Aarav Bhasin

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Basic Information:

- Career Goal: To become a physician–scientist by earning an MD/PhD degree, with a focus on pediatrics.
- Active in the school community through leadership and membership in clubs (see "Clubs & Experience")
- Extensive genomics and AI research experience from **Harvard, Ohio and Emory** universities
- Presented **4 abstracts** at international scientific meetings
- Published/submitted **4 research papers** in the international journals
- Honor Roll student for all three completed years
- High Course Rigor (See "AP Courses")

Short bio and planned major to pursue in college: I'm aspiring to become a medical/research professional, and I have a strong passion for the intersection of medicine, data science, and technology. My Interests have been shaped by the strong educational and rigorous AP coursework at JCHS in computer science, biology, physics, chemistry, and math. This is further augmented through online independent certifications in data science and AI, along with opportunities to gain hands-on research experience at prestigious labs of Harvard Medical School, Ohio University, and Emory University in cutting-edge fields such as cancer genomics, single-cell profiling, and medical imaging to uncover deep insights into disease mechanisms. I have published or submitted four research articles, including two as a first author, and have presented my research at several prestigious conferences, such as the Annual American Association for Cancer Research Meeting 2025. To foster student engagement in data science and raise funds for cancer care, I founded the "CODING for CURE" initiative, which I lead. The goal of this program is to introduce students to programming and data science, while also demonstrating how these skills can be applied to research and statistical analysis.

I'm particularly interested in how innovations in biomedical research can translate into better diagnostics, treatments, and patient outcomes for those suffering from chronic diseases such as cancer and diabetes. I'm eager to contribute to the future of healthcare through genomics and data science, as well as innovation.

Strongest qualities: I would describe my strongest qualities as determination, persistence, curiosity, dependability, and adaptability, traits that have allowed me to thrive in academic, social, and research settings, overcome challenges, adjust to changing circumstances, and contribute my best effort to ensure team success.

Determination and persistent effort: I always give my best to every task I partake in, whether that's internships, clubs, or classes, no matter how challenging it gets. For example, I have always academically persevered in the fields of science, math, and CS, taking the most challenging classes and earning exceptional grades, while also balancing the duties of clubs and research internships. I am motivated to reach my goal of becoming a medical professional by methodically taking academic courses and extracurricular opportunities that align with my interest in these fields.

Dependable and adaptable: I can always be counted upon to follow through and get things done, whether in clubs, classes, or internships. I demonstrated this quality best in my junior year, when I joined the newly formed Linguistics Olympiad club as the vice-president. The club struggled a bit to get momentum, and most officers quickly lost interest. As the competition approached, meetings dwindled, and the club officers disengaged completely and stopped organizing meetings to prepare for the competition. Still, some members showed interest in competing, and I refused to let them down. I organized last-minute study sessions, led our team at the event, and made sure we had a meaningful experience. Even though none of our members qualified for the next level of competition, we had a great time competing together and enjoyed the experience of meeting other like-minded students and learning valuable advice from them. This year, we have rebuilt the club by putting in weekends and evenings on developing advertisement materials, poster boards, practice materials, and strategies so that future students interested in the linguistics club would have a strong foundation. We have advertised heavily at club fair, bringing the club from the initial 3 members who went to the compeition to 18 prospective.

Curious and inquisitive: I have always been driven by curiosity, whether the question is of a mechanical or a biological field. This mindset shaped my interest in human physiology and medicine and guided my internship at **Harvard Medical School,** where I investigated how a certain type of cell, the Pericyte, affects the tumor environment in thyroid cancer. Previous literature seemed to suggest that a higher level of pericyte cells had a strong correlation with treatment resistance in thyroid cancers. Driven by my curious nature, I asked two important questions: Why are pericytes linked to worse outcomes, and Do pericytes show a similar relationship with poor survival in other cancers? To investigate this, I spent 3 years learning cancer biology and performing extensive genomics data analysis in a Harvard Medical School lab. I discovered that expression(level) of pericytes and T-cell exhaustion were highly correlated, suggesting that pericytes may distract T-cells from fighting tumors, thus leading to worse outcomes. Expanding my analysis, I found the same trends in colon, breast, and pancreatic cancers and developed the first universal pericyte signature to catch aggressive cancers. This

manuscript will be submitted for publication soon. Experiences like this have deepened my passion for uncovering biological "whys" and pursuing a career in medicine to develop new therapies to improve health. I continued this pattern again in my second internship at Ohio University, in this case regarding how the knockdown (removal) of a fat-related gene results in cognitive decline, and through genomics analysis, we discovered that it disrupts neuro-metabolic pathways affecting both memory and muscle. I have published this work as the first author in *bioRxiv* and it is also under peer-review in the **Journal of Biological Chemistry**.

