Mahmudul Hasan

Principal Systems Architect & Forward Deployed AI Engineer

15+ Years Programming Journey (Since 2009) · Autonomous Multi-Agent Systems · Frontier LLM Evaluation (MCP/RLHF) · Reverse Engineering

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⚡ **Hardware & Production Infrastructure:** Apple Silicon MacBook Pro (macOS Sequoia) · Bare-Metal Linux Worker Cluster (30+ Containers) · RP2040 Hardware Lab · ESP32-C3 & ESP8266 IoT Station · Studio Audio (GK74 Pro)

PROFESSIONAL SUMMARY

Polymathic **Principal Systems Architect & Forward Deployed AI Engineer** with a continuous **15+ year software development journey starting in 2009 (Grade 9 with Visual Basic 6 and native Win32/x86 architectures)**, followed by 10+ years of enterprise production engineering. Deep multi-disciplinary expertise bridging frontier foundation models (OpenAI, Anthropic, Google DeepMind, DeepSeek) with real-world enterprise hardware, IoT, and high-concurrency systems. Pioneer in deterministic multi-agent autonomous harnesses with specialized subagent fleets, agentic tool layers (**Model Context Protocol [MCP]**, pgvector semantic search), binary/Android reverse engineering, and low-level firmware engineering (RP2040, ESP32, C/C++). Supervised bare-metal Linux infrastructure (Celery task queues, Redis, Suricata IDS/IPS, launchd daemons). Demonstrated an unbroken **100% first-pass evaluation benchmark record on frontier model rubrics**. Available immediately for Senior/Staff/Principal engineering and architecture contracts.

TECHNICAL MASTERY & CORE COMPETENCIES

1. Frontier AI Model Evaluation & Model Context Protocol (MCP): Frontier Models (GPT-4o, o1, o3-mini, Claude 3.7 Sonnet, Gemini 2.0, DeepSeek R1/V3, Llama 3.3), **Model Context Protocol (MCP)**, Function Calling, Portkey AI Gateway Orchestration, Hybrid RAG (pgvector 384-dim dense + BM25 FTS), SWE-bench Code Verification, RLHF Pairwise Preference Auditing (>85% What/Where/Why Action Density, Strict Anti-Silence Narration).

2. Autonomous Multi-Agent Systems & Deterministic Workflows: Distributed multi-agent frameworks coordinating task-specialized subagent workers for concurrent code validation, automated security auditing, and continuous verification. Machine-wide process governance ledger, self-healing process supervision (launchd daemons), dynamic token budget governors, multi-model gateway fault tolerance, Chrome CDP + macOS AX perception loops.

3. Systems Programming & Polyglot Foundations (15+ Years): Visual Basic 6 (foundational programming in 2009, native Win32, event-driven loops), **Python** (AsyncIO, FastAPI, PyTorch, Scikit-learn), **Go / Golang** (high-concurrency networking, microservices), **Rust** (Tauri v2), **C/C++** (11/14/17, firmware), **PHP / Laravel** (10+ years), **Swift & Kotlin** (native iOS/Android bridges), **TypeScript / React 19 / Next.js 15**, **SQL** (PostgreSQL, pgvector, MySQL, SQLite).

4. Vulnerability Research, Reverse Engineering & Red-Teaming: Android APK Bytecode & Smali Reversing (JADX, APKTool, Baksmali), Native Binary (.so) & White-Box Cryptography (Ghidra, IDA, radare2, KonaShield/KonaWbc), Dynamic Instrumentation (Frida hooks), Cryptanalysis (Triple-DES / DESede, AES, salt extraction), 802.11 Layer-2 Management Frame Injection (raw deauth, beacon floods, captive portal), AI Safety Red-Teaming (TAP, FlipAttack).

5. Embedded Hardware, Microcontrollers & IoT: RP2040 Raspberry Pi Pico USB HID Electrical Signal Synthesis (TinyUSB, CircuitPython, Neuromuscular Gaussian Physics), Espressif SoCs (ESP8266 lwIP NAPT bridge, ESP32-C3 SuperMini RISC-V), LoRa Sub-GHz RF (SX1278 433MHz, CAD listening loops), Apple Find My BLE (OpenHaystack), Deep-Sleep MPU6050 Interrupt Wake, CoreAudio HAL Darwin Daemons.

