

# 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

## Projects

### OpenSkills (active) | Solo Developer

- Open-source, agent-framework-agnostic implementation of Anthropic's Skills protocol that achieves full parity with their closed-source, first-party-only version
- Matches and exceeds baseline skill activation by agents without manual prompting, by replacing the Anthropic `Skill` mcp-style tool approach with a clean CLI tool + AGENTS.md specification

### context-mcp (active) | Solo Developer

- Open-source collection of optimized context-gathering tools (ask-docs-agent, fetch-docs, fetch-site) for agents that minimize token burn and latency while maximizing relevant information retrieval
- fetch-docs tool outperforms Context7's MCP by wrapping their API to be more agent-friendly and reduce round-trip invocation to a single tool call
- fetch-site tool achieves 25-50% lower token usage than most agent CLIs default `WebFetch` tools by auto-saving extracted content locally so agents can read what they need vs forcing full reads + re-fetches

### climb-cli (active) | Solo Developer

- Open-source tool that auto-generates user-friendly TUI interfaces for almost any command-line program by extracting arg info and man pages
- Non-interactive mode for LLM agents enables easy learning of complex call-graphs and arg-structures for CLI tools, without guesswork or web searches
- Eliminates manual lookup of complex CLI arguments, reducing agent/human errors and improving usability

### 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

- Agent Infrastructure:** MCP, Kosong, LMCache, DSPy/GEPA, Claude Code SDK, Google Agent ADK/A2A, Pocketflow, LiteLLM, Context Engineering
- ML/AI:** Transformers, Agentic LLMs, RAG, Deep RL, Mechanistic Interpretability, GAlfO, PyTorch, HuggingFace
- Engineering:** Python, C/C++, Rust, Docker, Git/GitLab CI, FastAPI, React
  - Familiar: Java, MATLAB, ROS, Qiskit
- Cloud & Data:** AWS (Bedrock, SageMaker, Lambda, Fargate), PostgreSQL/NeonDB, Neo4j, Dask, Selenium/BeautifulSoup
- Quantitative Finance:** Stochastic Calculus, Black-Scholes, Delta Hedging
- Recognition:** Interim Security Clearance, Congressional App Winner, Eagle Scout, National Merit Scholar, Dean's Scholarship

## Experience

### Tilli Software

AI Engineering MTS

Applied Research:XDEX

July 2025 - Present | Hybrid

- Engineered** the Tilli Agent MVP (Kosong + DSPy + lastmileai/mcp-agent) to act autonomously on behalf of users, on any crawled site **at < \$0.01/task**
- Developed** site2mcp and leading the effort to extract structured data from arbitrary sites and generated template-derived MCP servers (Kosong + browser-use + Claude Agent SDK)
- Architected** a shared, multi-tenant MCP Super-Server as a centralized auth and tool/resource store across usecases; instrumented automated performance logging for post-hoc analysis and GEPA-optimization pipelines, **increased cache-hit rate; reduced p50 latency and token cost**
- Leading** Tilli Agent (tilli.ai) launch for an **initial 150k+ users; planned rollout to ~3M**

### University of Maryland CMNS

Student Researcher

Crowd Simulation

September 2024 - June 2025 | College Park, MD

- Investigated** non-Euclidean formulations for crowd navigation and interaction (Hilbert-ball/hyperbolic distance models; curvature-aware interaction costs)
- Applied** transformer-based models to language-directed crowd navigation, mapping natural-language instructions to motion goals and primitives

### 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

- Developed** an optimized GAlfO variant leveraging architectural insights that **improved long-horizon performance versus prior iterations that already outperformed baselines imitation models**
- Extended** GTRI's SCRIMAGE mass-simulation framework with **higher scenario complexity and expert controller functionality**
- Revamped** GitLab CI pipelines to remediate vulnerabilities and achieved a **~25% speedup and efficiency gains; ~50% faster builds; ~40% lower memory footprint for project-wide Docker base image**
- Led** the winning team for the sector Intern Challenge, delivering a secure, non-GPS intra-campus navigation prototype
- Authored** literature reviews on state-of-the-art Transformer models to inform future project strategies

### University of Maryland MIND Lab

Research Intern

Breathing Analysis Project

October 2023 - December 2024 | College Park, MD

- Optimized** dataset loading with Dask and multithreading **~400%+ higher throughput, with real-time dataset visualization capabilities for large-scale analysis and feature extraction**
- Implemented** supervised learning approaches for improved breath segmentation

### 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

## Publications

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