Vikram Bala

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Education

The University of Pennsylvania, Philadelphia, PA   August 2020 – May 2024
- *GPA: 4.0/4.0 | Dean's List 2021-2022 | ACT 36/36 | BSE in Computer Engineering | Minor in Mathematics*
- **Relevant Coursework:** Data Structures & Algorithms (A), Computer Architecture (A+), Discrete Math (A), Embedded Systems (A+), Big Data Analytics (A) | *Awards:* IEEE HKN Engineering Honor Society — Top 12.5% of Class of 2024

Technical Skills

Languages: Java, Python, C, C++, JavaScript, OCaml, C#, HTML & CSS, SQL
Other Skills: AWS, Express.js, Node.js, MongoDB, AVR & STM Microcontrollers, Java Swing, Linux, Git

Professional Experience

Susquehanna International Group (SIG) | Philadelphia, PA   June 2022 – August 2022
Software Engineering Intern – Electronic Options Trading, Super Quoting Team
- Improved accuracy of 500+ options' quotes by designing a stream processor in C# providing live metrics & issue isolation.
- Published a UDP multicast feed of my stream processor's analyses for consumption by market-making trading systems.
- Developed software in Python to find errors in price computation delaying over 10 million quotes from going to the market.

Johns Hopkins Applied Physics Laboratory (APL) | Laurel, MD   June 2021 – August 2021
Software Engineering Intern – Force Projection Sector
- Engineered an anomaly detection & behavior prediction system for aircraft with C++ & Google Protocol Buffers.
- Built a front-end visualizer for flight data using ReactJS and TypeScript, and generated testing data with MATLAB.
- Led onboarding for new full-time employees to continue work on my software system due to its success in testing.

Brainwaive LLC | Huntsville, Alabama   September 2020 – March 2021
Software Engineering Intern - Ethar Augmented Reality
- Developed an augmented reality (AR) content management and delivery mobile app with C#, using the Unity platform.
- Integrated a REST API with the app for online AR content and designed a touch-based object manipulation interface.

Penn Electric Racing | Philadelphia, PA | www.pennelectricracing.com   January 2021 - Present
Software & Electrical Engineer (We build an electric racecar to compete in the Formula SAE International competition)
- Led embedded software (C++) & electrical design of a 112-cell battery management PCB with STM32 microcontrollers.
- Spearheaded onboarding program for 20+ rookies with a series of interactive presentations, projects, & design reviews.

Teaching Assistant – CIS120 | Philadelphia, PA   September 2021 - Present
Programming Languages and Techniques I – Functional (OCaml) & Object Oriented Programming (Java), Data Structures
- Led weekly recitations for 20+ students, graded assignments, facilitated code reviews, and held weekly office hours.

Projects

Projectile Locating and Tracking System   March 2022 – April 2022
C, C++, Python, OpenCV, AVR Microcontrollers, ESP8266 Microcontroller, JavaScript | [GitHub Repository](#) | [YouTube Video](#)
- Created a projectile tracking system to locate a moving projectile, point a laser at it, and display its location on an LCD.
- Wrote custom UART serial communication, servo motor control, and LCD graphics libraries for the ATmega328p MCU.
- Designed a computer vision program employing a two-camera stereo vision algorithm in OpenCV to locate projectiles.

Jazz Improvisation Bot   May 2022 – June 2022
Node.js & JavaScript, Express.js, MongoDB, AWS Lambda & EC2, HTML, CSS, Bootstrap | [Website Link](#) | [GitHub Repository](#)
- Built a full stack web app where users can create chord progressions over which my bot plays novel jazz improvisations.
- Devised an improvisation algorithm written in Node.js and running on AWS Lambda, providing users with numerous parameters to change generated improvisations. Created a JavaScript audio player and visualizer for the improvisations.
- Wrote a backend server in Express.js to manage encrypted account information and save user compositions in MongoDB.

Connect-4 AI and TCP Multithreaded Login Server   December 2020 – January 2021
Java, Java Swing, Java Socket Programming | [GitHub Repository](#)
- Engineered an AI for Connect-4 with the minimax algorithm and implemented a GUI for the game using Java Swing.
- Designed a multithreaded backend server for accounts validation and information storage using the TCP protocol.