THE/NUDGE INSTITUTE | Meta

Pragati

AI for Impact Hackathon

Powered by H2S HACK2SKILL

Team Name : Team V

Team Leader Name : Pranjal Mishra

Which domain does your idea address? (Agriculture / Healthcare / Skilling / Education): Healthcare

What is the problem you are solving? (50 words max)

we’re building an AI-powered healthcare assistant for rural India that works via voice calls on feature phones and through a lightweight app on smartphones. It helps ASHA workers detect high-risk pregnancies, prevent anemia, access offline support, and spread health scheme awareness in local languages with risk free Loan Assement.

We will use **TensorFlow Lite** and **Keras** to build **lightweight NLP models** for voice understanding and **rule-based ML models** for health risk prediction, optimized for **on-device inference** to ensure offline access and performance on low-end Android devices.

Making an Responsible AI

Describe your solution. How different is it from any of the other existing ideas? How will it be able to solve the problem? USP of the proposed solution? What is the intended impact of your solution (max 350 words).

Aarogya Saathi is an **AI-powered healthcare assistant** built for **rural India**, aiming to bridge the healthcare gap through accessible technology. The solution works via **voice calls on basic feature phones** and a **lightweight Android app**, both supporting **multiple Indian languages**. It empowers **ASHA workers** and **rural citizens** to access **reliable health support** without requiring **internet connectivity or smartphones , btw** in India people prefer there cultural food over balanced diet fixing there thought process with better knowledge in there own local language.

Main Features:

•It uses **lightweight on-device AI models** and **IVR (Interactive Voice Response)** to deliver **voice-guided pregnancy risk assessments**, even in **low-network areas**.
•The system can understand **local-language medical queries** and provide **instant health guidance** using **NLP tailored for Indian dialects**.
•Aarogya Saathi is designed to be **offline-first**, with features like **smart caching of medical data and health schemes**, and **automatic syncing** once the internet is available.

What Makes It Unique:

•Unlike most digital health solutions that rely on **smartphones and stable internet**, this solution works on **any phone**.
•The approach is **voice-first, language-first**, and focuses on **inclusive design** for communities with **low digital literacy and to teach them also about balanced Diet**.

Our Goal:

The intended impact is to **reduce maternal and infant mortality**, provide **ASHA workers with intelligent tools**, and bring **equitable healthcare access** to India’s most underserved regions using **scalable AI-driven tech** and Educate people about **balanced diet** .

Who is the primary user of your solution, and explain how your solution will leverage open-source AI to address the aspects mentioned in the Key Design Guidelines (max 200 words).

The **primary users** of Aarogya Saathi are people in **rural and underserved areas** with **limited access to healthcare and digital infrastructure**. While designed to support **ASHA workers**, with important features is meant for **anyone with a basic phone**, especially **pregnant women and families** seeking trusted medical guidance.

Aarogya Saathi leverages **open-source AI models** like **Whisper** for speech recognition and Indicbert for understanding regional languages. These models are optimized to run **offline** and on **low-end devices**, ensuring accessibility even without internet. The system uses **IVR** and **lightweight on-device AI** to offer voice-based health support in multiple Indian languages , even it can be used on shared device with security features , we will be making it keeping every aspect of society in mind.

This approach supports the **Key Design Guidelines** by being:

- **Inclusive** (supports all phones and local languages)
- **Low-resource friendly** (works offline, minimal infrastructure needs)
- **Ethical** (respects user privacy, open-source based)
- **Scalable and affordable** (built using flexible, community-driven tools)

