HERA AI

An AI Powered Healthcare Data Extraction and Record Assistant

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Problem Statement

India's healthcare system struggles with significant inefficiencies in managing patient data due to reliance on manual paperwork, non-standardized records and fragmented digital platforms. As a result, doctors and healthcare staff spend a considerable amount of time on administrative tasks such as filling out patient forms, transcribing handwritten or printed prescriptions, and updating records, time that could be better spent on direct patient care. These inefficiencies not only delay treatment but also increase the risk of medical errors, especially in rural and underserved areas where healthcare infrastructure is already limited. Addressing these challenges through improved digital workflows and automation is crucial to enhancing healthcare delivery, reducing errors and ensuring timely, data driven treatment for all, particularly for vulnerable populations.

Target Audience & Context

This solution is aimed at healthcare providers, including frontline workers, rural health centers and hospital administrative staff. In Tier 2/3 cities and rural areas, limited internet access and the absence of structured hospital management systems result in continued reliance on handwritten records, making data access and transfer inefficient. Even urban hospitals face challenges with incompatible software systems and heavy administrative workloads. There is an urgent need for a tech driven, AI assisted system that can manage patient records seamlessly, both offline and online, to improve efficiency, reduce errors and support better healthcare delivery across diverse settings.

Use of Generative AI

Generative AI, especially large language models (LLMs) and speech-to-text systems, forms the backbone of our intelligent assistant platform. By leveraging models like Whisper for speech recognition and fine-tuned transformers for document understanding, the system can convert handwritten notes or spoken inputs into structured patient records. LLMs further enable automation of form-filling, diagnosis summarization, and responding to staff queries about patient history. Integrating OCR technologies such as EasyOCR or Tesseract with generative AI enhances consistency, reduces paperwork, and minimizes manual data entry. Crucially, generative AI is well suited for handling non-standard inputs, such as varied handwriting, regional accents, or inconsistent formats and supports natural, intuitive interactions. This allows healthcare workers to more easily navigate records, prescriptions and digital transitions, improving both efficiency and care delivery.

Solution Framework

Our proposed solution is an AI-powered assistant platform that streamlines data extraction, record management, and staff interaction across rural and urban healthcare facilities. The core system includes:

1. **Mobile App (Capacitor + React) –** Enables rural health workers to scan prescriptions, record voice inputs, and access patient records even offline using local SQLite storage.

2. **OCR Pipeline (Tesseract/EasyOCR) –** Built into the backend and triggered via API, this module extracts structured data (medicine, symptoms, dosage) from scanned prescriptions or lab reports.

3. **Speech-to-Text Engine (Whisper) –** Users can record audio notes or patient interviews, which are transcribed into structured text using Whisper, wrapped in a FastAPI service endpoint.

4. **Generative AI Assistant (using TinyLlama and LangChain) –** Integrated into the FastAPI backend, this lightweight, local AI assistant helps healthcare staff auto-fill patient forms, summarize records, and answer queries through natural language. It uses TinyLlama (a small, efficient open-source LLM) with LangChain for prompt management and workflow orchestration, ensuring full offline capability without relying on the internet.

5. **Backend (FastAPI) –** Acts as the central coordinator. Handles API requests from mobile/web, triggers ML inference (OCR, Whisper, LLMs), manages authentication, sync logic, and routes data to MongoDB and Firebase.

6. **Sync System –** Local data (from mobile) is synced via FastAPI endpoints to MongoDB Atlas (for structured data) and Firebase Storage (for audio/prescription images) when internet becomes available.

7. **Web Dashboard (React) –** For hospital staff to securely view, edit, and manage patient data in real-time, integrated via REST APIs exposed by FastAPI.

The workflow starts with offline data capture through OCR or voice, followed by AI-assisted verification and cloud sync, enabling multilingual input, system migration, and intelligent patient history tracking in a unified healthcare ecosystem.

Feasibility & Execution

The project is practically achievable within the hackathon timeline using a React frontend, Capacitor for mobile deployment and FastAPI as the backend. Open-source tools like Tesseract for OCR, Whisper for voice transcription and TinyLlama (via LangChain) for language understanding form the AI core. Data for testing can be collected using sample prescriptions or open medical datasets. Cloud infrastructure such as MongoDB Atlas and Firebase ensures real time sync and storage, while Capacitor enables cross-platform mobile deployment. The team can confidently demo key features like document scanning, voice entry and GenAI assistant interaction within 48 hours.

Scalability & Impact

This solution can scale across public and private healthcare systems by integrating APIs for hospital management systems and enabling multilingual, localized deployments. The offline-first design makes it ideal for remote clinics, while AI support improves efficiency in urban hospitals. If implemented widely, it could save hundreds of hours in administrative work, reduce patient wait times and create a centralized, secure, and interoperable patient data infrastructure. Long term, it can support diagnostics, telemedicine, and public health analytics, transforming how healthcare data is managed in India.

Conclusion

HERA is a hybrid AI assistant using OCR and voice AI to streamline healthcare record maintenance. Designed for both offline rural use and urban integration, it presents a scalable business opportunity. We propose a tiered SaaS model for clinics and hospitals, ensuring recurring revenue. Our MVP will prove its commercial viability by demonstrating core features, positioning HERA to make Indian healthcare faster, smarter, and more efficient, ready for investment and market adoption.