

Alexander Y. Liu
331281 Georgia Tech Station
Atlanta, GA 30332-1400

703.220.5928 (cell)
aliu338@gatech.edu
Website: 2019aliu.github.io

Education

Georgia Institute of Technology

B.S. Computer Science, 2021

GPA: 3.8 Atlanta, GA

August 2019 - Present

- Selected courses: Data Structures and Algorithms, Objects and Design, Honors Linear Algebra with Abstract Vector Spaces, Discrete Mathematics, Combinatorics, Statistics and Applications, Macroeconomics

Thomas Jefferson High School for Science and Technology

Alexandria, VA

Main Interests: Computer Science, Neuroscience

September 2016 - June 2019

- Selected coursework: Artificial Intelligence, Mobile Application Development, Web Application Development, AP Computer Science A and Data Structures, Neuroscience Research Lab, Neurobiology, Research Statistics
- Honors received: Siemens Regional Semifinalist, Virginia Science and Engineering Fair: 2nd in Bioengineering Category, AP Scholar with Distinction, Athletic Honor Roll

Skills

Languages: Java, Python, JavaScript, Golang, SQL, HTML, CSS, LaTeX, Dart

Infrastructures and Frameworks: Node.js, React.js, Bootstrap, Git, MongoDB/MongoDB Atlas, Firebase, Redis, Vue.js, Keras, Tensorflow, WebSocket, Heroku, MySQL, PyTorch, Angular, Flutter

Software: Terminal (Linux, Mac), Postman, Vim, Jupyter Notebook, Android Studio, Figma, Visual Studio Code, IntelliJ IDEA, PyCharm, jGRASP, Google Colab, Windows Subsystem for Linux (WSL)

Selected Experience and Projects

- **HeartsRL** Great Falls, VA - remote
Personal Projects *June 2020 - Present*
 - Make a computer program to play the game of Hearts using reinforcement learning
 - Build website to allow users to play the game of Hearts against other users or with the computer program
 - Technologies used: Python, Javascript, Tensorflow, React.js, WebSocket, Figma
- **Recycling Website** Atlanta, GA - remote
Google Developer Student Club, Georgia Tech Chapter *June 2020 - Present*
 - Create website and mobile application to handle administration of Georgia Tech's Office for Solid Waste Management and Recycling
 - Connect the user interfaces to the existing Firestore database
 - Improve design of user interfaces
 - Technologies used: Javascript, Dart, Flutter, Angular, Firebase/Firestore, Figma
- **Software Developer Intern** Rockville, MD - remote
S&C Electric *May 2020 - Present*
 - Build a web application to view and edit settings of electrical products for consumers nationwide
 - Design a proxy-microservice type application to allow for easier maintenance and construction
 - Construct UI with React.js and supporting proxy with GraphQL and Apollo for client-side operations
 - Implement, test, and document microservice to retrieve data from S&C Electric's devices, and a microservice to open channels for subscribing to the devices' data

- Technologies used: Java, Javascript, GraphQL, Redis, Spring Boot, React.js, WebSocket and STOMP, Docker

