ACTIVITIES AND ACHIEVEMENTS

ALEXANDER JIN

Boston University Academy, Class of 2023. Born 4/4/2004
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Academic Awards

- **2023 Regeneron Science Talent Search Scholar** (Grade 12) An SEIRD+V Model for the Effect of Social Distancing and Vaccination on SARS-CoV-2 Infection and Mortality
- **2022 Davidson Fellows Scholarship for Gifted Students Honorable Mention** (Grade 12) An SEIRD+V Model for the Effect of Social Distancing and Vaccination on SARS-CoV-2 Infection and Mortality
- **National Latin Exam** (Grade 8, 9, 10) Certificate of Honorable Merit Summa Cum Laude (39/40, 39/40, 40/40 respectively)
- **BU Academy Classics Declamation Contest** (Grade 9) Sole Latin Winner

Publications

- Patel, A., Jin, A., Lee, M., & Lee, K.J. (to be published in 2023). AI and Information Technology, Pros, Cons, and Opportunities. In Lee, K.J. (Ed), *Essential Rational Healthcare Economics and Its Environment*. Nova Science Publishers
- Jin, A., Sharifi, H. (2022). An SEIRD+V Model for the Effect of Social Distancing and Vaccination on SARS-CoV-2 Infection and Mortality. *Biomed J Sci & Tech Res.* 46(5) (Peer-reviewed)
- Leung, L.C., Lee, K.J., & Jin, A. (2022). Organizing a Successful Practice and Considering Tax and Estate Planning. *Otolaryngol Clin North Am.* 2022 Feb;55(1)
- Jin, A. (2021). A Love Sonnet. *The BU Academy Literary Magazine*
- Jin, A. (2016). Courage in a Robotics Competition. In *Courage of Children* (25th Ed). Won the Max Warburg Fellow Award (chosen from more than 2500 submissions, awarded by then Boston mayor Marty Walsh)

Research and Internships

Dystonia and Speech Motor Control Laboratory at Mass Eye and Ear (Grade 12, 4 hrs/wk, 40 wks/yr)
Advisors: Dr. Kristina Simonyan, Dr. Giovanni Battistella and Dr. Dongren Yao

- Offered the 9-month internship after a rigorous coding interview. My work includes pre-processing MRI images, maintaining the code database, managing the Lambda server, and applying the deep learning model to new data to find novel diagnosis and treatment solutions for complex speech motor disorders

Yale Ear Lab at Yale Medical School (Summer Grade 12, full time, 40 hrs/wk, 8 wks/yr)
Advisor: Professor Dhasakumar Navaratnam

- I self-studied a cryogenic electron microscopy course taught by Professor Jensen at CalTech to learn electron microscopy, Fourier transforms, tomography, 2D crystallography, and more
- After completing laser safety training and pathogen safety training, I self-studied RELION-4.0 documentation to learn how to construct a model of proteins through cryo-EM
- I replicated the existing results and analyzed a new 2TB dataset from cell cultures

Independent COVID Epidemiology Study (Grade 10, 11, 12, 6 hrs/wk, 25 wks/yr)
Advisor: Dr. Husham Sharifi, Stanford Medical School

- I began to model how COVID spreads when the wide-spread panic hit my school community hard in 2020. I studied literature, took a Differential Equations course at BU, and built an SEIR (Susceptible, Exposed, Infected, Recover) compartmental model using Python. It successfully replicated the results in existing literature and extended the model to include additional variables and a thresholding technique. It provided public health tools for future pandemics. My paper won an Honorable Mention in the 2022 Davidson Fellows Scholarship for Gifted Students, the 2023 Regeneron Science Talent Search Scholar and is published in the peer-reviewed *Biomedical Journal of Scientific and Technical Research*

Yale CINEMA Lab (Cellular Imaging Using New Microscopy Approaches) (Summer Grade 11, 40 hrs/wk, 5wks/yr)
Advisor: Professor Derek Toomre, Yale Medical School

- After self-studying Matlab and cell biology, I modified the Automated Cilia Detection in Cells software to standardize the way in which cilia are counted by individual physicians. I attended weekly online team meetings, completed my tasks and suggested improvements to the program interface and documentation

Audiology Independent Study (Summer Grade 9, 5 hrs/wk, 4 wks/yr)
Advisors: Dr. K.J. Lee, Yale Medical School & Jason Leonard, PhD Physics UCSD

