Vishrut Sachan

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Education

Manipal Institute of Technology — Manipal, KA
B.Tech in Computer and Communication Engineering — *2023 – 2027 (Expected)*

Skills

Languages: C++, Rust, C#, Python, Java, TypeScript, JavaScript, SQL, CUDA C
Systems & Graphics: CUDA, OpenMP, multithreading, Qt6, RISC-V, QEMU, OpenGL/GLFW, Intel OIDN
ML & AI: PyTorch, LightGBM, Hugging Face Transformers, timm, scikit-learn, pandas, Polars, RAG, LLM agents
Web & Backend: ASP.NET Core, EF Core, React, Node.js, Express, FastAPI, PostgreSQL, Prisma, SQLite, Redis, REST, SSE
Tools: Git, GitHub Actions, CMake, Linux, Blender
Core CS: Data Structures & Algorithms, OOP, Operating Systems, DBMS, Computer Networks

Experience

Engineers India Limited (EIL) — New Delhi, India
Software Developer Intern | C#, ASP.NET Core, EF Core, PostgreSQL — *May 2026 – July 2026*

- Built a **RAG assistant** for the internal employee dashboard over CGHS reimbursement rules and leave policy: hybrid trigram and vector retrieval fused with **Reciprocal Rank Fusion**, served through an **SSE-streamed Gemini chat** with cache-backed confirmation gates and grievance/claim-status tools.
- Developed a **role-based manager module** for grievance and medical-claim approval workflows.
- Moved credentials into user-secrets and added **defence-in-depth validation** at the API and database layers.
- Cut page load times across the **salary, allowance and attendance** modules by compiling Tailwind at build time and **parallelising** each view's database queries.

VARISE, MIT Manipal — Manipal, KA
Blender Head — *March 2024 – Present*

- Led the end-to-end **3D and VR pipeline** for two production projects, an ASD treatment tool and a VR simulator; the team placed **Top 8 of ∼2,000** at the XR Creator Hackathon (Nov 2024 – Mar 2025).
- Built a Blender curriculum, mentoring **100 participants** as technical lead across modelling, shading and rendering.

Achievements

- **Top 5% of 10,000+ teams**, Amazon ML Challenge 2026 (0.987 macro F0.5, team of 2).
- **Top 8 of ∼2,000 teams**, XR Creator Hackathon (2024–25).

Open Source Contributions

40 merged PRs plus 2 patches applied upstream by maintainers.

Blender *(3D creation suite, C++)* — 4 merged

- **VSE animated strips** (#164862): animated color and text strips stopped updating in the Video Sequencer. Traced a **cache-invalidation regression** to commit `8a0622ac682` and cleared the stale source images.
- Also fixed Clear Offset not updating attached transitions (#164936), compositor dither staying after the backdrop is turned off (#164711) and the Node Editor sidebar missing in old files (#164790).

RPCS3 *(PlayStation 3 emulator, C++20/Qt6)* — 9 merged

- **ISO metadata cache** (#18546): replaced a full ISO 9660 directory-tree walk per disc image, run twice per game per launch in the scanner and again in the icon loader, with a stat and **three cached reads**. Entries hold the SFO, raw icon bytes and resolved paths under an FNV-64 stem, invalidate on mtime and commit atomically; a corrupt cached SFO falls back to a live read.
- **Multi-game collection discs** (#18571): multi-game ISOs were unbootable past the first title. Enumerated sub-game directories and threaded a game-dir field through the game list, cache keys and EBOOT resolution so each title boots on its own; follow-ups fixed the cache bypass and icons (#18683, #18693).
- **PR auto-labeling CI** (#19630): GitHub Actions workflow labelling PRs from titles and linked issues, with an allowlist built from label agreement on 500 merged PRs. Replayed on those PRs, **108 of 123** labels matched what maintainers applied.
- **Overlay trophy sorting** (#18965) with four controller-cycled modes, and reorderable game-list columns (#18492).

PrismLauncher *(Minecraft launcher, C++/Qt6)* — 23 merged

- **Multiple instance directories** (#5827): instance discovery across several roots with cross-root symlink detection. Group storage was redesigned mid-review to one consolidated file; shipped the **migration** (#5894) so upgrading users kept their groups, a destination picker (#5870) and collision-free folder naming (#6110).
- **Non-blocking world loading** (#5845): the reported cause was already fixed; traced the real stall to a second caller on every settings-dialog open and moved NBT parsing to the thread pool. Dialog open fell **109 ms to 26 ms** across 82 worlds.
- **Features**: a **Launch As** account submenu (#6142), a **persistent global playtime counter** that survives instance deletion, with a one-time migration from existing instances (#5881), and world-import progress.
- **Fixes**: native extraction failing in symlinked instances, by resolving the canonical path before libarchive's secure-symlink check (#6202); a mods-tab crash from stale signal connections (#5707); broken shortcuts after renaming (#5816).
- **Automation**: copies priority and complexity labels from linked issues onto PRs without overwriting maintainers' (#6139).

fish-shell *(command-line shell, Rust)* 2 applied upstream

- **Stale `$PWD` after the cwd is moved** (411a432): `cd .`, `cd ..` and relative completion failed once the current directory was renamed. The builtin now **recovers the kernel's real cwd**; bisected the cause to a refactor that dropped the parser's cwd fd.
- Git completions now list recent commits first for `rebase --interactive` (467b03d).

