Aashna K. Soni

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Education

BASIS Independent Fremont, Fremont California ***2021-2025***
GPA: Weighted: **4.76** / Unweighted **4.0** | PSAT/NMSQT **1520** | SAT **1580**

Work Experience

- **Biao Wang Lab Computational Research Intern** ***Summer After 11th-Present***
  - **Lab Focus:** The Biao Wang Lab conducts mouse model studies to investigate the function of ADAR1, an RNA-editing enzyme, in fat cells. As a pure biology lab, it lacks the computational skills and resources for advanced data analysis.
  - **Data Analysis:** I sourced and analyzed a public human dataset related to the lab's mouse dataset, providing clinical insights into the role of ADAR1 in obesity. I validated the lab's hypothesis that ADAR1 is an important regulator in fat cells by demonstrating its involvement in obesity in both mouse and human subjects through pathway enrichment analysis, linear regression, and p-value testing.
  - **RESET** (**RNA Editing Site Evaluation Tool**): I analyzed the lab's mouse fat RNA-Seq data using statistical methods. I reviewed existing open-source packages for RNA-editing site detection and reached out to developers to understand their methodologies and obtain data for positive controls. Through this process, I identified limitations in these packages, which informed my design of a novel statistical tool for RNA-editing site detection (ongoing project).
  - **Key Contributions**: My findings and analyses were included in the PI's manuscript for an October grant application. My initiative in locating and analyzing a new dataset provided objective data and clinical relevance to the lab's research, supporting efforts to secure grant funding. I made a research poster to summarize my review of the literature, methodology, analysis, and next steps.

- **Biao Wang Lab Intern** ***Summer after 10th***
  - **Problem:** The lab had a mass spectrometry pilot dataset including time-series data for quantification levels of 6,000+ proteins in different cellular regions following forskolin treatment. The goal was to narrow this large list of proteins to a smaller set of proteins that demonstrated significant translocation between the nucleus and cytoplasm in response to forskolin, thereby enabling deeper *in vitro* studies of these genes.
  - **Solution**: I created Python scripts to analyze this pilot dataset and identified 3 genes (CDKN1A, SLC52A2, and GET1) that translocated significantly from the nucleus to the cytoplasm (or vice versa) in response to forskolin treatment. I further validated these findings through literature research.
  - **Impact:** My findings narrowed the area of analysis, enabling the lab members to focus their work on CDKN1A, SLC52A2, and GET1 genes in HEK293T cells.

Other Research Projects

- **Identification of Methylomic and Transcriptomic Biomarkers for Cancer Subtype Classification** ***Summer after 10th***
  - **Mentor:** Ahmet Ay: Professor of Biology & Mathematics, Director of the Picker Interdisciplinary Science Institute, Colgate University

    - **Work:** I developed a statistical and machine-learning framework to discover transcriptomic and epigenomic biomarkers that best distinguish 6 cancer types based on their primary sites. I used the pathway-enrichment analysis tool Metascape to analyze these biomarkers in a biological context.
    - **Impact:** I identified novel biomarkers for specific cancer types, as well as validated other biomarkers found with the literature. My mentor nominated my original research paper for the *2023 Pioneer Research Journal* (8.9% acceptance rate).
- **Discovering SNPs correlated with CFTR-opathies (poorly understood diseases linked to CFTR)** ***10th-11th***
    - **Mentor:** Dr. Ruchika Bajaj, UCSF postdoc
    - **Problem**: The identification of significant single nucleotide polymorphisms (SNPs) to the Cystic Fibrosis Transmembrane Conductance Regulator (CFTR) gene could help in designing personalized treatments for CFTR-opathies. When I joined this project, structural data for 1,067 CFTR SNPs was being collected manually, making the approach tedious, slow, and prone to errors.
    - **Contribution**: As the lead computational researcher, I developed Python scripts and integrated them with the ChimeraX molecular visualization software to automatically retrieve all necessary structural data for the 1,067 SNPs to CFTR in an efficient, accurate manner.
    - **Impact**: This automation allowed structural biologists to focus on interpreting the results rather than collecting data. I presented the methodology & results of the computational domain of the project at the UCSF Quantitative Biosciences Institute (QBI) hackathon.
- **Literature Review: "Genomic Sequencing in Clinical Oncology"** ***Summer after 9th***
    - **Mentor:** Dr. Gauravjit Singh, Radiation Oncology, St Joseph's Medical Center, Stockton, CA
    - **Problem:** Many reviews discuss components of personalized cancer care without integrating them into a holistic clinical workflow.
    - **Work:** I conducted a review on how next-generation sequencing works at the molecular level, its application in diagnosing cancer types, its role in prescribing personalized treatments, and the latest advancements in the field.
    - **Impact:** My review paper was published in the International Journal of High School Research (**IJHSR**).

Academic Papers

- Authored literary review of Joy Harjo: Poet, Activist, and Musician (grade 12)
    - Gained a deeper understanding of stylistic choices in free-verse poetry, which has helped me develop my own voice as a poet.
- Co-authored research paper on the Ghadar Party (grade 11)
    - Gained historical background on the Indian community in America, which helped me co-create the StoriMY! digital exhibit, focusing on the experiences of the South Asian diaspora (described below).
- Authored literature review on applications of artificial intelligence in healthcare (grade 9)
    - Piqued my interest in the intersection of AI and healthcare, which I explored in the following summers.

