INSTITUTION'S INNOVATION COUNCIL
(Ministry of Education Initiative)

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RAISE SMART
Raising you Smarter for the New Gen Era

A++ 3.60 CGPA ACCREDITED BY NAAC

TECH HUB

<HACK BEYOND LIMITS>

ONLINE ODYSSEY

TEAM NAME: ARCHBTW

PROJECT TITLE : MEDLEDGER

TRACK : AI | ETHEREUM | HEALTHCARE

COLLEGE NAME : PSG COLLEGE OF TECHNOLOGY

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What Needs Fixing ?

Fragmented Access

Records trapped in hospital silos; delays of days to weeks for transfers

Security Risks

Centralized databases are breach magnets; millions exposed in one hack

No Patient Control

Hospitals dictate permissions; patients can't decide who sees their data

Global Incompatibility

Different countries, formats, and standards block real-time sharing

Offline Accessibility

Designing the system to work without internet

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The Fix

Instant Global Access:
Securely share verified medical records with any provider, anywhere, in seconds with offline access.

Patient Data Ownership:
Encryption keys stay with the patient—no hospital or third party can alter, sell, or withhold data.

Interoperability:
Unifies data from incompatible healthcare systems into a single blockchain-verified record.

Zero-Trust Security:
Multi-signature decryption with immutable audit trails ensures uncompromised privacy.

AI-Driven Clarity:
Transforms raw records into concise, context-rich insights for faster, better decisions.

"80% of medical errors are caused by inaccessible or incomplete patient data." — WHO

**The future of healthcare records -> offline-sync,
real-time, tamper-proof, and in the patient's hands.**

Our Stack Map

Frontend / Backend: Secure dashboards and APIs for patients and providers to manage and share records.

AI Layer: Real-time summarization, anomaly detection, and insight extraction from medical data.

Storage Layer: IPFS for decentralized, tamper-proof document and evidence storage.

Blockchain Layer: Ethereum smart contracts for immutable logging, permission control, and trustless record exchange.

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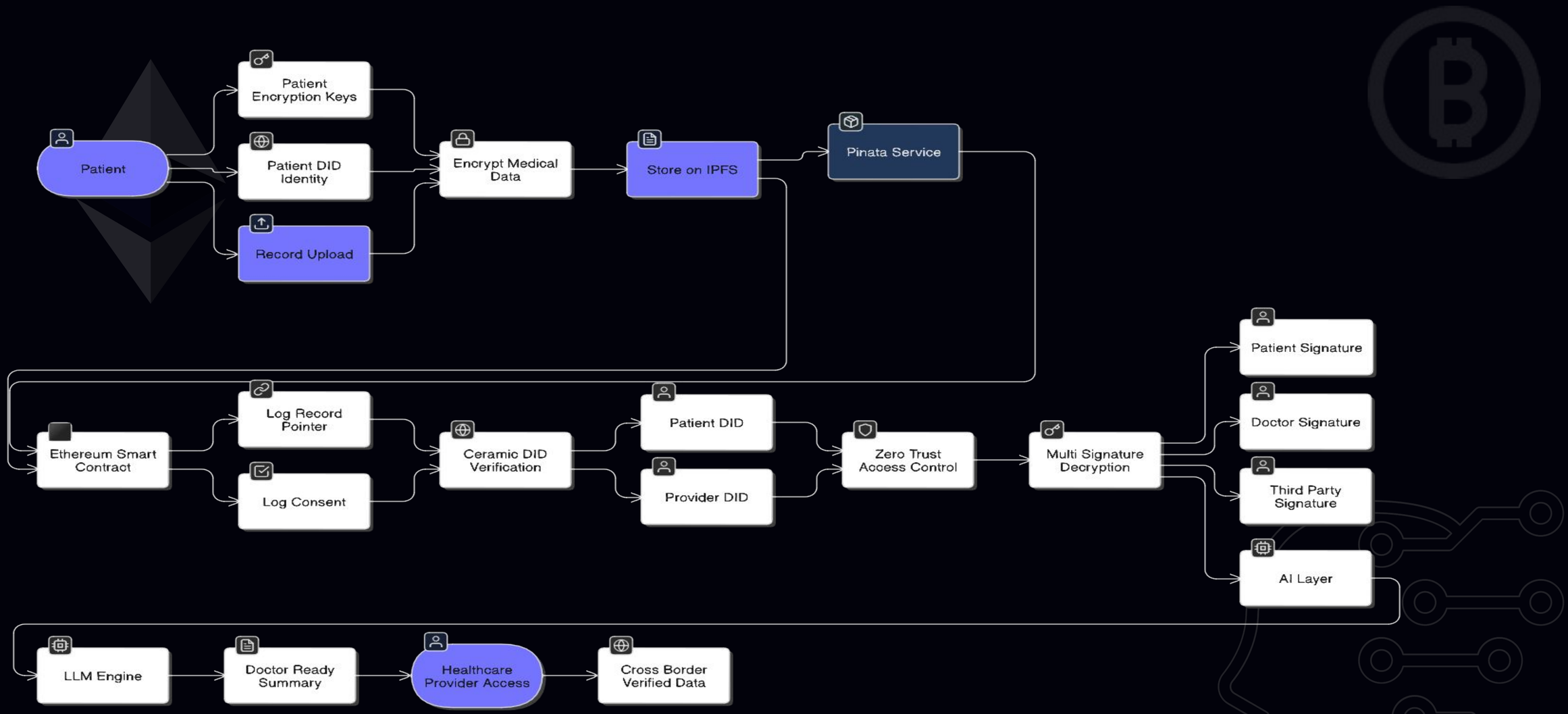
Flow Chart