Experience that shaped me: During the summer of my 9th grade year, I launched a program, called "Coding for Cure," to teach kids foundational coding in python and data science skills, as well as donating the course fees to foundations like CURE childhood cancer because I wanted the funds to benefit others more than myself.

Initially, I thought that with my coding skills and multiple certifications in this domain, teaching coding to kids would be an easy task, but I quickly discovered that teaching is *one of the hardest and most rewarding things that I have ever done*. The kids would ask any kind of question under the sun, had very different comfort levels with the programming, and had very different attention spans. This taught how to be adaptable, patiently listen, slow down, break complex problems down, and to above all, never assume anything when teaching! This has not only taught me a great lesson in my life but has also helped me in raising funds to support cancer care and has created a space for young minds to channel their technological curiosity in learning something new. I have developed a deep appreciation for my teachers after learning from my experience about how much effort goes into preparing lessons and thinking about every angle of a lesson.

This experience has shaped my future learning, curiosity, and leadership skills in all domains of my life. This made me a better communicator and taught me to adopt better approaches to convey my ideas and findings to peers, mentors, and the greater community. It also helped me become a better planner and team player to achieve the aims of the project. For example, I participated in research projects in academics with teams at Harvard, Ohio, and Emory university related to cancers and metabolic disorders that culminated in 8 research papers and abstracts and ideas for future treatments for patients. In the end, teaching coding and data science has taught me much more than simple loops and functions. It taught me humility, patience, and a sense of achievement to give back.

Leadership positions and impacts: My academic journey at JCHS has been enhanced by my commitment, leadership, and community engagement through various clubs and organizations. As the President of Science Olympiad club, I have boosted the recruitment and am committed to uplifting the club's performance. As Vice President of Linguistics Olympiad, I have revived the club and put persist efforts to strengthen it. Through being an officer in National Honor Society, I have created and participated in many service events, along with helping the club overall by remaking outdated elements like the application and the website. As the Secretary of NEHS, I have also participated in advancing student interest in Literature, by creating flyers, and reaching out to other schools to provide engaging opportunities for our students. **One of my most meaningful experiences has been leading the "Coding for Cure" initiative, a program where I taught coding and data science to children while raising donations for cancer care.** This also fueled my interest in disease biology, which is supported by research internships at Harvard Medical School, Ohio University, and Emory University. This Participation in clubs, organizations, and internships taught me how to balance leadership with service, to be innovative and inclusive, curious, and engaged, and to transform my passions into success for my teams and an impact for the community. Further Details about this are in the clubs, community engagement, and experience sections.

Contributions to future college: I will contribute to the excellence of my future college by supporting a positive environment in the classrooms, along with the highest academic commitment. Based on my high School STEM clubs and rigorous research experience, I will contribute by leading and participating in the STEM clubs related to Genomics, AI, healthcare, and entrepreneurship, as well as it providing my upmost dedication to all the courses I take. I will get involved in research projects focused on finding an understanding of complex diseases and provide contributions via data science, genomics, and AI experience I must enrich research environments. I also look forward to connecting to those who may have similar hobbies as me, those being modelmaking, painting, and history. And of course, I look forward to creating lifelong memories by making new friends and growing my social/professional network.

High Course Rigor: Relevant AP and other coursework

Sciences	History and Social Sciences	Mathematics	Computer Science
AP Biology (5)	AP United States Government (4)	AP Precalculus (5)	AP Computer Science Principles (4)
AP Chemistry (5)	AP World History (5)	AP statistics (5)	
AP Physics 1 (5)	AP Macroeconomics*	AP Calculus AB*	AP Computer Science Advanced (5)
Honors Anatomy*	AP Microeconomics*		
	AP Psychology*	*Currently Taking	

Clubs

- **Science Olympiad Club (2019-Current)**
  - Science Olympiad competitor from 6th grade onwards (2019-Current)
  - **President**, **JCHS Science Olympiad Club (2025-2026)**

