

# AYESHA SHAFIQUE

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## EDUCATION

### University of Wisconsin–Madison

Madison, WI

*M.S. in Computer Science (Fully Funded), GPA: 4.0/4.0*

*Expected May 2028*

- Coursework: Advanced Operating Systems, Advanced Databases, Artificial Intelligence
- Fellowship: **Meta Production Engineering (MLH)**, Summer 2026

### Lahore University of Management Sciences (LUMS)

Lahore, Pakistan

*B.S. in Computer Science, CGPA: 4.0/4.0, Top of Class, Dean's Honor List*

*May 2025*

## EXPERIENCE

### Trusted CI, NSF Cybersecurity Center of Excellence

Madison, WI

*Research Assistant, advised by Prof. Barton P. Miller | C, Linux, AFL++, GDB, gcc, clang, Docker*

*May 2026 – Present*

- Architected a **multi-agent system** that rebuilds software from documentation alone, orchestrating specialized coding, review, and verification agents to autonomously produce **12 Linux programs** (including **make**, **less**, **dash**) in **C**.
- Accelerated the black-box fuzzer, the original tool from **Miller et al.** that introduced fuzz testing, accelerating it **4×** with **parallel** input execution and fixing **resource leaks** from orphan processes left by fuzzed programs.
- Fuzz-tested the AI-written and human-written versions with the refined **black-box fuzzer** and coverage-guided **AFL++**, showing AI-written code matches or surpasses the reliability of its human-written counterparts.
- Diagnosed **10+ crashes and freezes** in **6** widely used **Linux** programs (**less**, **dash**, **ptx**, **tac**, **make** and **grep**, tracing each failure to the exact line at fault with **valgrind** and **GDB**, then submitting fixes upstream.
- Sped up **ptx**, the **Rust coreutils** text-indexing tool, **29×** (**10.02s to 0.34s**) and cut peak memory **30%** by collapsing quadratic prefix rescans into a single linear pass and deduplicating per-word filename clones, submitted patch upstream.

### CS 220: Data Science Programming

Madison, WI

*Head Teaching Assistant | Python, FastAPI, MySQL, Redis, Docker, Azure, GitLab CI/CD*

*Jan 2026 – May 2026*

- Scaled an **AI tutoring service** to a peak of **20K+ requests/day** by rearchitecting a single-threaded **Flask** backend as asynchronous **FastAPI** on **Azure Kubernetes Service**, with **Traefik** ingress and autoscaling application replicas.
- Reduced **LLM API costs 5×** by adding per-student **rate limiting**, **Redis** request caching for repeated queries, and an **authentication service** that gates the paid API to enrolled students, cutting duplicate and unauthorized requests.
- Closed a root-level **arbitrary code execution** vulnerability in the **Gradescope** autograder, where every student submission ran as root, by sandboxing each one under an **unprivileged user** to block answer-key leaks and grade tampering.
- Shortened average incident response time **80%** with monitoring and alerting (**OpenTelemetry** tracing, **Prometheus** dashboards) that flags latency spikes and failures within a minute.
- Eliminated manual deployments by building a **GitLab CI/CD** pipeline that tests every change, then ships it through **blue-green** releases that switch students to a verified copy with zero downtime.

### Awaaz-e-Sehat, Gates Foundation-funded Maternal-Health Platform

Lahore, Pakistan

*Research Software Engineer | Python, React Native, Whisper, PostgreSQL, Elasticsearch, GCP*

*May 2024 – May 2025*

- Cut clinician paperwork time **60%** with a **React Native** app and **Whisper** speech pipeline that turned spoken notes into **500+ structured medical records** at **96% accuracy** over a 7-month hospital deployment.
- Raised detection of dangerous pregnancy complications from **7% to 40%** of cases with an **Elasticsearch** service that checked patient answers against trusted medical guidelines, surfacing **300+ risk alerts** to doctors.
- Kept the platform stable under unpredictable clinic traffic with auto-scaling **microservices** on **GCP Cloud Run**, shipped via **GitHub Actions** with zero-downtime **blue-green** releases onto reproducible **Pulumi** infrastructure as code.

## PROJECTS

### Menstrual Health Chatbot | Python, LLM, RAG, AWS (EC2, DynamoDB)

2024 – 2025

- Developed a **WhatsApp LLM** chatbot for menstrual health education, grounding responses in an expert-curated **RAG** knowledge base to minimize hallucinations and deploying the backend on **AWS EC2** with **DynamoDB**.
- Evaluated the chatbot over a two-week deployment (**403 messages**), showing an expert-grounded **LLM** can be a trusted menstrual health resource in low-resource settings, published at **ACM CHI 2026**.

### Textish | Python, AsyncSSH, asyncio, Textual, pytest, mypy, GitHub Actions

Apr 2026 – Present

- Built **Textish**, a Python library that serves any **Textual** app over SSH via a custom terminal driver routing rendering, input, and resize events between isolated app instances and **AsyncSSH** channels, then re-architected it from subprocess-per-connection to a single **asyncio event loop** for **96×** lower memory and **4.3×** faster startup.
- Improved reliability under load with **idle-connection cleanup**, **backpressure**, and **public-key authentication**, shipped over **4 automated PyPI releases** via **GitHub Actions** CI running **unit and integration tests**.

### Open-Source Contributions | NVIDIA Sirius DB, Google Gemini CLI

- Added **string aggregation** to **NVIDIA Sirius DB** (**1K+ stars**, C++/CUDA GPU database), unblocking a full industry benchmark suite and fixing calculation bugs in overflow and empty-value handling (PRs **#124**, **#115**).
- Contributed **Ctrl+R history search** to **Google Gemini CLI** (**100K+ stars**), letting users instantly find and reuse past prompts, with cached incremental matching and a multi-line rendering (PRs **#5539**, **#4793**).

## TECHNICAL SKILLS

**Languages:** Python, C, C++, Go, TypeScript, JavaScript, Bash, Rust, CUDA, SQL

**Frameworks:** FastAPI, Flask, Node.js, Bun.js, React, React Native, Textual, AsyncSSH, gRPC, GraphQL, REST, WebSockets

**Tools & Platforms:** Unix/Linux, Docker, Kubernetes, Traefik, Pulumi, Redis, MySQL, PostgreSQL, Elasticsearch, MongoDB, DynamoDB, AWS, Azure, GCP, Git, GitHub Actions, GitLab CI/CD, GDB, AFL++, OpenTelemetry, Prometheus

**Concepts:** Object-Oriented Design, Data Structures & Algorithms, Operating Systems, Distributed Systems, Microservices