Udaysinh Sapate

Computer Science undergraduate · Applied ML, NLP & on-device AI systems · English, Hindi, Marathi

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RESEARCH INTERESTS

Applied machine learning and deep learning, with active hands-on work in sequence modeling and attention mechanisms for NLP, audio signal representation and retrieval, and systems-level AI engineering (efficient on-device inference, privacy-preserving local-first pipelines). Open to research in NLP, speech and audio ML, multimodal models, and human-centered AI systems.

EDUCATION

B.Tech, Computer Science Engineering — D Y Patil International University (DYPIU), Pune *2023 – 2027 (Expected)*

Relevant coursework: Artificial Intelligence & Machine Learning, Data Structures & Algorithms, Operating Systems, Database Systems, Discrete Mathematics, Linear Algebra, Probability & Statistics.

EXPERIENCE

Chief Executive Officer — WeLabs.in *Oct 2025 – Present · Remote*

- Lead a small team focused on research, development, and open-source initiatives; drive product direction across multiple internal R&D projects spanning AI, web systems, and developer tooling.

AI Engineer (Intern) — LifeAt *2026 – Present · Remote*

- Build and integrate AI systems for new-frontier product surfaces; work spans evaluation, prompt and pipeline design, and shipping production-facing AI features.

Full-Stack Developer (Intern) — Neev Technologies *May 2025 – Present · Remote*

- Ship features end-to-end across the product stack — API design, data layer, and UI delivery.

AI Engineer — LiSYS Technocraft *Mar 2024 – Sep 2024 · India*

- Designed and implemented ML models for healthcare analytics workflows; optimised data pipelines and improved model accuracy in collaboration with cross-functional teams.

Founder — Citta Hub *2020 – 2022 · Remote*

- Founded and ran a SaaS / bot-hosting startup; managed a four-person distributed team across India and the Netherlands.

SELECTED RESEARCH PROJECTS

Fragmentor — Shazam-style Audio Fingerprinting *Python, NumPy, SciPy*

- Built an audio identification pipeline from scratch: STFT spectrogram → constellation peaks → combinatorial hashing → inverted-index lookup, reproducing the core idea of Wang (2003) end-to-end on real audio.
- Implemented time-offset alignment for robust match scoring; explored the trade-offs between hash density, query latency, and recall under noisy recordings.

Rupant — Privacy-First, Local-First File Transformation Engine *Go, Svelte, Wails*

- Designed a layered architecture (Core engine → Adapters → CLI/Desktop/Server wrappers); the engine is the single source of truth, with no business logic leaking into UI or CLI.
- Implemented a job model with worker-pool scheduling and cancellable per-job contexts; adapters around FFmpeg, ImageMagick, and Pandoc with auto-detected PDF engines (Typst, tectonic, LaTeX). Entirely on-device — a study in privacy-preserving systems built on widely-deployed open-source tooling.

MSI Katana Ambient — Real-Time Screen-to-Keyboard RGB Sync *Python, USB HID, OpenCV*

- Real-time screen capture partitioned into vertical zones with dominant-colour extraction (median + percentile blending) at 15–60 FPS; talks directly to the MSI MysticLight HID device via raw USB feature reports — required reverse-engineering the keyboard's RGB control protocol from packet inspection.

Hugo.ai — News Aggregation & Summarisation Agent *Python, LLMs, RSS / web ingestion*

- Aggregates current-day news, deduplicates by topic, verifies against multiple sources, and produces concise, citation-linked summaries; touched retrieval, ranking, and faithfulness/hallucination evaluation in a multi-source LLM pipeline.

Myra — Large-Scale Conversational Bot *Python, Distributed Systems*

- Discord bot serving ~150,000 users across servers; designed for low-latency command handling and graceful degradation under load — an exercise in scaling a stateful, real-time chat system on commodity infrastructure.

TECHNICAL SKILLS

Languages	Python, TypeScript / JavaScript, Go, C / C++, Dart, Mojo
ML & Data	PyTorch, NumPy, SciPy, scikit-learn, Pandas, Jupyter; classical NLP and sequence models; LLM application engineering; basic audio DSP (STFT, MFCC, spectrograms)
Web & Systems	Node.js, Eleventy, Svelte / SvelteKit, React, Next.js, Wails (Go + web); REST and event-driven services
Data Stores	MongoDB, SQLite, PostgreSQL
Tooling	Git, GitHub Actions, Linux, Docker, Pandoc, FFmpeg, ImageMagick; USB HID and low-level device interfacing; on-device / privacy-first system design
Open Source	25+ public repositories at **github.com/udaysinh-git**; engineering blog at **udaysinh.me**