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**: Graduate NLP; HRI/Embodied AI; Computer Vision;; Intro to: Multimodal DL, AI, ML, Data Science
- **Math**: Calc III; Advanced Linear Algebra; Differential Equations;; Advanced Calculus; Abstract Algebra;; Mathematical Finance: Derivatives & Stochastic Models;; Transform Methods; Numerical Analysis
- **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 | Team Lead/ML Developer

- AI-powered personalized newsletter platform; MVP built for Bitcamp 2025
- Test-time MoE agentic architecture improving context retrieval via document-expert LLMs

QSafe | Solo Developer

- Open-source Python/Rust quantum-safe password manager using lattice-based cryptography
- Secure Docker manager and end-to-end encrypted CLI–container protocol; MVP for Bitcamp 2023

CoronaSafe | Team Lead/Backend Developer

- Python/Flutter app for global COVID-19 risk assessment using time-weighted foot traffic and urban density analytics
- **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

- NLP-driven matching tool connecting underrepresented students to resources (NLTK, spaCy, semantic similarity)
- **Award:** Best Education Award: 2022 Blairhacks_5 Hackathon

Skills

- **Programming**: Python, C/C++, Fullstack Development, APIs, DevOps, Webhosting, Design Paradigms
  - Familiar: Java, Rust, Lua, MATLAB, Flutter/Dart, HTML5, CSS3, JavaScript, Assembly
- **ML/AI**: Transformers, Agentic LLMs, MCP, Context Engineering, DSPy, GEPA, GraphRAG, Deep RL, Supervised/Unsupervised Learning, Genetic Algorithms, GANs
- **Data Science**: Statistical Analysis, Data Processing
- **Finance**: Brownian Motion, Black-Scholes, Arbitrage Pricing, Stochastic Calculus, Delta Hedging
- **Tools & Technologies**: Git, GitHub/Lab, Docker, Linux, Bash, WSL2, Python, FastAPI, React, Flask, RESTful, PostgreSQL, NeonDB, Neo4j, LiteLLM, Claude Code SDK, MCP, Google Agent ADK, Google Agent2Agent (A2A), Pocketflow, OpenAI API, HuggingFace, PyTorch, NumPy, Pandas, Dask, NLTK, SciPy, spaCy, scikit-learn, Seaborn, Matplotlib, TensorBoard, Selenium, BeautifulSoup, LaTeX, PowerShell, Memory Profiler, ROS, IBM Qiskit, AWS EC2, AWS Fargate, AWS Lambda, AWS S3, AWS Bedrock, AWS SageMaker
- **Soft Skills**: First-Principles Problem Solving, Leadership, Technical Writing, Self-teaching, Iterative Experimentation
- **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)

Experience

Tilli Software

AI Engineering Intern
Edge:XDEX:Agent
July 2025 - Present | Remote

- **Built** an end-to-end MVP of Tilli Agent using Pocketflow and the Google Agent ADK to act in utility customer web portals
- **Designed** the Scrape2MCP paradigm to scrape arbitrary sites and extract structured info for API/browser actions, generating template-derived MCP servers with the Claude Code SDK
- **Architected** the Tilli MCP Super-Server as a shared tool 'store' for user agents
- **Optimized** agent deployment stack on AWS Bedrock Agentcore, ***increasing cache-hit rate; lowering p50 latency and token cost***
- **Devised** automated agent performance logging for asynchronous analysis
- **Leading** launch of Tilli Agent ***initially serving 150k+ users; planned rollout to ~3M across Tilli Software's client base***

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
- **Developed** an optimized GAIfO variant leveraging architectural insights that outperformed prior versions over long horizons
- **Enhanced** GTRI's SCRIMMAGE mass-simulation framework with increased scenario complexity and expert controller functionality
- **Revamped** GitLab CI pipelines, boosting speed and efficiency ***25% while addressing security vulnerabilities***
- **Optimized** project-wide Docker image used across repositories, reducing pipeline build times and memory footprint ***50% faster builds; 40% better memory efficiency***
- **Led** winning team for sector Intern Challenge delivering a secure, non-GPS intra-campus navigation prototype
- **Authored** literature reviews on SoTA Transformer-based models, unlocking ***direct insights for future project strategies***

University of Maryland MIND Lab

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

- **Developed** a visualization dashboard and dataset structures for large-scale breath-data analysis and downstream feature extraction
- **Optimized** dataset loading with Dask and multithreading ***400%+ faster throughput***
- **Implemented** supervised learning approaches for improved breath segmentation

University of Maryland CMNS

Student Researcher
Crowd Simulation
September 2024 - June 2025 | College Park, MD

- **Explored** applications of non-Euclidean geometries to crowd navigation and interaction
- **Applied** transformer-based models to language-directed crowd navigation

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 honors students; held weekly office hours for advanced topic support