Supplementary Document - KNOVO

Knowledge + Voice = Knovo

OVERVIEW

Knovo transforms traditional quizzing into an immersive, voice-driven learning experience.

Instead of static question banks, it dynamically generates quizzes from form input (titles, PDFs) , or voice input (Vapi Workflow) using Gemini AI. Learners attempt quizzes in voice mode with a Vapi Agent (A Quizmaster), get real-time feedback, and compete with others via leaderboards.

Our mission / purpose : Make learning inclusive, engaging, and personalized - for students, educators, and especially the visually impaired who benefit from a screen-free, hands-free quiz experience.

KEY FEATURES

- **Voice Quizzing** – Converse with AI Quizmaster. Live transcript of full conversation.
- **Custom Quiz Generation** – Build quizzes from forms or voice prompts via Vapi + Gemini.
- **Detailed Feedback** – Tracks accuracy, fluency, clarity, articulation. provides MCQ/True-False Answer keys.
- **Accessibility** – Voice-first interface designed for visually impaired learners and students of all ages.
- **Leaderboards** – Compete with peers. Each quiz in every format features top 3 scorers.
- **Challenge Modes** – An additional Challenge Environment where you will be tested on random topics with adaptive difficulty.

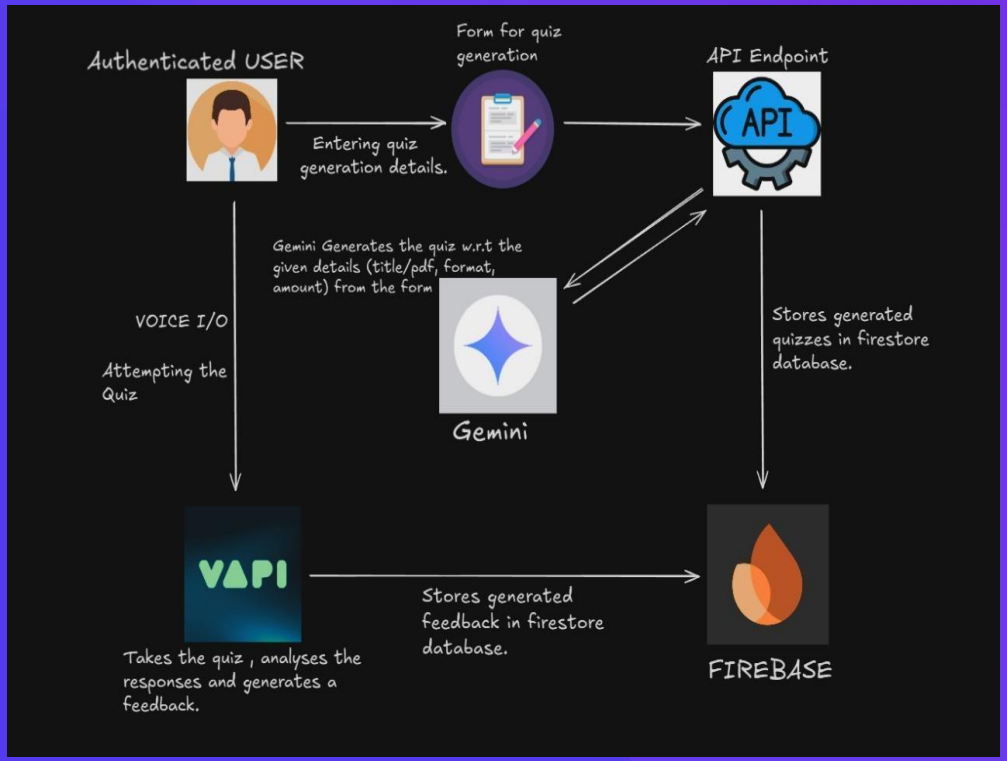
STAKEHOLDERS :-

- Students & Learners → Can engage learning with fun & ease (voice based interaction) .
- Educators & Institutions → Can gamify learning & track progress of their students.
- Visually Impaired Users → Can have accessible voice based quiz generation and attempts.
- Corporate & Professionals → Can upskill by generating dynamic quizzes on any topic (For example: Interview Preparation)

TECH STACK :-

- Frontend – NEXT.Js with Tailwind-CSS
- Backend – Node.js server for quiz logic
- AI & Voice – Gemini API + Vapi SDK
- Database & Auth – Firebase Fire-store + Firebase Auth
- Hosting – Deployed on VERCEL

Architecture



User Authentication – Secure sign-in via Firebase Auth.

Quiz Generation – Create dynamic quizzes from titles, PDFs, or voice using Gemini API. Stored in Fire-store.

Voice Interaction – Attempt quizzes through Vapi AI (Deepgram ASR + Eleven Labs) with real-time analysis.