- - - *Leadership and Outreach:* Led club recruitment efforts by designing new flyers, coordinating outreach through social media and group messaging, and actively engaging with incoming students to increase membership .
    - *Strategy for success:* Managed a team of six officers by delegating tasks strategically based on individual strengths, ensuring balanced workloads, and maximizing team efficiency.
    - *Administration:* Revamping the club's outdated website and Linktree to improve accessibility to resources, including practice tests, study guides, and competition-specific information.
  - **Former JCHS Science Olympiad Testing Manager (2024-2025)**
    - *Mentorship:* Provided individualized mentorship by offering preparation strategies, creating custom practice tests, and guiding members through event-specific strategies and content.
    - *Commitment to success:* Improved overall team performance by stepping into unfamiliar events to ensure full team participation in all events and prevent disqualification.
    - *Success strategies:* Balanced mentoring team members with maintaining personal performance, contributing to increased overall team points, and higher competition placements.
  - **Awards**
    - 4th Place- Entomology- (2025 State Championship at Georgia Tech)
    - 4th Place- Fossils- (2025 State Championship at Georgia Tech)
    - 3rd Place- Entomology- (2025 Regional Championship at Georgia State University)
    - 3rd Place- Fossils- (2025 Regional Championship at Georgia State University)
    - Multiple Top Five and Podium awards for prior years of high school and middle school
- **Linguistics Olympiad Club (2024-Present)**
  - **Vice President 2025-2026**
    - Took initiative to relaunch club, creating communication and advertising campaigns, and organizing meetings.
  - **Co-Founder/Vice President of Technology 2024-2025**
    - Managed study resource collection, organized club activities and meetings, and social media outreach.
    - Assumed leadership to ensure club's participation in NACLO after other officers became unresponsive.
    - Participated in the NACLO open round competition
- **National English Honor Society (2024-present)**
  - **Club Secretary 2025-2026**
    - Planned activities for the club, such as coffee houses, essay writing sessions, creative writing requirements, and required English community service (library volunteering)
    - Arranged with the local elementary school to provide members as book readers in exchange of volunteer hours
    - Designed an interest letter for those who may want to join the club.
  - **Member 2024-2025**
    - Participated in a club events furthering student interest in literature and meetings to discuss literature and essays.
- **National Honor Society (2024-Present)**
  - **Officer 2025-Present**
    - Updated the club website to modernize its design and made it user-friendly with relevant content and documents
    - Revamped the member application for easy information and application submission
    - Planned a talent show, which will involve the help of other clubs and will showcase talent at JCHS while donating admission fees to St. Jude Children's Research Hospital
  - **Member 2024-2025**
    - Participated in a variety of service programs, from volunteering to fill gift bags to thank bus drivers to helping clean up after Creek fest (school sports day)
    - Created my own project, where I delivered a seminar at the local library (Northeast/Spruill Oaks, Johns Creek) for senior citizens, educating them about online safety.

Internships and Work Experience
- **FCS Gifted Internship at the Emory Empathetic AI for Health Institute in the laboratory of Professor Anant Madabhushi (July 2025 - Present)**
  - Delivered a seminar on a review of AI-based approaches for the analysis of medical histopathology slide images
  - Implemented AI models for analysis of histopathology images for cancer, immune, and stromal cells detection
  - Currently working on implementing AI workflow for virtual detection of immune cells on +10,000 slides from different cancers to assess cellular profile associations with progression

- **Independent Aging related Research (March 2025 - Aug 2025)**
  - Brainstormed with a group of friends to understand the biology of aging and the health problems associated with it.
  - Led the discussion on established biological aging biomarkers (telomere length, methylation clocks, proteomic/metabolomic models, retinal imaging).
  - Proposed a simple, naive-to-exhausted T cell ratio measurement as a biomarker of aging.

- Performed analysis on genomics data to explore association of naive-to-exhausted T-cell with cancer survival
- The first-authored article based on this is currently under review in Frontiers of Aging Journal.
- **Research Internship at Diabetes Institute of Ohio University in Dr Vishwajeet Puri Lab (Nov 2024 - April 2025)**
  - Performed RNA-sequencing on brain samples of mice with silencing (removal) of the Fsp27 gene
  - RNA-sequencing data analysis using R/Bioconductor to identify the gene signature of those effected by removal
  - Resulted in a shared first-authored manuscript that is currently under review in the Journal of Biological Chemistry (JBC) and available as a Preprint on bioRxiv (https://doi.org/10.1101/2025.07.28.667235)
- **Remote Research Student at Harvard Medical School, BIDMC in the lab of Prof Nucera (07/2022-02/2025)**
  - Carried out single-cell data analysis on Pericytes (cells wrap around blood vessels) from 15 cancers
  - Developed a novel pan-cancer pericytes signature that associates with them with poor cancer outcomes
  - Accepted abstracts at the Atlanta Workshop on single cell Omics [Got 1st place award for best poster] and at the Annual American Association for Cancer Research (AACR) meeting (April 2025, Chicago)
  - The manuscript will be submitted for Publication to the Journal of Cancer Research from AACR.
- **Clinical Research Internship at PGIMER, India at Endocrinology and Podiatry Clinic (07/2021-08/2021)**
  - Observed a team of clinicians treating patients with diabetic foot ulcers (DFUs), a major complication of Diabetes
  - Collect wound images and clinical information for a project to predict DFUs infection using AI
  - Presented abstract at the Atlanta Workshop on single-cell Omics in 2023
  - Coauthored an article based on this work in Frontiers in Endocrinology

