Samuel Tam `@usertam`

Kernel bypass, high-throughput networking and low-latency systems.

https://usertam.dev
hello@usertam.dev

Experience

- **Junior Linux Infrastructure Engineer, *prev. Engineering Intern*** — **Apr 2025–Present**
  ExpressVPN / Kape Technologies — Hopewell Centre, Wan Chai
  - Wrote the 10 Gbps+ *Generic Segmentation Offload (GSO)* prototype for the *Lightway* protocol.
  - Implemented end-to-end IPv6 support for *Lightway*, merging with existing IPv4 infra on *TrustedServer*.
  - Re-architected DNS filtering *Threat Manager* to evaluate and recompile regex lists from 30+ to 5 minutes.
  - Co-maintain *TrustedServer*, architected deployments end-to-end, and signed off weekly releases.
  - *Spoke* at *NixCon 2025* on *TrustedServer* and Nix, also represented ExpressVPN at *FOSSASIA 2026*.
- **Free and Open-Source Software Developer** — **May 2022–Present**
  A fellow NixOS/Nixpkgs maintainer. — GitHub PRs
  - Develop and maintain software used in production and by the wider community, e.g. *cloudsmith-cli*.
  - Focus on reproducible builds, but also go the extra mile to fix e.g. *ABI incompatibility* and *C++ crash*.
  - Ranked in the top 100 most active GitHub committers in Hong Kong, according to *https://committers.top/*.
- **Honorary Advisor, *prev. UG Representative and Executive Committee*** — **Apr 2023–Present**
  The Computer Science and Engineering Students' Society, HKUSTSU — HKUST, Clear Water Bay
  - Hosted dept. events and credit-bearing talks, like *Developing with GitHub* and *The Unix Philosophy*.
  - Now to oversee executive operations, and provide strategic guidance to the student society.
  - Provided technical mentorship and career guidance to students across departments.

Projects

- **Embedded Linux Replacement for reMarkable 2 · i.MX7D on ARMv7** — **September 2025**
  Reproducible Nix-built kernel and userland, deployed live via `kexec`. — Repository

  Produces a minimal statically-linked `musl` userland from Nixpkgs, resembling a standard GNU userland; alongside a patched Linux 5.4 kernel with custom device tree modifications (UART rerouting on the pogo pin) and binutils/GPU driver compatibility fixes for the downstream fork.

  Tailscale is baked in with native `tun` networking, exposing the tablet's web UI over a private network without USB tethering. Fully reproducible via Nix flakes; the resulting kernel image is loadable via `kexec` for live, in-place kernel replacement without reboots or reflashing.
- **LLVM Cross-Compile Toolchain · 4 build stages in 8h+ build time** — **June 2024**
  Self-optimising toolchain built with PGO, for embedded kernel development. — Repository

  Weekly multi-stage build of a *latest LLVM tip* cross-compilation toolchain. Targets `x86_64` and `aarch64`, and incorporates ThinLTO, PGO and BOLT using a Linux kernel defconfig build as the profiling workload.

  The pipeline runs 4 sequential LLVM builds: bootstrap → instrumented → profiling → PGO-optimised final, demonstrating how PGO requires the compiler itself to be compiled twice with a representative workload profiled. Distributes a portable binary tarball with relative `RPATH` to avoid glibc version pinning.
- **Android Kernel Development · 1.8k+ commits backported** — **September 2021**
  I asked, "What if you can run `dockerd` on your armv8 phone natively?" — Repository

  Maintained a Linux 4.4 kernel tree for OnePlus 5T, forked from LineageOS and rebased onto the latest stable, then onto CIP *Super-Long-Term Stable* branch for sustained backports. Tracked and merged linux-stable across 13+ releases, sifted through thousands of commits across Qualcomm's Snapdragon trees to identify fixes applicable to the MSM8998; resolving merge conflicts where upstream code paths diverged.

  Beyond stability, the defconfig was extended to enable e.g. namespaces, cgroups, that were absent from the vendor baseline, then bootstrapped a fully working container stack on Android with a read-only rootfs.

Technical Skills

- **Programming Languages**
  C · C++11/17 · Rust · Python 3 · Go · Nix · Shell (bash/mksh)
- **High-Performance Computing / Low Latency**
  Kernel bypass (DPDK, XDP) · eBPF · io_uring · CPU affinity/isolation · NUMA-aware allocation · SIMD · hugepages · zero-copy with I/O scatter · cache line optimization
- **Operating System / Kernel Internals**
  Sysctl tuning · namespaces · seccomp · kprobes · uprobes · tracepoints · epoll · eventfd
- **Networking / Protocols**
  TSO/USO/GSO/GRO · TCP coalescing · IP checksum · eBPF steering · TCP congestion control · D/TLS 1.3 · QUIC · SR-IOV · macvlan · veth · nftables
- **Concurrency / Memory Model**
  Lock-free queues · SPSC/MPSC ring buffers · mutexes · futex · spinlocks · atomics · memory ordering · RCU · shared memory IPC
- **Profiling / Tracing**
  perf · flamegraphs · valgrind/callgrind · bpftrace · strace · ltrace · ftrace · tcpdump
- **Building / Toolchain**
  LLVM/Clang · PGO/LTO/PLO · Nix/NixOS/Nixpkgs · cross-compilation · static linking · bindgen

Certifications

- **AWS Community Builder, with 3× AWS Certified** — **January 2025**
  LinkedIn
  - AWS Certified SysOps Administrator – Associate (SOA-C02)
  - AWS Certified Cloud Practitioner (CLF-C02) & AWS Certified AI Practitioner (AIF-C01)

Education

- **The Hong Kong University of Science and Technology** — **July 2025**
  Bachelor of Engineering in Computer Engineering — Clear Water Bay
  - Advanced Deep Learning Architectures
  - Competitive Programming in Cybersecurity II
  - Design and Analysis of Algorithms
  - Modern Compiler Construction
  - Honors Object-Oriented Programming and Data Structures
- **The University of Wollongong College Hong Kong** — **July 2022**
  Distinction, Associate of Science in Information Systems Development — Tai Wai