

Tirth Patel

B.Tech Computer Science and Engineering
Sardar Vallabhbhai National Institute of Technology (SVNIT) , Surat
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EDUCATION

•B.Tech in Computer Science and Engineering

Aug 2023 – Jul 2027 (Expected)

Sardar Vallabhbhai National Institute of technology, Surat

- **Relevant Coursework:** Data Structures and Algorithms, Operating Systems, Database Management Systems, Computer Networks, Object-Oriented Programming, Machine Learning, High Performance Computing.

PROJECTS

•Kovari 🔄

Social Travel Matching Platform

- **Led end-to-end implementation of a full-stack travel matching platform**, driving core architectural decisions across frontend, backend, and infrastructure using Next.js, TypeScript, Supabase, Redis, and Clerk.
- **Engineered solo travel matching systems**, defining compatibility logic across destinations, dates, budgets, and interests, while currently incorporating ML-based ranking to improve match precision and personalization.
- **Implemented user-facing and admin dashboards**, building server observability views that actively fetch and display live runtime metadata (active instances, session counts, cache status, and health checks) via authenticated APIs and real-time data polling.
- **Established production-grade backend infrastructure**, transitioning Redis to a cloud-hosted deployment with TTL-enforced session lifecycles, caching layers, and fault-aware connection handling to improve system reliability and ML-readiness.

•Multi-Timeframe Algorithmic Trading Bot 🔄

Python, Pandas, NumPy, Scikit-learn, Plotly, SciPy

- **Developed** a multi-timeframe decision pipeline that detects market structure events (BOS/CHOCH) using swing-point analysis and confidence scoring, with strict point-in-time evaluation to eliminate look-ahead bias.
- **Built** higher-timeframe trend detection over dual lookback windows, computing volatility-normalized strength metrics to provide directional context for lower-timeframe decisions.
- **Designed** a sequential filtering pipeline combining displacement, momentum expansion, and retracement validation, reducing raw trade signals by approximately 30–40% over a 180-day backtest period.
- **Created** a custom candle-by-candle backtesting and execution engine with ATR-based stop placement, fixed fractional risk per trade, and performance diagnostics including drawdowns and R-multiple distributions.

•Bayesian Portfolio Optimization with Regime switching 🔄

Python, Pandas, NumPy PyMC, CVXPY, HMMlearn

- **Created** a Bayesian portfolio optimization system integrating Hidden Markov Models for market regime detection and adaptive asset allocation.
- **Applied** Bayesian inference with PyMC to model uncertainty in expected returns, enhancing robustness of portfolio decisions.
- **Optimized** allocations using CVXPY under real-world constraints, improving Sharpe ratio and reducing drawdowns in backtests.

•Ultra Low-Latency Order Book Engine(C++) 🔄

C++, CMake, STL(custom allocators), Multithreading & Synchronization, Fine-grained Concurrency, CPU-aware Compilation

- **Architected** an exchange-style limit order book in C++ that maintains strict price–time priority while handling the full order lifecycle (submission, modification, cancellation) under high-frequency event flow.
- **Realized** a latency-sensitive execution path using cache-conscious layouts, manual memory reuse, and concurrent coordination, achieving predictable microsecond-scale order processing and consistent top-of-book state.
- **Structured** the system around an event-driven core with synthetic market feeds and internal telemetry, enabling deterministic replay, benchmarking, and a clear upgrade path toward network-based trading gateways.

TECHNICAL SKILLS

- **Languages:** Python, C, C++, SQL(Postgres), JavaScript, TypeScript, Golang
- **Frontend:** React, Next.js, TailwindCSS
- **Backend:** Node.js, Express, Supabase, Redis
- **ML:** NumPy, Pandas, SciPy, Scikit-learn, CVXPY, Seaborn
- **Tools & Platforms:** Git/GitHub, Docker, Supabase, Matlab, VS Code, Cursor

ACHIEVEMENTS & COMPETITIONS

•**WorldQuant BRAIN Bronze Level** Recognized globally for high-performing alpha design in the WebSim WorldQuant Challenge.

June 2025

•**Harvard TECH Summer Program – Invited Candidate** Nominated for Harvard’s 2025 TECH Program for innovation and leadership.

Feb 2025

LEADERSHIP & COMMUNITY IMPACT

•**Founder & Developer - Kovari – Social Travel Platform**

June 2025 – Present

•**Finance lead & Mentor - Nexus – Dept. of CSE, NIT Surat**

Aug 2024 – Present