Tetsuya Takahashi

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Work Experience

- Tencent America, USA | senior researcher **10/2023–Present**
- Adobe Inc, USA | software engineer **05/2020–05/2023**
  - Developed and refined watercolor brushes on Adobe Fresco for iOS and Windows platforms, resulting in improved performance and user experience.
  - Redesigned tile-based domain handling to enhance code readability and optimize performance, resulting in improved robustness and synchronization of tile connections.
  - Improved integration of watercolor engine into the app, resulting in a more seamless and intuitive workflow experience.
- University of Maryland, USA | postdoctoral researcher **01/2020–07/2020**
  - Designed and implemented an innovative, differentiable physics approach for fluid-solid coupling to enable efficient learning and optimization for inverse problems.
  - Interleaved differentiable physics with deep neural networks for learning and control of solids surrounded by fluids.
  - Led and collaborated with other researchers, producing a first-authored paper on differentiable physics published in AAAI 2021.
- Adobe Inc, USA | research intern **05/2017–08/2017**
  - Mentor: Dr. Byungmoon Kim and Dr. Qingnan Zhou
- Adobe Inc, USA | research intern **06/2015–08/2015**
  - Mentor: Dr. Byungmoon Kim
- UEI Research, Japan | collaborative research staff **09/2014–05/2015**
- UEI Research, Japan | research staff **12/2013–07/2014**

Education

- University of North Carolina at Chapel Hill, USA **08/2014–05/2020**
  - Ph.D. in Computer Science
  - Thesis: Efficient Particle-based Viscous Fluid Simulation with Video-Guided Real-to-Virtual Parameter Transfer (defended on Aug. 2019)
  - Advisor: Professor Ming C. Lin
- University of Maryland, USA **08/2018–08/2019**
  - Visiting Ph.D. student
- University of North Carolina at Chapel Hill, USA **08/2014–08/2017**

  - M.S. in Computer Science
  - Advisor: Professor Ming C. Lin

- Keio University, Japan **04/2012–03/2014**
  - M.S. in Computer Science
  - Thesis: Position-Based Viscous Fluids with Elasticity and Thermal Conductivity
  - Advisor: Professor Issei Fujishiro

- Keio University, Japan **04/2008–03/2012**
  - B.S. in Computer Science
  - Thesis: Simulation of Trampling Roughly into Snow Taking Sintering Effect into Account
  - Advisor: Professor Issei Fujishiro

Publications

1. **Tetsuya Takahashi** and Christopher Batty, "A Primal-Dual Box-Constrained QP Pressure Poisson Solver with Topology-Aware Geometry-Inspired Aggregation AMG", *IEEE Transactions on Visualization and Computer Graphics, 2024*.

2. **Tetsuya Takahashi** and Christopher Batty, "A Multilevel Active-Set Preconditioner for Box-Constrained Pressure Poisson Solvers", in *Proceedings of the ACM on Computer Graphics and Interactive Techniques (Symposium on Computer Animation 2023)*.

3. **Tetsuya Takahashi** and Christopher Batty, "ElastoMonolith: A Monolithic Optimization-based Liquid Solver for Contact-Aware Elastic-Solid Coupling", *Transactions on Graphics (SIGGRAPH ASIA 2022)*.

4. **Tetsuya Takahashi** and Christopher Batty, "Fast Marching-Cubes-Style Volume Evaluation for Level Set Surfaces", *Journal of Computer Graphics Techniques (JCGT)*, 2022.

5. **Tetsuya Takahashi** and Christopher Batty, "FrictionalMonolith: A Monolithic Optimization-based Approach for Granular Flow with Contact-Aware Rigid-Body Coupling", *Transactions on Graphics (SIGGRAPH ASIA 2021)*.

6. **Tetsuya Takahashi**, Junbang Liang, Yi-Ling Qiao, and Ming C. Lin, "Differentiable Fluids with Solid Coupling for Learning and Control", *AAAI 2021*.