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What makes us Stand Out ?

True Patient Control – Encryption keys, permissions remain entirely with the patient and accessible offline, anywhere, anytime.

Borderless Access – Instant, secure sharing of records anywhere in the world.

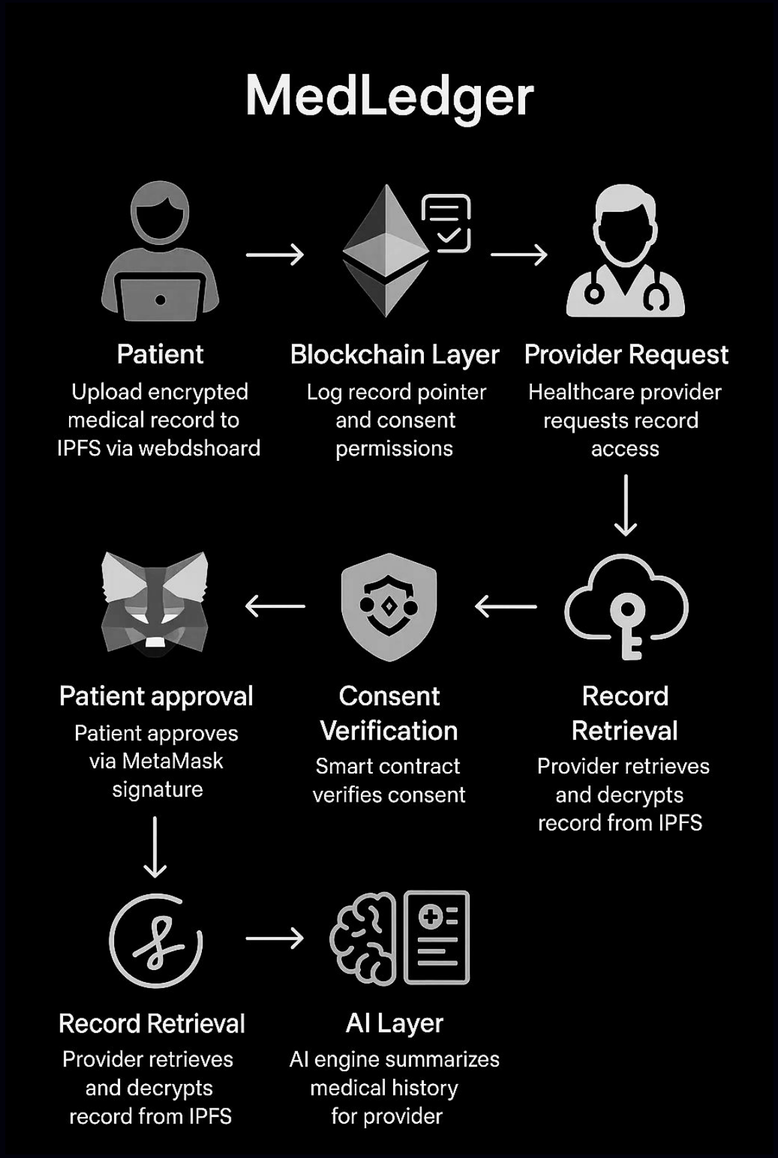
System-Agnostic – Works across all EHR platforms without costly integrations.

