

# DENIS UZHVA

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GitHub: <https://github.com/denisuzhva>

## PROFILE

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Highly motivated mathematical programming graduate student at Saint Petersburg State University. I have over a year of experience in machine learning applied to data analysis in the NA61/SHINE CERN experiment. During that period, I not only developed programming skills, but also gained experience in working with various software frameworks and APIs such as TensorFlow, NVIDIA CUDA or OpenCV, as well as strong background in applied mathematics: statistics, dynamics and theory of computation. Now my interests also encompass multiagent technology (swarm robotics, IoT), stochastic programming (compressed sensing), creative coding and corresponding hardware and software.

## CORE SKILLS

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- Programming languages: Python, MATLAB, R, C++, Java
- Frameworks and APIs: TensorFlow, PyTorch NVIDIA CUDA, Keras, Scikit-learn, JADE, OpenCV
- Data visualization: Matplotlib, NetworkX
- Mathematics: Dynamics, Discrete Mathematics, Optimization Statistics, Cybernetics, Information Theory
- Other: Git, Docker, LaTeX, Vim, Bash

## EDUCATION

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<b>St. Petersburg State University, Saint Petersburg</b> Ph.D. in Mathematics Department of Mathematics & Mechanics	<i>September 2021 - Present</i>
<b>St. Petersburg State University, Saint Petersburg</b> M.Sc. in Software Engineering Department of Mathematics & Mechanics	<i>September 2019 - June 2021</i>
<b>St. Petersburg State University, Saint Petersburg</b> B.Sc. in High energy and elementary particles physics Department of Physics	<i>September 2015 - June 2019</i>

## EXPERIENCE

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<b>Software Engineer</b> <b>Gazprom Neft</b>	<i>July 2021 - September 2021</i>
<ul style="list-style-type: none"><li>• Investigation of algorithms for geophysical data compression.</li><li>• Responsible for development of a compression and reconstruction algorithms.</li><li>• <b>Key achievement:</b> the developed algorithm allows to compress geophysical data without much losses after reconstruction.</li></ul>	
<b>Research engineer</b> <b>Saint Petersburg State University</b>	<i>January 2021 - Present</i>
<ul style="list-style-type: none"><li>• Investigation of algorithms for low luminosity photography quality improvement.</li></ul>	

- Responsible for modeling of noise for simulated data. Also responsible for algorithm implementation and deployment on GPU.
- **Key achievement:** the developed noise model adequately fits standards and is able to provide pairs of baseline-noised data samples.

**Junior Researcher**

*October 2020 - Present*

**Institute for Problems in Mechanical Engineering of the RAS**

- Investigation of new methods to control swarm robotic systems.
- Responsible for development of mathematical theory, which is able to describe multiagent networks. Also responsible for the development of the software environment for network simulations.
- **Key achievement:** the developed theory successfully describes cluster synchronization phenomenon in networks of intelligent agents.

**Research assistant**

*September 2019 - December 2020*

**Saint Petersburg State University**

- Investigation of the applicability of modern machine learning methods (convolutional neural networks) to data analysis in the NA61/SHINE CERN physical experiment.
- Responsible for design of architecture and software implementation of the model, as well as data preparation, augmentation and visualization.
- **Key achievement:** the developed model demonstrate superior accuracy in comparison with classical approaches such as decision trees and “cut-based analysis”.

## LANGUAGE SKILLS

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- Russian: native
- English: proficient
- Japanese: beginner

## CONFERENCES AND SUMMER SCHOOLS

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**XIV Multiconference on Control Problems (Divnomorsk)**

“Cluster Flow Control in Distributed Network Systems”

**Eighteenth Russian Conference on Artificial Intelligence 2020 (Moscow)**

“Invariance preserving control of clusters recognized in networks of Kuramoto oscillators”

**XIV Workshop on Particle Correlations and Femtoscopy 2019 (Dubna)**

“Convolutional neural network for centrality in fixed target experiments”

**NA61/SHINE CERN Analysis/Software/Calibration Meeting 2019 (Katowice)**

“Convolutions neural nets for centrality in Be+Be”

**Science And Progress 2018 (Saint Petersburg)**

“Investigation of Deep Learning methods for the classification of events in the NOvA experiment”

**JINR Summer Student Program 2018 (Dubna)**

“Investigation of Deep Learning methods for the classification of events in the NOvA experiment”

## PUBLICATIONS

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- “Cluster Control of Complex Cyber-physical Systems”, Cybernetics and Physics, 2021
- “Cluster Flows and Multiagent Technology”, Mathematics, 2021

- “Invariance preserving control of clusters recognized in networks of Kuramoto oscillators”, Artificial Intelligence, 2020
- “Measurements of  $\Xi^-$  and  $\bar{\Xi}^+$  production in proton–proton interactions at  $\sqrt{s_{NN}} = 17.3$  GeV in the NA61/SHINE experiment”, European Physical Journal C, 2020
- “Convolutional neural network for centrality determination in fixed target experiments”, Physics of Particles and Nuclei, 2020