# ANTON ALYAKIN

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## EDUCATION

**Washington University in St. Louis** *[Aug 2021, May 2026]*
*Doctor of Medicine* *(Expected)*
One-Year Research without Degree Program (MD5)

**Johns Hopkins University** *[Jan 2019, Dec 2019]*
*Master of Science in Engineering*
Applied Mathematics & Statistics

**Johns Hopkins University** *[Aug 2015, May 2019]*
*Bachelor of Science*
Computer Science
Applied Mathematics & Statistics

## RESEARCH

**New York University** *[Mar 2024, present]*
*Visitng Medical Student Researcher*
Department of Neurosurgery / OLAB
Faculty Supervisor: Eric K. Oermann

**Washington University in Saint Louis** *[Mar 2023, present]*
*Medical Student Researcher*
Department of Neurosurgery / Leuthardt Lab
Faculty Supervisor: Eric Leuthardt

**Johns Hopkins University** *[Jan 2020, Mar 2021]*
*Assistant Research Engineer*
Department of Applied Mathematics & Statistics / Neruodata Lab
Faculty Supervisors: Carey E. Priebe & Joshua T. Vogelstein

**Johns Hopkins University** *[Jun 2019, Dec 2019]*
*Graduate Research Assistant*
Department of Applied Mathematics & Statistics
Faculty Supervisor: Carey E. Priebe

**Johns Hopkins University** *[May 2017, May 2019]*
*Undergraduate Research Assistant*
Department of Computer Science
Faculty Supervisor: Suchi Saria

## DISSERTATIONS

1. **A. Alyakin**, *Robust Hypothesis Testing of Location Parameters using Lq-Likelihood-Ratio-Type Test in Python*, a thesis submitted to The Johns Hopkins University in conformity with the requirements for the degree of Master of Science in Engineering, 2019. [arXiv] [library] [code]

2. **A. Alyakin**, *Motif Discovery in the Irregulary Sampled Time Series Data*, a thesis submitted to The Johns Hopkins University in conformity with the requirements for Senior Honors Thesis in Computer Science, 2019. [pdf]

## PUBLICATIONS

1. **A. Alyakin**, D. Kurland, D. Alber, K. Sangwon, D. Li, A. Tsirigos, E. Leuthardt, D. Kondziolka, E. Oermann, *CNS-CLIP: Transforming a Neurosurgical Journal into a Multimodal Medical Model*, Neurosurgery, 2025. [journal]

2. D. A. Alber, Z. Yang, **A. Alyakin**, E. Yang, J. Zhang, S. Rai, A. A. Valliani, G. R. Rosenbaum, A. K. Amend-Thomas, D. B. Kurland, C. M. Kremer, A. Eremiev, B. Negash, D. D. Wiggan, M. A. Nakatsuka, K. L. Sangwon, S. Neifert, H. A. Khan, A. V. Save, A. Palla, E. A. Grin, M. Hedman, M. Nasir-Moin, C. X. Liu, L. Y. Jiang, M. A. Mankowski, D. L. Segev, Y. Aphinyanaphongs, H. A. Riina, J. G. Golfinos, D. A. Orringer, D. Kondziolka, E. K. Oermann, *Medical Large Language Models are Vulnerable to Data-poisoning Attacks*, Nature Medicine, 2025. [journal]

3. G. R. Rosenbaum, L. Y. Jiang, I. Sheth, J. Stryker, **A. Alyakin**, D. A. Alber, N. K. Goff, Y. J. F. Kwon, J. E. Markert, M. Nasir-Moin, J. M. Niehues, K. L. Sangwon, E. Yang, E. K. Oermann, *MedG–KRP: Medical Graph Knowledge Representation Probing*, Findings of the 4th Machine Learning for Health symposium (ML4H), 2024. [arXiv]

4. R. Guennoun†, **A.Alyakin**†, H. Higushi, S. Demehri, *Commensal HPVs Have Evolved to Be More Immunogenic Compared with High-Risk $\alpha$-HPVs*, Vaccines, 2024. [journal]

