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Sleep Talk Analyzer: A Deep Dive into Nocturnal Conversations and Dream Interpretation

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Abstract: ***This research evaluates the innovative application of speech recognition technology in analyzing sleep speech. The system transcribes nighttime speech and interprets possible dream meanings in multiple languages using the Web Speech API. Utilizing the Web Speech API, the project aims to reduce dependence on external NLP models such as Google or Whisper AI. This research investigates the role of multilingual support in dream interpretation while also improving transcript analysis accuracy. Sleep speech analysis is viewed as a novel intersection between linguistics and psychology through the application of minimal web-based technology. The proposed system aims to analyze individual's dream by capturing their nocturnal speech, analyzing it, and providing dream interpretations.***

Keywords: Sleep Speech, Web Speech API, Speech Recognition, Multilingual Dream Analysis, Voice Recording, Transcript Analysis

I. INTRODUCTION

Sleep speech, commonly known as somniloquy, is an observed phenomenon in which individuals talk while asleep. This study focuses on using the Web Speech API to record, transcribe, and analyze sleep speech in pursuit of gaining insights into possible dream interpretations. Previous studies that have used either NLP or cloud-based services rely on traditional models; therefore, this study presents a lightweight, privacy-focused alternative. Understanding sleep speech can lead to broader sleep studies that investigate subconscious thought processes. While somniloquy is often found to have little effect, it can sometimes suggest underlying stress, anxiety, or neurological conditions.

The aim of this study is to bridge advances in sleep research with technological advancements, thereby developing a tool that is both relevant and scientifically grounded.

II. LITERATURE REVIEW

Sleep speech analysis is an emerging topic in sleep research and computational linguistics. Previously NLP models like Google Speech-to-Text engine and Whisper AI were used to transcribe, analyze nocturnal speech. But these models require computational resources and cloud-based services which leads to privacy concerns.

Study/Approach	Model Used	Key Features	Limitations
Traditional NLP-based analysis	Google Speech-to-Text, Whisper AI	High accuracy, cloud-based processing	Requires extensive computational resources, privacy concerns
Offline Speech Recognition	Custom-built models	Works without internet, preserves privacy	May have lower accuracy, requires training on diverse datasets
Web Speech API-based Analysis	Web Speech API	Lightweight, real-time, privacy-focused, no third-party AI dependency	Limited customization, browser-dependent

Table 1: Comparison of Speech Recognition Approaches for Sleep Speech Analysis

Alternative approaches, including offline speech recognition models and custom-built datasets for sleep speech pattern analysis, have been suggested for analyzing dream-state data. The Proposed research highlights the multilingual support in dream interpretation, emphasizing the role of language in dream analysis. Previous works has discussed the significance of multilingual support, suggesting that the language of the dream influences the interpretation.

This study diverges from prior research by utilizing the Web Speech API, which offers a lightweight, real-time, privacy-focused solution without reliance on third-party AI services. By integrating multilingual capabilities, the system enables the interpretation of previously studied monolingual datasets. Since dreams are culturally influenced, they require an adaptive method of interpretation. This study aims to validate the effectiveness of a web-based approach while also assessing the limitations of previous NLP-based methodologies.

III. PROPOSED SYSTEM

The proposed system is designed for easy recording, transcription, and interpretation of sleep speech. conventional NLP-based models, which use cloud-dependent speech recognition software, this system leverages the Web Speech API for real-time speech recognition. This approach enhances efficiency and accessibility. By minimizing computational overhead, the system ensures usability on basic hardware, making it widely accessible.

Additionally, this system prioritizes real-time processing, allowing users to receive immediate transcriptions and interpretations, unlike other models that require batch or cloud processing.

A. System Components

1) Voice Recording Module: A web interface enables users to start and stop recording.
2) Speech Recognition Module: The Web Speech API processes speech and generates text.
3) Multilingual Support Module: The system translates transcriptions into multiple languages.
4) Dream Analysis Module: Use of symbolic dream interpretation datasets, the system provides insights into potential dream meanings.
5) User Dashboard: Users can access transcripts and dream interpretations through an interactive interface.

