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AI for Bharat Hackathon

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Problem Statement : Voice-first AI health assistant for India's 100M+ chronic disease patients

Brief about the Idea

ArogyaMitra — Voice-First AI Health Companion

India has 100M+ chronic disease patients taking 3-8 medications daily on complex schedules (alternate days, tapering doses, cyclical courses). Health info is in English with medical jargon. Records are scattered across paper prescriptions, WhatsApp photos, and hospital files.

ArogyaMitra is a voice-first AI health assistant in 12+ Indian languages that combines:

- Smart Medication Scheduling — handles every pattern: daily, alternate-day, tapering, cyclical, split doses, short courses
- Chronic Disease Tracking — voice-logged vitals (BP, sugar) with trends and critical alerts
- Health Passport — centralized medical records shareable via QR code (no app needed for doctor)
- Symptom-to-Specialty Guidance — conversational triage with follow-up questions and emergency detection
- Caregiver Alerts — family members notified on missed doses via push/SMS

All accessible via voice with zero English literacy required. Powered by Bhashini (AI4Bharat) for STT/TTS and Claude for AI.

Differentiation & USP

How is it different?

- Voice-first, not text-first — the AI bot IS the interface, not a chatbot add-on
- Complex schedule engine — no other app handles tapering, cyclical, every-N-days, split doses
- Health Passport with QR sharing — doctor scans QR, sees full history in 30 seconds, no app install
- Conversational symptom triage — 2-3 follow-up questions narrow down the right specialist
- Caregiver ecosystem — remote family members get alerts on missed doses

How does it solve the problem?

- Removes English literacy barrier — everything works via voice in native language
- Eliminates missed doses — smart reminders with voice confirmation + caregiver safety net
- Ends bring-your-reports problem — one QR code = complete health history for any doctor
- Guides to right specialist — no more guessing which doctor to visit

USP:

The only app where a non-literate 72-year-old can manage 6 complex medications, share full health records with a new doctor, and get symptom guidance — all by just talking to their phone in Tamil/Hindi/Telugu.

Key Features

FR-1: Voice-First AI Bot

Primary interface in 12+ Indian languages. Voice commands for everything: log vitals, confirm doses, ask health questions. Code-mix support (Hindi-English). RAG-grounded medical responses with safety disclaimers.

FR-2: Smart Medication Scheduler

Handles 8 schedule patterns: daily, alternate-day, every-N-days, specific days, tapering, cyclical, split-dose, short courses. Voice confirmation. Prescription OCR (parses 1-0-1, OD, BD). Caregiver missed-dose alerts.

FR-3: Chronic Disease Vital Tracking

Voice-logged BP, blood sugar, weight, SpO2. Trend charts with normal range bands. Critical alerts (BP>180, sugar>400). Weekly voice summaries.

FR-4: Health Passport

Upload prescriptions, lab reports, discharge summaries via camera/WhatsApp. Auto-categorize and extract data. QR code sharing — doctor scans, sees full summary (24hr expiry, no app needed). Offline access.

FR-5: Symptom-to-Specialty Guidance

Conversational triage: 2-3 follow-up questions before recommendation. Maps to 14 specialties with urgency levels. Emergency detection (stroke, chest pain) bypasses all — shows 108 call button. Never diagnoses.

User Journey: Ramesh (55, Diabetic, Hindi)

Day 1: Onboarding

- Opens app → selects Hindi → signs in with phone OTP
- Says: Mujhe diabetes hai, BP hai, thyroid hai
- Photographs 3 prescriptions → OCR extracts 6 meds incl. weekly Methotrexate + tapering Prednisolone
- Sees unified Todays Medicines card on home screen

Daily Routine

- 7:30 AM: Thyronorm 50mcg — khali pet leni hai → says Le li
- 8:30 AM: Metformin + Amlodipine — khana ke baad → no response → 30-min follow-up
- Still no response → daughter Priya gets alert: Papa ne dawai nahi li
- Sunday: Aaj Methotrexate ka din hai — 15mg (app knows weekly schedule)

Doctor Visit (Health Passport)

- Opens QR on home screen → new cardiologist scans with phone camera
- Doctor sees: conditions, 6 medications, BP trend, recent HbA1c — in 30 seconds

Symptom Check

- Says: 2 din se chakkar + haath mein jhunjhuni → Bot asks: Ek taraf ya dono?
- Bot asks: Bolne mein dikkat? → No → Recommends Neurologist (non-urgent)
- If stroke signs detected → EMERGENCY: Abhi 108 call karein + one-tap button

Key App Screens

Home Dashboard

Unified Todays Medicines card with time slots + food instructions. QR code button for Health Passport. Voice input mic button at center bottom. Todays vitals summary bar.