6. Distributed Infrastructure, Bare-Metal & Cloud: Linux Worker Cluster (30+ Docker containers, Celery distributed task queues, Redis, Flower), Suricata Network IDS/IPS, ntopng real-time traffic analysis, go2rtc ultra-low latency WebRTC/RTSP gateway, Cloudflare Zero-Trust Tunnels (cloudflared apex edge ingress without open ports), macOS launchd SSOT process ledger (57 daemons, self-healing flap guards).

PROFESSIONAL EXPERIENCE

Senior Forward Deployed AI Engineer & Evaluation Specialist · Frontier AI Research & Evaluation Labs
Jan 2024 – Present | US Remote Contract

- **Frontier Model Evaluation & Benchmarking:** Authored, audited, and benchmarked multi-domain technical tasks spanning **Cybersecurity, Quantitative Finance, Cloud Infrastructure (K8s), and Software Engineering** under strict automated quality criteria.
- **SWE-Bench & Security Red-Teaming:** Conducted granular code auditing and adversarial testing across Python, C++, Go, and TypeScript—detecting API hallucinations, algorithmic race conditions, memory leaks, and prompt injection vectors (TAP/FlipAttack).
- **Ground Truth & CoT Curation:** Authored verified ground truth datasets and complex Chain-of-Thought reasoning trajectories, sustaining >85% cognitive action density (**[Screen Area] + [Window Panel] + [Action Verb] + [Target] + [Purpose]**) with 100% first-pass reviewer approval.
- **Autonomous Telemetry & Execution Harnesses:** Built bespoke recording and verification harnesses on Apple Silicon (Web Audio silence guards, ScreenCaptureKit telemetry, Clerk JWT sync, and local PWA teleprompter harnesses) guaranteeing zero dropped cues, strict live-typing compliance (≤25%), and flawless quality-control (QC) delivery.
- **Hardware-Level Anti-Detection Automation:** Developed an RP2040 Raspberry Pi Pico USB HID hardware relay with dual-Gaussian typing latency physics (mean 110ms) and cubic Bézier mouse paths, generating authentic electrical `kCGEventSourceStateHIDSystemState` signals that bypass OS synthetic event detection.

Staff Systems Engineer & Automation Architect · Slicesoft / US Enterprise Platforms
May 2023 – Aug 2024 | US Remote Contract

- **High-Throughput Microservices:** Architected and maintained distributed backend APIs and automation pipelines in Go, Python, and PHP/Laravel, serving US enterprise platforms with 99.9% uptime.
- **Data Modeling & Vector Optimization:** Designed relational schemas and vector search pipelines (PostgreSQL + **pgvector**), cutting query latency by 45% across multi-million record datasets.
- **Contract-Driven API Integration:** Established OpenAPI/Swagger specifications and contract-driven interfaces bridging frontend React teams and backend data engines with zero contract mismatches.
- **Automated Quality Assurance & CI/CD:** Built Dockerized testing suites (PyTest, Jest) and staging-to-production deployment pipelines, reducing regression rates by 38% and cycle times by 50%.

Full-Stack & Systems Developer · Global Enterprise Remote Contracts
Sep 2022 – Apr 2023 | Remote

- **Scalable Web Platforms:** Delivered full-stack web platforms and administrative portals utilizing React, Node.js, and modern relational databases with strict modular architectures.
- **High-Concurrency Automation:** Developed asynchronous data ingestion pipelines, proxy rotators, and webhook notification services handling thousands of daily events.
- **US Founder Collaboration:** Partnered directly with US founders and engineering directors to translate product roadmaps into verified, production-ready deliverables on schedule.

Senior Frontend & Data Visualization Engineer · C4ADS (Center for Advanced Defense Studies) — May 2017 – Jan 2019 | Washington, D.C. / FL (Remote)

- **Geospatial Intelligence Dashboards:** Built interactive data visualization applications mapping complex global illicit supply chains and multi-node ownership graphs using React, Next.js, Redux, and Mapbox SDK.
- **Performance Profiling:** Optimized large-scale client-side state management and SVG/WebGL rendering, slashing bundle size by 35% and improving LCP/TTI metrics by 50%.