Abstracts and Publications: 4 Abstracts and 4 Publications:
Abstract
1. Sendilraj, V., Pilcher, W. J., Choi, D., **Bhasin, A., et al.** (2023). DFUCare: Deep learning platform for diabetic foot ulcer detection, analysis, and monitoring. Presented at AWSOM 2023 Conference, Atlanta, GA.
2. **Bhasin, A.,** & Nucera, C. (2024). Role of pericyte lineage in thyroid cancer for prognosis and therapy. Poster presented at the Georgia Junior Science and Humanities Symposium, UGA.
3. **Bhasin, A.,** & Nucera, C. (2025, April). A single-cell pericyte signature reveals a poor outcome in a pan-cancer data set. Poster presented at the American Association for Cancer Research (AACR) Annual Meeting, Chicago, IL.
4. **Bhasin, A.,** & Nucera, C. (2025). Pan-cancer pericyte signature derived from major cancers reveals a poor outcome. Poster presented at AWSOM 2025 Conference, Atlanta, GA.

Publications:
1. Sendilraj, V., Pilcher, W., Choi, D., **Bhasin, A.,** et al (2024). DFUCare: Deep learning platform for diabetic foot ulcer detection, analysis, and monitoring. Frontiers in Endocrinology, 15, Article 1386613.
2. Pugh, A*., **Bhasin, A*,** et al (2025). Whole-body Loss of FSP27 Impairs Cognitive Function via Disruption of Neuro-Metabolic Pathways [Preprint]. https://doi.org/10.1101/2025.07.28.667235, Review: **JBC**. *First authors.
3. **Bhasin, A.,** et al (2025). Estimation of biological aging based on T cell differentiation trajectories: Emerging and future avenues. Manuscript submitted for publication, Frontiers in Aging.
4. **Bhasin, A., et al** (2025). Single-cell meta-analysis identifies a universal pericyte signature linked to poor clinical outcome and immune T-cell dysfunction in thyroid and other cancers. Manuscript in preparation.

Community Engagements, Experience, and Hobbies:

- **Founder and President for CODING FOR CURE Initiative: (2023 -Present)**
  - Launched the CODING FOR CURE program that introduce students to programming and data science skills.
  - Program given as in-person classes to elementary and middle school students over the last 2 years and has raised $2,250 (100% donated to Children's Healthcare of Atlanta and CURE Childhood Foundation)
  - Initiative launched online as well via educational classes on YouTube platform for widespread impact (https://www.youtube.com/@CodingForaCure/videos)
  - The program has been invited to continue this year in collaboration with CURE Childhood Foundation.
- **Independent 3D/Modeler/Cader on Thingiverse: (2023-Present)**
  - Created and uploaded personal designs to Thingiverse, which have been downloaded and modified by others for 3D printing (https://www.thingiverse.com/icewing177/designs) (Total Views: 11,326, Total Downloads: 2,698)
  - Designed, Planes, Tanks, as well as mounts and stands

- Hobbyist and scale model builder.
  - Have Built a variety of scale models over the years of middle to high school (27)
  - I have posted my models to my website in a blog format, discussing the history of the subjects they are based on, as well as the effort and skills i learned making each model. (https://aaravbhasin.com/my-scale-plastic-models)
  - Have built models of various subject matters, including planes, tanks, cars, trucks, and Gundam (Robots)
- **Developed medical images analysis pipelines of whole-slide images:(2022-2023)**
  - Created a Python program that seamlessly assembles slices of histopathology images into a complete whole for digital pathology analysis of various diseases, utilizing the OpenCV library.

- **Volunteer, Food Collection Campaign – Local Community Pantry in 2023**
  - Assisted in organizing and running a food drive for the local pantry.
  - Collected and packaged donated food for the delivery pantry.
  - Collaborated with the JCHS students to raise awareness and encourage participation in donation efforts.
- **Volunteer and Emcee, Community Diwali Celebration 2023-2024**
  - Assisted with event organization and logistics.
  - Served as stage conductor for the performances both years.

Skills/Achievements:

Google Certified Python Programmer	Coursera AI Programmer	Founded an Educational initiative for a Cause
Inspirit AI: AI Scholars Program	Published abstracts	
Knowledge of Deep Learning Models	Published Research Papers	Created an initiative for Seniors to stay safe online
Python-based Image analysis	Volunteered in Community Activities	
	Expert 3D modeler	Multiple Science Olympiad awards