Adaptive Challenges – Difficulty adjusts after first 5 questions to match learner level in Challenge Mode.

Feedback & Evaluation – AI analyses accuracy, fluency, articulation, clarity. results saved in Fire-store DB.

Leaderboard – Real-time scoring per quiz with live updates of top performers.

RESULTS AND CLAIMS

We were able to successfully execute all the goals we set out / promised in our Problem Statement and Innovation highlights :

- **Dynamic Quiz Modes** – Implemented True/False, MCQ, and verbal answers based quizzes.
- **Verbal Expression Analysis** – Verbal Answer Quiz will evaluated clarity, fluency, and articulation.
- **Multimodal AI Integration** – Combined voice, text, and contextual inputs.
- **Accessibility-Centred Design** – Voice-first, hands-free quizzing for visually impaired.
- **Challenge Mode** – Adaptive difficulty with performance-based quiz flow.
- **No Static / Hardcoded Content** – Quizzes generated dynamically from user inputs (form/voice).
- **Leaderboard Feature** – Enabled competitiveness by showing top 3 scorers in every quiz.

Assumptions Made During Development

- Alongside the leaderboards (which we achieved), we initially thought of including an extra feature :- a multiplayer buzzer-style quiz mode using Web-Sockets to allow real-time competition. Due to the limited hackathon timeframe, we deferred this feature for future implementation.

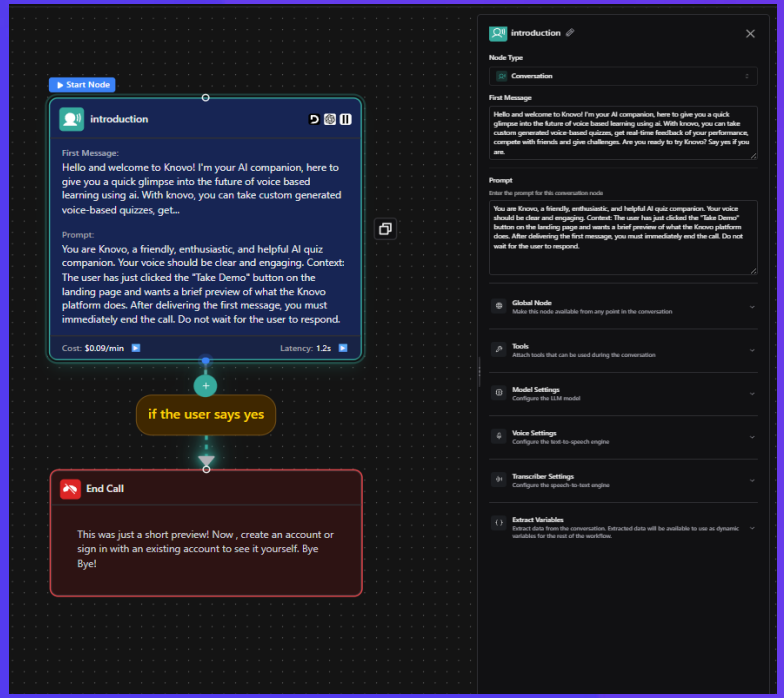
- Due to the time constraint of 6 minutes precisely , we were not able to include the demo of Challenge Mode in our Demo Video. We request you to try it yourself in our live deployment.

- We also wanted to add a payment based model as Vapi only provides first 10$ credits as free per account (we have 5.5$ left in our account for the live deployment which ensures approximately one hour of calls of any type and should be enough to test all the features) but due to the limited hackathon timeframe, we deferred this feature for future implementation.

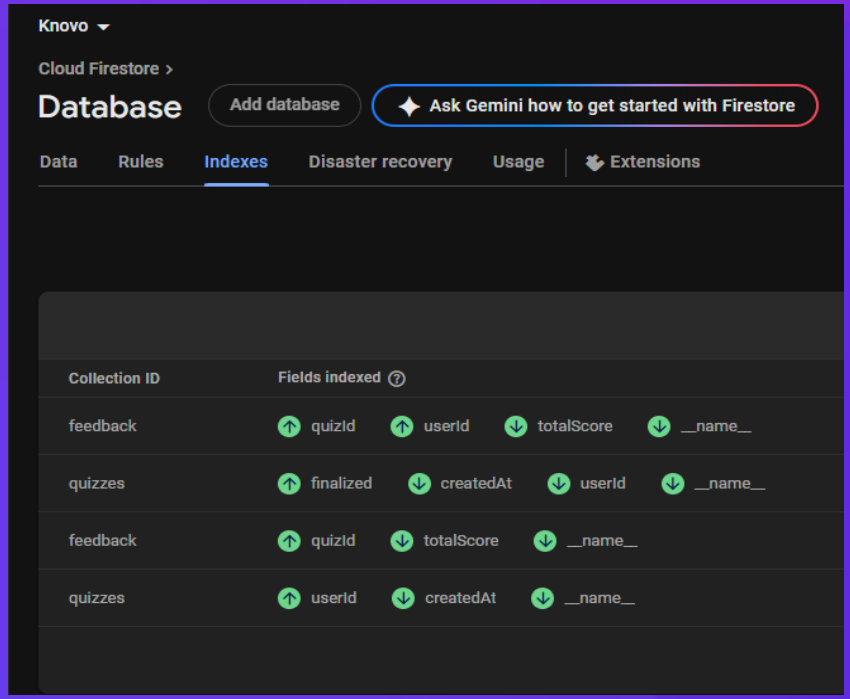
- We have ensured that the important parts of quiz giving where a person decides the Topic , Difficulty , Format (MCQ / TF / Verbal) , Amount of Questions and finally the Quiz Attempt are all implemented using Vapi Agents and Workflows which will make it accessible to visually impaired learners through voice I/O. We do not claim that the whole application is tailored specifically for them , they may need an assistant to at least open or close sections / pages and explain them their performance / feedback .

