Dr. Yili Zhao

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Education

University of Southern California, Los Angeles, CA
Ph.D. in Computer Science, August 2009 - August 2014
Dissertation Title: *Plant Substructuring and Real-time Simulation Using Model Reduction*
Committee: Jernej Barbič (advisor), Stefan Schaal, Gaurav S. Sukhatme, Ulrich Neumann, Igor Kukavica

Peking University, Beijing, China
M.S. in Computer Science, September 2006 - July 2009
Thesis Title: *Acceleration Techniques in Rendering Large-scale and Complex Scenes*

Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu, China
B.S. in Computer Science, September 2002 - June 2006 (Ranked **2^{nd} out of 268**)
Thesis Title: *Research on Segmentation of three-dimensional Meshes with Color and Texture*

Working Experience

Facebook Menlo Park, CA
Research Scientist, March 2015 - present

- **Lead architect, developer of the "Habitat-Sim"**, a photorealistic, high-performance 3D simulator, within which the virtual robots performing a variety of tasks (e.g., navigation) can be developed, evaluated and compared. It is a part of the open-source project Habitat at **Facebook AI Research** (FAIR).

  The very 1st version of Habitat-Sim (internal prototype) was written almost entirely by me from scratch.

  In terms of final release version, led, co-designed and co-implemented the system architecture. Designed, programmed, and tested many core modules. Maintained the system. Led and helped the team to build roadmaps for the future simulator development.
- **Tech lead**. Focused on improving the post-click experience of Facebook ads. Initiated and led many related projects. Designed and developed ads backend infra, data pipelines, and deep learning models, that significantly boosted the quality of the Facebook ads and company revenue.
- Designed and developed real-time, ads backend infrastructure, data pipelines that could ingest billions of user events in real-time, and transform them into denormalized, flat data, ready for the Facebook machine-learning system.

Oculus, Facebook Menlo Park, CA
Research Scientist, December 2014 - March 2015

- Designed and developed a kinematics system to construct and optimize geometric models of human hands from the sampled data.

Nimble VR (acquired by Facebook), San Francisco, CA
Research Engineer, October 2014 - November 2014

- Designed and developed visualization tools to analyze the recognition rates of the hand tracking system.

Research Experience

University of Southern California, Los Angeles, CA
Graduate Research Assistant, advisor: Jernej Barbič, August 2010 - August 2014

- **Developed a biomechanical model to set the mass density, stiffness, and damping properties of branches and leaves in complex botanical systems.**
  Published at ACM SIGGRAPH 2017.

- **Presented a real-time dynamics system, as well as a comprehensive pipeline for simulation of anatomically realistic plants (trees, flowers, bushes, forests, etc.).**
  Published at ACM SIGGRAPH 2013. I delivered the 20-minute SIGGRAPH presentation.
  Video 1: Oregon White Oak, realistic anatomy, adult tree, 120,000 leaves
  Video 2: Real-time physically-based simulation of plants

- **Proposed a novel multi-domain dynamics method in reduced dimensional space for real-time simulation of flexible objects undergoing large-deformations.**
  Published at ACM SIGGRAPH 2011.
  See Figure 1.

- **Developed an algorithm to simulate time-varying, geometrically complex, penalty-based distributed contact between many rigid objects and articulated objects.**
  Published at IEEE Transactions on Visualization and Computer Graphics.
  Video: Implicit Multibody Penalty-based Distributed Contact

- **Code contributor to Vega FEM library**, a computationally efficient and stable C/C++ physics library for three-dimensional deformable object simulation.

