Arnav Mehra

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EDUCATION

Purdue University, West Lafayette, IN — Dec 2024
Bachelor of Science in Computer Science — *GPA: 3.9/4.0*
Relevant Coursework: Software Engineering I & II, Data Structures and Algorithms (Java), Analysis of Algorithms, Information Systems (SQL), Security (C++), Cryptography, Operating Systems (ASM, C), Computation Geometry, Randomized Algorithms, Reasoning about Programs, Algorithmic Economics, Computer Graphics (C++, OpenGL), VR/AR (Unity, C#).

AWS Certified Cloud Practitioner — Validation Number: KRHKNR1C01B4QG5N

EXPERIENCE

Capital One — Feb 2025 - Present
Associate Software Engineer — *McLean, VA*
- Developed enhancements and features for the orchestrator and qualification services of Capital One's in-app messaging platform using Java Spring Boot and AWS (Fargate, ECS, EC2, DynamoDB, Lambda).
- Migrated an orchestration API from Spring MVC to Spring WebFlux, leveraging reactive programming to improve thread utilization and boost max throughput by 50%.
- Helped lead a platform-wide migration of secret managers by authoring and distributing PRs, scripts, and documentation, which resulted in reducing secret costs by 75% and compliance with company-wide deadlines.
- Cut logging costs by 50%+ across 4 APIs by making state update logs asynchronous, eliminating intermediary log-forwarding services, and filtering out unnecessary logs with Log4j.
- Demonstrated agility by transitioning to a shorthanded team and immediately driving lasting impact by securing leadership buy-in for architectural and performance enhancement roadmaps, automated testing audits and left-shifting, better load testing tools, coding standards, and code linting.

Purdue Computer Science — Aug 2024 - Dec 2024, Aug 2022 - Dec 2022
Instructor, CS 390: Web Application Programming — *West Lafayette, IN*
- Owned the design and delivery of a comprehensive course on full-stack web development for 100 students, covering HTML, CSS, JavaScript, React, Express.js, MongoDB, and web security.
- Delivered weekly lectures, hands-on assignments, and help sessions to promote student proficiency and engagement.

Alleo — Jun 2024 - Aug 2024
Software Engineer Intern — *Carmel, IN*
- Engineered widgets and internal libraries to enhance virtual collaborative whiteboarding and meeting software.
- Developed multi-user, synced-state widgets (checkboxes, timers, etc.), via HTML, SCSS, TypeScript, and WebSockets.
- Pitched and delivered new features, including a Babylon.js 3D model viewer showcased at InfoComm 2024.
- Accelerated migration from Fabric.js to an internal Solid.js whiteboard library by implementing advanced functionality such as drawing, text stylization, auto-scaling text, and reshapable sticky notes.

Purdue Computer Science — Aug 2023 - May 2023
Undergraduate TA, CS 381: Analysis of Algorithms — *West Lafayette, IN*
- Mentored 20 students weekly on algorithmic problem-solving, emphasizing classic paradigms and design strategies.
- Evaluated 300 students on dynamic programming, graph algorithms, complexity analysis, and reductions by grading assignments and designing quizzes (approx. 10 hours/week).

Deloitte — Jun 2023 - Aug 2023
Software Engineer Intern — *New York, NY*
- Collaborated with an agile team of 8 engineers to design and implement signup flows for Thomson Reuters products.
- Built interactive forms and FAQs with customer interaction tracking using React, TypeScript, CSS, Redux-Saga, Storybook, Jest, React Testing Library, and Adobe Experience Manager.

Rogo — May 2022 - Aug 2022
Software Engineer Intern — *Remington, IN*
- Developed core features for soil-sample shipment tracking software including label customization, QR code identification, and delivery verification with image uploads using JavaScript, React, Axios, Express.js, and AWS S3.

- Implemented client-server data replication with RxDB, IndexedDB, and GraphQL, ensuring data integrity for sample collection in remote areas with unstable networks.
- Migrated backend from AirTable to AWS Lambda and DynamoDB, enhancing scalability and lowering costs.

PROJECTS

Algorithmic Economics Research Paper, NeurIPS 2025   Nov 2024 - Present
- Developed novel algorithms and proofs to address problems in cake-cutting, the fair division of a divisible resource.
- Authored a paper with Professor Alexandros Psomas titled "On Hierarchies of Fairness Notions in Cake Cutting: From Proportionality to Super Envy-Freeness," which was accepted and published by NeurIPS.

Cake-Cutting Visualizer | React, AntDesign   Jun. 2024 - July 2024
- Built a visualizer for step-by-step execution of cake-cutting algorithms, with an eDSL for providing algorithms.

Inferring L-Systems | Julia, JuMP, Z3 Solver, C++   Nov 2024 - Dec 2024
- Ideated, implemented, and benchmarked various algorithms for inferring the underlying grammar of a L-system given a single generated string based on papers in program synthesis and similar L-system inference problems.

Programming by Example In VR for 3D Vector Functions | C#, Unity, Meta Quest 2   Jun. 2024 - July 2024
- Developed and implemented an algorithm for efficiently generating and scoring 3D vector programs against a user-provided set of input and output vectors using principles of program synthesis.
- Ideated a novel error metric aimed at adjusting error scores for drawing error, implementing automatic differentiation and gradient descent to compute it and conducting user tests to validate it.

L-System Visualizer | React, AntDesign, Three.js   Jun. 2024 - July 2024
- Implemented a 3D L-System visualizer, with a declarative eDSL for defining systems and drawing rules.

JavaScript Framework | JavaScript, TypeScript, Rollup.js, Nodemon, Node.js, Rust, Pest   May 2023 - Jan 2024
- Developed a JavaScript framework outperforming React v18 by 55%, Vue v3 by 18%, and Svelte v4 by 12%.
- Implemented static-site generation, dynamic hydration, fine-grained reactivity, and a DSL.

Chess Engine | C++   Jul 2021 - Present
- Built chess engine using the mini-max algorithm with alpha-beta pruning, move ordering, transposition tables with Zobrist hashing, and bitwise representation, reaching 55M positions/s evaluated and rating of 2100 on Lichess.org.

TECHNICAL SKILLS

Languages: Java, Go, Scala, JavaScript, TypeScript, HTML, CSS, C/C++, Rust, C#, Python, SQL, Bash.
Libraries/Frameworks: Spring Boot, React, Solid.js, Svelte, Angular, React Native, MaterialUI, AntDesign, Axios, Redux, RxDB, Three.js, Babylon.js, Storybook, Jest, React Testing Library, Express.js, Django, Flask.
Others: Git, AWS (Lambda, EC2, ECS, API Gateway, S3, DynamoDB, Elasticache), Redis, MongoDB, ArangoDB, Neo4j, Unity.