

# 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, 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

## 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)

## 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 to maximize token cache hits on AWS Bedrock Agentcore, reducing latency and cost ***increased cache-hit rate; lowered 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