Zero-Trust by Design – Multi-signature decryption and blockchain audit trails prevent misuse.

AI-Augmented Care – Summarized, context-rich insights replace overwhelming raw data.

Fraud & Tamper Proof – Immutable records eliminate alteration risks.

How We Did It ?



User Interface – Built a responsive React/Next.js dashboard with MetaMask integration for seamless consent approval.

AI Engine – Integrated transformer-based NLP models to parse unstructured medical records into concise, actionable summaries.

Blockchain Layer – Deployed Ethereum smart contracts to store immutable record pointers and manage consent via multi-signature logic.

Storage Layer – Used IPFS for decentralized, encrypted storage of patient records with patient-held encryption keys.

External Integrations – Enabled secure APIs for hospitals, insurance providers, and research institutions to request and retrieve verified data.

Where It Fits ?

Cross-Hospital Record Exchange: 80% of healthcare providers still fax or mail records between systems.

Medical Tourism: $54B global industry hindered by fragmented patient data.

Emergency Care: Delays in accessing records contribute to 250,000 preventable deaths annually in the US.

Insurance Processing: 30–50% of claim delays are due to missing or unverified medical records.

Research & Trials: 70% of clinical studies face recruitment delays from poor data interoperability.

Impact:

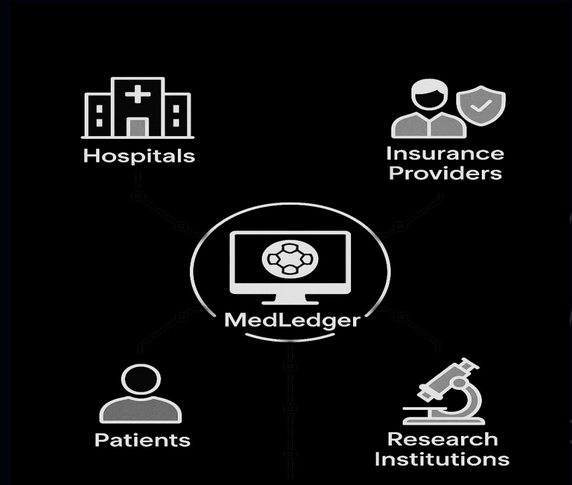
Record Access Time: 2 minutes → **5 seconds**

Data Duplication: -90% through unified blockchain profile

Fraudulent Insurance Claims: -80% via verified medical evidence

Administrative Overhead: -70% with automation and AI summarization

Cross-Border Data Sharing: Instant for 100% of verified patients



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Challenges We Faced

Complex Interoperability

Mapping diverse health data formats (FHIR, HL7, proprietary) into a unified blockchain model

Zero-Trust Security Design

Implementing multi-signature decryption without compromising speed

Real-Time AI Summaries

Optimizing LLM performance for instant medical insights

Cross-Border Testing

Simulating healthcare workflows across different countries and regulations

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What's Coming Ahead ?

Global Interoperability Layer – A universal health record protocol bridging hospitals, insurers, and clinics across borders, eliminating the need for manual transfers or repeated diagnostics.

Patient-Centric Data Economy – Enabling individuals to selectively share and even monetize anonymized medical data for research, with full cryptographic control over access and revocation.

Continuous AI Health Monitoring – Always-on analysis from connected medical devices, predicting risks early and triggering automated care pathways without waiting for hospital visits.

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