

# Hikaru Ibayashi: Computer Science Ph.D.

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## Experience

- Research Scientist (Full Time) at [Meta Inc.](#) (Nov 2023 - present)
  - ML Research Scientist in the Instagram Reels team.
- Software Engineer (Full Time) at [Cepton Inc.](#) (May 2023 - Oct 2023)
  - I was part of [Helius](#) Project, working on the perception algorithm development.
  - Developed rain filter for Lidar sensor.
  - Mentored a intern [blog](#)
  - Related Skill: C++, C, Python, Machine Learning
- Machine Learning Engineer Internship at [Meta Inc.](#) (June 2022 - Aug. 2022)
  - I worked as an ML Engineer intern in the Instagram Reels ML Core modeling team. I implemented a new down-sampling scheme for Instagram Reels' recommendation system. I successfully reduce the cost of training cost without losing performance.
  - Related Skill: PyTorch and Caffe2
- Software Engineer at [Cepton Inc.](#) (Jan. 2022 - Apr. 2022)
  - Intern in the LiDAR perception team. I implemented a mesh visualizer on the End-User interface of their system.
  - Blog post: [Instanced Rendering with OpenGL](#)
  - Related Skill: Python and C++
- Research Assistant at USC Vision & Graphics Lab (Aug. 2017 - Dec. 2017)
  - Worked on a research project of computer vision. I implemented a data processor of hair geometry data that are fed into a variational autoencoder.
  - Publication: [3D Hair Synthesis Using Volumetric Variational Autoencoders](#)
  - Related Skill: PyTorch
- Research Internship at Institute of Science and Technology Austria, (Jul. 2016 - Jan. 2017)
  - Implemented a fluid simulator with a novel discretization technique
  - Publication: [Simulating Liquids on Dynamically Warping Grids](#)
  - Related Skill: C++
- Research Assistant in User Interface Research Group at University of Tokyo (Mar. 2015 - Jan. 2016)
  - Worked on a research project of VR. I implemented the whole system of "Dollhouse VR" including the interfaces of VR and the multi-touch display on Unity. Besides the implementation, I conducted a user study of the system and wrote a whole part of the paper.
  - Publication: [Dollhouse VR: A Multi-view, Multi-user Collaborative Design Workspace with VR Technology](#)
  - Related Skill: Unity and Oculus VR

## Skills

- Programming Languages: python, C++, and Haskell
- Libraries: PyTorch, JAX, Pandas, scikit-learn, and matplotlib
- Others: Linux, bash, Unity, HPC, and git

## Open Source Contributions

- **Pandoc**: Contributed to the Pandoc project, a universal document converter. Involved in enhancing and debugging Haskell code, improving documentation, and participating in community discussions.

## Language

- Japanese: Native
- English: Professional working proficiency

## Education

- **Ph.D. in Computer Science (Annenberg Graduate Fellow)** (Aug. 2017 - May 2023)  
University of Southern California, Viterbi School of Engineering, [CACs Research Group](#)  
Adviser: Prof. Aiichiro Nakano  
Research Topics: Foundation of Deep Learning/Physically Informed Machine Learning
- **Master in Computer Science (Dean's List)** (Apr. 2015 - Mar. 2017)  
The University of Tokyo, User Interface Research Group  
Adviser: Prof. Takeo Igarashi  
Research Project: Dollhouse VR, Fluid Simulation
- **Bachelor in Physics** (Apr. 2011-Mar. 2015)  
The University of Tokyo

## Research

### Publications

- **Hikaru Ibayashi**, Taufeq Mohammed Razakh, Liqiu Yang, Thomas Linker, Marco Olguin, Shinnosuke Hattori, Ye Luo, Rajiv K. Kalia, Aiichiro Nakano, Ken-ichi Nomura, and Priya Vashishta. [Allegro-Legato: Scalable, Fast, and Robust Neural-Network Quantum Molecular Dynamics via Sharpness-Aware Minimization](#). International Supercomputing Conference 2023
- **Hikaru Ibayashi** and Masaaki Imaizumi. [Why does SGD prefer flat minima?: Through the lens of dynamical systems](#). When Machine Learning Meets Dynamical Systems: Theory and Applications. When Machine Learning Meets Dynamical Systems: Theory and Applications 2023
- Vishrut Jetly, **Hikaru Ibayashi**, and Aiichiro Nakano. [Splash in a Flash: Sharpness-aware minimization for efficient liquid splash simulation](#). Eurographics'2022 Poster
- **Hikaru Ibayashi**, Ken-ichi Nomura, Pankaj Rajak, Taufeq Mohammed, Ankit Mishra, Aravind Krishnamoorthy and Aiichiro Nakano. [Sharpness-Aware Minimization for Robust Molecular Dynamics Simulations](#). NeurIPS 2021 workshop on Machine Learning and the Physical Sciences. [[link](#)]
- **Hikaru Ibayashi**, Takuo Hamaguchi, Masaaki Imaizumi. Minimum sharpness: Scale-invariant parameter-robustness of neural networks. International Conference on Machine Learning Workshop on Theoretic Foundation, Criticism, and Application Trend of Explainable AI 2021 [[link](#)].
- **Hikaru Ibayashi**, Chris Wojtan, Nils Thuerey, Takeo Igarashi, and Ryoichi Ando. [Simulating Liquids on Dynamically Warping Grids](#). IEEE Transactions on Visualization and Computer Graphics (TVCG 2018)
- Yuta Sugiura, **Hikaru Ibayashi**, Toby Chong, Daisuke Sakamoto, Natsuki Miyata, Mitsunori Tada, Takashi Okuma, Takeshi Kurata, Masaaki Mochimaru and Takeo Igarashi. [An Asymmetric Collaborative System for Architectural-scale Space Design](#). The 16th ACM SIGGRAPH International Conference on Virtual-Reality Continuum and its Applications in Industry (VRCAI 2018)

- Shunsuke Saito, Liwen Hu, Chongyang Ma, **Hikaru Ibayashi**, Linjie Luo, Hao Li. [3D Hair Synthesis Using Volumetric Variational Autoencoders](#). ACM Transactions on Graphics, Proceedings of the 11th ACM SIGGRAPH Conference and Exhibition in Asia (SIGGRAPH Asia 2018)
- **Hikaru Ibayashi**, Yuta Sugiura, Daisuke Sakamoto, Natsuki Miyata, Mitsunori Tada, Takashi Okuma, Takeshi Kurata, Masaaki Mochimaru and Takeo Igarashi. [Dollhouse VR: A Multi-view, Multi-user Collaborative Design Workspace with VR Technology](#) In ACM SIGGRAPH Asia 2015 Emerging Technologies (SA '15). ACM, New York, NY, USA.

### *International Presentation*

- **Hikaru Ibayashi** and Masaaki Imaizumi. Exponential escape efficiency of SGD from sharp minima in non-stationary regime. Workshop on Functional Inference and Machine Intelligence 2022 [[link](#)]
- **Hikaru Ibayashi** and Masaaki Imaizumi. Exponential escape efficiency of SGD from sharp minima in non-stationary regime. USC Annenberg Graduate Fellowship Research and Creative Project Symposium 2022