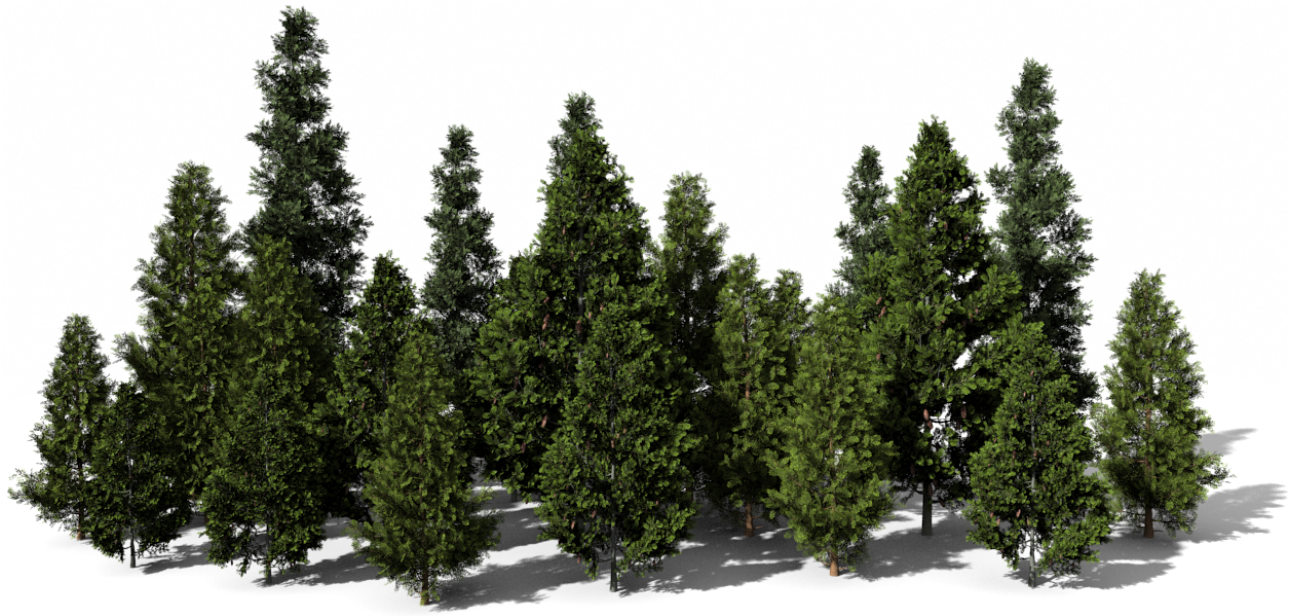

Figure 1: Simulating forest in randomized wind: 3 species, **24** trees, **1,920,525** triangles, **180,795** domains, **139,418** reduced DOFs, simulation fps: **3** Hz. **[video]**

University of Southern California, Los Angeles, CA
Graduate Research Assistant, advisor: Suya You, August 2009 - May 2010

- Developed a 3D simulator that allows the user to navigate in a virtual, **large-scale** and **complex scene** with many textured three-dimensional building models, and provides augmented reality experience to the user.

Peking University, Beijing, China
Graduate Research Assistant, advisor: Guoping Wang, September 2006 - July 2009

- Developed novel algorithms to accelerate rendering of a **large-scale, complex** scene with many three-dimensional massive models (funded by China National High-tech Research and Development Program).
- Developed algorithms to detect and repair the irregularities on three-dimensional triangle meshes (funded by National Grand Fundamental Research Program of China).

Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu, China
Undergraduate Research Assistant, advisor: Songcan Chen, Liyan Zhang, September 2005 - June 2006

- Developed an algorithm based on quadric error metrics to segment three-dimensional triangle meshes with color and texture properties.

Publications

Manolis Savva, Abhishek Kadian, Oleksandr Maksymets, **Yili Zhao**, Erik Wijmans, Bhavana Jain, Julian Straub, Jia Liu, Vladlen Koltun, Jitendra Malik, Devi Parikh, Dhruv Batra: "**Habitat: A Platform for Embodied AI Research**" *Proceedings of the IEEE International Conference on Computer Vision* (ICCV 2019), **Best Paper Award Nominee**

Bohan Wang, **Yili Zhao**, Jernej Barbič: "**Botanical Materials Based on Biomechanics.**" *ACM Transactions on Graphics*, Vol. 36, No. 4, (SIGGRAPH 2017) (July 2017)

Hongyi Xu*, **Yili Zhao***, Jernej Barbič: "**Implicit Multibody Penalty-based Distributed Contact.**" IEEE Transactions on Visualization and Computer Graphics (TVCG), Vol. 20(9), 2014 (*** joint first authors**)

Yili Zhao and Jernej Barbič: "**Interactive authoring of simulation-ready plants.**" *ACM Transactions on Graphics*, Vol. 32, No. 4, (SIGGRAPH 2013) (July 2013)

Jernej Barbič and **Yili Zhao**: "**Real-time large-deformation substructuring.**" *ACM Transactions on Graphics*, Vol. 30, No. 4, (SIGGRAPH 2011) (July 2011)

Skills

Strong research & programming experience in physically-based simulation, robotics, computer graphics, animation, numerical optimization, machine learning.

Solid experience in designing, developing, and debugging software, written mostly in C++, using state-of-the-art algorithms and procedures.

Solid knowledge of calculus, advanced linear algebra, classical mechanics (forward/inverse kinematics/dynamics, etc.), robotics (PD, PID controller, Featherstone's algorithm etc.), Finite Element Method, numerical methods (optimization, Lagrange multiplier method, implicit numerical integration, etc.), Object Oriented Programming, C/C++, computer architecture, parallel programming.

Languages: C/C++ (since 2002), Python, Objective-C, Presto, HiveQL, LaTeX, HTML;

Tools: vi, clang, gcc, Makefiles (Linux), CMake, OpenMP, OpenGL, GLUT, Intel MKL, Intel TBB, GLUI, gnuplot, git, Mercurial

Platforms: Mac OS X, Linux, Windows. All three used on a regular basis.

Paper Reviews

- SIGGRAPH 2016, 2017
- SIGGRAPH Asia 2015, 2016, 2017
- Eurographics 2017
- Pacific Graphics 2014, 2015, 2016
- Graphical Models 2016, 2017
- Neurocomputing 2016
- Computers & Graphics 2013
- CASA 2017

Honors and Awards

Best Poster for Visual Presentation, Department of Computer Science, USC, 2012, 2013

Chiang Chen Scholarship, Peking University, 2006 (**1 of 20** winners, university-wide)

Excellent Graduate 2006, NUAA, June 2006 (**top 1%**)

Bronze medal, the 29^{th} ACM International Collegiate Programming Contest (Hangzhou site, 2005)

Member of Outstanding Student Program, NUAA, An elite subset of University Undergraduate Program, 2003 - 2004 (Ranked $\mathbf{2^{nd}}$ **out of 32**)

Excellent Student Scholarship, $\mathbf{1^{st}}$ **Prize** , NUAA, 2003 - 2006 (Consecutive **4** years, **top 2%**)

Personal

I like swimming, free style. I swim 1 mile (nonstop) every day in USC Daland's Swim Stadium.

References

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