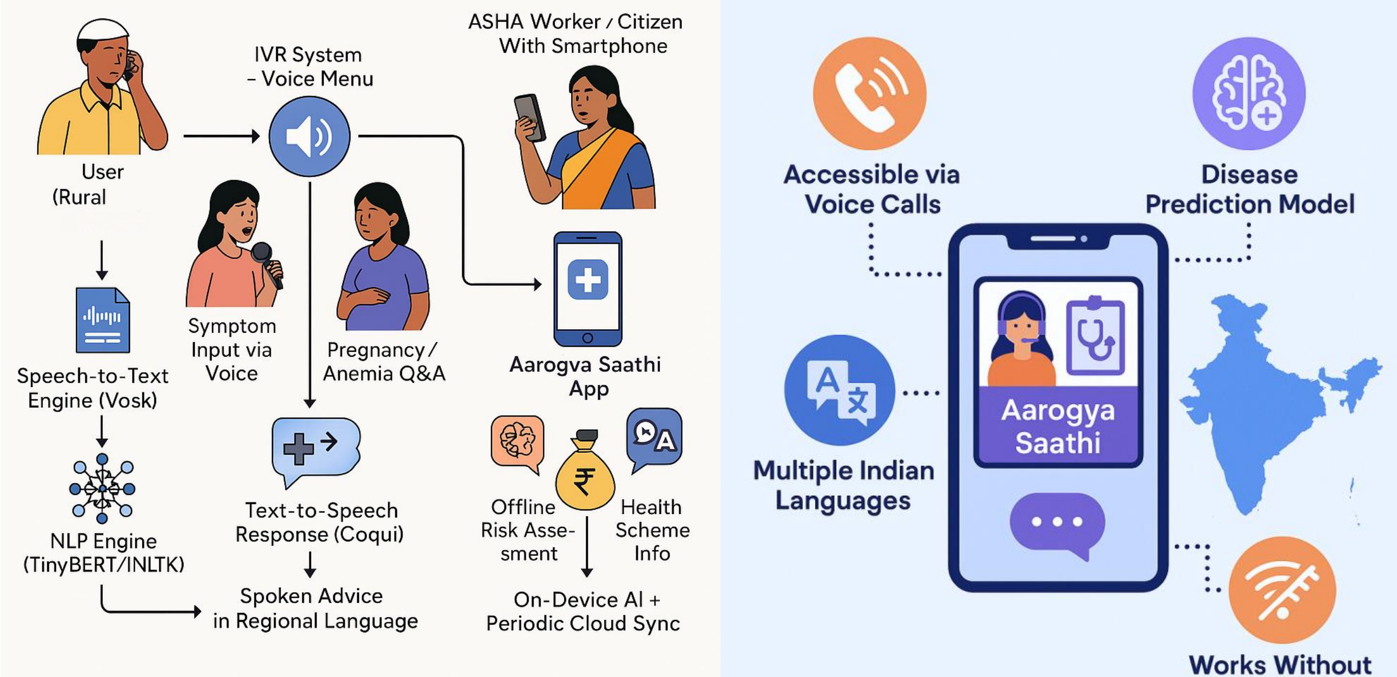
By combining **open-source AI** with a **voice-first, offline-first** design, Aarogya Saathi delivers critical health support to those who need it most.

How is this solution scalable? (100 words max)