The system is designed to function smoothly without requiring advanced hardware infrastructure or cloud-based NLP processing.

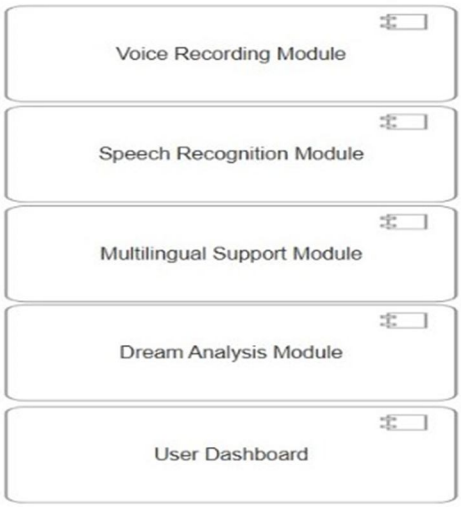

Fig. 1: System Component Modules of Sleep Talk Analysis System

IV. METHODOLOGY

The methodology follows a structured approach to developing and evaluating the system:

A. Data Collection

The first step involves collecting sleep speech recordings through the web application. Continuous audio recording captures spoken words. To improve accuracy and minimize background noise, advanced noise reduction techniques are applied. The collected speech data is stored securely, ensuring privacy and confidentiality.

B. Speech-to-Text Conversion

Once audio recordings are obtained, the Web Speech API transcribes the audio into text in real time. Supporting multiple languages enhances accessibility and allows users from different linguistic backgrounds to analyze their sleep talk accurately.
The transcription ensures that even low-audio signals are recognized and converted into readable text for further analysis.

C. Multilingual Translation

To improve accessibility, the Web Speech API enables automatic multilingual translation. This feature ensures that users can understand and interpret their transcribed sleep talk without relying on external translation services

D. Dream Interpretation

Dream interpretation is an established field in psychology that explores the meanings of dreams. Cultural variations significantly impact dream symbolism and interpretation. Different societies assign distinct meanings to dream symbols based on historical and contextual factors.
Once the system translates the transcribed text, a symbolic dream dataset is used for analysis. Recognized dream symbols, such as "water," "fire," or "flight," are identified, and the system provides concise interpretations of their psychological significance. Users receive a comprehensive report on recurring themes in their subconscious thoughts.

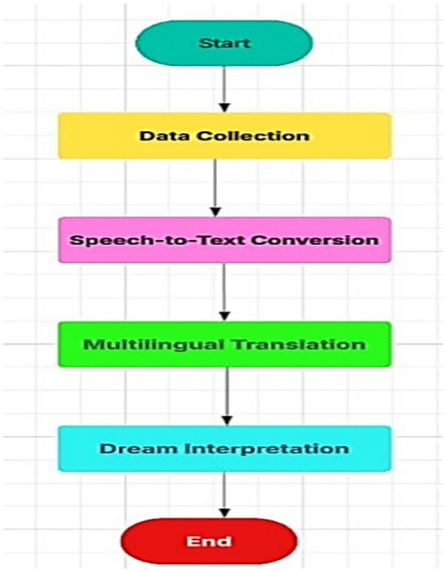

Fig. 2: Workflow of Sleep Talk Analysis System

V. IMPLEMENTATION

The system is implemented using web technologies:

1) Frontend: HTML, CSS, JavaScript for an intuitive user interface.
2) Backend: JavaScript handles Web Speech API interactions and multilingual translations.
3) Database: Predefined datasets store symbolic dream meanings for quick retrieval.
4) Processing Logic: A rule-based algorithm matches transcribed words with dream interpretations.

The Web Speech API ensures real-time speech recognition, prioritizing user privacy and eliminating the need for external AI services that increase system complexity.

VI. RESULTS

Initial testing reveals that the Web Speech API effectively captures and transcribes sleep speech. A multilingual translation feature has been added to enhance accessibility and inclusivity in dream analysis. Compared to AI-based models, this system offers a lightweight and privacy-focused alternative without compromising dream interpretation accuracy.
Preliminary user testing suggests that real-time transcription accurately captures meaningful speech from individuals with sleep-related issues. It should distinguish relevant speech from background noise remains a challenge.

