

TIANYU WANG

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BIOGRAPHY

Now I am a senior R&D engineer at Faceunity Technology at Hangzhou and a visiting researcher at State Key Lab of CAD&CG, Zhejiang University, hosted by Prof. Kun Zhou and closely collaborating with Prof. Huamin Wang. Before that, I got my M.Eng. degree from the same university advised by Prof. Jin Huang and my B.Eng. degree from Sichuan University. My current research interest includes (a).physically based differentiable simulation, (b).inverse problems in fabrication and design, (c).human digitization.

EDUCATION

Zhejiang University, Hangzhou, China

M.Eng. in Computer Science

Sept. 2016 - Mar. 2020

Advisor: Prof. Jin Huang

Sichuan University, Chengdu, China

B.Eng. in Computer Science

Sept. 2012 - Jun. 2016

PUBLICATION

Tianyu Wang, Dongping Li, Xiaowei Liu, Jiong Chen, Huamin Wang, Kun Zhou
A Two-Way Interior Point Method for Collision Handling in Deformable Body Simulation
to be submitted to *SIGGRAPH 2022*

Tianyu Wang

Super-resolution of shallow water equation simulation based on GAN

Master Thesis at Zhejiang University 2020

Jiong Chen, Hujun Bao, **Tianyu Wang**, Mathieu Desbrun, Jin Huang

Numerical Coarsening using Discontinuous Shape Functions

ACM Transaction Graphics 37(4)(SIGGRAPH 2018), Vancouver, Canada, 2018

INDUSTRY EXPERIENCE

Senior R&D Engineer, Faceunity Technology Co. Ltd, Hangzhou

May 2020 - Now

- Co-developed a GPU-based cloth simulation CAD software as the core engineer

R&D Intern, Xmov Technology Co. Ltd, Shanghai

Sept. 2019 - Jan. 2020

Mentor: Prof. Jinxiang Chai

- Developed an open-sourced single view based hair modeling system
- Developed static hair/cloth retargeting algorithms for artists

RESEARCH EXPERIENCE

Visiting Researcher, State Key Lab of CAD&CG, ZJU

Oct. 2021 - Now

Host: Prof. Kun Zhou

- Lead research on collision handling of deformable body (to be submitted to **SIGGRAPH 2022**)

Research Assistant, State Key Lab of CAD&CG, ZJU

Sept. 2016 - Mar. 2020

Advisor: Prof. Jin Huang

- Research on super-resolution of shallow water equation simulation (Master Thesis 2020)
- Participated in research on numerical coarsening of FEM based simulation (**SIGGRAPH 2018**)

SELECTED CHRONOLOGICAL R&D EXPERIENCE DETAILS

R&D on GPU-based deformable body simulation and collision handling, 2020 - Now

After graduation, I was hired by Faceunity Technology to develop a GPU-based garment simulation engine, from scratch. I exhausted the survey of existed methods, designed the whole framework of the engine and implemented the original version independently. Until now, I solved several challenging problems independently: (a).**solving the indefiniteness problem of the several different energys Hessian matrix with existing methodology to avoid the unacceptable divergence occurring when solving the linear system on GPU**, (b).**fixing several incorrect or imprecise formula in existing famous technical papers which can cause unexpected numerical instability that arises when using the mesh with extremely low quality made by artists but the authors didn't take into account**, (c).**inventing a novel algorithm efficiently to handle the notorious self-collision problem which guarantees an intersection-free simulation without using any tedious continuous collision detection and Log-Barrier terms**.

As the industrial achievement, with my magic colleagues Dongping Li, Xiaowei Liu, Cihui Xie, Hao Guo, we together developed a high-performance fully GPU-based cloth simulation CAD software which outperforms the simulation quality, speed of the well-known professional software Marvelous Designer 10 and our product has been used for commercial purpose successfully.

As the academic fruit, collaborating with Prof. Huamin Wang and Prof. Kun Zhou, we wrote a technical paper and it will be submitted to SIGGRAPH 2022. I extended the novel collision-handling method to variety of codimensional deformable body simulation, including volumetric bodies, hair, sand in addition to the shell-like cloth which is our original aim. Furthermore, I did all the experiments of the paper and our experiment shows our method is safe, fast, friendly with GPU parallelization, robust against large time steps and deformation. Prof. Huamin Wang led the writing reconstruction and I learned countless scientific writing skills from him. Prof. Kun Zhou supported me to do this research as a visiting researcher in his group and helped me a lot.

Developed an open-sourced single view based hair modeling system, 2019

Development of using a single image as input to reconstruct the 3D hair model to accelerate the process of hair asset production for artists. I surveyed 18 representative related papers from 2012 to 2019 and understood its evolution clearly. According to four aspects: (a).robustness of the algorithm, (b).whether the input of algorithm matches the input from the current available hardware, (c).whether the output of algorithm can be used for simulation, (d).whether the data flow of the algorithm can be refined by artists flexibly, I implemented, modified and combined existed algorithms from scratch to make a tool for artists. See the [hair report](#) for more implementation details. Find the source code [here](#).

Developed static hair/cloth retargeting algorithms for artists, 2019

Development of retargeting a hair/cloth model from one suited character to another different character. I used less than a day to design and implement the algorithm for hair retargeting based on ARAP deformation and the artists gave a positive feedback to my timely help. Find the source code [here](#). After surveying cloth retargeting related papers, I gave out a suitable solution to the artists. See the [retargeting report](#) for details.

Research on super-resolution of shallow water equation simulation, 2018 - 2019

My master thesis proposed to achieve the SWE data's super-resolution using generative adversarial network. After considering the temporal smoothness constraint, rotation equivalence requirement, the possible negative value, this thesis proposed some insightful modifications to the state of the art framework and obtained verified better results. See the [SWE report](#) for details.

Participated in research on numerical coarsening of FEM based simulation, 2017 - 2018

Research on numerical coarsening to accelerate the FEM based solid simulation with heterogeneous materials and non-linear constitutive laws on coarse grid. See our [paper](#) on SIGGRAPH 2018 for more details. I implemented a FEM based solid simulation framework and did the major two papers' comparison experiments quickly and independently from scratch.

HONORS AND AWARDS

Graduate of Merit/Triple A graduate, Zhejiang University, 2018

Award of Honor for Graduate, Zhejiang University, 2018

Wen Chixiang Scholarship, Zhejiang University, 2018

Silver Medal, ACM-ICPC China Provincial Programming Contest, Chengdu Site, 2013 and 2014

2nd University Scholarship, Sichuan University, 2013

SKILLS

English

TOEFL score: 102 (R:29 L:24 S:21 W:28)

Programming Languages

C, C++, Python

Main Toolkit

CUDA, Eigen, NumPy, Tensorflow, PyQt, OpenGL, \LaTeX , Git

Software

ParaView, MeshLab, Maya, Blender, Origin, Office