICLR 2025**
Xiaoyu Xiong, Changyu Hu, Chunru Lin, Pingchuan Ma, Chuang Gan, Tao Du.

Research Experience

Text2Sim: Agentic Physics-Based Simulation Generation with Distilled Expertise 2026.03–2026.09
School of Computer Science, Carnegie Mellon University; Advisors: Minchen Li and Tao Du

- Project description:** We develop an autonomous framework that converts natural-language physics tasks into runnable simulations. It combines a Planner-led multi-agent architecture for multi-physics environments with a SIGGRAPH-based training and evaluation dataset.
- My work:** I design and implement the core **LLM**-driven pipeline, including the Planner action loop, worker dispatch, repair routing, and **Genesis**-based asset generation, and contribute to benchmark construction.

Learning to Reconfigure 2025.06–2026.02
Institute for Interdisciplinary Information Sciences, Tsinghua University; Advisor: Tao Du

- Project description:** We jointly learn configurations and control policies for reconfigurable robots in multi-physics locomotion tasks using hierarchical RL, achieving significant improvements over SOTA baselines on heterogeneous tasks.
- My work:** I develop the core co-optimization pipeline, including its **PPO**-based hierarchical **RL** architecture and **MuJoCo** simulation; build and tune multi-physics locomotion tasks; run benchmark experiments; and write the paper.

Learning to Control Free-Form Soft Swimmers 2024.11–2025.05
Institute for Interdisciplinary Information Sciences, Tsinghua University; Advisor: Tao Du

- Project description:** We develop a bidirectionally coupled simulator based on LBM to model underwater elastic robots, combining with RL to jointly learn their control policies and actuator designs. We evaluate this in multiple environments, demonstrating its applications in unconventional robotics.
- My work:** I design and optimize the **RL (SAC)** training pipeline to demonstrate the applications of our simulator.

TopoGaussian: Inferring Internal Topology Structures from Visual Clues 2024.03–2024.10
Institute for Interdisciplinary Information Sciences, Tsinghua University; Advisor: Tao Du

- Project description:** We develop a visual reconstruction pipeline to infer the internal structure of objects from videos using 3DGS, differentiable simulation, and topology optimization. We validate the pipeline on multiple synthetic and real-world examples, with further demonstrations through 3D printing.
- My work:** I develop the algorithmic components of the pipeline and write most of the implementation, including the integration of **3DGS**, **differentiable simulation**, and **topology optimization**. I also design the experiments, construct synthetic datasets, and write most of the paper.

Awards

Chinese Physics Olympiad (CPhO) 7th Place , Asian Physics Olympiad (APhO) Gold Medal	High School
Tsinghua University Freshman Scholarship	2023.09
Tsinghua University Xuetang Scholarship	2023.09, 2024.09, 2025.09
SenseTime Scholarship (only 30 recipients nationwide per year)	2025.06
Tsinghua University Jiukun Scholarship	2025.09
Tsinghua University AEON Scholarship	2025.12
Yao Award Bronze Medal (Top 9 in the Yao Class)	2026.09
China National Scholarship (only 10 recipients in the Yao Class per year)	2026.10