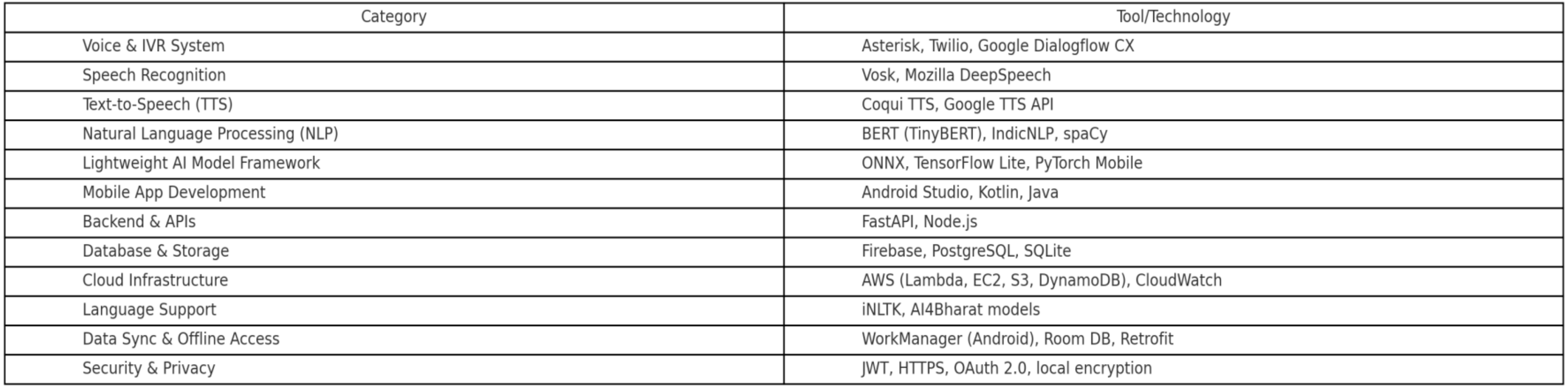
- Built with **modular, open-source AI tools** – easily customizable for different regions and languages
- **Offline-first architecture** – works without internet, ideal for rural deployment
- Compatible with **feature phones and low-end smartphones** – no need for expensive devices
- **Lightweight on-device models** with **cloud sync** – ensures smooth performance and scalability
- Can integrate with **existing government schemes and NGO networks** for wide rollout
- **Low cost, high reach** – scalable across India’s diverse geographies with minimal infrastructure

List of features offered by the solution

It is always better to add a few visual representations (drawings/sketches/illustrations etc.) to your presentation, it adds to the power through which it reaches the audience.



What open-source AI tools and technologies will you use to design the solution? (Please list all.)



Category	Tool/Technology
Voice & IVR System	Asterisk, Twilio, Google Dialogflow CX
Speech Recognition	Vosk, Mozilla DeepSpeech
Text-to-Speech (TTS)	Coqui TTS, Google TTS API
Natural Language Processing (NLP)	BERT (TinyBERT), IndicNLP, spaCy
Lightweight AI Model Framework	ONNX, TensorFlow Lite, PyTorch Mobile
Mobile App Development	Android Studio, Kotlin, Java
Backend & APIs	FastAPI, Node.js
Database & Storage	Firebase, PostgreSQL, SQLite
Cloud Infrastructure	AWS (Lambda, EC2, S3, DynamoDB), CloudWatch
Language Support	iNLTK, AI4Bharat models
Data Sync & Offline Access	WorkManager (Android), Room DB, Retrofit
Security & Privacy	JWT, HTTPS, OAuth 2.0, local encryption

We use a range of open-source technologies including **Asterisk**, **Vosk**, **Mozilla DeepSpeech**, **Coqui TTS**, **TinyBERT**, **IndicNLP**, **spaCy**, **ONNX**, **TensorFlow Lite**, **PyTorch Mobile**, **Android Studio**, **Kotlin**, **Java**, **FastAPI**, **Node.js**, **PostgreSQL**, **SQLite**, **Room DB**, **Retrofit**, **WorkManager**, **iNLTK**, **AI4Bharat models**, **JWT**, **OAuth 2.0**, and **local encryption** methods. These tools ensure our solution remains cost-effective, adaptable, and accessible for deployment and scaling across rural India.

Why are these open-source technologies the most appropriate for your solution? (150 words max)

These open-source technologies are ideal for our solution because they offer **cost-effectiveness**, **customizability**, and **offline capabilities**, which are essential for deployment in **rural India**. Tools like **Vosk**, **Coqui TTS**, and **TinyBERT** are lightweight and support regional languages, enabling AI functionalities on low-end devices and basic feature phones. Frameworks such as **TensorFlow Lite** and **PyTorch Mobile** allow efficient on-device AI processing, reducing dependency on internet connectivity.

Open-source platforms like **FastAPI**, **Node.js**, and **SQLite** ensure fast, scalable backend operations with minimal infrastructure. Using **Room DB**, **WorkManager**, and **Retrofit** allows reliable offline-first mobile experiences. Moreover, tools like **iNLTK** and **AI4Bharat** models provide localized language support, enhancing usability for native speakers. Open-source standards like **JWT** and **OAuth 2.0** maintain strong security and data privacy. Overall, this tech stack ensures our solution remains inclusive, flexible, and scalable in resource-constrained environments.

