

Aleksei Kalinov

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EDUCATION

- Institute of Science and Technology Austria** 2021 – Present
PhD in Computer Graphics and Physics Simulation
- Skolkovo Institute of Science and Technology** 2019 – 2021, GPA: 5.0/5.0
MSc in Mathematics and Computer Science, Data Science concentration
- National Research University Higher School of Economics** 2015 – 2019, GPA: 9.08/10.0
BSc in Applied Mathematics and Informatics with Honors, Machine Learning track, Minor in Physics

RESEARCH EXPERIENCE

- Deep Learning Research Intern, NVIDIA** USA (Remote), February – August 2021
Proposed CarneliNet, a new speech recognition model with adjustable inference resource requirements.
Sped up training of flagship model by 30% with efficient masking and automatic mixed precision tweaks.
Contributor to the NVIDIA's NeMo open source project for conversational AI: github.com/nvidia/NeMo
- MSc Student, Skoltech HPC & Big Data Lab** Russia, November 2019 – June 2021
Designed a distributed numerical algorithm to simulate Compton scattering on Zhores supercomputer.
Optimized for narrow-band scattering radiation via laser pulse phase optimization with black-box methods.
Visualized emerging caustics in radiated spectra.
Developing a differentiable physically-accurate model to perform higher-order laser pulse optimization.
- BSc Thesis Research Intern, MSU Graphics and Media Lab** Russia, November 2018 – May 2019
Designed a system to enlarge a training dataset with GAN-enhanced CGI for traffic sign classifier, leading to 7% accuracy improvement on classes with no prior training data compared to a baseline with no enhancement.

PUBLICATIONS

Kalinov A, Bychkov R, Ivanov A, Osinsky A, Yarotsky D. Machine Learning-Assisted PAPR Reduction in Massive MIMO. 2020. *IEEE Wireless Communications Letters*. <https://doi.org/10.1109/LWC.2020.3036909>

CONFERENCE PRESENTATIONS

- Kalinov A**, Kharin V Yu, Rykovanov S G. Caustics in Non-linear Compton Scattering. 2020. Poster presented at: *IX Conference for Young Researchers "Elementary Particle Physics and Cosmology"*.
- Matveev S A, **Kalinov A**, Krapivsky P, Brilliantov N V. Steady Oscillations in Kinetic Model of Aggregation Process with Collisional Fragmentation. 2020. Poster presented at: *33rd M. Smoluchowski Symposium on Statistical Physics*.
- Kalinov A**, Konushin A. CNN-based Post-Processing of Synthetic Objects For Data Augmentation. 2019. Poster presented at: *Travelling Seminar on Machine Learning at HSE*.

PREPRINTS

- Kalinov A**, Osinsky A I, Matveev S A, Otieno W, Brilliantov N V. Direct simulation Monte Carlo for new regimes in aggregation-fragmentation kinetics. 2021. <https://arxiv.org/abs/2103.09481>
- Kalinov A**, Majumdar S, Balam J, Ginsburg B. CarneliNet: Neural Mixture Model for Automatic Speech Recognition. 2021. <https://arxiv.org/abs/2107.10708>

AWARDS, ACHIEVEMENTS AND CONTRIBUTIONS

- Alternate Captain** of Skoltech ice-hockey team. Led the team to Moscow Amateur Cup victory in 2019.
- World Record holder** for fastest completion of Hack 'n' Slash game (www.speedrun.com/hack_n_slash/).
- The Ilya Segalovich Scholarship** 2018. Yandex and HSE Faculty of Computer Science Scholarship for achievements in academics and research. Awarded to 16 out of 1500 students.
- The Ilya Segalovich Scholarship** 2017. Yandex and HSE Faculty of Computer Science Scholarship for achievements in academics and research.
- CS department award** The Best Computer Science Freshmen Project. 2016.

WORK EXPERIENCE

Software Engineering Intern, Google *UK (Remote), June – August 2020*
Designed and launched a pipeline to perform a continuous static code analysis of 2 Million Play Store apps that helps to drive non-SDK interface restrictions. Participated in Android's Inclusive Language Fix It *Java, C++, MapReduce* <https://android-review.googlesource.com/q/author:akalinov>

Software Engineering Intern, Google *USA, July – October 2019*
Increased relevance of recommendations in the internal marketing tool by 6% by inferring missing metadata of hundreds of documents with modern DL approaches.
Go, Python, TensorFlow, SQL, App Engine

Teaching Assistant, Higher School of Economics *Russia, October 2018 – March 2019*
Reviewed problem sets, graded homework and gave recitations for Natural Language Processing course.

Software Engineering Intern, Google *USA, June – September 2018*
Designed and implemented a library to transform 3D data into format suitable for existing Street View Deep Learning models. Increased throughput of a distributed 3D rendering pipeline by 11%.
C++, OpenGL

SWE Intern in R&D department, CGF Studio *Russia, December 2017 – May 2018*
Implemented and compared several physically based skin deformation simulation models for 3D characters.
Houdini, VEX, Python <https://tinyurl.com/muscle-deformation-drive>

Software Engineering Intern, Google *USA, July – September 2017*
Developed a classification model for the YouTube content rating system based on text and sound features. Launched the model as a real-time production microservice.
Python, TensorFlow, C++

Teaching Assistant, Higher School of Economics *Russia, October 2016 – March 2017*
Reviewed problem sets, graded homework and gave recitation classes for Discrete Math course.

Software Engineering Intern, Google *Switzerland, July – September 2016*
Designed experiments and implemented YouTube-scale distributed pipelines to quantify importance of graph features for YouTube language classifiers.
C++, MapReduce, TensorFlow, SQL

PROJECTS

"We Are Not Alone" Fragment Shader
Designed a 3D dynamic scene and implemented it from scratch completely in a fragment shader, including raymarching engine with SDF support, procedurally generated terrain and lighting with soft-shadows.
<https://www.shadertoy.com/view/WllyDn> [*OpenGL shading language*]

Graph Convolutional Networks Modifications
Explored several techniques, such as truncated SVD and weight orthogonalization, that allow the construction of deep graph convolutional networks and preserve the ability of network to train effectively, by conducting experiments on DropEdge model.

Kaggle Freesound General-Purpose Audio Tagging Challenge
Designed a classification model to label 9400 audio samples recorded in various conditions. The final model is an ensemble of 1D and 2D ConvNets processing raw sound samples, sample statistics and MFCC features. Top 20% out of 583 participants. [*Python, PyTorch*]

WESPE Paper Reproduction
Independent reproduction of WESPE algorithm to enhance with GAN style-transfer.
<https://bitbucket.org/mousebaiker/wespe> [*Python, PyTorch*]

SCHOOLS AND COURSES

Travelling Seminar on Machine Learning *May 2019*
National Research University Higher School of Economics, Voronovo, Russia

Travelling Seminar on Machine Learning *May 2018*
National Research University Higher School of Economics, Voronovo, Russia

Course on Gaussian Processes *May-June 2017*
National Research University Higher School of Economics, Moscow, Russia