- **talk:now** Berkeley, CA - remote
hack:now (CalHacks 2020) *April 24-26, 2020*
 - Made a video chatting application for people experiencing hard times to chat with someone in a similar situation
 - Users fill out a 1-minute form to quickly categorize the problem they are facing (can also choose to just talk to anyone), and are connected with the same issue with a video calling and text chatting application
 - Top 30 Finalist in the main prize category out of 300+ submissions
 - Technologies used: Javascript, Vue.js, WebSocket and WebRTC, Peer.js, SASS
- **TAG** Atlanta, GA
Create-X: Idea to Prototype *January 2020 - April 2020*
 - Create a tracking device that has better range than most commercially available tracking tags
 - Uses Global Positioning System (GPS) to determine vicinity of device, Bluetooth/Wifi to identify exact location, and Android Studio to create a mobile app to easily manage tracking
 - Technologies used: Android Studio, Java, XML, Google Nearby Messages API, Google Maps API
- **CoronaDigest** Charlottesville, VA
HookHacks 2020 *March 28-29, 2020*
 - Make a web application that provides the latest news about Coronavirus (COVID-19), including a 2-minute daily digest, a 3D globe of Coronavirus cases, and financial information related to the Coronavirus.
 - Technologies used: Python, Plotly, Seaborn, Matplotlib, MongoDB Atlas, Pandas, Jupyter Notebook, Flask, Jinja, Bootstrap, Heroku
- **Creating the Next** Atlanta, GA
Hacklytics 2020 *February 22-23, 2020*
 - Visualized unemployment data and other macroeconomic factors nationally and globally, and built multivariate regression model to determine how much the government should spend on unemployment
 - Won best use of visualizations
 - Technologies used: Python, Plotly, Seaborn, Matplotlib, MongoDB Atlas, Pandas, Jupyter Notebook, Flask
- **FoxStocks** Athens, GA
UGAHacks 5 *February 7-9, 2020*
 - Created web application to teach new investors how to invest in stocks. My part was mostly backend work.
 - Won best use of MongoDB Atlas
 - Technologies used: Flask, Jinja, MongoDB Atlas, Python, BlackRock Aladdin API
- **TimePlotter** Atlanta, GA
Big Data Big Impact Club *October 2019 - December 2019*
 - Develop a data analytic algorithm for a time-based plot of Atlanta using SGD technique to optimize the lengths between any two points based on the time taken
 - Technologies used: Pandas, Google Maps API, Python
- **Season2Season** Atlanta, GA
Agency Club *October 2019 - December 2019*
 - Create a tool to change the season of an outdoors picture using a Generative Adversarial Network (GAN) machine-learning model trained with 1000+ images

- Technologies used: PyTorch, Python

Durham, NC

- **Inline**
HackDuke 2020 *November 2-3, 2019*

- Created web application to search for nearby health centers with the specified treatments and sort them by transportation time using Google Maps API
- Technologies used: Flask, Google Maps API, MongoDB Atlas, HTML/CSS/JS

Atlanta, GA

- **Stockastic**
HackGT 6 *October 25-27, 2019*

- Designed and implemented a web application that helps users to monitor stocks of their interest by conducting sentiment analysis of Twitter tweets about the corresponding companies
- Technologies used: React.js, Express.js, HTML/CSS, MongoDB, Twitter API, Google Cloud Natural Language API

Greenbelt, MD

- **Software Developer Intern**
Fluency Security Corporation *June 2019 - August 2019*

- Developed a web-based trouble ticketing system, FasterIncidentResponse, using MongoDB-Gin-Vue.js-Golang fullstack framework, and integrated it into existing log management software
- Created developer's guide documentation with Postman, Markdown, and Web Developer tools
- Unit tested log management software with Golang's unit testing framework
- Technologies used: Golang (including Gin server), MongoDB, Bootstrap, Vue.js, Node-RED, Visual Studio Code

Alexandria, VA

- **Tetris: Forty Lines**
Mobile Applications Development *March 2019 - June 2019*

- Implemented a swipe-capable Tetris Android app in Android Studio with Java backend
- Technologies used: Android Studio, Java

Alexandria, VA

- **LegiChat**
HackTJ 6.0 *April 2019*

- Motivated by the lack of a unified method of contacting local Congresspeople, as well as the Phone2Action challenge.
- Technologies used: Phone2Action API, HTML, CSS, JS, Node.js, Python (for scrapping data, elastic search), Git

Alexandria, VA

- **Arcade Game Suite**
Web Applications Development *September 2018 - January 2019*

- Designed and developed web-based suite of games, including U.S. Minesweeper, Tetris, and a word-finder assistant for Scrabble
- Technologies used: HTML/CSS/JS (including jQuery, AJAX), SQL, Node.js

Chantilly, VA

- **Website Developer and Administrator**
Hope Chinese School *August 2018 - December 2018*

- Helped develop and administer a new website for cultural and enrichment center serving 5000 users
- Former administrator of the website, managing a system of tens of thousands of users.
- Website: <https://www.hopechineseschool.org>
- Technologies used: HTML/CSS/JS, Django, SASS

Alexandria, VA

- **Othello AI**
Artificial Intelligence *December 2017 - January 2018*

- Coded an AI that can intelligently play the classic board game Othello
- Competed in an Othello AI competition

