# Charanjot Singh

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## Education

**National Institute of Technology, Jalandhar** **2024 – 2028**
B.Tech. in Computer Science and Engineering **CGPA: 8.17/10** (till 4th semester)

**Key Coursework:** Information Security (10/10), Mathematics (10/10), Computer Networks (9/10), Theory of Computation (9/10), DBMS (8/10), Data Structures and Algorithms (8/10), OOP (8/10)

**Class XII:** 94.33% | **Class X:** 93%

## Technical Skills

**Languages:** C++, Python, JavaScript, TypeScript, SQL, Swift

**AI and Machine Learning:** Deep Learning, NLP, RAG, Computer Vision (YOLO, OpenCV), TensorFlow, scikit-learn, pandas, NumPy

**Web and Backend:** React.js, Node.js, Express.js, REST APIs, WebRTC, Firebase, MongoDB, SQL, Vector Databases

**Cloud and AI Platforms:** Google Cloud (Vertex AI, Cloud Run), Cloudflare (Workers AI, R2, DNS), Oracle Cloud (OCI), OpenAI, Gemini and Claude APIs

**Systems and Tools:** SDLC, Git, GitHub, CI/CD (GitHub Actions), Unit Testing, Linux, Cisco Packet Tracer (VLANs, ACLs), Figma, LaTeX

## Experience

**Centre for Railway Information Systems (CRIS), Indian Railways** **New Delhi**
*Software Engineering Intern (Industrial Training)* *Jun 2026 – Jul 2026*

- Worked with the **UTS (Unreserved Ticketing System)** team, the IT backbone of Indian Railways serving **millions of daily passengers**, applying machine learning to high-volume ticketing data
- Built supervised-learning workflows and ran a categorical-encoding experiment on ticketing data; prototyped a **multimodal RAG pipeline** using Whisper, CLIP, ChromaDB, LangGraph and AWS Bedrock

**Connect The Clinics** **Remote**
*Project Intern (Paid Contract)* *Jun 2024 – Jul 2025*

- Shipped **full-stack MERN** features end to end for a live clinic-connectivity platform: designed REST APIs, owned the Firebase data layer, and delivered React.js and Node.js UI improvements used in daily operations

## Projects

**site60: WhatsApp-to-Website Builder (live product)** Live | Code
*Node.js, Express, WhatsApp Cloud API, Claude, Gemini, Cloudflare (Workers AI, R2, DNS), MongoDB, Stripe*

- **Why:** small shop owners, many of them older or non-technical, pay freelancers **$20+** for a basic promotional website they cannot build themselves
- **What:** a WhatsApp bot where the owner sends one chat message plus photos and gets a **live, mobile-first website in about 60 seconds** for **$9**, with Stripe payments, custom-domain suggestions and subdomain fallback
- **How:** a single stateless Node.js service with **HMAC-verified** Meta webhooks, a per-sender in-order queue and a conversational state machine; Claude and Gemini generate copy and design, Cloudflare Workers AI generates images
- **Result:** publishing a site is **one database insert** (no per-site deploy), serving about 12KB pages at **under 1.5s LCP** on 4G for about $1 generation cost per site, with content-moderation, phishing-slug and EXIF-stripping safeguards

**Akhar: Making AI Work Better in Punjabi (Gurmukhi)** Code
*Python, PyTorch, NumPy, BPE, Transformers, Hugging Face*

- **Why:** ChatGPT-style models fragment Punjabi text into significantly smaller tokens; GPT tokenizers (cl100k, o200k) produce up to **2.4x** more tokens than English, increasing inference costs and reducing context-window efficiency
- **What:** a tokenizer-level solution using a Punjabi-aware tokenizer that follows Gurmukhi writing conventions, preserving grapheme boundaries and never separating letters from their vowel signs
- **How:** built a gradient-checked autograd engine (NumPy), a script-aware BPE tokenizer and a GPT-style Transformer (PyTorch) from scratch; benchmarked 4 tokenizers under controlled compute budgets across 2 random seeds
- **Result:** **28.6% lower token fertility**, **12.3% improvement in bits-per-character** and **40.1% greater context-window efficiency** against English-trained BPE; open-sourced on Hugging Face with a token-cost calculator

**LLM Playground** Code

*Python, LangChain, Hugging Face Transformers, PyTorch, OpenAI / Gemini / Claude APIs, Prompt Engineering, AI Agents*

