FinVoice – AI Voice Assistant for Financial Operations

GHCI 2025 Hackathon: Solution Proposal

Project Information

Category	Detail
Team Member	Vaishnavi Singh
Code Repository	https://github.com/vaishnavisxngh/Fin-Voice/tree/main

I. Executive Summary & Problem Statement

Mobile banking applications present a significant accessibility barrier, particularly for elderly users, those new to technology, and individuals facing linguistic challenges. Traditional, menu-driven UIs are often overwhelming and exclusionary.

FinVoice's Vision is to eliminate this friction by transforming complex financial operations into **natural, conversational, and multilingual voice interactions**. This allows customers to securely manage their finances—checking balances, transferring funds, and inquiring about loans—using simple spoken commands in their preferred language.

Challenge	FinVoice Solution	Impact
Complex UIs	Voice-First Interaction Model	Reduces cognitive load and complexity.
Linguistic Barriers	Multilingual NLP (Hindi, Tamil, Telugu, English)	Promotes true financial inclusion across India.
Security Concerns	Voice Biometrics & OTP Verification	Maintains enterprise-grade security and user trust.

II. Core Solution Architecture: A Three-Layered System

FinVoice is built on a robust, scalable architecture designed for high-accuracy multilingual processing and secure transaction execution.

Layer	Function	Core Technology
1. Multilingual NLP Engine	Processes, transcribes, and understands user speech. Handles regional accents, dialects, and "code-switching" (e.g., Hinglish).	**Whisper ASR** (for transcription), **Transformer-based Models** (for Intent), **LLM Integration** (for conversational context).
2. Contextual Banking Logic	Maps transcribed inputs to specific financial actions and manages conversational flow, including error handling and clarification.	Specialized **Intent Classifier** mapping 12+ core banking operations (Transfer, Loan Inquiry, Bill Payment, etc.).

3. Secure Execution Layer	Authenticates the user, validates the transaction, and executes the operation via secure APIs.	**Mock Banking API Integration, OAuth 2.0, Voice Biometrics**, and **OTP-based Verification**.

III. Key Differentiators

FinVoice is designed to excel in the specific context of the Indian banking landscape, prioritizing inclusivity and user trust.

Differentiator	Description	Benefit to User
1. Multilingual Context Switching	Handles mixed-language input (e.g., "Mera account balance dikhao"). The system maintains integrity even when users switch languages mid-sentence, which is critical for India's linguistic diversity.	Seamless, natural conversation experience.
2. Conversational Error Handling	System manages ambiguous requests gracefully through conversational clarification (e.g., "Did you mean transfer ₹5,000 or ₹50,000?").	Reduces user frustration and transaction failure rates for inexperienced users.
3. Accessible User Experience (UX)	A dual interface approach (Voice + Visual confirmation). Crucially, all critical actions prompt a **Visual Confirmation of Transaction Summaries** before execution.	Maintains transparency and security for conscious users, ensuring "no accidental payments."
4. Observability & Risk Controls	Real-time logging tracks intent confidence scores and failed authentication attempts.	Proactively identifies potential fraud and ensures system reliability.

IV. Implementation & Tech Stack

A. Prototype Status (Round 1 Submission)

This submission focuses on establishing the full **UI/UX flow** and the foundational architecture, demonstrating the seamless onboarding experience required for a banking application.

Implemented in Round 1	Status
User Onboarding (Login → Registration → MPIN Setup → OTP)	**Complete**
Accessible Mobile-First UI/UX Foundation	**Complete**
Dashboard, Account, Credits, Rewards Pages	**Complete**
Voice Engine/Backend Logic	**Placeholder/Vision Only** (Planned for Phase 2)

B. Full Tech Stack (Planned)

Component	Technology	Rationale

Backend/Orchestration	Python (Flask/FastAPI)	Robust, efficient for API handling and machine learning model serving.
Front-End (Mobile UX)	React Native / React + TypeScript	Enables cross-platform mobile development with a superior, native-like user experience.
NLP/ML	OpenAI API / Hugging Face Models	Leveraging state-of-the-art transformer models (Whisper, custom LLM fine-tuning) for multilingual, high-accuracy processing.
Database/Logging	PostgreSQL	Reliable, scalable storage for transaction logs, user data, and audit trails.
Banking Integration	Mock APIs (Initially)	Simulates real financial operations securely for development and testing.

C. Phased Rollout Roadmap

Phase	Goal	Key Deliverables
Phase 1 (Round 1 Submission)	**UI/UX & Onboarding Foundation**	Complete mobile UI, full registration flow, Home Dashboard.
Phase 2	**Core Voice Engine & 5 Operations**	Integration of Whisper ASR, initial Intent Detection, and 5 essential voice operations (Balance, Transfer, History, Loan Inquiry, Bill Payment).
Phase 3	**Security & Bilingual Support**	Full implementation of the Secure Execution Layer (Voice Biometrics, OTP). Expanded bilingual support (Hindi + English). Conversational error handling.
Phase 4	**Production & Compliance**	Full multilingual support (4+ languages). Secure integration with real Banking APIs. Implementation of full Compliance checks and Fraud/Risk Detection.

V. Compliance, Security, & Privacy

Security and trust are non-negotiable for financial applications.

1. **PII Protection:** Strict end-to-end encryption for all voice data and private financial information.
2. **GDPR/RBI Compliance:** Voice data will be managed and disposed of according to regulatory mandates (e.g., automatic deletion after 90 days), with audit logs maintained for legal reasons.
3. **Voice Biometrics:** Utilizes speaker verification at the execution layer to lower fraud risk and secure high-value transactions.

VI. Impact & Business Outcomes

FinVoice is poised to deliver significant qualitative and quantitative benefits:

- **Accessibility:** Significant increase in feature adoption among elderly and non-tech-savvy users, driving overall digital financial inclusion.

- **Operational Efficiency:** Reduction in high-cost customer service chat and call inquiries for routine tasks, reallocating human resources to complex issues.
- **Inclusivity:** Breaking language barriers to capture the vast market of vernacular-first users in India, fostering a stronger customer relationship.

VII. Conclusion

FinVoice is a culturally aware and technologically robust solution that directly addresses the banking sector's most pressing accessibility challenges. By integrating state-of-the-art multilingual voice intelligence with an accessible UI and enterprise-grade security protocols,