7. **Tetsuya Takahashi** and Christopher Batty, "Monolith: A Monolithic Pressure-Viscosity-Contact Solver for Strong Two-Way Rigid-Rigid Rigid-Fluid Coupling", *Transactions on Graphics (SIGGRAPH ASIA 2020)*.

8. **Tetsuya Takahashi** and Ming C. Lin, "Video-Guided Real-to-Virtual Parameter Transfer for Viscous Fluids", *Transactions on Graphics (SIGGRAPH ASIA 2019)*.

9. **Tetsuya Takahashi** and Ming C. Lin, "A Geometrically Consistent Viscous Fluid Solver with Two-Way Fluid-Solid Coupling", *Computer Graphics Forum (Eurographics 2019)*.

10. **Tetsuya Takahashi** and Ming C. Lin, "A Multilevel SPH Solver with Unified Solid Boundary Handling", *Computer Graphics Forum (Pacific Graphics 2016)*.

11. **Tetsuya Takahashi**, Yoshinori Dobashi, Tomoyuki Nishita, and Ming C. Lin, "An Efficient Hybrid Incompressible SPH Solver with Interface Handling for Boundary Conditions", *Computer Graphics Forum* (presented in Pacific Graphics 2016).

12. **Tetsuya Takahashi**, Yoshinori Dobashi, Issei Fujishiro, Tomoyuki Nishita, and Ming C. Lin, "Implicit Formulation for SPH-based Viscous Fluids", *Computer Graphics Forum (Eurographics 2015)*.
13. **Tetsuya Takahashi**, Yoshinori Dobashi, Issei Fujishiro, and Tomoyuki Nishita, "Volume Preserving Viscoelastic Fluids with Large Deformations Using Position-based Velocity Corrections", *The Visual Computer*, 2014.
14. **Tetsuya Takahashi**, Issei Fujishiro, and Tomoyuki Nishita, "A Velocity Correcting Method for Volume Preserving Viscoelastic Fluids", in *Proceedings of Computer Graphics International*, 2014.
15. **Tetsuya Takahashi**, Issei Fujishiro, and Tomoyuki Nishita, "Visual Simulation of Compressible Snow with Friction and Cohesion", in *Proceedings of NICOGRAPH International*, 2014.
16. **Tetsuya Takahashi**, Tomoyuki Nishita, and Issei Fujishiro, "Fast Simulation of Viscous Fluids with Elasticity and Thermal Conductivity Using Position-Based Dynamics", *Computers & Graphics* 43, 21–30 (presented in Shape Modeling International 2015), 2014.
17. **Tetsuya Takahashi** and Issei Fujishiro, "Accelerated Viscous Fluid Simulation Using Position-Based Constraints", in *Proceedings of CAD/Graphics*, 2013.
18. **Tetsuya Takahashi** and Issei Fujishiro, "Particle-Based Simulation of Snow Trampling Taking Sintering Effect into Account", *ACM SIGGRAPH 2012 posters*, Article No. 7.

Funding and Awards

- Award for Excellence in Science, Japan Student Services Organization, 06/2018
- External Funding Award, University of North Carolina at Chapel Hill, 03/2017
- External Funding Award, University of North Carolina at Chapel Hill, 03/2016
- External Funding Award, University of North Carolina at Chapel Hill, 03/2015
- Scholarship for Study Abroad, Japan Student Services Organization, 08/2014–07/2017
- Award for Excellence in Science, Japan Student Services Organization, 04/2014
- The Research Grant of Keio Leading-Edge Laboratory of Science & Technology, Keio Leading-Edge Science and Technology, 06/2013
- Institutional Program for Young Researcher Overseas Visits, Japan Society for the Promotion of Science (JSPS), 07/2012
- Student Encouragement Award, Information Processing Society of Japan, 03/2012
- Nakanishi Encouragement Award, Keio University, 01/2012

Skills

- Programming: C++20, Python, Java, OpenGL (GLSL), PyTorch, OpenMP, CUDA, Latex
- Language: Japanese (Native), English