

Voice Based Budget Assistant

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<p>Peer Review Information</p> <p><i>Type: Article</i> <i>Received: 22 March 2026</i> <i>Revised: 06 April 2026</i> <i>Accepted: 24 May 2026</i> <i>Published: 05 June 2026</i></p>	<p style="text-align: center;">Abstract</p> <p>The rapid advancement in voice recognition technology and natural language processing has opened new possibilities for creating accessible financial management solutions. Voice based budget assistance uses abstraction to make the system simple and user friendly like voice recognition, budget tracking, and easy to use voice interface where the user only needs to talk. Traditional budget management applications often require manual input and navigation, which can be time-consuming and inconvenient for users with physical disabilities or those who. This survey explores the development of an intelligent Voice Based Budget Assistance system that leverages Web Speech API, Natural Language Processing (NLP), and modern web technologies to provide hands-free financial management. The system integrates React.js frontend, Firebase backend, OpenAI API for intelligent processing, and voice recognition capabilities to create an accessible, hands-free. The integration of voice recognition technology with financial management systems presents a significant opportunity to enhance accessibility and user experience. Advances in Web Speech API, Natural Language Processing (NLP), and Artificial Intelligence (AI) provide the foundation for developing intelligent voice-controlled financial assistance systems.</p> <p>Keywords: Natural Language Processing; Artificial Intelligence; Voice Recognition; Web Speech API; Speech-to-Text Conversion.</p>
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Introduction

A voice-based budget assistant is an advanced financial management solution that leverages artificial intelligence to simplify the way individuals monitor and control their expenses. In today's fast-paced digital environment, many users struggle with traditional budgeting methods due to time constraints, manual data entry, and lack of real-time insights. This system addresses these challenges by enabling users to interact through natural speech, making the process more intuitive and accessible. Using speech recognition technology, the assistant converts voice input into text and processes it using Natural Language Processing to extract essential financial details such as transaction amount, category, and time. The extracted data is then analyzed using machine learning techniques to identify spending patterns, categorize expenses, and generate meaningful insights. Furthermore, the system provides intelligent recommendations based on user behavior, such as suggesting budget limits, highlighting unnecessary expenditures, and encouraging savings. It can also generate periodic summaries, alerts, and reminders to help users stay within their financial goals. The inclusion of Text-to-Speech (TTS) technology allows the assistant to communicate responses in a conversational manner, enhancing user engagement and usability. The system can be further enhanced by integrating with mobile applications, banking systems, and cloud storage to ensure seamless data access and synchronization.

Literature Review

Recent advancements in Artificial Intelligence, Speech Processing, and Natural Language Processing (NLP) have significantly contributed to the development of voice-based financial assistants. Several research works highlight that traditional financial management systems, such as manual budgeting tools and text-based applications, lack accessibility and real-time interaction, especially for non-technical users. To overcome these limitations, voice-enabled systems have been introduced that utilize automatic speech recognition (ASR) to convert spoken input into text and NLP techniques to extract meaningful financial information. Studies such as the work by Saranya S. et al. (2025) emphasize the integration of intelligent voice interfaces in banking systems to improve user experience and accessibility. Their research demonstrates how voice commands can be used to track expenses, categorize transactions, and generate budget insights using rule-based and machine learning approaches. Similarly, other research highlights the role of intent recognition and entity extraction in identifying key financial elements such as income, expenses, and savings goals from user speech. Furthermore, hybrid models combining rule-based systems and machine learning algorithms have been found to improve accuracy in financial classification tasks. These systems can adapt to user behavior over time, offering personalized budgeting suggestions. Cloud-based architectures are also widely adopted to ensure scalability, real-time data processing, and secure storage of financial information. However, challenges such as speech ambiguity, multilingual support, and data privacy remain critical concerns in the implementation of such systems. Overall, the literature indicates that voice-based budget assistants have strong potential to transform personal financial management by providing a more intuitive, efficient, and user-friendly interface, especially when enhanced with advanced AI techniques and secure system design.

Limitations and Existing Work

- **Privacy and Security Concern:**– Data Security: Protecting personal information is crucial and can be complex.– Storing voice data: Storing voice data security risk data is not properly encrypted.– Integration: Combining with existing systems might face compatibility issues.
- **Depend on internet and Device:**– Internet: Mostly voice based systems require stable connection so it can require a internet.– Most voice assistants (e.g., Google Assistant, Alexa, Siri) use cloud-based processing your voice is recorded and sent to remote server.
- **Power and Storage usage:** Continuous voice processing so it can consume the more battery is require and device resource. more power is required to machines process the voice recognitions and speech recognition.
- **Limited Complex Input:** It is complex to explaining the transactions or detailed tracking budget notes by the voice can be harder. it can gives us to limited input to the users Limited support for personal categories or advanced rule.