- I implemented a hearing disease classification program in Python and ran regression analysis on audiograms of acoustic neuroma, acoustic trauma, hereditary loss, and Meniere's disease

Entrepreneurship

Team Member of Voice AI Differential Diagnosis App (Summer Grade 12, 10 hrs/wk, 4 wks/yr)

- I was part of a team (led by Dr. KJ Lee) that built an AI-based app to provide differential diagnoses for scheduling on Amazon's Alexa Platform. Conducted market analyses and co-designed the app. Presented at the 2022 Annual Conference of the American Academy of Otolaryngology

Programming Languages Python, Java, C++, R, Matlab

Music

Piano Lessons (Grade 9, 10, 11, 12, 1hr/wk Lesson 1 hrs/wk Practice, 45 wks/yr, 13 years)
The piano is my oldest friend. My teachers at the New England Conservatory (NEC) have lauded my perfect pitch, my talent to transpose music, and my capacity to analyze complex concepts. I have won many state, national, and international competition awards and performed at Carnegie Hall

Jazz Trombone (Grade 9, 10, 11, 12, 1 hr/wk Lesson, 4 hrs/wk Practice, 45 wks/yr, 5 years)
In 7th grade, I switched from classical piano competitions to playing jazz trombone and piano

- **Massachusetts Music Educators Associations All-State Jazz Band Lead Trombonist** (**Grade 9**) By audition, I didn't audition in Grade 10 & 11 due to the pandemic risk for my grandmother
- **New England Conservatory Youth Jazz Orchestra Lead Trombonist (Grade 9, 10, 11, 12, 2 hrs/wk, 36 wks/yr**) By audition
- **Boston Latin School (BLS) High School Big Band Lead Trombonist (Grade 8, 6 hrs/wk, 36 wks/yr)** By audition, a rare honor for an 8th grader to join BLS's nationally award-winning Big Band
  - **10th Annual Charles Mingus Festival and National High School Competition 1st Place (Grade 8)**
  - **Boston Public School 37th Annual MLK Celebration (Grade 8)**
  - **Massachusetts Association for Jazz Education Gold Medal (Grade 8)**
- **Boston University Academy Swamp Cats Jazz Band (Grade 9, 10, 11, 12, 2 hrs/wk, 36 wks/yr)** By audition. Trombonist. Performed in school events such as new students, school open houses and winter concerts
- **Boston University Academy Music Fusion Club (Grade 11, 12, 3 hrs/wk, 36 wks/yr) Leader**
  - Recruited members and formalized the structure. Promulgated a multi-cultural repertoire that I had arranged for a multicultural instrumentation. Our performance at the BUA multi-cultural festival was praised as being one of the greatest BUA ensemble performances ever
- **Music Composition (Grade 8, 10, 11 1 hr/wk, 36/wks/yr)**
  - Studied composition with Professor Alla Cohen at New England Conservatory
  - Composed music pieces for Latin, History and English projects

Athletics

Fencing A rated (highest rating) (Grade 9, 10, 11, 12, 7 hrs/wk, 45 wks/yr, at Cavalier Fencing Club)

- **National Championships & Junior Olympic Championships Junior Teams 4th Place, Division IA Men's Epee 24th Place (Grade 11)**
- **Neil Lazar Div1A/Div2/Vet ROC Division IA Men's Epee, 3rd Place (Grade 11)**
- **Fairfax Challenge Summer ROC/RJCC/VET Junior Men's Epee 6th Place (Grade 11)**
- **Massachusetts High School State Individual Championships 3rd Place (Grade 10)**
- **Mission Fencing Center RJCC Junior Men's EPEE 3rd Place (Grade 10)**
- **Gold Finch ROC/RJCC/RYC/VET Cadet Men's Epee 5th Place (Grade 10)**
- **New England Division U20 JO Qualifiers Men's Epee 3rd Place (Grade 9)**
- **Atlantic Fencing Academy Atlantic FA Men's Epee 2nd Place (Grade 9)**
- **Regional RYC Division II Men's Epee 1st Place (Grade 9)**
- **RPI Fall Open Tournament Men's Epee 1st place (Grade 9)**