5. J. Lee, M. A. Ruiz-Cardozo, R. P. Patel, S. Javeed, R. S. Lavandi, C. Newsom-Stewart, **A. Alyakin**, C. A. Molina, N. Agarwal, W. Z. Ray, M. Santacatterina, B. H. Pennicooke, *Clinical Prediction for Surgical versus Nonsurgical Interventions in Patients with Vertebral Osteomyelitis and Discitis*, Journal of Spine Surgery, 2024. [journal]

6. **A. A. Alyakin**, J. Agterberg, H. S. Helm, and C. E. Priebe, *Correcting a Nonparametric Two-sample Graph Hypothesis Test for Graphs with Different Numbers of Vertices with Applications to Connectomics*, Applied Network Science, 2024. [journal] [arXiv] [code]

7. M. Powell, C. Clark, **A. Alyakin**, J. T. Vogelstein, B. Hart, *Exploration of Residual Confounding in Analyses of Associations of Metformin Use and Outcomes in Adults With Type 2 Diabetes*, JAMA Network Open, 2022. [journal] [arXiv]

8. F. Rahman, N. Finkelstein, **A. Alyakin**, N. A Gilotra, J. Trost, S. P. Schulman, S. Saria, *Using Machine Learning for Early Prediction of Cardiogenic Shock in Patients with Acute Heart Failure*, Journal of the Society for Cardiovascular Angiography & Interventions, 2022. [journal] [arXiv]

9. J. Chung†, B. Varjavand†, J. Arroyo, **A. Alyakin**, J. Agterberg, M. Tang, J. T. Vogelstein, C. E. Priebe, *Valid Two-Sample Graph Testing via Optimal Transport Procrustes and Multiscale Graph Correlation with Applications in Connectomics*, Stat, 2021. [journal] [arXiv] [code]

10. K. Marchisio, Y. Park, A. Saad-Eldin, **A. Alyakin**, K. Duh, C. Priebe, P. Koehn, *An Analysis of Euclidean vs. Graph-Based Framing for Bilingual Lexicon Induction from Word Embedding Spaces*, Findings of the Association for Computational Linguistics: EMNLP 2021. [journal] [arXiv] [code]

## ABSTRACTS

1. K. L. Sangwon, D. Kurland, **A. Alyakin**, D. Kondziolka, E. K. Oermann, *Seven Decades Of Change: Tracing The Evolution Of Neurosurgery Through Lexical Analysis Of Neurosurgery Publications Of The CNS (1955-2024)*, Digital Abstract at the 2024 Annual CNS Meeting, 2024.

2. K. L. Sangwon, **A. Alyakin**, D. Kurland, E. Leuthardt, D. Kondziolka, E. K. Oermann, *A Generalizable Pipeline for Building an Extensive Domain-Specific Dataset from a Medical Journal - Neurosurgery Edition*, Oral Presentation at the 2024 Annual CNS Meeting, 2024.

† signifies equal contribution. author order preserved as in manuscript.

3. **A. Alyakin**, D. Kurland, D. Alber, K. Sangwon, D. Li, A. Tsirigos, E. Leuthardt, D. Kondziolka, E. Oermann, *CNS-CLIP: Transforming a Neurosurgical Journal into a Multimodal Medical Model*, Oral Presentation at the 2024 Annual CNS Meeting, 2024.

