ANTON ALYAKIN

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AAMC ID: 14808446 ⋄ Applicant ID: 2026720862

EDUCATION

Washington University in St. Louis *[Aug 2021, May 2026]*
Doctor of Medicine *(Expected)*
2024 Congress of Neurological Surgeons AI Fellow

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]*
AI Research Engineer / Visiting Medical Student
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 / Neurodata 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

AWARDS

Johns Hopkins University
Applied Mathematics & Statistics Prize for Outstanding Master's Research *2020*
Applied Mathematics & Statistics Achievement Award *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*

TASIS The American School In Switzerland
2015 Shah Akbar Khan Award for Excellence in Mathematics *2015*
Valedictorian *2015*

PUBLICATIONS

1. S. F. Chen, **A. Alyakin**, A. Seas, E. Yang, J. Choi, J. V. Lee, A. Chen, P. Warman, R. Bitolas, R. J. Steele, D. Alber, E. K. Oermann, *Large Language Models in Clinical Medicine: An LLM-Powered Large-Scale Systematic Review*, Nature Medicine, to appear, 2025.

2. **A. Alyakin**, J. Stryker, J.V. Lee, R. Feng, T. Hollon, D. Kondziolka, E. K. Oermann, *AI-Powered Pipeline Transforms Neurosurgical Articles into High-Quality Graphical Abstracts*, Neurosurgery Practice, to appear, 2025.

3. **A. Alyakin**, D. Alber, J. V. Lee, J. Stryker, S. Singh, A. Save, D. Kurland, C. Orillac, A. Valliani, S. Neifert, D. Lau, I. Laufer, P. A. Rozman, E. T. Hidalgo, H. Riina, L. Snyder, E. C. Leuthardt, D. Kondziolka, E. K. Oermann, *Automated Generation & Human Evaluation of Neurosurgical Board Examination Self-Assessment Questions*, Neurosurgery Practice, to appear, 2025.

4. S. Singh, **A. Alyakin**, D, A. Alber, J. Stryker, A. P. S Tong, K. Sangwon, N. Goff, M. de la Paz, M. Hernandez-Rovira, K. Y. Park, D. Kondziolka, E. K. Oermann, *Pitfalls of Multiple-Choice Questions in Generative AI and Medical Education*, Scientific Reports, to appear, 2025. [arXiv]

5. K. Vishwanath, **A. Alyakin**, M. Ghosh, J. V. Lee, D. A. Alber, K. Sangwon, D. Kondziolka, E. K. Oermann, *Evaluating the Performance and Fragility of Large Language Models on Neurosurgical Board-like Questions*, Neurosurgery, to appear, 2025. [arXiv]

6. K. Vishwanath, J. Stryker, **A. Alyakin**, D. A. Alber, E. K. Oermann, *MedMobile: A Mobile-sized Language Model with Clinical Capabilities*, BMJ Digital Health & AI, to appear, 2025. [arXiv]

7. X. Han[†1], **A. Alyakin**[†], S. Ciprut, C. Lapierre, J. Stryker, J. Golfinos, D. Kondziolka, E. K. Oermann, *Neuro Data Hub: A New Approach for Streamlining Medical Clinical Research*, Neurosurgery Practice, 2025. [journal]

8. 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*, Neurosurgery, 2025. [journal]

9. **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]

10. 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]

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

12. 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]

13. **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]

[1] † symbolizes equal contribution; order preserved as in manuscript.

14. 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]

15. 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]

16. 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]

17. 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]

PRESENTATIONS

1. **A. Alyakin**, J. Stryker, D. A. Alber, J. V. Lee, E. Leuthardt, D. Kondziolka, E. K. Oermann, *CNS-Obsidian: A Neurosurgery-Tailored Vision- Language Model Fine-Tuned Exclusively on Scientific Publications*, Oral Presentation at the 2025 Annual CNS Meeting, 2025. [poster]

2. X. Han†, **A. Alyakin**†, S. Ciprut, C. Lapierre, J. Stryker, A. Lowe, J. Golfinos, D. Kondziolka, E. K. Oermann, *Neuro Data Hub: A New Approach For Streamlining Medical Clinical Research*, Oral Presentation at the 2025 Annual CNS Meeting, 2025. [poster]

3. K. Vishwanath, **A. Alyakin**, M. Ghosh, J. V. Lee, D. A. Alber, K. Sangwon, D. Kondziolka, E. K. Oermann, *Evaluating the Performance and Fragility of Large Language Models on Neurosurgical Board-like Questions*, Neurosurgery, Mini Oral Presentation at the 2025 Annual CNS Meeting, 2025. [poster]

4. **A. Alyakin**, *Computational Optimization Of Laser Interstitial Thermal Therapy Parameters For Brain Tumor Ablation: A Thermodynamics-Based Simulation Approach*, Mini Oral Presentation at the 2025 Annual CNS Meeting, 2025. [poster]

5. **A. Alyakin**, J. Stryker, S. Singh, D. A. Alber, A. Save, D. Kurland, C. Orillac, A. A. Valliani, S. Neifert, D. Lau, I. Laufer, P. A. Rozman, E. T. Hidalgo, H. Riina, L. Snyder, E. C. Leuthardt, D. Kondziolka, E. Oermann, *Automated Generation And Human Evaluation Of Neurosurgical Board Examination And Self-Assessment Questions*, Mini Oral Presentation at the 2025 Annual CNS Meeting, 2025. [poster]

6. A. Y. Fu, A. A. Valliani, **A. Alyakin**, D. Kondziolka. K. Oermann, *Tabular Foundation Models Predict Clinical Outcomes in Skull Base and Cerebrovascular Surgery*, Mini Oral Presentation at the 2025 Annual CNS Meeting, 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*, 93th American Association of Neurological Surgeons Annual Scientific Meeting, 2025.