Describe the Solutions Architecture (500 words)

The *Aarogya Saathi* architecture is built to function in low-connectivity rural areas using a hybrid model of feature phones (via IVRS) and lightweight Android apps. It combines open-source AI tools with scalable cloud infrastructure to offer offline-first healthcare support, speech interaction, and multilingual access.

Key Architectural Highlight:

- **On-device AI processing** with **TensorFlow Lite** and **PyTorch Mobile** for offline risk prediction and symptom analysis.
- **Voice input/output pipeline** using **Vosk** (ASR) and **Coqui TTS**, enabling interaction in local languages without internet.
- **IVRS system** built on **Asterisk**, hosted on **AWS EC2**, supports voice navigation on feature phones.
- **Multilingual NLP** using **iNLTK**, **IndicBERT**, and **AI4Bharat** for understanding and responding to health queries in Indian languages.
- **Mobile app** developed in **Kotlin** with offline capability via **Room DB**, background sync using **WorkManager** and **Retrofit**.

- **REST APIs** built with **FastAPI** and **Node.js**, managing secure communication between app/IVRS and backend.

- **Backend services** hosted on **AWS**, utilizing **Amazon S3** (storage), **Amazon RDS/SQLite** (database), and **AWS Lambda** (event processing).

- **UI/UX** designed using **Jetpack Compose**, focused on accessibility and ease of use.

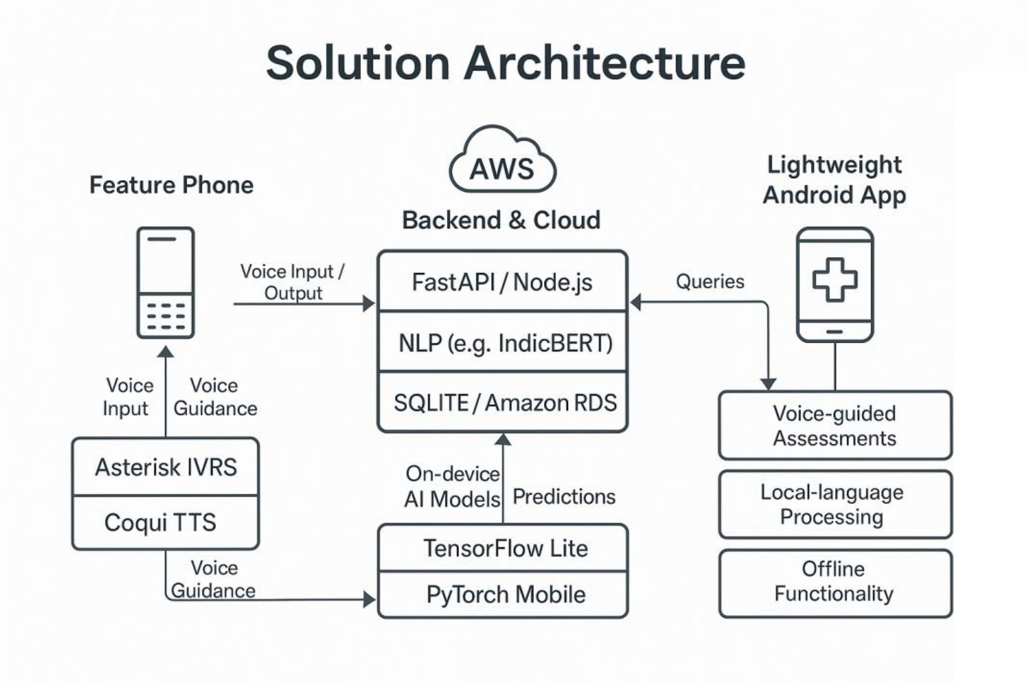
- **Security** ensured with **JWT** and **OAuth 2.0** for secure user identification and role-based access.