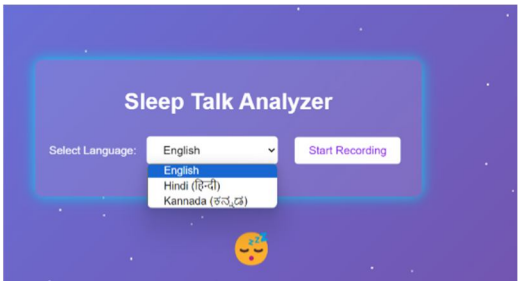

Fig. 3: Sleep Talk Analyzer – Language Selection

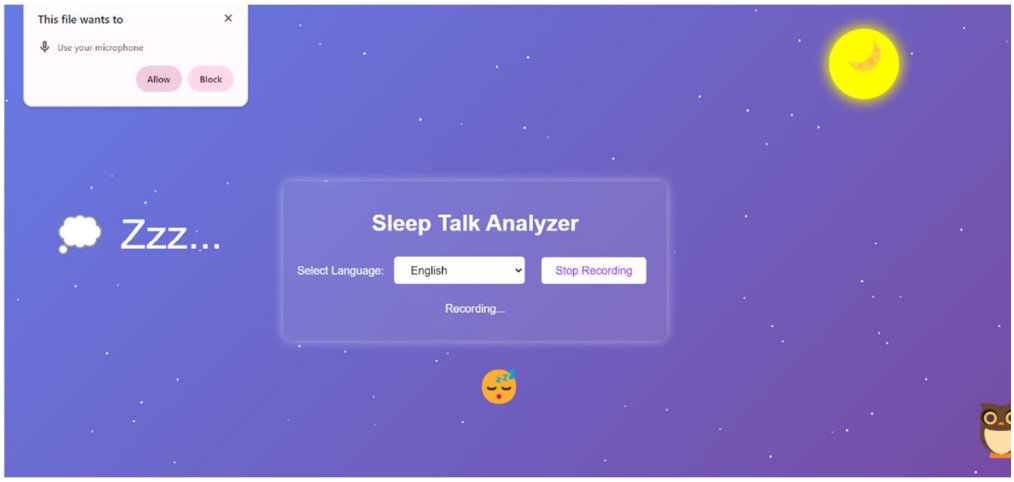

Fig. 4: Microphone Permission Request

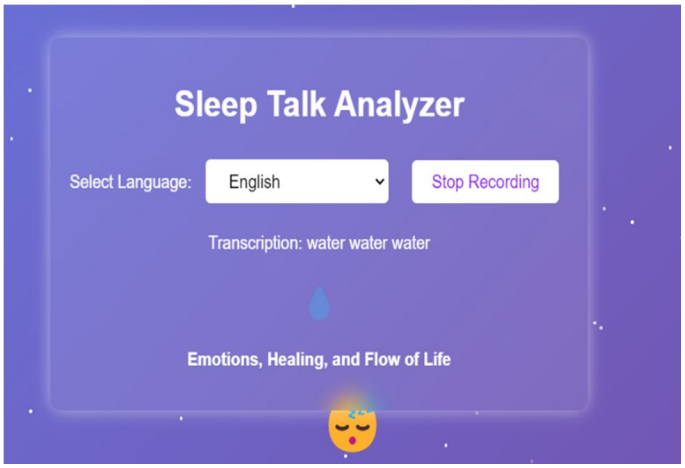

Fig. 5: Real-Time Transcription and Dream Interpretation

VII. CONCLUSION AND FUTURE WORK

This research evaluates the feasibility of using the Web Speech API for sleep speech analysis without relying on NLP-based AI models. Future improvements include enhancing speech recognition accuracy, expanding dream interpretation datasets, and incorporating sentiment analysis to refine dream predictions.

The system introduces a novel, web-based approach to dream analysis, making dream interpretation more accessible and efficient. Future developments will also include a user feedback mechanism, allowing individuals to personalize and validate dream interpretations, thus refining prediction accuracy and providing more meaningful insights.

