Dmitrii **Altukhov**

Machine Learning Scientist · Software engineer · PhD (Computer Science)

Amsterdam, The Netherlands

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Profile

I specialize in software engineering and data science with 8-years experience building data analysis algorithms. This involves using existing **machine learning**, **statistical analysis** and **linear algebra** techinques, as well as developing custom tools and algorithmic solutions.
Technologies: **Python**, **C/C++**, **Java**

Experience

Artificial Intelligence Research Institute (AIRI) — *Moscow, Russia*

Research fellow — *Feb. 2022 – Apr. 2023*

- Built and trained deep learning model to predict speech from MEG data in **PyTorch** in a multi-GPU cloud-based setup
- Developed real-time pipeline for EEG timeseries analysis using **Python**

Higher School of Economics, Centre for Cognition and Decision Making — *Moscow, Russia*

Junior research fellow — *Feb. 2017 – Dec. 2021*

- Curated and published MEG dataset for metacognition research using BIDS and OpenNeuro
- Led 4-people group developing software for real-time feature extraction and 3D visualization of brain activity from EEG in **Python**
- Sped up by a factor of 10 the beamformer inverse solver in MNE-python by modifying the algorithm for vectorized computations

Higher School of Economics, Faculty of Computer Science — *Moscow, Russia*

Senior lecturer — *Aug. 2019 – Dec. 2021*

- Developed and taught a course "**MATLAB** for data analysis" to undergraduate students

University of Montreal, CERNEC lab. — *Montreal, Canada*

Visiting researcher, temporary position — *Oct. – Dec. 2015, May 2016 – Dec. 2016*

- Built a classifier for ASD patients vs. Controls with 75% accuracy using classical ML and information geometry in **Python**
- Co-developed an open-source **Python** package for heavy neuroimaging data processing, Neuropycon, Meunier et al. [2020]

Moscow State University for Pedagogics and Education, MEG Center — *Moscow, Russia*

Junior research fellow — *Feb 2015 – Dec 2018*

- Published two papers in international collaboration with the University of Montreal, see Alamian et al. [2017a,b]

Scientific Research Institute of System Analysis — *Moscow, Russia*

Research assistant, promoted to junior research fellow — *Jun. 2011 – Jan. 2015*

- Validated commercial software for simulations of flow in jet engines by comparing simulated vs. theoretical shock wave parameters
- Developed a droplet evaporation model in **C++**

Education

Ph.D. in Computer Science — *Moscow, Russia*

Higher School of Economics, Faculty of Computer Science — *Jan. 2016 – Nov. 2021*

- Thesis: "Optimal methods for functional connectivity estimation in magnetoencephalography."; GPA: 4.0
- Published a paper in a leading neuroscientific journal (see Ossadtchi et al. [2018]) by proposing an algorithm for brain signals analysis. Implementation in **MATLAB** integrated with **C++**

Ph.D. in Computational Fluid Dynamics *(unfinished, transferred to CS program)* — *Moscow, Russia*

Lomonosov Moscow State University, Department of Mechanics and Mathematics — *Sep. 2013 – Jan. 2016*

- Thesis: "Numerical simulations of reactive gas flows."

Specialist degree in Mechanics *(Masters equivalent)* — *Moscow, Russia*

Lomonosov Moscow State University, Department of Mechanics and Mathematics — *Sep. 2008 – Jun. 2013*

- Thesis: "Enhancement and validation of LOGOS software for simulations of the reactive fluid flows."

Honors & Awards

- Selected together with other 178 people across the university for *2-year Higher School of Economics Academic Scholarship* for publishing a paper in a high-impact journal — *Moscow, Russia* — *2019*
- Selected 1-st out of 5 teams together with 2 teammates in *IEEE Brain Data Bank Challenge* for building a competitive 2-players drinking game based on brain-computer interface — *St. Petersburg, Russia* — *2017*

Conference contributions

Poster presentations

Biomag 2022 — *Birmingham, UK*
Overt speech decoding from MEG data decontaminated from articulation artifacts — *2022*

Biomag 2018 — *Philadelphia, USA*
Oblique projection for phase shift invariant imaging of coherent sources — *2018*

Tubingen Systems Neuroscience Symposium 2018 — *Tubingen, Germany*
Optimized projection for zero phase lag connectivity estimation — *2018*

Biomag 2018 — *Philadelphia, USA*
NeuroPycon: A python package for efficient multi-modal brain network analysis — *2018*

5th Workshop on Optically-Pumped Magnetometers — *Freiburg, Switzerland*
OPM vs. SQUID arrays in MEG Functional Connectivity Estimation — *2017*

Biomag 2016 — *Seoul, South Korea*
Power and shift invariant imaging of coherent sources by MEG data — *2016*

Brain Connectivity Workshop 2015 — *San Diego, USA*
Globally-Optimized Power and Shift Invariant Imaging of Coherent Sources — *2015*

Talks

International conference "Brain-Computer Interface: Science and Practice" — *Samara, Russia*
Cognigraph: a real-time EEG-based source imaging software — *2019*

Comprehensive training "MEG at McGill" — *Montreal, Canada*
MEG resting-state in autism. Approach to analysis. — *2015*

Selected Publications

1. Dmitrii Altukhov, Daria Kleeva, and Alexei Ossadtchi. PSIICOS projection optimality for EEG and MEG based functional coupling detection. *BioRxiv*, 2023
2. V. Manyukhina et al. Globally elevated excitation–inhibition ratio in children with autism spectrum disorder and below-average intelligence. *Molecular Autism*, 2022
3. B. Martín-Luengo et al. Retrospective confidence judgements in general-knowledge questions. *PsyArXiv*, 2021
4. D. Meunier et al. NeuroPycon: An open-source python toolbox for fast multi-modal and reproducible brain connectivity pipelines. *NeuroImage*, 2020
5. E. Combrisson et al. Visbrain: A multi-purpose GPU-accelerated open-source suite for multimodal brain data visualization. *Frontiers in Neuroinformatics*, 13, 2019
6. A. Ossadtchi, D. Altukhov, and K. Jerbi. Phase shift invariant imaging of coherent sources (PSIICOS) from MEG data. *NeuroImage*, 183, 2018
7. Z. Yaple et al. Power of feedback-induced beta oscillations reflect omission of rewards: evidence from an EEG gambling study. *Frontiers in Neuroscience*, 12, 2018
8. G. Alamian et al. Alterations of Intrinsic Brain Connectivity Patterns in Depression and Bipolar Disorders: A Critical Assessment of Magnetoencephalography-Based Evidence. *Frontiers in Psychiatry*, 8(March), 2017a
9. G. Alamian et al. Measuring alterations in oscillatory brain networks in schizophrenia with resting-state MEG: State-of-the-art and methodological challenges. *Clinical Neurophysiology*, 128(9), 2017b
10. N. Smirnov et al. Supercomputer simulations of detonation of hydrogen-air mixtures. *International Journal of Hydrogen Energy*, 2015
11. V. Betelin et al. Supercomputer modeling of hydrogen combustion in rocket engines. *Acta Astronautica*, 2012