

# Byungsoo KIM

## Machine Learning for Computer Graphics / Physics Simulations

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### 🎓 EDUCATION

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| Jan. 2021<br>Mar. 2017 | <b>PhD, COMPUTER SCIENCE, ETH Zurich, Switzerland</b> <ul style="list-style-type: none"><li>&gt; Thesis: <i>Data-Driven Methods for Artist-Directed Fluid Simulations</i></li><li>&gt; Supervisors: Prof. Markus Gross, Dr. Barbara Solenthaler, Dr. Vinicius C. Azevedo</li></ul>   |
| Dec. 2016<br>Sep. 2014 | <b>MSc, COMPUTER SCIENCE (SPECIALIZATION TRACK IN VISUAL COMPUTING), ETH Zurich, Switzerland</b> <ul style="list-style-type: none"><li>&gt; Thesis: <i>Learning Structured Representations for Geometry</i></li><li>&gt; Supervisors: Prof. Markus Gross, Prof. Cengiz Öztireli</li></ul>  |
| Aug. 2009<br>Mar. 2005 | <b>BSc, COMPUTER SCIENCE, KAIST, Republic of Korea</b> <ul style="list-style-type: none"><li>&gt; 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)</li><li>&gt; Supervisor: Prof. Kee-Eung Kim</li><li>&gt; 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></li><li>&gt; Supervisor: Prof. Jaeseong Jeong</li><li>&gt; Exchange student at Technical University of Munich (Apr. 2009 - Jul. 2009)</li></ul> |

### 👛 PROFESSIONAL EXPERIENCE

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| Since<br>Aug. 2022      | <b>Senior Software Engineer, NVIDIA, Switzerland</b> <ul style="list-style-type: none"><li>&gt; Developing simulation AI technology for Omniverse</li></ul>   |
| June. 2022<br>Aug. 2021 | <b>Consultant, DISNEY RESEARCH STUDIOS, Switzerland</b> <ul style="list-style-type: none"><li>&gt; Providing technical consulting services</li></ul>  |
| June. 2022<br>Apr. 2021 | <b>Postdoctoral Researcher, COMPUTER GRAPHICS LAB., ETH ZURICH, Switzerland</b> <ul style="list-style-type: none"><li>&gt; Working on Neural Physics Simulations</li></ul>  |
| Dec. 2020<br>Jan. 2020  | <b>Joint PhD Student, DISNEY RESEARCH STUDIOS, Switzerland</b> <ul style="list-style-type: none"><li>&gt; 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"</li></ul>   |
| Sep. 2015<br>Jun. 2015  | <b>Software Intern, NVIDIA, Switzerland</b> <ul style="list-style-type: none"><li>&gt; Porting the NVIDIA PhysX SDK to the NVIDIA Tegra processor and the Nintendo Switch platform</li><li>&gt; Writing Code which runs as part of all videogames that employ PhysX simulation on the Nintendo Switch</li></ul>   |
| Dec. 2014<br>Oct. 2014  | <b>Research Assistant, COMPUTER GRAPHICS LAB., ETH ZURICH, Switzerland</b> <ul style="list-style-type: none"><li>&gt; Developing an interactive 3D fluid simulator and renderer in a mobile environment</li></ul>   |
| Mar. 2014<br>Sep. 2013  | <b>Research Assistant, VISUAL SIMULATION LAB., DONGGUK UNIV., Republic of Korea</b> <ul style="list-style-type: none"><li>&gt; Developing fast 3D rendering techniques for 2D fluid simulations in a mobile environment as an Academic-Industrial cooperation project with Samsung Electronics</li><li>&gt; Developing Maya &amp; 3Ds Max plugins and tools for 🌐 a stand-alone VFX simulation software</li></ul>     |
| Sep. 2014<br>May. 2013  | <b>Co-Founder, TENELEVEN, Republic of Korea</b> <ul style="list-style-type: none"><li>&gt; Founded 🌐 an AI-based construction tech startup</li><li>&gt; Maintaining a stakeholder position</li></ul>  |
| May. 2013<br>Feb. 2010  | <b>Research Engineer, FXGEAR, Republic of Korea</b> <ul style="list-style-type: none"><li>&gt; Developing architecture, GUI and modules of a scalable fluid simulation software 🌐 FluX</li><li>&gt; Developing algorithms and shaders for real-time facial expression control in mobile environments</li><li>&gt; Serving alternative military duty as a skilled industry personnel (Mar. 2010 - Jan. 2013)</li></ul> |