Special Setup Guide for Vapi Workflows and Firebase

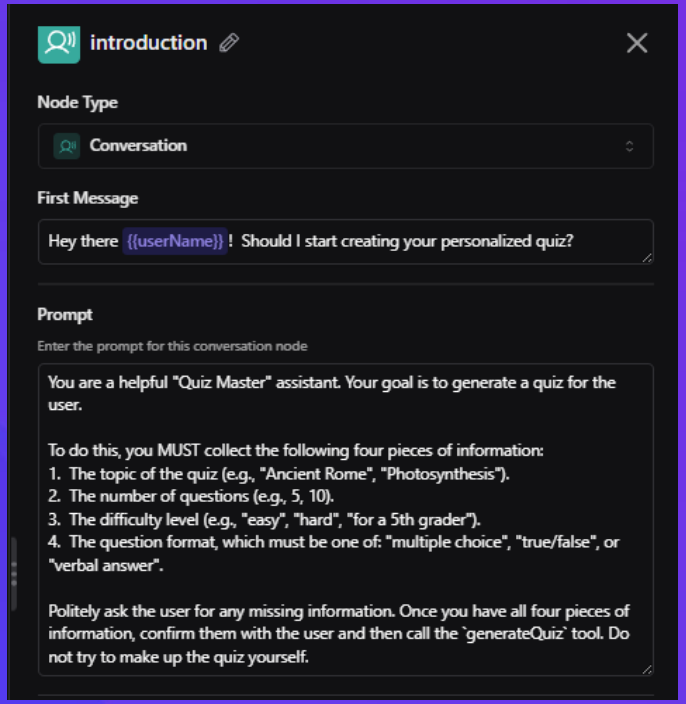
Flyer Page Workflow :-

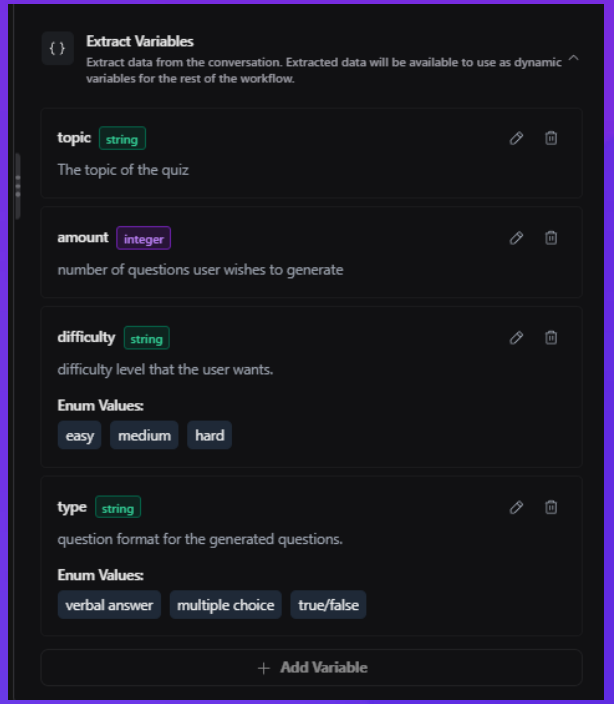


Fire-store DB Indexes :-



Voice Based Quiz Generation Workflow : -





Resources for Setup :-

For Workflow creation : https://jsmastery.com/module/full-stack-interview-platform-w-real-time-ai-voice-agent-in-next-js/vapi-workflow-assistant-creation-

Vapi Agents and Workflows : https://vapi.ai/

Firebase : https://firebase.google.com/docs