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Summary

Computer engineering student building correctness-heavy software across protocol tooling, systems, verification, and machine learning. Work includes upstream Linux kernel, Tetragon, and Pyrefly contributions, a BIP 352 differential harness that helped surface Silent Payments edge cases, and shipped tools for study, document retrieval, and public-service translation.

Selected Work

SP-DIFFER

2026

Protocol Tooling / Correctness and Verification

- Built a differential harness for BIP 352 Silent Payments with a native runner, CLI, reporter, semantic adapters, regression fixtures, fuzzing, benchmarking, and release-verification lanes.
- Used the harness to reduce and report order-dependent edge cases in `spdk` and `bdk-sp`; both projects acknowledged the bug class upstream, and one reduced case later became merged BIP-352 test-vector coverage.

PaperSorted

2026

Static Search / Document Retrieval

- Built a static exam-paper archive for Kathmandu University with subject search, program-aware browsing, and inline PDF viewing across 561 subjects and 2,792 papers.
- Modeled 17 program tracks and 138 semester groupings, then generated static manifests and search data so retrieval stays fast without introducing a backend.

ZK Guardian

2025 – 2026

Privacy Systems / Healthcare

- Built a privacy-first healthcare prototype spanning React Native, Express, Circom, Solidity, and FHIR R4 to verify clinician access with zero-knowledge proofs without exposing patient identity on-chain.

SANAD

2026

Public-Service Translation / Hackathon-Winning Product

- Built a trust-first document translation tool with FastAPI, React/Vite, scoped memory, protected-entity checks, deterministic risk flags, human review, and export/feedback-pack workflows.
- Placed 1st in the Google TMT Hackathon 2026 File Translation Tool Track as team SPAN, a two-person team building under KU ILPRL's Google-supported TMT project.

AXIOM-4

2025 – 2026

Computer Architecture / Verification

- Built a 4-bit RISC-inspired microprocessor in Verilog with banked memory, a custom ISA, assembler tooling, and simulation/verification through Icarus Verilog and GTKWave.

Upstream Contributions

- **Linux kernel** | 2026: 3 patches in mainline Linux and 4 additional patches in `linux-next/subsystem` trees, including a Bluetooth SSP passkey-handler UAF fix, KUnit tooling, `cmdline` and `seq_buf` regression coverage, `printf IPv6` tests, and an IIO DMA initialization fix marked for stable.
- **cilium/tetragon** | 2026: Merged a `kprobe` return-path validation fix for unsupported `returnArgAction` values, adding regression coverage and carrying the clarified semantics through CRDs, docs, vendored schema copies, and examples.
- **facebook/pyrefly** | 2026: Merged a descriptor-semantics fix for stub and interface declarations, adding regression coverage for inherited `.pyi` descriptors and reducing real-world false positives in `mypy_primer` results.

Education

Kathmandu University

B.E. in Computer Engineering | Expected Apr 2028

Skills

Languages: TypeScript, Python, C++, JavaScript, SQL, Verilog

Systems: React/Vite, Node.js, Express, PostgreSQL, Redis, MongoDB, Docker, Linux

Tooling: Socket.IO, libsodium, KUnit, EasyOCR, Tesseract, Icarus Verilog, GTKWave, Git, Make