# Armaan Ahmed

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## Academic Biography

Armaan is an undergraduate at the Johns Hopkins University studying Biomedical Engineering and Biophysics. He is an aspiring MD/PhD student interested in using computation to characterize molecular phenomena and to perform database analysis to find relevant oncological trends. With Dr. Yaojun Zhang at Johns Hopkins, he investigates what properties of a *de novo* protein lead it to undergo a non-classical crystallization pathway *in cellulo*. In collaboration with Elmhurst Hopsital, he investigates both national trends in oncological outcome and in-house management practices.

## Education

- **The Johns Hopkins University** — Baltimore, MD
  *B.S. in Biomedical Engineering and B.A. in Biophysics; Sophomore; 4.00 GPA* — *Aug. 2022 – June 2026*
- **Scarsdale High School** — Scarsdale, NY
  *High School Diploma; 4.00 (4.15/4.30) GPA* — *Aug. 2018 – July. 2022*

## Skill Set

- **Programming:** Python, Java, Bash, Javascript, HTML, CSS, Rust (learning)
- **Typesetting:** LaTeX, Markdown, Microsoft Office, LibreOffice
- **Research:** Bioinformatics, Amplification techniques (PCR, LAMP, SHARP), Nanopore sequencing, Cas12b

## Experience

- **Undergraduate Teacher Assistant/Learning Assistant** — Baltimore, MD
  *Jan 2024 - Present*
  - **Intro to Computing Teacher Assistant:** Hold office hours for students, grade assignments, and assist in class.
  - **Physics II Learning Assistant:** Assist students during discussion section on problem sets.

- **Yaojun Zhang Lab** — Baltimore, MD
  *Student Researcher* — *Apr 2023 - Present*
  - **Studying protein phase separation:** Using course-grain molecular dynamics simulations (LAMMPS) to understand how proteins phase separate and crystalize.
- **Taekjip Ha Lab** — Baltimore, MD
  *Student Researcher* — *Oct 2022 - May 2023*
  - **Rational protein engineering:** Worked with graduate student Jimin Kang to computationally design thermostable DNMT1 methyltransferase variants. Generated in silico mutation libraries and selected top candidatesby using metal cofactor, DNA, and SAM binding screens. Performed MD simulations to verify thermostability using NAMD
  - **Maintaining methylation markers during amplification:** Designed candidate target and primers to verify above results in vitro. Performed and optimized 37 °C SHARP amplification, an in-house method to isothermally amplify DNA. Performed protein purification.
- **Elmhurst Hospital Intern** — Queens, NY
  *Student Researcher and Intern* — *May 2022 - Present*
  - **2023 Summer Hospital Volunteer:** Performed clinical work, shadowing, and research. Called on patients, asked questions, and delivered relevant paperwork. Watched surgeries in the operating rooms, including open, laporoscopic, and robotic. Additionally, shadowed the surgical technology team. Aided in different database analyses.
  - **SEER cancer database exploratory analysis:** Performed database and survival analysis on SEER cancer cases. Analyzed survival difference depending on hospital accreditation status. Conducted all statistical analyses, wrote a manuscript on the results, and submitted poster to the International Conference on Surgical Cancer Care

- **Wigdahl Lab** Philadelphia, PA
  *Student Researcher* *Mar 2020 - Jun 2022*
  - **Computational design of robust diagnostic tool:** Conducted bioinformatic research under Dr. Will Dampier at the Wigdahl Laboratory developing clinically relavent probes against HIV-1 drug resistance using the novel SHERLOCK technology. Designed varient-resistant LAMP primers and gRNAs.
  - **In vitro validation:** Conducted in vitro research throughout the 2021 summer and six weeks from May to June, 2022 (40+ hrs/week). Performed Cas12b activity analysis and PCR and LAMP amplification. Wrote first-author manuscript and presented at multiple conferences and competitions
  - **Patient-varient HIV-1 amplification and sequencing:** Performed PCR amplification of patient HIV-1 samples and ran a subset of them through a Nanopore sequencer
- **Science Research** Scarsdale, NY
  *Science Research Mentor* *Oct 2020 - March 2022*
  - **Mentoring high school students in research:** Supervised high school mentees to prepare them for their research experience,Reviewed their projects/presentations and delivered feedback

## Peer-reviewed publications

1. **Ahmed, A.**, Whittington, J., & Shafaee, Z. (2023). Impact of Commission on Cancer Accreditation on Cancer Survival: A SEER Database Analysis. *Annals of Surgical Oncology*. doi:10.1245/s10434-023-14709-4

