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AI for Bharat Hackathon

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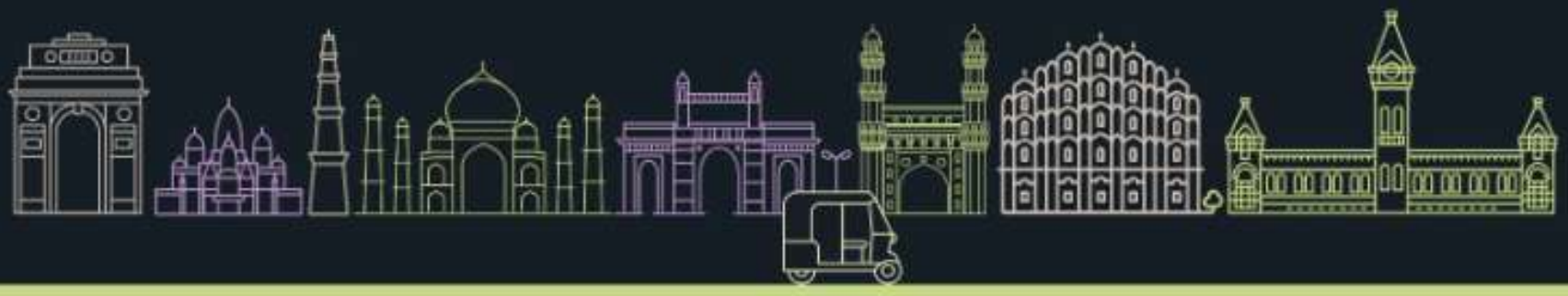


Team Name : On9 Developer

Team Leader Name : Bhavana Shah

Problem Statement : AssistantMillions of rural Indians face barriers accessing digital services due to language, literacy, and connectivity challenges. Existing AI assistants are English-centric and cloud-dependent, leaving critical services inaccessible.

Brief about the Idea:

BharatVoice – AI-Powered Multilingual Voice Assistant

- Enables voice-based interaction for rural and semi-urban users
- Supports 10+ Indian languages with code-switching detection
- Operates offline or in low-bandwidth environments
- Understands regional and cultural context (festivals, local terms, units)
- Provides access to education, government services, healthcare, and transportation info
- Ensures privacy compliance with Indian data protection laws
- Designed for ease-of-use for non-literate users and elderly citizens

Your solution should be able to explain the following:

1 How is it different from existing ideas?

- Built specifically for India; not a global English-first adaptation
- Supports 10+ Indian languages with code-switching detection
- Offline-first design for rural areas with low or intermittent connectivity
- Understands regional context, culture, and festivals
- Integrates government, healthcare, transport, and financial services
- Privacy-first and compliant with Indian data protection laws

2 How will it solve the problem?

- Converts voice input in local languages into AI-understood commands
- Provides spoken answers and guidance, removing text barriers
- Offline caching ensures usability even with poor internet
- Handles mixed-language speech, allowing natural communication
- Offers access to essential services for rural citizens and students
- Tracks user preferences and history for personalized experience

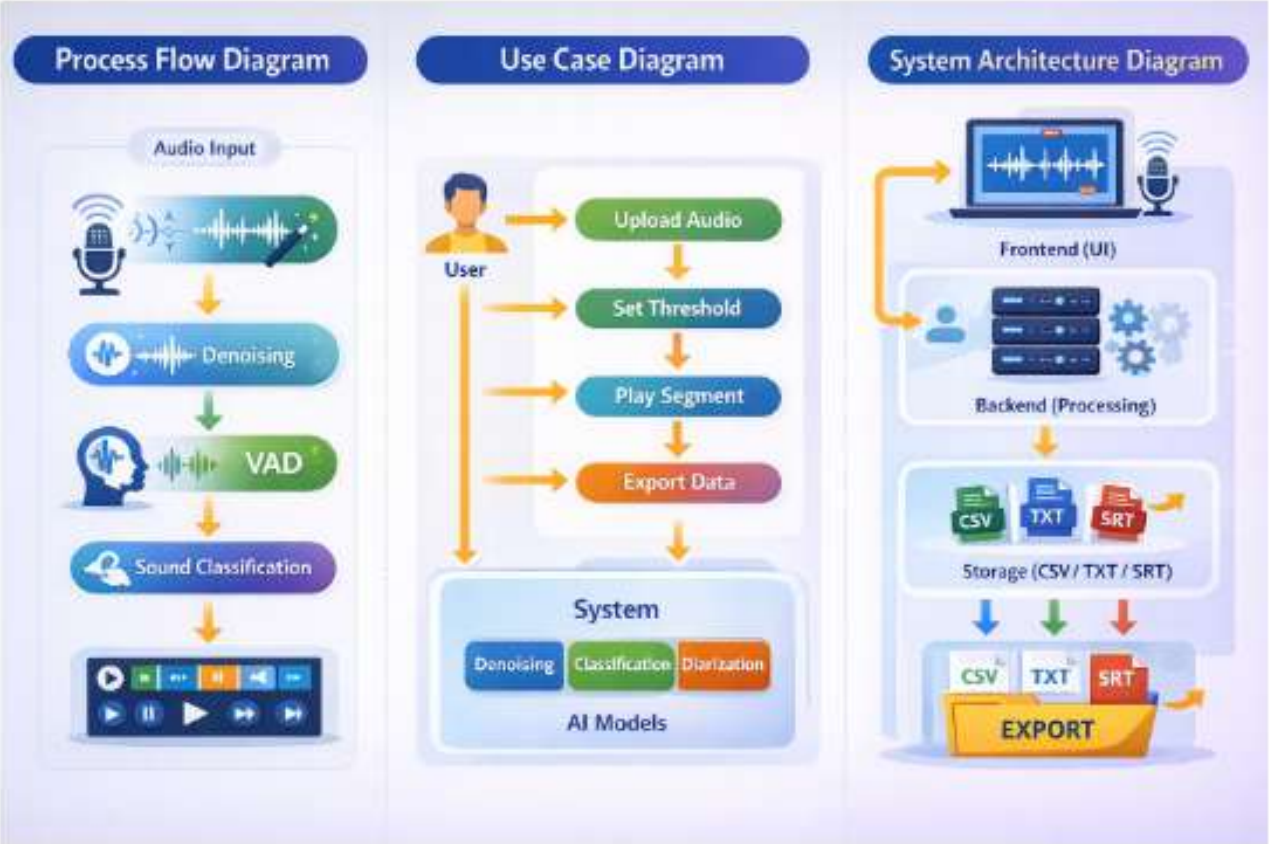
3 USP (Unique Selling Proposition)