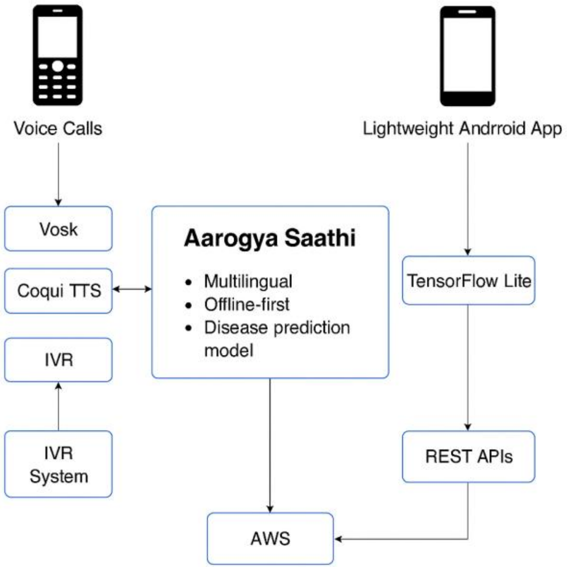
- **Monitoring** through **Prometheus** and **Grafana** to track system health and performance.

- **Containerized deployment** using **Docker** and **AWS ECS** for easy scalability.

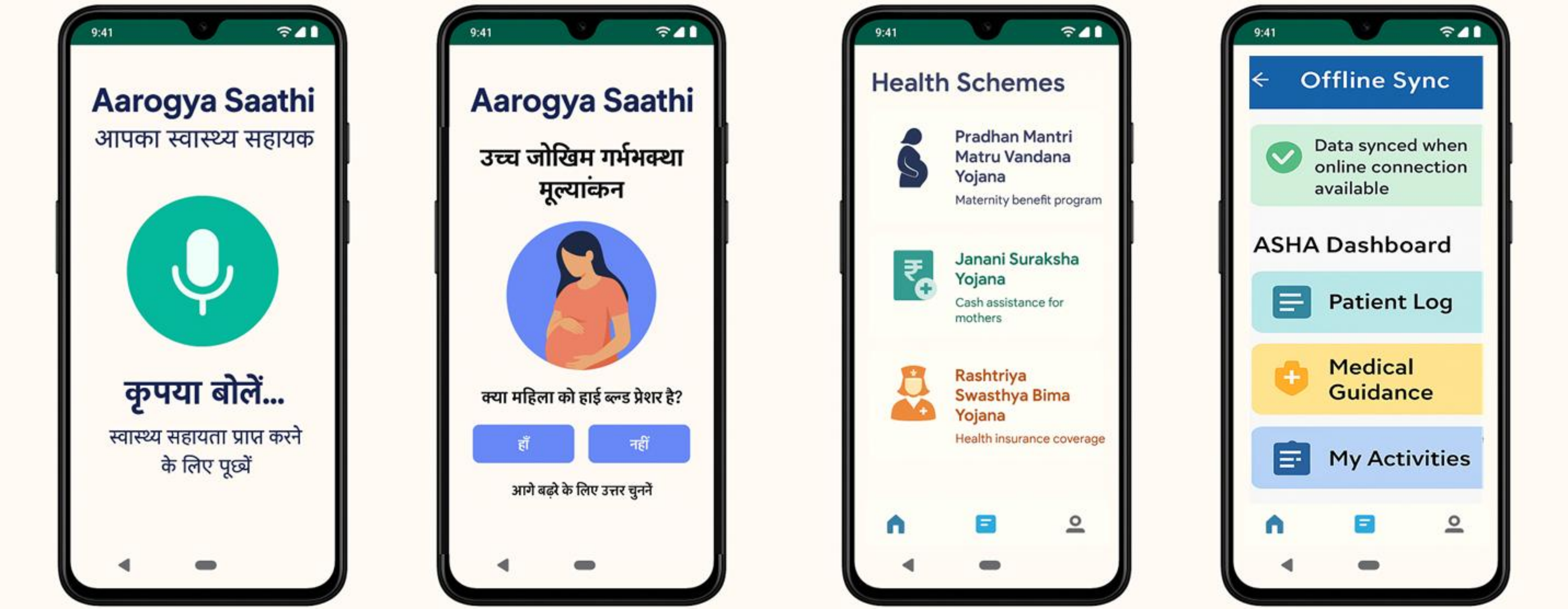
- **Model improvement loop** using anonymized user data and retraining on **Hugging Face**, **scikit-learn**, and **pandas**.