Leadership

- **Founder of the High School Literary Magazine Club** ***10th-present***
    - Roles: founder, editor-in-chief, layout-designer-in-chief, recruiter, mentor
    - Skills: editing, layout design using Canva, managing club funds
    - Built an inclusive environment where students feel comfortable exploring deep concepts through art and writing.
    - We publish a once-per-trimester literary magazine, Asterism (themes include change, fear, rebirth, nostalgia, and multimedia).
    - We host open mic events and guest speaker series in collaboration with other Fremont high schools such as Irvington and Mission San Jose.

    - The Young Writers Initiative (TYWI) BASIS Independent Fremont Chapter President: I connected the club to the TYWI Chapters Program for resources and networking.
        - We contribute our work to their website to showcase it internationally. For example, our fear-themed magazine issue from October of 2023 can be found here: Asterism October 2023 Issue.
- **Co-founder and CEO of Initiative StoriMY!** ***11th-present***
    - Recognizing the lack of representation for South Asian voices in the historical and literary narratives, I co-founded **StoriMY!,** a grassroots organization focused on sharing the history & stories of the South Asian diasporic community through technology.
    - 2 main projects: **MusiWE!** and **HistoriMY!**
    - Our first digital exhibit, MusiWE! (launched in October '24), explores the significance of South Asian-Western fusion music, showcasing historical research, musician interviews, and their original compositions.
    - HistoriMY!, a work-in-progress mobile app, uses Unity game development 3D modeling software to immerse users in historical stories. Our first interactive exhibition is about the Ghadar Party, formed by Indian-Americans in San Francisco to support the Indian Independence movement.
    - We collaborated with organizations such as the San Francisco Historical Society and the South Asian American Digital Archive (**SAADA**) to gain historical input and expand our audience reach.

App Development

- **Illumihealth**, an iOS application on the App Store ***9th-10th***
    - My grandparents manage several chronic conditions and sometimes forget to take their medicines or log their vitals. They previously used physical records, which were tedious and often misplaced.
    - To address this, I developed an app called **Illumihealth.** The app allows users to track vital data daily, share this with their doctors, receive reminders for medications, and view missed medication dates. It also includes an in-app calendar for tracking upcoming appointments.
    - My grandparents use this app to help manage their conditions effectively.

Community Service

- **HIPAA and BBP-certified volunteer at the Fremont and San Jose Sikh Gurdwaras' free medical clinics** ***10th-present***
    - Many individuals in the Punjabi community suffer from cardiovascular diseases, lack health insurance, and/or lack access to basic healthcare tools like glucometers and blood pressure meters to manage their conditions.
    - As a clinic volunteer, I manage paper and digital electronic medical records, manage patient intake, scribe for physicians, and mentor new volunteers.
    - Due to the small space and limited resources at the clinic, the workflow was unorganized. I helped optimize the use of this small space and ensure that there was a streamlined workflow to transfer patient data from volunteers collecting vital information to volunteers handling digital and paper EMRs.
    - Serve 8-10 patients per session. I use my Punjabi and Hindi language skills to communicate fluently with patients, accurately capturing their symptoms and conditions in notes for the doctor.
- Teacher's assistant for Honors/AP Biology & Post-AP/Capstone Linear Algebra at BASIS Independent Fremont ***12th***
- Certified Schoolhouse.world tutor ***10th***

Writing

- Published poetry book *Reflections* (ISBN-10: 1937675475) with Lekha Publishers (12th)

    - Was interviewed by my school to reflect on my experiences writing and publishing the book.
- BART Lines Teen Poetry Contest Finalist for poem Frames of Motion (11th)
- Published short story on the Teen Ink website: Who said you couldn't buy happiness? (10th)
- Published 7 short stories in the school literary magazine, *Asterism* (9th-12th)
- Published short story Belonging on student-created website and contributed to its design (8th)

Academic Awards

- Received the Distinguished Honor Roll award in 9th, 10th, and 11th grades for earning an overall average in the top 5% of the class
- Received AP Scholar with Distinction Award in 10th and 11th grades
- Received BASIS Independent Fremont's departmental awards in AP Calculus AB and AP Computer Science A in 9th and 10th grades, respectively
- 2024 National Merit Semifinalist, pending results for finalists

Courses

- Completed the Machine Learning Specialization offered by DeepLearning.AI and Stanford University (instructor: Andrew Ng)
- Completed the Neural Networks and Deep Learning course offered by DeepLearning.AI and Stanford University (instructor: Andrew Ng)
- Completed HIPAA and BBP medical clinic certifications

Skills

Programming, data analysis, machine learning

- Strong theoretical and applied machine learning foundation
- Experienced in handling and processing genomic, epigenomic, transcriptomic, and raw sequencing (FASTQ) data from public databases such as The Cancer Genome Atlas (TCGA) and the Gene Expression Omnibus (GEO)
- Proficient in using compute clusters and developing parallelized code to handle >1,000 GB datasets
- Proficient in Python, Java, and Swift programming languages
- Introductory R programming language knowledge
- Comfortable using UNIX commands for biological data analysis

Wet lab

- Plasmid isolation, cell splitting, SDS-page, western blot, transformation, transfection, and fractionation

Music

- Collection of performances over the years (since I was 4)
- Competed in the Hemkunt Keertan Darbaar competition in 2018 and 2019, won gold at the regional and international levels both times
- Vocalist and play 3 instruments: *dilruba*, *harmonium*, and violin