

# Byungsoo KIM

## Machine Learning for Computer Graphics / Physics Simulations

📍 ETH Zürich, CNB G 102.1, Universitätstr. 6, 8092 Zurich, Switzerland    ✉ kimby@inf.ethz.ch    ✉ contact.byungsoo@gmail.com  
🌐 www.byungsoo.me    in byungsoo    8 byungsoo    byungsook    byungsookim0608

### 🎓 EDUCATION

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| Mar. 2021 | PhD, COMPUTER SCIENCE, ETH Zurich, Switzerland   |
| Mar. 2017 | > Thesis: <i>Data-Driven Methods for Artist-Directed Fluid Simulations</i><br>> Supervisors: Prof. Markus Gross, Dr. Barbara Solenthaler, Dr. Vinicius C. Azevedo  |
| Dec. 2016 | MSc, COMPUTER SCIENCE (SPECIALIZATION TRACK IN VISUAL COMPUTING), ETH Zurich, Switzerland  |
| Sep. 2014 | > Thesis: <i>Learning Structured Representations for Geometry</i><br>> Supervisors: Prof. Markus Gross, Prof. Cengiz Öztireli  |
| Aug. 2009 | BSc, COMPUTER SCIENCE, KAIST, Republic of Korea  |
| Mar. 2005 | > Thesis: <i>Implementation and Performance Improvement of EKF-SLAM and TJTF-SLAM with Logs of Sensor Data Set taken from Real Robots</i> (jointly authored with Haebom Lee)<br>> Supervisor: Prof. Kee-Eung Kim<br>> Thesis: <i>Fractal Analysis Method applied to the Analysis of EEG Time Series for a Distinction between Patients with Alzheimer-Type Dementia and Late Life Depression</i><br>> Supervisor: Prof. Jaeseong Jeong<br>> Exchange student at Technical University of Munich (Apr. 2009 - Jul. 2009) |

### 📁 PROFESSIONAL EXPERIENCE

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| Since     | Consultant, DISNEY RESEARCH STUDIOS, Switzerland   |
| Aug. 2021 | > Providing technical consulting services  |
| Since     | Postdoctoral Researcher, COMPUTER GRAPHICS LAB., ETH ZURICH, Switzerland   |
| Apr. 2021 | > Working on Neural Physics Simulations  |
| Dec. 2020 | Joint PhD Student, DISNEY RESEARCH STUDIOS, Switzerland  |
| Jan. 2020 | > Developing neural network based fluid volume stylization tools for artists in collaboration with Walt Disney Animation Studio and Pixar, used in production for Disney's "Raya and the Last Dragon"  |
| Sep. 2015 | Software Intern, NVIDIA, Switzerland   |
| Jun. 2015 | > Porting and validation of NVIDIA Flex SDK on various NVIDIA SHIELD devices<br>> Porting and validation of NVIDIA PhysX SDK on a new platform   |
| Dec. 2014 | Research Assistant, COMPUTER GRAPHICS LAB., ETH ZURICH, Switzerland  |
| Oct. 2014 | > Developing an interactive 3D fluid simulator and renderer in a mobile environment  |
| Mar. 2014 | Research Assistant, VISUAL SIMULATION LAB., DONGGUK UNIV., Republic of Korea   |
| Sep. 2013 | > Developing fast 3D rendering techniques for 2D fluid simulations in a mobile environment as an Academic-Industrial cooperation project with Samsung Electronics<br>> Developing Maya & 3Ds Max plugins and tools for a stand-alone VFX simulation software                                 |
| Sep. 2014 | Co-Founder, TENELEVEN, Republic of Korea   |
| May. 2013 | > Founded an AI-based construction tech startup<br>> Maintaining a stakeholder position  |
| May. 2013 | Research Engineer, FXGEAR, Republic of Korea   |
| Feb. 2010 | > Developing architecture, GUI and modules of a scalable fluid simulation software FluX<br>> Developing algorithms and shaders for real-time facial expression control in mobile environments<br>> Serving alternative military duty as a skilled industry personnel (Mar. 2010 - Jan. 2013) |

### 📄 TECHNICAL SKILLS

Programming	Python, C/C++, Matlab, Java, Javascript
Framework/Library	PyTorch, TensorFlow (+Keras), OpenCV, Open3D, OpenGL (+ES, GLSL), Three.js, Qt, VTK

