

Piyush Utkar

Systems / C / Low-Level Engineer

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SUMMARY

Self-taught systems engineer with a published 3-year C / GPU roadmap (gpu-engineering) and shipped projects across memory, processes, and tooling. Production-quality C11 libraries with test suites, microbenchmarks, public APIs, and CI on Linux + macOS. Comfortable reading x86-64 assembly, profiling with perf/valgrind/ASan, and reasoning about cache lines, virtual memory, and OS interfaces (fork/exec/wait, pipe, mmap, dup2). Also ship real tooling in Python and Node — quant engines, exchange CLIs, and async scrapers — with the same test-driven discipline.

SYSTEMS PROJECTS (C)

pipe-shell — POSIX-ish command interpreter 2026

C11 · POSIX · fork/exec/pipe · make · GitHub Actions

- Full parser + executor: pipelines, input/output/stderr redirection (incl. multi-redirect per stage, 2>, append), backgrounding, cd / exit.
- Library API (shell_parse, shell_run) reusable from other C programs; 62 assertions across 17 test cases.
- Live editorial playground at pipe-shell.404piyush.me; CI matrix runs Linux + macOS x gcc/clang.

arena-allocator — bump arena memory allocator 2026

C11 · mmap · 16-byte aligned · 143 assertions

- Single mmap region, O(1) arena_alloc, O(1) arena_reset, OOM-safe; high-watermark tracking.
- Benchmarks: ~450M ops/s on Apple M-series, 5–14× faster than malloc for small allocations; randomized fuzz vs. Python reference.

bst-library — generic binary-search tree 2026

C11 · void* payloads · comparator-based · 74 assertions

- Generic over key (caller-supplied comparator) with optional caller-supplied allocator hook; the library never calls malloc.
- ~3.5M insert/s, ~4.5M find/s; documented ARCHITECTURE + planned AVL variant.

gpu-engineering — 3-year C / GPU roadmap 2025–2026 (ongoing)

C · Assembly · Make · per-week notes & labs

- Public roadmap tracking every week: source → process, data representation, x86-64 assembly, stack vs heap, valgrind/ASan, virtual memory, fork/exec, pipes, custom allocator, mini shell.
- Standalone projects above are month-capstones from this curriculum. 273 passing assertions across the standalone set.

SYSTEMS-ADJACENT PROJECTS (PYTHON / NODE)

primebot — Binance Futures Testnet CLI 2026

Python 3.10+ · HMAC-signed REST · ruff · mypy · pytest · GitHub Actions

- MARKET / LIMIT / STOP_LIMIT / OCO / TWAP order routing with strict input validation, secret-scrubbing log filter, and atomic OCO rollback.
- 155 tests, 92% coverage on bot/; CI on Python 3.11 / 3.12 / 3.13.

discord-trader — ICT-based futures trading system 2025

Python · MT5 · Discord.py · OpenAI · SpotGamma · FinBrain · TradingView webhooks

- Multi-confluence A+ filter (MSS + OB + FVG + Lux Algo + SpotGamma + FinBrain + macro), ATR volatility gate, spread/ping execution guard, 1%-per-trade risk + 4% daily drawdown kill switch.
- Dynamic slippage, retry logic, equity trailing lock, session limits (NY max 2, Asia max 1). Backtester, performance export, health checks.

ninjatrader-bot — NinjaTrader execution CLI 2026

Node.js (ESM) · market server · algo sim · trade reports

- Account balance / place-order / signals / live-signals / auth-test endpoints; algo-sim and trade-report scripts included.

ES-Futures-Bot — SPX market-internals quant engine 2025

Python · unittest

- Dual-filter SPX automation based on market internals + price action; VIX-aware dynamic thresholds covered by unit tests.

Python 3.12 · uv · Typer · Rich · instagrapi · httpx · pydantic-settings · keyring · cryptography · pytest

- Stories / highlights / posts / reels / single-URL / batch modes with 2FA (TOTP/SMS) prompts and Fernet-encrypted session in macOS Keychain.
- Parallel async downloads with progress, resume-by-content-hash, ffmpeg DASH merge; layered config (defaults → TOML → env → CLI).

SKILLS

C / low-level	C11, POSIX (fork/exec/wait, pipe, dup2, mmap, signal), x86-64 assembly reading, Make
Memory & data	Custom allocators, arena / bump, virtual memory, ASan, valgrind, perf, cache-aware code
Testing	Custom assertion harnesses, randomized fuzz vs. reference, microbenchmarks with reproducible runs, CI matrix Linux/macOS × gcc/clang
Tooling	git, GitHub Actions, gdb, strace, ripgrep, Make, Docker
Python	asyncio, httpx, instagrapi, Typer/Rich, pydantic, cryptography, ruff, mypy, pytest, uv
Node / TS	ESM, HMAC signing, REST clients, webhook handlers, MT5 integration, Discord bot SDKs
Trading domain	ICT concepts (MSS/OB/FVG), ATR, CVD, risk/R frameworks, equity trailing locks, drawdown kill switches

OPEN SOURCE

- github.com/404Piyush/gpu-engineering (roadmap) · [/pipe-shell](#) · [/arena-allocator](#) · [/bst-library](#)
- [/primeTrade-demo-bot](#) · [/instagramvault](#) · [/discord-trader](#)
- Live pages: [pipe-shell.404piyush.me](#) · [arena-allocator.404piyush.me](#) · [bst-library.404piyush.me](#)

Self-taught. References and verified client deliverables available on request.