- Technologies used: Python

- **CardBot** Alexandria, VA
HackTJ 4.0 March 2017
 - Developed a proof-of-concept hack for finding best credit card options given user input from a Facebook Messenger chat-bot, used Capital One's API
 - Won Best Entrepreneurial Hack
 - Technologies used: Python, Facebook Messenger API, Capital One Hack-a-thon API

Research Experience

- **Migraine Research** Great Falls, VA
Neuroscience Research Lab June 2018 - January 2019
 - **Title:** Exploration of Two-Dimensional Materials for Inhibition of the Calcitonin Gene-Related Peptide Pathway in Migraines
 - Employed high-performance CPU cluster and slurm management in collaboration with high school's computer systems lab
 - Continued using ABINIT, an open-source package for making predictions about molecular systems based on solving quantum physics equations.
 - Research proposal accepted by neuroscience research lab at high school, received guidance and \$2400 funding for project
 - Submitted to Intel Science Talent Search, presented at the Thomas Jefferson Symposium to Advance Research
 - **Research Abstract:** Current research shows blocking the Calcitonin Gene-Related Peptide Receptor (CGRPR) most effectively treats migraines. First-principle calculations have been performed to analyze the interaction between one of the most effective migraines medicines and the active amino acids in the CGRPR. Based on the premise that two-dimensional (2D) materials have van der Waals interactions with amino acids, computations on the binding energies between the active amino acids in CGRPR and the selected 2D materials, silicene, germanene, and graphene oxide, have been performed. Based on the calculated binding energies, the interaction strength of each selected 2D material with CGRPR and that of olcegepant with CGRPR were compared. Results indicate that silicene possesses potentially potency to treat migraines more effectively yet economically than most existing treatments do.
- **Alzheimer's Disease Research** Alexandria, VA
Project Lead June 2017 - August 2017
 - **Title:** Exploration of Chelation Materials for Treatment of Alzheimer's Disease
 - Used ABINIT, an open-source package for making predictions about molecular systems based on solving quantum physics equations.
 - Submitted to Siemens Competition 2017, achieved the semifinalist award
 - Competed in science and engineering fairs, placed 2nd at the Virginia State Science and Engineering Fair
 - **Research Abstract:** First-principle calculations have been performed to investigate the interaction of different metal ions with amyloid-beta, along with adsorption of the metal ion by potential chelating materials. Binding energies were evaluated for metal interaction with a first coordination sphere consisting of three nitrogens and one oxygen. Results indicate that this coordination sequence possesses greatest compatibility for copper. Due to copper's strongest affinity, binding energies were also evaluated for its interaction with MoS₂, WS₂, reduced graphene oxide (rGO), and cyanide. Our results indicate cyanide and rGO to possess strong chelation potential for treatment of Alzheimer's disease.

Community Leadership

- **Instructor of Introductory Computer Science** Chantilly, VA
Hope Chinese School January 2015 - June 2019
 - Co-founded and instructed first computer science course in Hope Chinese School
 - Outstanding service recognition for multiple years (2017, 2018) for voluntary service, received paid position in 2018-2019 school year
- **NeuroInspire Inc.** Alexandria, VA
Instructor September 2016 - May 2017

- Instructor for the NeuroInspire outreach program and 2017 NeuroInspire Impulse event
- Taught underprivileged middle schoolers in the outreach program
- Worked with TJ Partnership to acquire funding for thousands of dollars of equipment

Non-academic Activities

- **Member, Georgia Tech Swim Club** Atlanta, GA
Georgia Tech *August 2019 - Present*
 - Practice, compete, socialize, and volunteer with the members and coaches of the swim club
 - Qualified for the 2020 College Club Swimming National Championship
- **Member, Developer Student Club at Georgia Tech** Atlanta, GA
Georgia Tech *June 2020 - Present*
 - Develop software to meet communal needs
 - Built website to handle administration of the Waste and Recycling Program at Georgia Tech
- **Member, Georgia Tech Product Managers** Atlanta, GA
Georgia Tech *April 2020 - Present*
 - Learn how to manage product development, particularly for computer software
- **Member, GT Investment Club** Atlanta, GA
Georgia Tech *January 2020 - Present*
 - Studying in the mentorship program to understand accounting and investing fundamentals and strategies
- **Member, GT Pianoforte** Atlanta, GA
Georgia Tech *January 2020 - Present*
 - Play piano at concerts and socialize with other members of the club