Hriday Kapoor

India · Age 18

18-year-old student in India preparing for JEE Advanced and BITSAT toward Electrical Engineering and physical robotics. I build optical and sensor hardware prototypes, native macOS and Raspberry Pi systems, and offline study tools.

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Selected Projects

Li-Fi Optical Data & Audio Transmission

2023

Visible-Light Optics · LED Light Modulation · Light Sensor Receiver · Amplified Audio Stage

- Transmitted digital text ('hello') from a smartphone LED torch to an optical receiver screen via rapid binary pulses.
- Streamed live audio over an intensity-modulated light beam; hand occlusion cut and restored speaker output instantly.

Smart Manhole & Waste Segregation System

2024

Microcontroller · IR & Moisture Sensors · Water, Tilt & Gas Sensors · Motorized Sorting Chute

- Built an IR + moisture automated wet/dry sorting bin and a portable manhole monitor for water, tilt, and >65% gas.
- Integrated a lid solar panel and footstep piezoelectric plates to recharge the manhole unit's battery off-grid.

DP Analyzer

2026

Swift & SwiftUI · Go · macOS Networking · SOCKS5 Proxy

- Balances macOS TCP/UDP connections across Wi-Fi and iPhone/Android USB tethering with reversible route rollback.
- Patched a USB tether bridge busy-loop (~90% to <4% idle CPU); verified with 45 Go/Swift tests and zero flow drops.

My Learning Harness — Offline STEM & Circuit Toolkit

2026

Python · Circuit Diagrams · Symbolic Math & Units · Spaced Repetition

- Synthesizes light/dark vector schematics for RC/RLC, Wheatstone bridge, op-amp, transistor, and logic-gate circuits.
- Runs deterministic physics/unit/chemistry solvers, timed JEE mock exams, and <1 s A4 formula PDFs (18 self-tests).

Telegram Suite for Mac

2026

SwiftUI & AppKit · Bundled Python · SQLite · Parallel Transfers

- Native SwiftUI menu-bar app bundling an isolated Apple Silicon Python runtime (~1.3 s safe worker-boundary quit).
- Archived 536 posts in ~98 s via SHA-256 parallel chunks and SQLite deduplication ledger (56 automated backend tests).

Local Research Stack (Zero-Idle MCP)

2026

Node.js · Python · MCP Gateway · macOS Launch Agents

- Replaced 47 always-on MCP tools and 528 MB of idle RAM across 5 AI coding clients with a 9-tool on-demand gateway.
- Enforces 5–300 s per-call leases with a detached crash-safe process watchdog; passed 6 live fault/timeout tests.

Education & Exhibitions

JEE Advanced & BITSAT Preparation (Electrical Engineering & Robotics Track)

2025 – Present

Independent Study · Physics, Electromagnetism, Calculus & Chemistry

Full-time preparation for undergraduate Electrical Engineering, paired with deterministic circuit-schematic and physics verification scripts.

Atal Tinkering Lab (ATL) & CBSE Science Exhibition Projects

2023 – 2024

School Atal Tinkering Lab · Hardware & Sensor Prototypes

Wired and demonstrated visible-light Li-Fi optical links (CBSE Science Exhibition) and solar/piezo civic sensor hardware (ATL Marathon).

Skills & Tools

Hardware & Electronics	Microcontroller & Sensor Prototyping, Visible-Light (Li-Fi) Circuits, Solar & Piezoelectric Charging, Circuit Schematic Drawing, Physics & Unit Verification
Systems & Platforms	Swift & SwiftUI (macOS), Go & Local Networking, Linux & Raspberry Pi Services, SQLite & Local Storage, Self-Contained App Packaging
Software, Vision & Web	Python (OpenCV, FFmpeg, Automation), Local AI Tooling (MCP), TypeScript, React & Astro, HTML5 Canvas & Web Audio, Browser PDF & Study Tools