Dmitrii **Altukhov**

ML 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. I'm passionate about programmer's craft, code quality and tools behind it, while having a strong background in **machine learning**, **statistical analysis** and **linear algebra**.
I mostly write code in **Python** but also have experience with **C/C++**, **Java** and **MATLAB**.

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**, meg_speech_decoding on github
- Developed real-time pipeline for EEG timeseries analysis using **Python**
- Developed a **Python** library for type-safe timeseries arrays manipulation

Higher School of Economics, Centre for Cognition and Decision Making

Moscow, Russia

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

- 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
- Created a pipeline for MEG data preprocessing, see metacognition, MRI_metacognition on github

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.

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 for *2-year HSE Academic Scholarship* for publishing a paper in a high-impact journal — *Moscow, Russia, 2019*
- Selected 1-st out of 5 teams in *IEEE Brain Data Bank Challenge* for building a drinking game based on a 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*

Publications

1. Dmitrii Altukhov, Daria Kleeva, and Alexei Ossadtchi. PSIICOS projection optimality for EEG and MEG based functional coupling detection. *NeuroImage*, 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*, 2015a
11. N. Smirnov et al. Accumulation of errors in numerical simulations of chemically reacting gas dynamics. *Acta Astronautica*, 2015b
12. V. Betelin et al. Supercomputer modeling of hydrogen combustion in rocket engines. *Acta Astronautica*, 2012