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# Voice Bridge:AI-Powered Spoken Language Learning Assistant

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***Abstract*—**The VoiceBridge mobile application is designed for language learners to practice their speaking skills by providing them with immediate, personalized corrections. By utilizing an offline speech recognition engine and a free grammar checker, learners can practice speaking a sentence with pre-recorded sentences or prompts. In addition, our transcription services are available and provide users with immediate feedback on the errors they made while speaking and their options for correcting those mistakes.

VoiceBridge provides users with an individual score at the word level through its pronunciation scoring module, which provides phoneme-level analysis and provides users with the ability to listen to their pronunciation while comparing it to the correct pronunciation. We have developed structured conver- sation activities, including role-plays, to help learners gradually and effectively develop their fluency. VoiceBridge is a stand-alone system developed to keep user information secure and provide users with a safe environment to practice their communication skills and create content.

## I. Introduction

Most folks find talking in a new language tough - it means juggling sentence rules, smooth flow, and clear sounds - all at once. While many apps spend time on reading and writing practice, they give little attention to how you speak. Because of that gap, people may repeat errors without even realizing them. Right off the bat, VoiceBridge runs as a smart phone tool that listens closely to how people speak, offering live guidance without needing internet access. Instead of sending data away, it handles voice input right where it's spoken, using sharp listening tech plus clever error spotting. From there, corrections pop up fast - clear hints you can actually use while talking through lessons built step by step. Not only does it check word flow, but it tunes into how sounds are shaped, giving marks on clarity. Privacy stays strong because nothing leaves the device, making practice safe and always available. Confidence grows quietly over time, simply by doing regular drills in your own space. The whole thing hums along locally, so help comes instantly, anytime, anywhere.

## II. PROPOSED SYSTEM

VoiceBridge is a smartphone app that uses artificial intelligence to enhance spoken language skills by giving offline, real-time feedback. Through a mobile interface, the system records user speech, which is then processed by an offline speech-to-text engine. To find and fix grammatical errors, a grammar correction module analyzes the transcribed speech.

A pronunciation assessment module that assesses speech at the word and phoneme levels is also included in VoiceBridge. Text-to-speech output provides the user with corrected sentences and pronunciation feedback. Because all processing is done on-device, privacy, low latency, and internet-independent accessibility are guaranteed.

## III. SYSTEM ARCHITECTURE

One piece at a time, the VoiceBridge setup builds around quick responses during use along with later review of spoken words. Each part plays a role - starting with how users interact through their phones, then capturing what they say. After that comes turning speech into written form using an automated translator behind the scenes. From there, checks happen on sentence structure and how clearly sounds are made. Finally, tailored notes come together based on those results. Starting at the mobile app, voice input gets picked up and turned into words by a built-in speech recognizer that works without internet. After that, those written words go under review for grammar mistakes. Meanwhile, how clearly someone spoke is judged by studying sound patterns in their voice. From there, fixes are made to incorrect sentences, shaping the next step. Spoken advice on correct pronunciation comes out as audio, thanks to a text-reading component. A diagram labeled Figure 1 shows how these pieces connect inside VoiceBridge.