Voice Bot Interface

Full-screen mic button with waveform. Real-time transcript in users language. Response shown as text + played as audio. Emergency red banner with 108 call button when triggered.

Medication Setup

Prescription photo capture → OCR extraction preview → schedule type auto-detected. Manual edit for corrections. Voice setup alternative.

Vital Tracking

Simple number input with voice: Mera sugar aaj 145 hai. Trend line chart with normal range bands. Weekly average comparison. Critical alert overlay for dangerous readings.

Health Passport / QR

One-page summary: conditions, medications, vitals, recent labs. Large QR code for doctor scanning. Share via WhatsApp button. 24-hour expiry timer shown.

Symptom Triage

Chat-style conversation: user describes symptoms → bot asks follow-ups → shows specialist recommendation + urgency badge + home care tips.

System Architecture

Client Layer

React Native (Android + iOS) I Next.js PWA (Web) → HTTPS/WebSocket → AWS API Gateway

Backend Microservices (FastAPI on AWS EKS)

- Auth Service — OTP login (MSG91), JWT tokens (15min access + 30d refresh)
- Onboarding Service — Health profile, BMI calc, voice-guided setup
- Health Tracking Service — Vitals, medications, schedules, dose logs, prescription OCR
- AI Assistant Service — Bhashini STT/TTS, intent routing, RAG medical Q&A (Claude + LangChain)
- Report Service — Weekly health reports, PDF generation, health score calculation
- Notification Service — Celery + Redis, medication reminders, caregiver alerts (FCM + MSG91)
- Doctor Recommendation Service — Symptom triage, follow-up questions, specialty mapping

AI/ML Layer

Bhashini ASR/TTS (12+ languages) I Claude API (RAG) I Google Vision OCR I IndicTrans2 (NMT)

Data Layer

PostgreSQL (Multi-AZ) I Redis (cache + sessions) I S3 (encrypted docs) I Pinecone (vector DB) I Elasticsearch

Technology Stack

Frontend
React Native (Android + iOS), Next.js PWA (Web)

Backend
Python FastAPI (7 microservices), Celery + Redis (task queue)

AI / ML
Claude API (Anthropic) — RAG medical Q&A, symptom analysis
Bhashini (AI4Bharat) — STT, TTS, NMT for 12+ Indian languages
LangChain — RAG pipeline orchestration
Google Cloud Vision — prescription OCR
OpenAI text-embedding-3-small — vector embeddings

Databases
PostgreSQL (primary, pgcrypto encryption), Redis (cache + sessions)
Pinecone/ChromaDB (vector DB for medical KB), Elasticsearch (search + logs)

Cloud & Infra
AWS: EKS (Kubernetes), API Gateway, S3, RDS, ElastiCache, CloudFront, Route 53
Docker + GitHub Actions (CI/CD), Prometheus + Grafana (monitoring), Sentry (errors)

Notifications
Firebase Cloud Messaging (push), MSG91 (OTP + SMS alerts)

Security
AES-256 (S3 SSE), pgcrypto (column-level DB encryption), TLS 1.3, JWT auth, DPDPA compliant

Impact & Scalability

Impact (Year 1 Targets)

- 200,000 registered users across 12+ Indian languages
- 25% improvement in medication adherence for chronic disease patients
- 10,000 Health Passport QR scans by doctors — reducing consultation setup from 10 min to 30 sec
- 50,000 weekly active users tracking vitals and medications
- 7% free-to-premium conversion I User satisfaction >= 4.3/5.0

Social Impact

- Breaks English literacy barrier for 100M+ chronic disease patients in India
- Empowers elderly and low-literacy users to independently manage their health via voice
- Reduces preventable health complications from missed medications and delayed specialist visits
- Enables remote caregivers (working children) to monitor elderly parents medication adherence

Scalability

- Microservices on AWS EKS — auto-scales to 10,000+ concurrent users
- Bhashini integration supports 22 scheduled Indian languages — expand from MVP 3 to 12+ languages
- B2B clinic dashboard for hospitals I B2G integration with NHA for scheme enrollment
- Roadmap: wearable integration, lab report interpretation, telemedicine referrals, pharmacy tie-ups

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