## PUBLICATIONS

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T-RO 2020	Samuel L. Charreyron, Quentin Boehler, <b>Byungsoo Kim</b> , Cameron Weibel, Christophe Chautems, Bradley J. Nelson, <i>Modeling Electromagnetic Navigation Systems</i>
SCA 2020	Steffen Wiewel, <b>Byungsoo Kim</b> , Vinicius C. Azevedo, Barbara Solenthaler, Nils Thuerey, <i>Latent Space Sub-division: Stable and Controllable Time Predictions for Fluid Flow</i>
SIGGRAPH 2020	<b>Byungsoo Kim</b> , Vinicius C. Azevedo, Markus Gross, Barbara Solenthaler, <i>Lagrangian Neural Style Transfer for Fluids</i> ( <b>*selected for the video trailer and back cover of the proceedings</b> )
EG 2020 Short	Fabienne Christen, <b>Byungsoo Kim</b> , Vinicius C. Azevedo, Barbara Solenthaler, <i>Neural Smoke Stylization with Color Transfer</i>
EG 2020 Short	Simon Biland, Vinicius C. Azevedo, <b>Byungsoo Kim</b> , Barbara Solenthaler, <i>Frequency-Aware Reconstruction of Fluid Simulations with Generative Networks</i>
SIGGRAPH Asia 2019	<b>Byungsoo Kim</b> , Vinicius C. Azevedo, Markus Gross, Barbara Solenthaler, <i>Transport-Based Neural Style Transfer for Smoke Simulations</i> ( <b>*selected for the video trailer</b> )
EuroVis 2019	<b>Byungsoo Kim</b> and Tobias Günther, <i>Robust Reference Frame Extraction from Unsteady 2D Vector Fields with Convolutional Neural Networks</i>
EG 2019	<b>Byungsoo Kim</b> , Vinicius C. Azevedo, Nils Thuerey, Theodore Kim, Markus Gross, Barbara Solenthaler, <i>Deep Fluids: A Generative Network for Parameterized Fluid Simulations</i>
EG 2018	<b>Byungsoo Kim</b> , Oliver Wang, A. Cengiz Öztireli, Markus Gross, <i>Semantic Segmentation for Line Drawing Vectorization Using Neural Networks</i>
Int. J. GIS 2014	Seung Man An, Ho-Young Lee, <b>Byungsoo Kim</b> , Chae-Yeon Yi, Jeong-Hee Eum and Jung-Hun Woo, <i>Geospatial Spreadsheets with Microscale Air Quality Visualization and Synchronization for Supporting Multiple-Scenario Visual Collaboration</i>
Int. J. Climatol. 2013	Seung Man An, <b>Byungsoo Kim</b> , Ho-Young Lee, Chang-Hun Kim, Chae-Yeon Yi, Jeong-Hee Eum and Jung-Hun Woo, <i>Three-Dimensional Point Cloud based Sky View Factor Analysis in Complex Urban Settings</i>
KCGS 2013	<b>Byungsoo Kim</b> , Ho-Young Lee and Chang-Hun Kim, <i>Visual Simulation of Vortex Particle using Adaptive Grid in High Vorticity Region</i>
KCGS 2012	Kwang-Jin Choi, Kyung-Gun Na, Jong-Chul Yoon, <b>Byungsoo Kim</b> , Sehwi Park, Huicheol Hwang, Insang Yoon, <i>FluX - A Software Platform for Large-Scale Fluid Simulation</i>
KR Patent	<i>Apparatus and Method for Converting Geometric Coordinate, [KR101449816B1]</i>
KR Patent	<i>Calculating System for Open Area Ratio of the Sky using Aerial LIDAR Data, [KR101232292B1]</i>

## SCHOLARSHIPS

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2014-2015	Recipient of Korean Government Scholarship from NIIED of CHF 65,900, Korea
2005-2008	Recipient of Presidential Science Scholarship of \$40,000, Certified by President Roh, Moo-hyun, Korea

## ACADEMIC ACTIVITIES

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Reviewer	SIGGRAPH 2021, TVCG 2021, CGF 2020-2021, Eurographics 2019, Pacific Graphics 2021
Talk	<i>Data-Driven Methods for Artist-Directed Fluid Simulations</i> , Epic Games (V. Talk, Host: Prof. Ron Fedkiw), 2021 <i>Data-Driven Methods for Fluid Simulations</i> , LLNL (Virtual Talk, Host: Dr. Youngsoo Choi), 2020 <i>Lagrangian Neural Style Transfer for Fluids</i> , UMBC (Virtual Talk, Host: Prof. Adam Bargteil), 2020 <i>Latent Space Fluid Simulation with Machine Learning</i> , Pixar, 2017
Supervision	Riccardo Uslenghi, <i>Exploring Frequency Aware Machine Learning Techniques for Discontinuous Fluids Data</i> , Master Thesis, ETH Zurich, 2021 Hrshikesh Ghodki, <i>Dataset Generation to Encourage Data-Driven Synthesis of Large-Scale Rivers</i> , Bachelor Thesis, ETH Zurich, 2020 Jesús Martín Berlanga, <i>Efficient Deep CNN for Transport-Based NST</i> , Master Thesis, ETH Zurich, 2020 Xingchang Huang, <i>Sketch-Based 4D Prototyping for Smoke Simulations</i> , Master Thesis, ETH Zurich, 2019 Fabienne Christen, <i>Efficient Colorized Stylization of Smoke Simulations</i> , Master Thesis, ETH Zurich, 2019 Irfan Bunjaku, <i>Image-Based Smoke Reconstruction</i> , Bachelor Thesis, ETH Zurich, 2019
TA	Physically-Based Simulation in Computer Graphics (252-0546-00L), ETH Zurich, FS 2017-2019, 2021 Visualization (263-5701-00L), ETH Zurich, SS 2021 Linear Algebra (401-0131-00L), ETH Zurich, FS 2020 Computer Science (C++ Language, 252-0832-00L), ETH Zurich, SS 2017-2020 Engineering Tool: Case Study Physics Simulations (252-0867-00L), ETH Zurich, SS 2020 Introduction to Programming (Java, CS101), KAIST, FS 2008