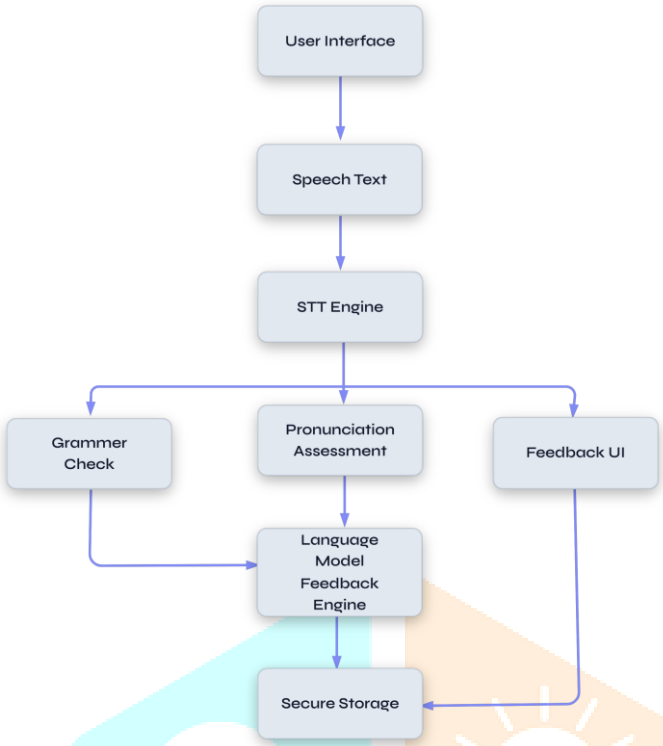


Fig. 1. System Architecture

## IV. MODULE DESCRIPTION

### A. Speech-to-Text Module

The Speech-to-Text (STT) module is in charge of translating spoken input into text. The device's microphone records user speech, which is then processed using an offline speech recognition engine like Vosk. This makes it possible to transcribe in real time without an internet connection. For later grammar and pronunciation analysis, the generated transcript maintains timing and word-level information. Because offline processing keeps voice data on the device, it also guarantees low latency and protects user privacy.

### B. Grammar Correction Module

The grammar correction module goes through the transcribed text to find which words are wrong, not only regarding spelling but also syntax. A free grammar checking code is implemented to point out the wrong sentence patterns and give the alternatives corrected. The module marks the mistakes and offers precise, context-aware, corrections, in this case, it is the learners that get to know their mistakes and their language accuracy gets improved. Therefore, this is a very quick feedback that is in turn very effective for learning the speaking practice.

### C. Pronunciation Assessment Module

The pronunciation assessment module allows the user to judge how closely his or her speech is like a native speaker's. The speech signal has its acoustic features extracted and these are compared with reference pronunciation models. The system then calculates accuracy scores at the word and phoneme levels, which in turn facilitates detailed feedback on articulation, stress and clarity. This module identifies the specific pronunciation problems of the learners and thus helps them gradually to be fluent in speaking.

### D. Feedback Module

The feedback system integrates all the results from grammar correction and pronunciation assessment modules to create comprehensive feedback. The grammar correction outputs, pronunciation scores and tips to improve are offered by a user-friendly interface. Text-to-Speech technology is used to deliver the corrected sentences in a human-like voice, to which students can listen, repeat, and practice. This two-way feedback loop positively influences the motivation and self-esteem of the learner.

## V. RESULTS AND DISCUSSION

Testing VoiceBridge involved real conversations plus checks on how well it supports speaking practice. Right off, the tool catches words you say, turns them into text accurately, works without Wi-Fi. No online link needed because everything runs locally, which means feedback comes fast. It spots mistakes in grammar, highlights mispronunciations, pinpoints wrong word choices instantly. Even when disconnected, it keeps analyzing speech with precision. Offline function allows users to learn anytime, anywhere, free from network limits. Feedback happens during speaking, not after delays caused by loading or syncing. Each feature ties back to helping learners improve fluency naturally. Corrections appear at the moment they matter most - right after a slip occurs. The whole process feels smooth since there is no waiting for responses. Errors in grammar got caught by the tool, then clear fixes came up so people could learn on the spot. Word by word, the speech checker broke down how things were said, giving precise notes that made flaws easier to see. With time and repeated tries, speaking grew sharper because feedback hit right where it mattered. Confidence grew among speakers after hearing their own corrected lines played back through speech synthesis. What stands out is how VoiceBridge combines voice transcription, error fixing, and sound analysis without needing the cloud. Instead of relying on servers, everything runs locally - cutting delays while keeping data private. Even where internet access fails, people still find ways to use it smoothly.

## VI. CONCLUSION AND FUTURE WORK

On your phone, VoiceBridge runs without needing the internet, guiding language practice through smart tools built right in. Instead of sending recordings away, it listens and responds privately using on-device thinking power. One piece turns talk into words instantly, another checks how sentences are built, while a third focuses on accent clarity. Feedback comes fast, shaped by what you say, not prewritten paths. Everything happens where you speak - inside the app, off

the grid, kept close. One step ahead might mean teaching the system new languages. Getting better at spotting wrong sounds when someone speaks comes next. Each learner may get lessons shaped by how they actually perform. Talking like real life happens could slip into practice sessions too. Feedback that adapts mid-flow might help users feel more sure while speaking. Smarter responses over time can lift how involved people stay.

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