- Multilingual voice-first assistant with natural code-switching
- Secure & privacy-compliant, respecting Indian laws
- Offline-first for rural accessibility
- Culturally aware AI, understands festivals, local terms, and regional nuances
- Integrated platform: government services, healthcare, transport, UPI payments
- Accessibility-focused, supports non-literate and visually/hearing impaired users

List of features orered by the solution

- Real-Time Audio Processing – Analyze and process audio instantly.
- Sound Classification – Identify and label different types of sounds automatically.
- Speaker Diarization – Detect and differentiate multiple speakers in a conversation.
- Audio Denoising – Remove background noise for clear audio output.
- Voice Activity Detection (VAD) – Recognize speech segments from silence or noise.
- Segment-wise Audio Playback – Play specific sections of audio efficiently.
- Confidence Threshold Slider – Adjust detection sensitivity for accurate results.
- Export Options (CSV, TXT, SRT) – Save processed data in multiple formats for analysis or reporting.

Process Flow diagram or Use-case diagram



Process Flow diagram, Use-case diagram, System Architecture Diagram

Wireframes/Mock diagrams of the proposed solution

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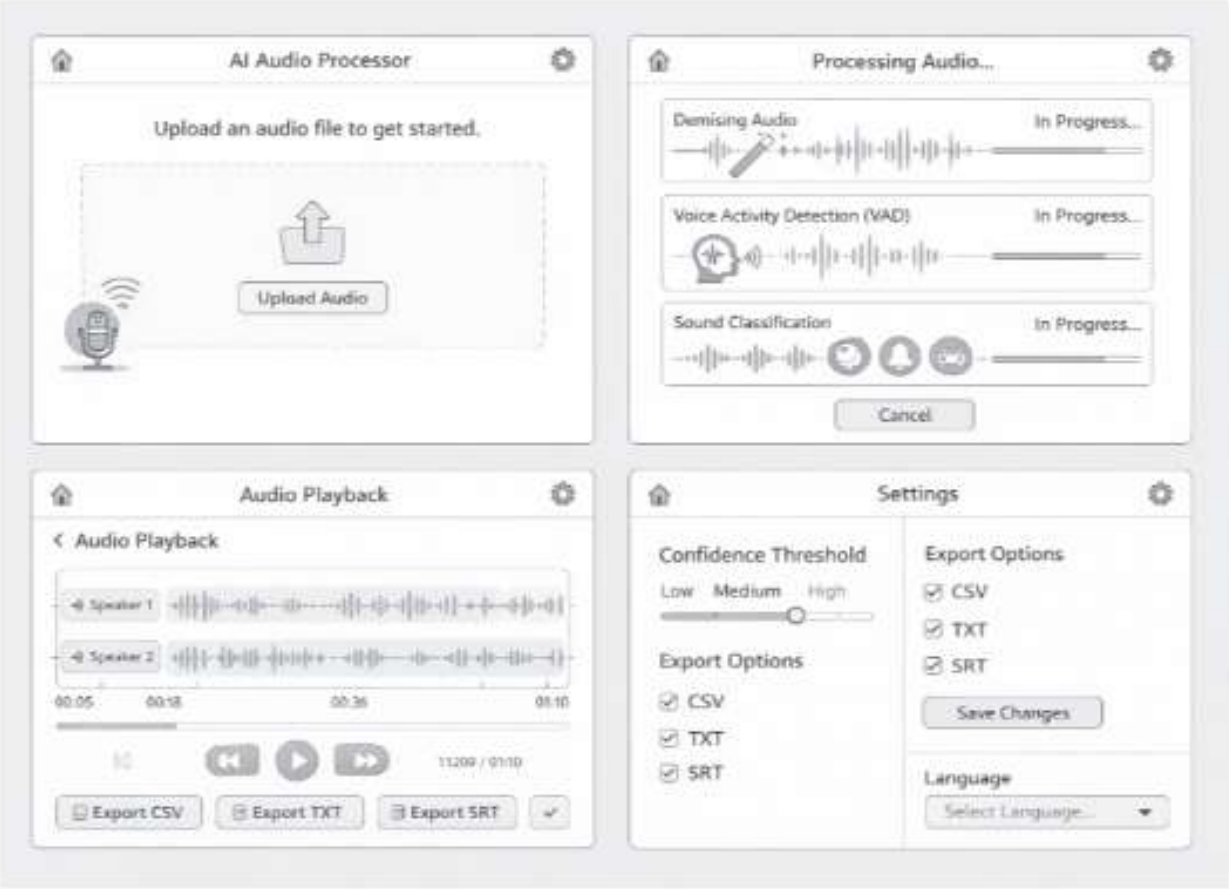
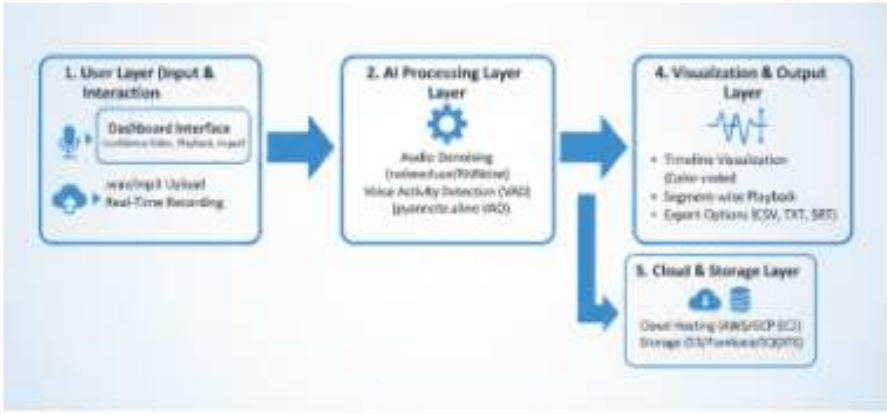
Architecture diagram of the proposed solution:



Architecture diagram of the proposed solution



Architecture Flow diagram of the proposed solution

Technologies to be used in the solution:

Technologies Used in the Solution:

- Programming Languages: Python, JavaScript

Machine Learning & AI Frameworks:

- TensorFlow / Keras – for sound classification models
- PyTorch – for speaker diarization & VAD models
- pyannote.audio – speaker diarization
- noisereduce / RNNoise – audio denoising
- Silero VAD – voice activity detection

Data Processing & Feature Extraction:

- NumPy, Pandas – data manipulation
- Librosa – audio feature extraction (MFCC, spectrogram)

Web / App Interface:

- Streamlit – interactive dashboard
- React.js (optional) – UI components

Cloud & Hosting Platforms:

- AWS (S3, Lambda, EC2) – storage & model deployment
- Google Cloud / Vertex AI – cloud model inference (optional)

File Formats & Export: CSV, TXT, SRT – for reporting & downloads

Visualization & Timeline Tools: Matplotlib, Plotly – audio timelines & charts

Estimated implementation cost :

- Cloud Hosting (AWS / GCP): EC2 instance for processing + S3 storage → ₹5,000 – ₹7,000 per month
- Domain & SSL: Domain name + SSL certificate → ₹1,500 – ₹2,000 per year
- AI / ML Frameworks: TensorFlow, PyTorch, pyannote.audio → Free (Open Source)
- Libraries & Tools: NumPy, Pandas, Librosa, Streamlit, Matplotlib → Free
- Storage & Database: Cloud storage (audio + models), SQLite / Firebase → ₹1,000 – ₹2,000 per month
- UI / Frontend Development: Streamlit dashboard / React components → Free – ₹2,000 (optional enhancements)
- Miscellaneous: API calls, minor subscriptions → ₹1,000 – ₹1,500 per month

💡 Total Estimated Monthly Cost: ₹7,000 – ₹12,000
💡 Total Estimated Annual Cost: ₹90,000 – ₹1,40,000

Note: This solution primarily uses open-source frameworks and cost-effective cloud services, keeping the implementation budget low while maintaining scalability and efficiency.

Add as per the requirements for the hackathon:

- The solution meets all hackathon functional requirements including real-time audio processing, sound classification, and speaker diarization.
- Scalable architecture using cloud services (AWS / GCP) ensures smooth performance even with multiple users.
- Low-cost implementation with primarily open-source frameworks, keeping the solution budget-friendly.
- User-friendly interface via Streamlit dashboard for easy interaction and visualization.
- Export and reporting features (CSV, TXT, SRT) allow judges and users to analyze results efficiently.
- Additional enhancements: VAD, segment-wise playback, confidence slider – adds real-world practicality.
- Ready for deployment: Can be tested live on cloud and demonstrated in hackathon environment.

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Thank You