Provide a high-level architecture diagram or a use-case diagram of your proposed solution





Please share the wireframes/Mock diagrams of the proposed solution (optional)



Aarogya Saathi

आपका स्वास्थ्य सहायक

कृपया बोलें...

स्वास्थ्य सहायता प्राप्त करने के लिए पूछ्वें

Aarogya Saathi

उच्च जोखिम गर्भभक्था मूल्यांकन

क्या महिला को हाई ब्लड प्रेशर है?

आगे बढ़रे के लिए उत्तर चुननें

Health Schemes

Pradhan Mantri Matru Vandana Yojana
Maternity benefit program

Janani Suraksha Yojana
Cash assistance for mothers

Rashtriya Swasthya Bima Yojana
Health insurance coverage

Offline Sync

Data synced when online connection available

ASHA Dashboard

What datasets will your solution use? Are they publicly available, synthetic, or user-generated?

Yes , Most of them are publicly available.

•**HMIS (Health Management Information System)**
•Public maternal health data from MoHFW India
•hmis.nhp.gov.in

•**RCH Portal Data**
•Reproductive & Child Health statistics
•rch.nhm.gov.in

•**AI4Bharat Datasets**
•Multilingual speech/text for NLP in Indian languages
• ai4bharat.iitm.ac.in

•**Indic NLP / iNLTK**
•Indian language corpus for voice/text models

•**Synthetic Data**
•Simulated user conversations for model training

•**User-Generated Data**
•Real app/IVRS inputs (anonymized, with consent)

Does your solution require cloud-based computation, or can it work with on-device processing? If cloud-based, how do you plan to address connectivity challenges and cost constraints?

Yes, our solution follows a **hybrid architecture** — it supports **both on-device processing** and **cloud-based computation**, depending on the use case and device capabilities.

On-Device Processing

- For basic diagnosis, symptom checks, and pregnancy risk assessment, we use **lightweight AI models (e.g., TensorFlow Lite, TinyBERT)** that run directly on low-end Android smartphones without requiring internet.
- This ensures **offline functionality**, which is crucial for rural areas with poor or no connectivity.
- The app uses **local storage (Room DB)** and **WorkManager** for delayed data synchronization when connectivity is restored.

Cloud-Based Processing

- Feature phone users connect via **IVR**, where **speech processing (Vosk/DeepSpeech)** and **NLP tasks** are handled in the cloud.
- Backend logic, language model handling, analytics, and voice synthesis are hosted on **AWS services** such as EC2, Lambda, RDS, and S3.

Addressing Connectivity and Cost Constraints

- The solution uses **smart caching** and an **offline-first design** to reduce dependence on real-time connectivity.
- **Batch data synchronization** is performed only when the device regains connectivity, minimizing bandwidth usage.
- **Cost efficiency** is achieved by leveraging **serverless AWS Lambda functions**, **auto-scaling EC2 instances**, and **open-source AI tools**, eliminating the need for expensive third-party APIs.

This balanced approach ensures the solution remains both **accessible** and **cost-effective**, regardless of the user's device or infrastructure limitations.

Feasibility:

Aarogya Saathi is technically and practically feasible. It uses lightweight open-source AI tools that run offline on basic phones and smartphones. IVR support ensures reach without internet, while AWS cloud ensures scalability. It aligns with existing ASHA programs for easy deployment in rural areas.

THE/NUDGE INSTITUTE | Meta

Pragati

AI for Impact Hackathon

Powered by H2S HACK2SKILL

THANK YOU