Other projects

- **BlueMap** *(Java)*: fixed water **z-fighting** on waterlogged blocks in the 3D map renderer by insetting liquid faces (#892).
- **PCSX2** *(C++/Qt)*: fixed the Big Picture Mode shortcut being lost after a state change (#14245). **xerxes**: indexing of mount points outside `$HOME` and skipping missing directories (2 PRs).

Projects

Business Entity Resolution, Amazon ML Challenge 2026 *(Python, Polars, LightGBM, PyTorch, Transformers)* GitHub

- Scored **0.987 macro F0.5**, **top 5%** of 10,000+ teams, matching **10M noisy records** to 1.73M businesses.
- Recalled **98.5%** of true pairs via rare-token blocking with phonetic keys, embedding search and a learned Indian-script dictionary; scored **63.2M** candidate pairs with two-pass **LightGBM** and multilingual-e5 **cross-encoders** stacked in a final model.
- France had no labels: trained a France-only cross-encoder on rule-verified pairs and kept French matches only when both models agreed, then wrote rules from hand-read decoys. Lifted the score from **0.948 to 0.987**.

Physically-Based Path Tracer *(C++, CUDA, OpenMP, OpenGL/GLFW, Intel OIDN, CMake)* GitHub

- Implemented **four integrators** (path tracing, BDPT with full MIS, progressive photon mapping, ReSTIR DI+GI) across OpenMP CPU and CUDA backends sharing one shading model.
- **GGX microfacet BSDF** with VNDF sampling and Kulla–Conty energy compensation; HDR environment sampling.
- Owen-scrambled low-discrepancy sampler with fixed sample dimensions: **19–42% lower relMSE** on the GPU path tracer; renders are **bit-reproducible** at any thread count.
- Removed `shared_ptr` **refcount contention** in the intersection loop: **1.3–3.6**× faster CPU renders, up to **6.4**× on GPU. A **707-check test suite** verifies energy conservation, reciprocity and CPU/GPU agreement.

tessera: Capability-Based Microkernel *(Rust, RISC-V, QEMU)* GitHub

- Designed a **heap-free microkernel** that does only address spaces, threads, synchronous IPC and capability enforcement; userspace retypes untyped memory into page tables, threads and IPC endpoints.
- Enforced capability rights at **compile time** via const generics and marker traits. A virtio-blk driver and filesystem run **unprivileged**; faults arrive as IPC, so a supervisor revokes and **restarts a crashed driver** while clients reconnect.
- Bisected a **38% IPC regression**, cutting a round trip from **1136 to 722 instructions**; 276 tests across 19 bootable images.

RenderNet: Distributed Blender Render Farm *(Node.js, Express, React, SQLite, Redis)* GitHub

- Built **lease-based scheduling** on SQLite transactions, preventing double renders and reclaiming dead workers' frames in 30 s.
- Implemented **start-time fair queueing** and adaptive batching sized by each machine's **median frame time**.
- Kept Blender **resident** to parse each scene once; added preflight checks for missing textures and unbaked simulations.

BlenDiff: Semantic Diff and Merge for Blender Scenes *(Python, Blender Python API, pytest)* GitHub

- On Blender Extensions with **300+ downloads**; all `bpy` access sits in one module so **600+ tests** run without Blender.
- Built **three-way merge** for `.blend` files across 16 scene domains, detecting both-modified, modify/delete and add/add conflicts.
- Implemented **rename-safe identity** via persistent UUIDs and BLAKE2b geometry digests; a **content-addressed object store** cut snapshot history **15**× (24.6 → 1.6 MB) and parse time **17**× (280 → 17 ms).

Diabetic Retinopathy Grading *(Python, PyTorch, timm, scikit-learn, pandas)* GitHub

- Controlled comparison of MLP, CNN, EfficientNet-B0 and ViT-S/16 with softmax, regression and CORAL heads on APTOS 2019 (team of 4); owned EfficientNet-B0, preprocessing, evaluation and experiments.
- Refitting collapsed **CORAL** thresholds lifted EfficientNet-B0 from **0.760 to 0.896 QWK**; bootstrap CIs and 3-seed runs showed the three deep models are statistically tied.

Scenewright: LLM-Driven Blender Automation *(Python, FastAPI, WebSockets, Ollama, Gemini)* GitHub

- **Planner–executor–critic** agents turn natural language into Blender Python operations, with a ReAct loop that feeds failures back so it recovers unattended; runs on a local Qwen model or Gemini.
- Generated code runs on Blender's main thread over a socket bridge; session memory resolves pronouns like "it" across turns.

GameVault: Game Library Analytics *(TypeScript, React, Node.js, PostgreSQL, Prisma)* GitHub

- Steam library and HowLongToBeat analytics (activity heatmap, price per hour) with budget-constrained **0/1 knapsack** recommendations scored on discount, HLTB hours per rupee and taste.
- Built a **backlog planner** that projects finish dates from HLTB main-story time minus hours played, scheduled shortest-first at the user's **measured daily playtime** and play frequency over the last 30 days.