## PREPRINTS

1. **A. Alyakin**, J. Stryker, D. A. Alber, K. L. Sangwon, B. Duderstadt, A. Save, D. Kurland, S. Frome, S. Singh, J. Zhang, E. Yang, K. Y. Park, C. Orillac, A. Valliani, S. Neifert, A. Liu, A. Patel, C. Livia, D. Lau, I. Laufer, P. A. Rozman, E. T. Hidalgo, H. Riina, R. Feng, T. Hollon, Y. Aphinyanaphongs, J. G. Golfinos, L. Snyder, E. Leuthardt, D. Kondziolka, E. K. Oermann, *Repurposing the scientific literature with vision-language models*, submitted, 2025.
2. X. Han†, **A. Alyakin**†, S. Ciprut, C. Lapierre, J. Stryker, A. Lowe, J. Golfinos, D. Kondziolka, E. K. Oermann, *Neuro Data Hubs: Clinical Research Data Services for Neurosurgical Departments*, submitted, 2025.
3. K. Vishwanath, **A. Alyakin**, A. Anand, E. K. Oermann, *MedQA-NoOp: Medical large language models are easily distracted*, submitted, 2025.
4. Y. Lan, **A. Alyakin**, E. K. Oermann, *Gateformer: Advancing Multivariate Time Series Forecasting through Temporal and Variate-Wise Attention with Gated Representations*, submitted, 2025.
5. S. Singh, **A. Alyakin**, D, A. Alber, J. Stryker, A. P. S Tong, M. de la Paz, M. Hernandez-Rovira, F. Pat, P. Cruz, K. Y. Park, D. Kondziolka, E. K. Oermann, *Multiple choice questions are poor assessments of medical knowledge for humans and generative AI*, 2024.
6. K. L. Sangwon, X. Han, A. Becker, Y. Zhang, R. Ni, J. Zhang, D A. Alber, **A. Alyakin**, M. Nakatsuka, N. Fabbri, Y. Aphinyanaphongs, J. Yang, A. Chachoua, D. Kondziolka, I. Laufer, E. K Oermann, *Automating the referral of bone metastases patients with and without the use of large language models*, submitted, 2025.
7. A. Save, **A. Alyakin**, J. Stryker, D. A. Alber, J. Zhang, G. Rosenbaum, S. Singh, E. Leuthardt, D. Kondziolka, E. K. Oermann, *A Platform for Serving Large Language Models for Neurosurgical Diagnostic Support*, submitted, 2024.
8. K. Vishwanath, J. Stryker, **A. Alyakin**, D. A. Alber, E. K. Oermann, *MedMobile: A mobile-sized language model with expert-level clinical capabilities*, submitted, 2024. [arXiv]
9. C. Hang, R. Deng, L. Y. Jiang, Z. Yang, D. A. Alber, **A. Alyakin**, E. K. Oermann, *BPQA Dataset: Evaluating How Well Language Models Leverage Blood Pressures to Answer Biomedical Questions*, submitted, 2024.
10. **A. Alyakin**, Y. Qin, and C. E. Priebe, *LqRT: Robust Hypothesis Testing of Location Parameters using Lq-Likelihood-Ratio-Type Test in Python*, 2019. [arXiv] [code]

## AWARDS

**Johns Hopkins University**

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|---|---|
| Applied Mathematics & Statistics Prize for Outstanding Master's Research | *2020* |
| Applied Mathematics & Statistics Achievement Award | *2019* |
| Undergraduate General Honors | *2019* |
| Undergraduate Departmental Honors with Thesis, Computer Science | *2019* |
| Undergraduate Departmental Honors, Applied Mathematics & Statistics | *2019* |
| Whitening School of Engineering Dean's List (8/8 Semesters) | *2015-2019* |

† signifies equal contribution. author order preserved as in manuscript.

## TEACHING

**Congress of Neurological Surgeons**
*Teaching Assistant*
CNS 2024 Data Science Course — *Sep 2024*

**Johns Hopkins University**
*Teaching Assistant*
580.475 Biomedical Data Science — *Fall 2019*
553.430/630 Introduction to Statistics — *Spring 2019*
553.436/636 Data Mining — *Fall 2018*

## MENTORING

**NYU OLAB**
*Undergraduate Intern Supervisor*
Shrutika Singh — *[2024, Present]*
Krithik Vishwanath — *[2024, Present]*
*High School Intern Supervisor*
Gabriel Rosenbaum — *[2024, Present]*

## REVIEW

**Quantitative Imaging in Medicine and Surgery**
*Reviewer* — *[2025, present]*
**Neurosurgery**
*Reviewer* — *[2024, present]*

## SKILLS

**Languages** (in order of proficiency):
Python, English, Russian, R, Matlab, Java, C++.

**Python skills**:
PyTorch[DDP, FSDP, DeepSpeed, PyTorchLightning, LightningFabric, HuggingFaceAccelerate], Tensorflow.

**Other skills**:
LaTeX, Git, SLURM, API[OpenAI, Anthropic, AWS Bedrock], Prompt Engineering, Databases[PostgreSQL, BigQuery], Lead climbing (6b/5.10), Bouldering (7a/V6 indoor; V2 outdoor).