## TECHNICAL SKILLS

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**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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EG 2023 Jingwei Tang, **Byungsoo Kim**, Vinicius C. Azevedo, Barbara Solenthaler, *Physics-Informed Neural Corrector for Deformation-based Fluid Control*

SIGGRAPH 2022 Lingchen Yang, **Byungsoo Kim**, Gaspard Zoss, Baran Gözcü, Markus Gross, Barbara Solenthaler, *Implicit Neural Representation for Physics-driven Actuated Soft Bodies (\*honorable mention)*

EG 2022 **Byungsoo Kim**, Xingchang Huang, Laura Wuelfroth, Jingwei Tang, Guillaume Cordonnier, Markus Gross, Barbara Solenthaler, *Deep Reconstruction of 3D Smoke Densities from Artist Sketches*

J. Glaciology 2021 Guillaume Jouvét, Guillaume Cordonnier, **Byungsoo Kim**, Martin Lüthi, Andreas Vieli, Andy Aschwanden, *Deep learning speeds up ice flow modelling by several orders of magnitude*

T-RO 2021 Samuel L. Charreyron, Quentin Boehler, **Byungsoo Kim**, Cameron Weibel, Christophe Chautems, Bradley J. Nelson, *Modeling Electromagnetic Navigation Systems*

SCA 2020 Steffen Wiewel, **Byungsoo Kim**, Vinicius C. Azevedo, Barbara Solenthaler, Nils Thuerey, *Latent Space Sub-division: Stable and Controllable Time Predictions for Fluid Flow*

SIGGRAPH 2020 **Byungsoo Kim**, Vinicius C. Azevedo, Markus Gross, Barbara Solenthaler, *Lagrangian Neural Style Transfer for Fluids (\*selected for the video trailer and back cover of the proceedings)*

EG 2020 Short Fabienne Christen, **Byungsoo Kim**, Vinicius C. Azevedo, Barbara Solenthaler, *Neural Smoke Stylization with Color Transfer*

EG 2020 Short Simon Biland, Vinicius C. Azevedo, **Byungsoo Kim**, Barbara Solenthaler, *Frequency-Aware Reconstruction of Fluid Simulations with Generative Networks*

SIGGRAPH Asia 2019 **Byungsoo Kim**, Vinicius C. Azevedo, Markus Gross, Barbara Solenthaler, *Transport-Based Neural Style Transfer for Smoke Simulations (\*selected for the video trailer)*

EuroVis 2019 **Byungsoo Kim** and Tobias Günther, *Robust Reference Frame Extraction from Unsteady 2D Vector Fields with Convolutional Neural Networks*

EG 2019 **Byungsoo Kim**, Vinicius C. Azevedo, Nils Thuerey, Theodore Kim, Markus Gross, Barbara Solenthaler, *Deep Fluids: A Generative Network for Parameterized Fluid Simulations*

EG 2018 **Byungsoo Kim**, Oliver Wang, A. Cengiz Öztireli, Markus Gross, *Semantic Segmentation for Line Drawing Vectorization Using Neural Networks*

Int. J. GIS 2014 Seung Man An, Ho-Young Lee, **Byungsoo Kim**, Chae-Yeon Yi, Jeong-Hee Eum and Jung-Hun Woo, *Geospatial Spreadsheets with Microscale Air Quality Visualization and Synchronization for Supporting Multiple-Scenario Visual Collaboration*

Int. J. Climatol. 2013 Seung Man An, **Byungsoo Kim**, Ho-Young Lee, Chang-Hun Kim, Chae-Yeon Yi, Jeong-Hee Eum and Jung-Hun Woo, *Three-Dimensional Point Cloud based Sky View Factor Analysis in Complex Urban Settings*

KCGS 2013 **Byungsoo Kim**, Ho-Young Lee and Chang-Hun Kim, *Visual Simulation of Vortex Particle using Adaptive Grid in High Vorticity Region*

KCGS 2012 Kwang-Jin Choi, Kyung-Gun Na, Jong-Chul Yoon, **Byungsoo Kim**, Sehwi Park, Huicheol Hwang, Insang Yoon, *FluX - A Software Platform for Large-Scale Fluid Simulation*

KR Patent *Apparatus and Method for Converting Geometric Coordinate, [KR101449816B1]*

KR Patent *Calculating System for Open Area Ratio of the Sky using Aerial LIDAR Data, [KR101232292B1]*

## 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, SIGGRAPH Asia, EG, PG, TOG, TVCG, CGF, TPAMI  
TA Physically-Based Simulation in Computer Graphics (252-0546-00L), ETH Zurich, FS 2017-2019, 2021  
Visualization (263-5701-00L), ETH Zurich, SS 2021-2022  
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