VIII. ACKNOWLEDGMENT

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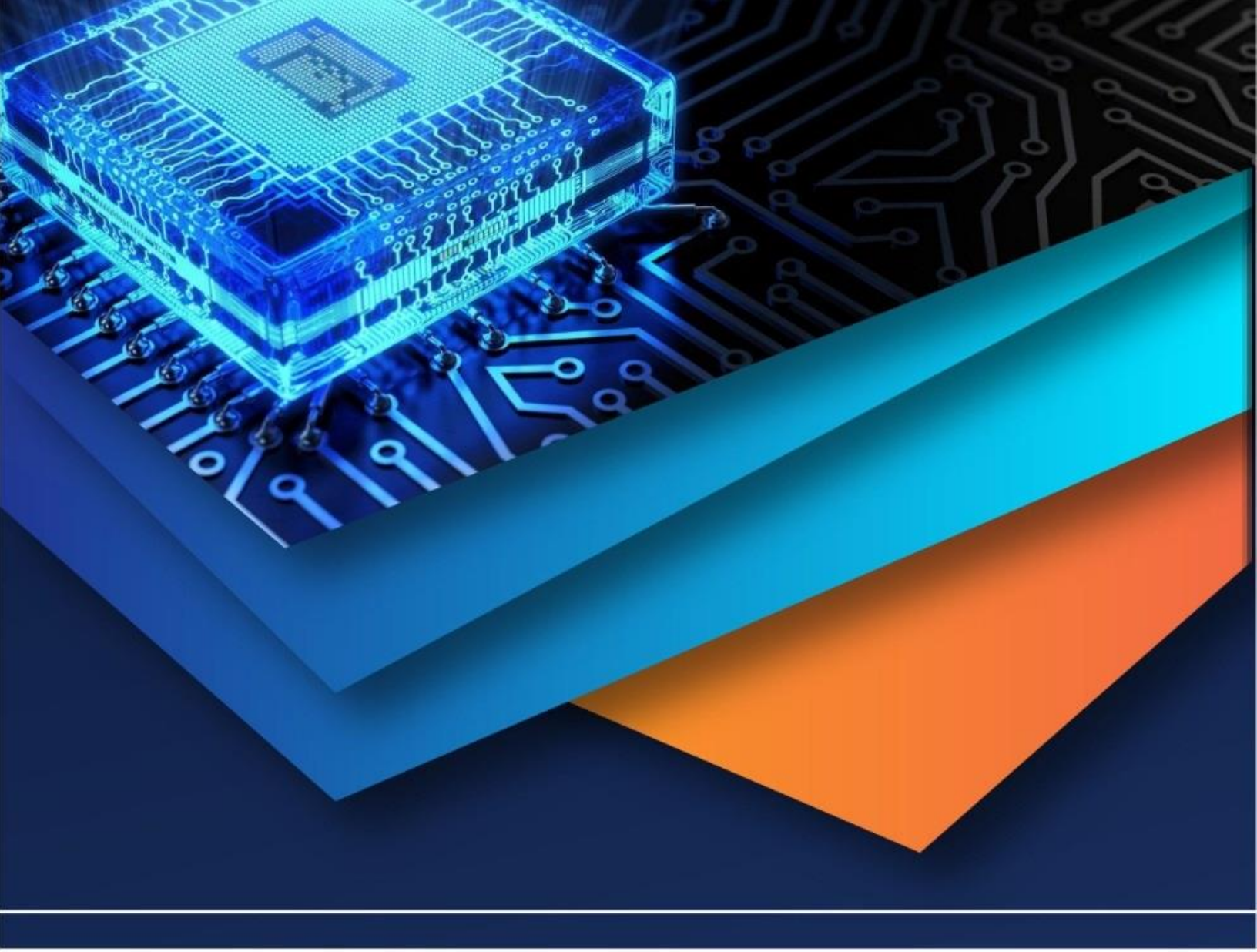
REFERENCES

[1] Web Speech API Documentation - Mozilla Developer Network (MDN)
[2] Research on Somniloquy - National Sleep Foundation
[3] Speech Recognition in Web Applications - IEEE Transactions on Audio, Speech, and Language Processing



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