Early Systems & Commercial Software Engineer · Freelance & Independent Platforms — 2012 – 2016 | Remote & Independent

- **Desktop & Systems Development:** Built standalone desktop applications and automation tools evolving from early Visual Basic 6 origins into native C/C++ utilities, PHP/MySQL transactional systems, and network communication clients.

FEATURED PROJECTS & PRODUCTION SYSTEMS

1. Autonomous Multi-Agent Orchestration & Subagent Execution Engine: Distributed multi-agent autonomous execution harness supervising concurrent specialized sub-agent workers for continuous code verification, security auditing, and system health monitoring. Engineered a machine-wide process ledger with self-healing process supervision (`launchd` system daemons), automated rate-limit recovery across multi-model gateways (OpenAI-compatible), and low-latency browser/desktop telemetry integration (Chrome CDP, macOS Accessibility API, hardware-level USB HID synthesis) with zero synthetic event detection.

2. DVRify — AI Smart Video Surveillance SaaS & Gateway: Turnkey Forward Deployed AI pipeline transforming any legacy CCTV/DVR/NVR hardware into intelligent surveillance. Ingests RTSP/ONVIF streams via **go2rtc WebRTC gateway**, executing live person/face detection, **PostgreSQL + pgvector** spatial vector search, and automated real-time alert dispatching.

3. VeloTrack & Shikho Mobile Engineering Platforms: Production offline-first vehicle fleet telemetry suite (Flutter 3.x, Dart 3.11, Shorebird 2.0 OTA instant code push, native **Swift CoreBluetooth / Kotlin GATT** bridges, Fastify, PostGIS) with embedded **10-50Hz Goertzel DSP frequency classification** to differentiate engine vibration from pedestrian movement (121 tests); alongside high-scale educational video streaming architecture.

4. Bare-Metal Distributed Worker Node & Ingress Mesh: High-availability bare-metal Linux server cluster hosting 30+ production containers: Celery distributed worker task queues, Redis, Flower monitoring, **Suricata Network IDS/IPS**, Portkey AI Gateway, Model Context Protocol (MCP) servers, and zero-trust Cloudflare edge ingress tunnels.

5. RP2040 Pico USB HID Hardware Stealth Relay: Physical microcontroller synthesizer (RP2040 CircuitPython/TinyUSB) spoofing Apple Magic Keyboard descriptors. Generates electrical D+/D- bus signals with dual-Gaussian typing physics (mean 110ms) and Bézier mouse paths to bypass kernel-level synthetic automation taps.

6. BikeGuard Long-Range IoT & apkLab Reverse Engineering Suite: Embedded hardware systems: ESP32-C3 SuperMini with 2-10km long-range **LoRa SX1278 (433MHz)** RF alarms, Apple Find My OpenHaystack BLE, and deep-sleep MPU6050 EXT0 wake (0.3-0.5mA); paired with automated 8-phase Android reverse engineering pipeline auditing native `.so` boundaries and decomposing Triple-DES ciphers.

EDUCATION & ACADEMIC FOUNDATION

B.Sc. in Computer Science & Engineering (Applied Systems Practice) · Rajshahi University / Core Engineering Foundation — **2016 – 2020 (Graduated)**

Core coursework & continuous practice: Systems Architecture, Operating Systems, Cryptography, Embedded Systems, Network Security, Database Systems, Algorithmic Analysis.

VERIFIED FRONTIER AI CERTIFICATIONS

Mastering Model Mechanics — Mercor Academy · Verify: MRC-2026-VZQDFBSU — **Nov 2026 (Certified)**
Introduction to Agents — Mercor Academy · Verify: MRC-2026-WRDCKBGK — **Oct 2026 (Certified)**

CODING PROFILES, VERIFIED LINKS & AVAILABILITY

Coding Profiles: GitHub: github.com/bdlogicalerror · Portfolio: bdlogicalerror.github.io · LinkedIn: linkedin.com/in/bdlogicalerror
Availability: Immediate availability for 40+ hrs/week. Full flexibility across US Eastern (EST), Pacific (PST), and European (CET) timezones.
Languages: English (Full Professional Working Proficiency — 10+ years daily collaboration with US engineering teams), Bengali (Native).