- **Why:** every LLM provider and open-source model exposes a different interface, making it hard to switch between models or compare them fairly
- **What:** a unified chat platform where users pick any model, from commercial LLM APIs to open-source Hugging Face models run **locally** or via **Hugging Face Inference**, behind one **LangChain** interface
- **How:** multi-turn chat with structured roles (SystemMessage, HumanMessage, AIMessage), prompt templates and memory; an **agent mode** where a tool-calling LangChain agent invokes external tools for multi-step tasks
- **Result:** a side-by-side mode that runs identical prompts across hosted and local models to compare response quality, speed and cost

**Jotr: AI Smart Teleprompter (live product)** Live | Chrome Extension

*React, WebRTC, Streaming ASR, MediaPipe (Face Mesh, iris), TensorFlow.js, Chrome Extensions*

- **Why:** fixed-speed teleprompters force speakers to match the scroll, so speakers lose their place when they pause or look away
- **What:** a teleprompter, available as a web app and a **Chrome extension**, that follows the speaker, auto-pacing the script to their voice and pausing when they look away
- **How:** fused **live speech recognition (ASR)** with **on-device gaze tracking** (MediaPipe iris, TensorFlow.js); all perception runs in the browser, so no video leaves the device
- **Result:** live product with **60+ users**, 15 active

**FinSim: 2D Financial-Literacy Metaverse** Live | Code | Google Solution Challenge 2026

*TypeScript, Phaser 3, Firebase, Vertex AI (Gemini), Cloud Run*

- **Why:** first-time investors often learn through costly mistakes with real money, driven by behavioural biases they never see coming
- **What:** a **6-district walkable metaverse** where users practise trading safely with real-time bias coaching
- **How:** 14K+ lines of code across 75+ TypeScript modules (Phaser 3) with live data from 6 market APIs, a Firestore multiplayer leaderboard and a Gemini AI coach
- **Result:** ships in **under 500KB**; a **7-detector behavioural-bias engine** fires coaching within **50ms** of trade intent

**VeriFin: RAG Document and Chat Intelligence Engine** Code

*Python, RAG, Vector Retrieval, LLM APIs*

- **Why:** LLMs answer financial questions confidently even when they have no source, which is risky for money decisions
- **What:** a **retrieval-augmented generation** engine that grounds answers in the user's documents and chat history
- **How:** vector retrieval over embedded documents feeding an LLM, returning grounded, context-aware answers
- **Result:** powers **FinTrace**, a RAG-based risk-behaviour scorer for BSE, NSE and crypto trading built on FinSim

## Coding and Problem Solving

**LeetCode:** 500+ solved, rating **1600+** | **CodeChef:** DSA rating **1630**, contest rating **1200+** | **500+** GitHub contributions

**Core DSA:** Dynamic Programming, Graphs, Trees, Heaps, Union-Find, Segment Trees, Binary Search, Backtracking, Two Pointers, Sliding Window

## Leadership and Communication

- **Core Member, NETRA (Photography Club), NIT Jalandhar:** teach a weekly photography foundation-elective class for first-year students; ran ColorHunt, the Sony Photography Workshop and Snap Treasure
- **Core Member, Cybernauts (Coding Club):** organised a DSA contest and **mentored 30+ students**
- **Debate Adjudicator, LADC** and **MUN Organising Committee:** adjudicated debate-league rounds and helped run conferences (public speaking, structured argument)
- **Cultural Secretary, BH-1 Hostel:** awarded by the Director, NIT Jalandhar [Certificate]

## Achievements and Certifications

- **Certifications:** Oracle Cloud Infrastructure **AI Foundations Associate** (Sep 2026) [Certificate | Badge]; Appreciation Certificate, **Google Solution Challenge 2025** (India level) [Certificate]
- **Academics:** **Top 1%** in JEE Main 2024 among **1.5M+** candidates; qualified JEE Advanced 2024 (top 1.2%); **AISQ** qualified (IIT Kanpur)
- **Hackathons:** **4th**, HackMol 6.0 [Certificate]; **College Finalist**, Smart India Hackathon (selected twice); **Top 10**, Thapar Makethon 8; **Top 100 India**, Level SuperMind; **3rd** institute and **155th** national, EROH
- **Innovation:** **INSPIRE Award**, Government of India; **2x 1st Prize**, inter-institutional Robotics and IoT championships with national media coverage [Photos]