Ainesh Chatterjee

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Education

University of Maryland - College Park

Dual BS in Computer Science (Machine Learning) and Mathematics
December 2025 | GPA: 3.384
University, CS Departmental Honors; BS/MS; Dean's List

- **AI/ML**: Intro to: AI, ML, Data Science; Computer Vision; Graduate NLP
- **Math**: Calc III; Advanced Linear Algebra; Differential Equations; Advanced Calculus; Abstract Algebra; Mathematical Finance: Derivatives & Stochastic Models; Transform Methods
- **CS**: Quantum Computing; Algorithms; Data Structures; Computer Systems; Object-Oriented Programming; Organization of Languages
- **Stat**: Applied Prob&Stat; Probability Theory

Publications

- *Ipelets for the Convex Polygonal Geometry*, published at SoCG 2024, 2024
- *AgreeMate: Teaching LLMs to Haggle*, published at arXiv, 2024

Projects

Vizier (active) | Team Lead/ML Developer

- AI-powered platform for personalized newsletters
- (Full Pipeline: Content Aggregation → Monetization)
- Test-Time MoE agentic architecture for improved context retrieval via specialized document-expert LLM models
- MVP built for Bitcamp 2025 Hackathon

QSafe (active) | Solo Developer

- Open-Source Python/Rust Quantum-Safe password manager with lattice-based cryptography
- Secure Docker container core manager
- End-to-end encrypted CLI-container comm protocol
- MVP built for Bitcamp 2023 Hackathon

CoronaSafe | Team Lead/Backend Developer

- Python/Flutter app for global COVID-19 risk assessment
- Analyzed real-time foot traffic and urban density using a time-weighted algorithm for predictive accuracy
- **Award:** Congressional App Challenge Winner: 2021 District MD08
- **Recognition:** Guest Speaker at 2022 US Patent and Trademark Office APPLY Yourself event

Resourceful | Team Lead/Backend Developer

- Python/Flutter app that connected underrepresented students to resources using NLP-driven searches
- Implemented advanced NLP techniques (e.g. NLTK, Spacy, and Cosine/Wu-Palmer similarities)
- **Award:** Best Education Award: 2022 Blairhacks_5 Hackathon

Skills

- **Programming**: Python, C/C++, DevOps, Webhosting, Fullstack Development, APIs, Design Paradigms
  - Familiar: Java, Rust, Lua, MATLAB, Flutter/Dart, HTML5, CSS3, JavaScript, Assembly
- **ML/AI**: Un/Supervised Learning, Deep RL, Agentic LLMs, GraphRAG, MCP, Context Engineering, GANs
- **Data Science**: Statistical Analysis, Data Processing
- **Finance**: Brownian Motion, Black-Scholes, Arbitrage Pricing, Stochastic Calculus, Delta Hedging
- **Tools & Technologies**: Git, GitHub/Lab, Docker, SQL, Linux, Bash, WSL2, Google Agent ADK, Pocketflow, OpenAI API, LangChain, Neo4j, Agent2Agent, LiteLLM, FastAPI, HuggingFace, PyTorch, NumPy, Pandas, NLTK, Dask, Scipy, Plotly, Matplotlib, Spacy, Scikit-learn, Seaborn, TensorBoard, AWS SageMaker, BeautifulSoup, React, Flask, RESTful, ROS, PostgreSQL, Firebase, NeonDB, IBM Qiskit, Postman, Selenium, LaTeX, Powershell, Memory Profiler
- **Soft Skills**: First-Principles Problem Solving, Leadership, Technical Writing, Self-teaching, Iterative Experimentation

Experience

Johns Hopkins University Applied Physics Laboratory

Computer Science Intern - Interim Security Clearance
Force Projection Sector: Ocean Systems & Engineering Group
May 2024 - Aug 2024 | Laurel, MD

- **Implemented** iteratively enhanced Generative Adversarial Imitation from Observation (GAIfO) agents ***substantially outperforming baseline imitation models***
- **Authored** critical literature reviews on GAIfO and Generative AI, providing ***direct insights for future project strategies***
- **Developed** an optimized GAIfO variant, using core-architectural insights from a literature review, which outperformed all prior versions over long timeframes
- **Enhanced** GTRI's SCRIMMAGE mass-simulation framework with increased complexity and expert controller functionality
- **Revamped** GitLab Continuous Integration pipelines, boosting speed and efficiency by ***25% while addressing security vulnerabilities***
- **Optimized** project-wide Docker Image, used across all repositories, reducing pipeline build times by ***50% and increasing memory efficiency by 40%***
- **Led** winning team for sector Intern Challenge in developing a secure, non-GPS intra-campus navigation prototype

University of Maryland MIND Lab

Research Intern
Breathing Analysis Project
October 2023 - December 2024 | College Park, MD

- **Developed** an advanced visualization dashboard for efficient analysis of mass breath data
- **Designed** dataset structures for visualization and feature extraction in future work
- **Optimized** massive dataset-loading using Dask and multithreading by over ***400%***
- **Implemented** and evaluated supervised learning techniques for improved breath segmentation

University of Maryland CMNS

Student Researcher
Crowd Simulation
September 2024 - Present | College Park, MD

- **Exploring** application of non-Euclidean geometries
- **Applying** Transformers to crowd navigation, with focus on natural language goal-direction

University of Maryland CMNS

Lead Teaching Assistant
CMSC351H (Algorithms Honors)
Spring 2024 | College Park, MD

- **Co-designed and graded** homeworks, exams, and lecture material for 38 honours students
- **Conducted** weekly office hours, providing personalized guidance on advanced topics

Additional Qualifications

- **Certifications**: Complete Linear Algebra - Udemy; Algorithmic Toolbox - UCSD; Game Theory - Stanford
- **Awards**: National Merit; Dean's Scholarship; Eagle Scout; Congressional App Challenge Winner; ISKF Black Belt
- **Languages**: English (Native); Bengali (Native); Hindi (Intermediate); Spanish (Intermediate); French (Beginner)