Healthcare Translation Web App Documentation

1. Executive Summary

Purpose and Scope

The Healthcare Translation Web App is designed to facilitate real-time multilingual communication in healthcare settings. It enables healthcare providers and patients to communicate effectively across language barriers by providing instant voice-to-text translation with specialized medical terminology support.

Key Features

- Real-time voice-to-text transcription
- Medical terminology validation and correction
- 15 language support with automatic detection
- Voice synthesis for translated text
- Mobile-responsive interface
- Volume monitoring and audio quality checks

Supported Languages

- English
- Spanish
- French
- German
- Chinese
- Hindi
- Japanese
- Korean
- Russian
- Arabic
- Portuguese
- Italian
- Dutch
- Polish
- Turkish

2. Technical Overview

Speech Recognition using OpenAI Whisper

The application utilizes OpenAI's Whisper API for accurate speech recognition, particularly optimized for medical terminology. The system includes specialized context prompting to enhance accuracy in medical contexts.

Medical Terminology Validation with GPT-4

GPT-4 powered validation system ensures medical terms are correctly transcribed and translated. The system validates terminology, corrects common errors, and provides warnings for potentially critical medical information.

Real-time Translation System

Implements a robust translation pipeline using Google Translate API with medical context preservation. The system includes specialized handling for medical terminology across all supported languages.

Voice Synthesis Capabilities

Multi-layered voice synthesis system with fallback options: 1. Browser-native speech synthesis 2. Google Text-to-Speech API fallback 3. Audio streaming fallback for unsupported languages

3. Features Guide

Language Selection

Select from 15 supported languages for both input and output. The interface provides intuitive dropdown menus for language selection with real-time switching capabilities.

Voice Recording and Transcription

High-quality voice recording with volume monitoring and automatic silence detection. The system provides real-time feedback on audio quality and speech detection.

Medical Term Validation

Automatic detection and validation of medical terminology, including dosages, vital signs, and medical abbreviations. Provides immediate feedback on potential errors.

Translation Display

Dual-panel interface showing original and translated text in real-time. Includes visual indicators for translation progress and quality.

Audio Playback

High-quality text-to-speech synthesis with support for medical terminology pronunciation. Multiple fallback options ensure consistent audio output across all languages.

4. User Instructions

Step 1

Select your desired input and output languages from the dropdown menus.

Step 2

Click 'Test Microphone' to verify your audio input is working correctly.

Step 3

Press 'Start Recording' and speak clearly into your microphone.

Step 4

Monitor the volume meter to ensure optimal audio levels.

Step 5

Review the transcribed text and medical term validations.

Step 6

Click 'Speak Translation' to hear the translated text.

5. Security & Privacy

Data Handling

All audio and text data is processed in real-time and not stored permanently. Temporary buffers are cleared immediately after processing.

API Security

All API communications are encrypted using HTTPS. API keys are securely managed using environment variables and never exposed to the client side.

Medical Information Privacy

The application follows healthcare privacy guidelines. No patient information is stored or logged. All processing occurs in memory and is immediately discarded.