## Conferences and Workshops

1. Esparham, A., **Ahmed, A.**, Shoar, S., & Shafaee, Z. (2024). Impact of Obesity on In-Hospital Outcomes Following Hepatic Resection: A Propensity Score Matched Analysis of the US National Inpatient Sample. Advanced Cancer Therapies, Puerto Rico.
2. **Ahmed, A.**, Whittington, J., & Shafaee, Z. (2024). Patterns of presentation and delivery of care of appendiceal neoplasms in the municipal safety-net setting. Society of Surgical Oncology Annual Meeting, Atlanta.
3. Esparham, A., **Ahmed, A.**, Shoar, S., & Shafaee, Z. (2024). National Trends, Complications, and In-hospital Outcomes for Patients Undergoing Immediate Implant-based versus autologous-based Breast Reconstruction: A Propensity Score Matched Analysis. Society of Surgical Oncology Annual Meeting, Atlanta.
4. **Ahmed, A.**, Whittington, J., & Shafaee, Z. (2024). Patterns of presentation and delivery of care of appendiceal neoplasms in the largest municipal health care delivery system in the United States. ASCO Gastrointestinal Cancers Symposium, San Francisco.
5. Kang, J., Momčilo, G., Urteaga, R. M., **Ahmed, A.**, & Ha, T. (2023). Engineered Helicase Replaces Thermocycler in DNA Amplification. The UKC.
6. **Ahmed, A**. & Shafaee, Z. (2023). Impact of Commission on Cancer Accreditation on Cancer Survival: A SEER Database Analysis. International Conference on Surgical Cancer Care, Boston. doi:10.1245/s10434-023-13332-7
7. Berman, R., Dampier, W.,... **Ahmed, A.**, Szep, Z., Nonnemacher, M., & Wigdahl, B. (2022). PP 6.5-00205 Utilization of high-throughput assays and deep-learning for selection of CRISPR/Cas9-gRNA pairs used in an HIV-1 cure strategy. Tenth International Workshop on HIV Persistence during Therapy, Miami. doi:10.1016/j.jve.2022.100258
8. **Ahmed, A.**, De Souza, D. R., Link, R. W., Nonnemacher, M. R., Wigdahl, B., & Dampier, W. (2021). Design of a SHERLOCK-based low resource screening assay for HIV-1 drug resistance. Discovery Day 2021, Philadelphia, PA, USA. Zenodo, https://doi.org/10.5281/zenodo.5719853
9. **Ahmed, A.**, De Souza, D. R., Link, R. W., Nonnemacher, M. R., Wigdahl, B., & Dampier, W. (2021). In silico design of a SHERLOCK-based point-of-care diagnostic for HIV-1 drug resistance. 17$^{th}$ International Symposium on NeuroVirology (ISNV), Virtual. Zenodo, https://doi.org/10.5281/zenodo.5719377
10. **Ahmed, A.**, Link, R. W., Nonnemacher, M. R., Wigdahl, B., & Dampier, W. (2020). Design of a low resource screening technology for HIV drug resistance using SHERLOCK. Discovery Day 2020, Virtual. Zenodo. https://doi.org/10.5281/zenodo.5719377

## Projects (Clickable)

- **Website:** Designed a personal portfolio using the Django Python framework.
- **Hospital Accreditation Comparison:** Comparison of survival rates between hospitals with and without CoC accreditation.
- **Variability Analyzer:** Tool to analyze variability and entropy of genomic sequences
- **LAMP primer design for quasispecies amplification:** Designed a system to generate sensitive LAMP primers, able to overcome target variability.
- **ReactionMechanizer:** Created a program to simulate chemical reactions and analyze kinetics.

## Relavent Coursework

*(Unofficial transcript available here)*

- Single Molecule & Cell Biophysics (250.335; A)
- Honors Multivariable Calculus (110.211; A+)
- Differential Equations (110.302; A)
- Honors Linear Algebra (110.212; A+)
- General Physics II (171.102; A+)
- Honors Organic Chemistry II (030.212; A+)
- Biochemistry I (250.315; A+)
- Probability (553.620; A+)

## Awards

- **Dean's ASPIRE Award Recipient ($2,250 Research Award)** — Baltimore, MD
  *The Johns Hopkins University* — *Jan 2024*
- **Dean's List (2x)** — Baltimore, MD
  *The Johns Hopkins University* — *Jan 2023*
- **Outstanding Academic Performance and Interest in Science** — Scarsdale, NY
  *Science Department of Scarsdale High School* — *May 2022*
- **Outstanding Academic Performance and Interest in Mathematics** — Scarsdale, NY
  *Mathematics Department of Scarsdale High School* — *May 2022*
- **2nd Place in Cellular & Molecular Biology** — Westchester, NY
  *Westchester Science and Engineering Fair (WESEF)* — *Mar 2022*
- **3rd Place in Computational Biology/Bioinformatics** — Westchester, NY
  *Junior Science and Humanities Symposium (JSHS)* — *Feb 2022*
- **Regeneron STS Semifinalist** — Washington D.C.
  *Society For Science* — *Jan 2022*
- **1st Place for Outstanding High School Poster** — Philadelphia, NY
  *Discovery Day 2021, Drexel University* — *Oct 2021*

## Extracurricular Activities

- **Johns Hopkins Learning Den** — Baltimore, MD
  *Tutor* — *September 2023 - Present*
  - **Learning Den Personalized Tutor:** I tutor students on subjects ranging from Organic Chemistry to Honors Linear Algebra.
- **The Johns Hopkins News-Letter** — Baltimore, MD
  *Writer* — *Jan 2023 - Present*
  - **Volunteer writer for the SciTech column:** I generally write articles weekly about different scientific topics. Duties include researching topics, interviewing scientists, and writing articles.

- **Ex-Numera** Baltimore, MD
  *Website Designer and Member* *Feb 2023 - Present*
  - **Reviving the Johns Hopkins University's math club:** I am currently working with a team of students to revitalize the Johns Hopkins University's math club. I am in the process of revamping the old website.