Yixin CHEN

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EDUCATION

School of Information Science and Technology, ShanghaiTech University Sep. 2015 – Jul. 2019
Bachelor of Engineering (BEng) in Computer Science and Technology

Department of Computer Science, University of Toronto Sep. 2020 - Present
Ph.D. student in Computer Science

PUBLICATIONS

Meta-ABC: A High-complexity Lattice Geometry Dataset for Deep Learning
Yixin Chen, Towaki Takikawa, Ty Trusty, David I.W. Levin, Alec Jacobson, Elissa Ross, Daniel Hambleton **(Submitted to CVPR 2023**)

Multi-Agent Path Planning with Asymmetric Interactions In Tight Spaces
Vismay Modi, **Yixin Chen**, Abhishek Madan, Shinjiro Sueda, David I.W. Levin **(Accepted by CGF 2022 for publication**)

GPU Optimizations for High-Quality Kinetic Fluid Simulation
Yixin Chen, Wei Li, Rui Fan, Xiaopei Liu **(Accepted by IEEE TVCG 2021 for publication**)

Fast and Scalable Turbulent Flow Simulation with Two-Way Coupling
Wei Li, **Yixin Chen**, Mathieu Desbrun, Changxi Zheng, Xiaopei Liu **(Accepted by ACM SIGGRAPH 2020 for publication**)

RESEARCH EXPERIENCE

Dynamic Graphics Project, Department of Computer Science, University of Toronto
Research Assistant (RA) | Advisor: Professor David I.W. Levin
Physics-based Method for Elastic Body Simulation Sep. 2020 - Present

- Took comprehensive survey on current elastic body simulation research and analyzed the corresponding limitation of previous methods
- Implemented several basic physics-based methods and built up my own simulation library
- Focusing on highly complex lattice geometry simulation (cooperating with Metafold 3D Inc.)
- Focusing on interactive and efficient 2D fluid control problem based on eigenfluids (cooperating with Adobe Inc.)

FLARE Lab, School of Information Science and Technology, ShanghaiTech University
Research Assistant (RA) | Advisor: Professor Xiaopei LIU
Fast and Scalable Turbulent Flow Simulation with Two-Way Coupling Feb. 2019 - Jan. 2020
Collaboration with Professor Changxi Zheng from Columbia University, USA and Professor Mathieu Desbrun from California Institute of Technology, USA

- Proposed a stable and accurate solution for fluid-solid coupling by kinetic method with lattice Boltzmann equations
- Derived numerical optimization to determine high-order relaxation rates in non-orthogonal central-moment relaxation model and dimensional mapping for fluid-solid coupling
- Implemented new LBE solver with parallel optimization on both single and multi-GPU systems and achieved real-time coupling simulation with volume rendering

GPU Optimizations for Highly-Quality Kinetic Fluid Simulation Feb. 2019 - Jan. 2020
Collaboration with Professor Rui Fan from ShanghaiTech University, China

- Derived efficient parameterized data layout and memory access method for numerical fluid simulation based on the latest kinetic methods using lattice Boltzmann equations
- Proposed GPU optimization algorithms for single-scale and multi-scale fluid simulation using kinetic method to effectively balance efficiency and accuracy

- Implemented CUDA-based parallel optimization on single and multi-GPU, significantly faster than state-of-the-art GPU-based Navier-Stokes solvers for given accuracy and 10-20 times faster than a direct implementation

Systematical Evaluation of Different Simulation Methods and Real-world Reconstruction Aug. 2019 - Dec. 2019

Collaboration with Professor Nils Theurey from Technical University of Munich, Germany

- Conducted a series of comparisons and experiments using several simulation methods and ScalarFlow (the latest volumetric data from real-world scalar transport flows)
- Implemented buoyancy model for smoke simulation based on the kinetic method using lattice Boltzmann equations
- Took survey on corresponding evaluation methods and tried to derive a learning-based quantitative evaluation metric rather than a simple perceptual evaluation

WORKING EXPERIENCE

Research Scientist Intern Metafold 3D Jan. 2023 – Present

- Develop microstructure simulation method and implement related code
- Incorporate the new simulation pipeline into the production environment

Research Scientist Intern Adobe Inc. May. 2022 – Dec. 2022

- Mentored by Timothy Langlois
- Worked on interactive and efficient 2D fluid control problem based on eigenfluids pipeline

Teaching Assistant University of Toronto Sept. 2021 – April 2022

- Assisted course instructors in grading students' assignments
- Prepared and facilitated question and answer sessions to provide feedback on questions from students

Software Testing Intern UBTech Robotics Aug. 2020 - Dec. 2020

- Participate in algorithm training and test data collection, sorting, labeling and automation
- Worked with research team to test different functions and operations on current robot products and feedback with detailed reports

CG Research Intern Dgene Digital Technology (Shanghai) Co., Ltd. Jan. 2020 – Aug. 2020

- Participated in many CG-related research projects, especially about high-performance high-quality fluid simulation
- Application of the optimized fluid simulation platform to intelligent city, intelligent medical treatment and other fields

Teaching Assistant ShanghaiTech University Sept. 2018 - Jan. 2019

- Assisted course instructors in grading students' assignments
- Prepared and facilitated question and answer sessions to provide feedback on questions from students

LEADERSHIP AND ACTIVITIES

Co-founder Basketball Club of ShanghaiTech University Mar. 2016 - June 2019

- Responsible for club management, including organization, planning, and coordination
- Organized various basketball competitions and guided team to become the largest sports club at ShanghaiTech

Student Leader Student's Union of ShanghaiTech University Oct. 2015 - July 2018

- Served as the main organizer of ShanghaiTech University's annual New Year's Day Party
- Initiated and organized various activities and competitions for arts and sports

SKILLS AND OTHERS

- **Programming Languages:** Python, C / C++, MATLAB, SQL, HTML
- **Computer Skills:** Git, LaTex, Microsoft Office, Adobe Photoshop, Adobe After Effects, Adobe Illustrator
- **Engineering Platforms:** CUDA, OpenGL, OpenCV, CMake, Origin pro, Mathematica, NVVP
- **Languages:** Chinese (Native), English (Fluent: TOEFL (104, R 29, L 25, S 22, W 28))