Boston University Academy Fencing Team (Grade 10, 11, 12, 6 hrs/wk, 10 wks/yr)
Co-Captain

- Recruited members, designed training plans, supervised daily training, competed in state tournaments

School Clubs/Organizations

Student Council (Grade 9, 10, 11, 5 hrs/wk, 36 wks/yr)
Elected Representative for Resource, Public Relations, and Policy Committee

- Proposed an extra-council student advocacy group. Fought for the implementation of a school-wide student survey and an Annual Mental Health Initiative to tackle pandemic challenges. Planned events such as the Fall Festival and Valentine Rose Delivery. Managed the Council's Instagram and student relations

Disciplinary Committee (Grade 10, 11, 12, when necessary, 36 wks/yr)
Elected Representative (2 representatives per grade, chaired by faculty)

- Reformed the operating procedure of the Disciplinary Committee to increase its transparency from the Policy Committee

Chinese Culture Club (Grade 11, 12, 3 hrs/wk, 36 wks/yr) Leader

- Set up a discord server, recruited members, and formalized the club structure
- Hosted lunch events in partnership with other departments/clubs on special Chinese Festivals
- Wrote well over 200 mini lectures on primary history, literature, and contemporary events

Fencing Club (See Athletics). **Music Fusion Club** (See Music). **Swamp Cats Jazz Band** (See Music)

Community Service

- **President's Volunteer Service Awards Gold (Grade 9, 11) Silver (Grade 10)**
- **TPIU (The Patient Is U) Foundation (Grade 9, 10, 11, 12, 3-6 hrs/wk, 42 wks/yr)**
  TPIU Best Volunteer Award (Grade 11) & TPIU Superlative Volunteer Award (Grade 12)
  - Expanded my role as Twitter Account manager to a more central member of the foundation by proposing essay contests, creating a contact database, proposing strategic alliances, building a literature database, and fundraising
- **BHSE (Boston High School Education) (Grade 9, 10, 1 hr/wk, 50 wks/yr)**
  - Tutored middle and high school students in math, writing, and Latin

Alexander Shi Jin, Boston University Academy Class of 2023. Born April 4, 2004

Research Supplement - COVID Project

Jin, A., Sharifi, H. (2022) An SEIRD+V Model for the Effect of Social Distancing and Vaccination on SARS-CoV-2 Infection and Mortality. *Biomed J Sci & Tech Res.* 46(5) (Peer-reviewed).

Won 2023 Regeneron Science Talent Search Scholar
Won 2022 Davidson Fellows Scholarship for Gifted Students Honorable Mention

COVID Paper Abstract

Respiratory viral pandemics have occurred repeatedly over recent decades, including Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV-1) in 2002 – 2004, H1N1 influenza in 2009, Middle Eastern Respiratory Syndrome Coronavirus (MERS-CoV) in the 2012 and again in 2019, and SARS-CoV-2 since 2019. While attempts at preparedness have been made, public health infrastructure in multiple countries have been inadequate to meet the challenges of the SARS-CoV-2 pandemic. Modeling epidemics allows for quantifiable, anticipatory planning prior to pandemic occurrence and for policy adaptation during a pandemic itself. We created an epidemiological model -- Susceptible-Exposed-Infected-Recovered-Dead (SEIRD) -- to include vaccine efficacy, vaccine rate in the population, degrees of social distancing, and a thresholding metric to understand the stringency required from these parameters to achieve a pre-specified target for peak infection percentage and total mortality in a population. For example, if policy makers aim to limit peak infection rate in a community to 5%, what goals should they have for vaccination rate, social distancing, etc.? This study advances knowledge in its representation of multiple public policy tools in an integrated analytic model and in its flexibility to allow modification of critical parameters to achieve utility for future pandemics.

* The following is not part of the abstract, but comments from Davidson Fellowship judges, emailed to me by Ms. Moessner, Director of Davidson Gifted on 12/22/2022.

"*It's both a solid reproduction of an advanced and highly technical published result AND a nice exploration of the impact of vaccinations and social distancing. The mathematics, visualizations, and interpretation for exploring the 'vaccine efficacy vs. fraction vaccinated' plot are excellent.*

The student did a thorough read of the current literature of math models in epidemiology and synthesized that knowledge to create a sophisticated and accurate model for COVID dynamics in Italy. The quality of the report is on the level of a beginning grad student."