8. 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.

9. **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.

POSTERS

1. **A. Alyakin**, J. Stryker, J. V. Lee, R. Feng, T. Hollon, D. Kondziolka, E. K. Oermann, *AI-Powered Pipeline Transforms Neurosurgical Articles into High-Quality Graphical Abstracts*, Digital Poster at the 2025 Annual CNS meeting, 2025. [poster]
2. **A. Alyakin**, J. V. Lee, H. Riina, E. K. Oermann, *Computational Optimization Of Endovascular Coil Deployment Parameters For Aneurysm Treatment: A Physics-Based Simulation Approach*, Digital Poster at the 2025 Annual CNS meeting, 2025. [poster]
3. S. Singh, J. Zhang, **A. Alyakin**, E. K. Oermann, *GRPO Versus SFT: Optimizing Large Language Models For Neurosurgical Decision Support*, Physical Poster at the 2025 Annual CNS meeting, 2025. [poster]
4. A. Kapoor, **A. Alyakin**, L. Blinder, A. Korpus, E. Yang, E. Yang, R. J. Steele, A. M. Schulze, J. A. Frontera, E. K. Oermann, *Large Language Models Predict Modified Rankin Scale After Acute Ischemic Stroke*, Digital Poster at the 2025 Annual CNS meeting, 2025. [poster]
5. 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]
6. 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 Poster at the 2024 Annual CNS Meeting, 2024.

PREPRINTS

1. **A. Alyakin**, J. Stryker, D. A. Alber, J. V. Lee, 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, *CNS-Obsidian: A Neurosurgical Vision-Language Model Built From Scientific Publications*, 2025. [arXiv]
2. K. Vishwanath, **A. Alyakin**, J. V. Lee, A. Anand, D. A. Alber, E. K. Oermann, *Medical Large Language Models are Easily Distracted*, submitted, 2025. [arXiv]
3. 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*, 2025. [arXiv]
4. **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]

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]

TALKS

Congress of Neurological Surgeons
2025 Artificial Intelligence in Neurosurgery: A Practical Course — *May 31st, 2025*
How Can We Build Foundation Models with Neurosurgical Data

Global AI Frontier Lab
Global AI Frontier Lab: Seminar Series — *June 16th, 2025*
Data Quality is Multidimensional: Product-Market-Data Fit in AI and Neurosurgery

TEACHING

Congress of Neurological Surgeons
Faculty
CNS 2025 Special Symposium 3: Data Science and AI for Neurosurgeons — *Oct 2025*
2025 Artificial Intelligence in Neurosurgery: A Practical Course — *May 2025*
Teaching Assistant
CNS 2024 Special Symposium 3: Data Science and AI for Neurosurgeons — *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

Joanne Choi
Visiting Medical Student Researcher at NYU OLAB — *[2025, Present]*
1 abstract submitted
1 *CNS-Nexus* case submitted

Anjali Kapoor
Post-baccalaureate Researcher at NYU OLAB — *[2025, Present]*
1 poster (CNS 2025)

Krithik Vishwanath
Visiting Undergraduate Researcher at NYU OLAB — *[2024, Present]*
2 manuscript accepted (Neurosurgery; BMJ Digital Health & AI)
2 manuscripts submitted
1 oral presentation (CNS 2025)

Shrutika Singh
Undergraduate Researcher at NYU OLAB — *[2024, Present]*
1 manuscript submitted
1 oral presentation (CNS 2025)
1 poster (CNS 2025)

Gabriel Rosenbaum
High School Student Researcher at NYU OLAB — *[2024, 2024]*
1 poster (ML4H 2024)

SOCIETIES

Congress of Neurological Surgeons
Medical Student Member — *[2024, present]*
CNS Quarterly Member Spotlight — *Summer 2025*
Sergeant-At-Arms — *CNS 2025*

American Association of Neurological Surgeons
Medical Student Member — *[2021, present]*

REVIEW

Neurosurgery
Reviewer *[2024, present]*
Quantitative Imaging in Medicine and Surgery
Reviewer *[2024, present]*
Scientific Reports
Reviewer *[2025, present]*
npj: Digital Medicine
Reviewer *[2025, present]*
Digital Health
Reviewer *[2025, present]*

GROUPS

Washington University School of Medicine
WUSM Global Health and Medicine
Treasurer *[2022, 2022]*
WUSM Global Surgery Student Alliance Chapter
Treasurer *[2022, 2022]*
WUSM ClimbRx (Climbing Club)
Co-lead *[2022, 2022]*

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).

INTERESTS

Clinical:
Cerebrovascular and skull base surgery
Complex reconstructive spine surgery
Neuroendovascular interventions
Stereotactic Radiosurgery
Research:
Large language models (LLMs) and vision-language models (VLMs) in neurosurgery
Statistical networks theory in applications to connectomics
Artificial intelligent agent systems
Causality and consciousness