Motivation

The integration of voice recognition technology with financial management systems presents a significant opportunity to enhance accessibility and user experience. Advances in Web Speech API, Natural Language Processing (NLP), and Artificial Intelligence (AI) provide the foundation for developing intelligent voice-controlled financial assistance systems. it is especially helpful for busy individuals, elderly people not comfortable with complex apps, since voice commands are simple and hands free.

Proposed System

The proposed system is an AI-based Voice Budget Assistant designed to help users manage their financial activities through simple voice commands. The system aims to provide an intuitive and accessible platform where users can record expenses, track income, and receive budget insights without manual data entry. This text is then processed by the Natural Language Processing (NLP) module, which performs intent detection and entity extraction to identify key financial information such as amount, category (e.g., food, travel), and transaction

type (income or expense). Once the data is extracted, it is passed to the classification and processing module, where a hybrid approach combining rule-based logic and machine learning algorithms is used to categorize transactions accurately. The processed data is then stored securely in a database, allowing the system to maintain a history of financial records. The system also includes a budget analysis module that evaluates spending patterns and compares them with predefined or user-defined budget limits.

Implementation Details

The implementation of the Voice-Based Budget Assistant is carried out using a modular and integrated approach that combines speech processing, natural language understanding, and financial data management. The system is primarily developed using Python, as it provides extensive support for artificial intelligence and data processing libraries. The voice input from the user is captured through a microphone and processed using Google Speech Recognition, which converts spoken language into text with a good level of accuracy. This converted text is then analyzed using Natural Language Processing techniques with the help of libraries such as NLTK and spaCy, enabling the system to identify user intent and extract important entities like amount, category, and transaction type. After extracting the relevant information, the system processes the data using a hybrid classification approach that combines rule-based logic with machine learning techniques, ensuring better. The system also includes a budget analysis component that evaluates spending patterns, compares them with predefined budget limits, and generates meaningful insights such as expense summaries, overspending alerts, and saving suggestions. allowing users to receive responses in a natural and interactive manner. Overall, the system is designed to be efficient, user-friendly, and scalable, providing a practical solution for modern financial management through voice interaction.

Result And Discussion

The implemented Voice-Based Budget Assistant was tested with multiple users to evaluate its performance in terms of accuracy, usability, and efficiency. The system successfully converted voice inputs into text using Google Speech Recognition, achieving high accuracy under normal speaking conditions. It was observed that the system performed best in a low-noise environment, while minor errors occurred in noisy surroundings or with unclear pronunciation. The Natural Language Processing module, developed using NLTK and spaCy, effectively identified user intent and extracted key entities such as amount, category, and transaction type. The hybrid classification approach (rule-based + machine learning) showed improved accuracy compared to using only rule-based methods, especially for varied user inputs. Additionally, handling multiple languages and complex sentences remains a challenge. Background noise and accent variations can also affect accuracy. Overall, the results demonstrate that the proposed system is effective, user-friendly, and capable of simplifying personal financial management. The integration of voice technology with intelligent data processing provides a modern and efficient solution compared to existing traditional methods.

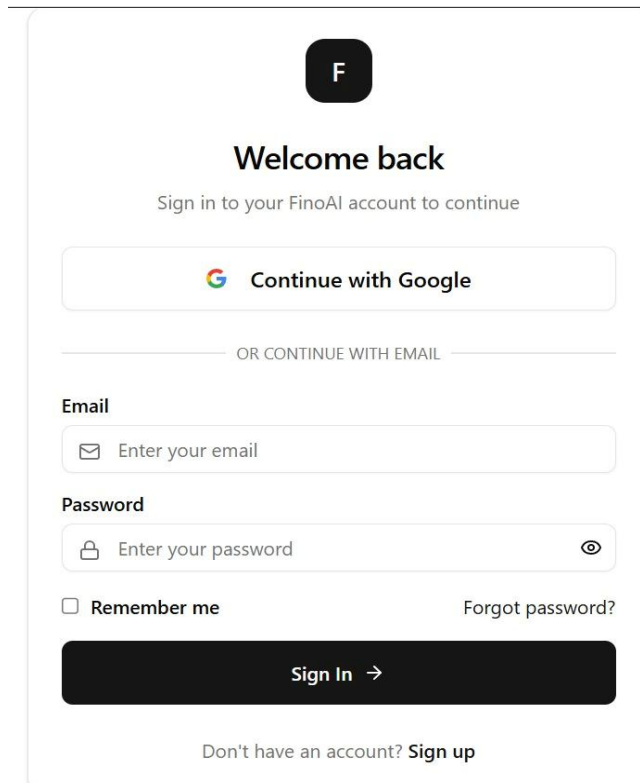


Fig. 1. Login Page

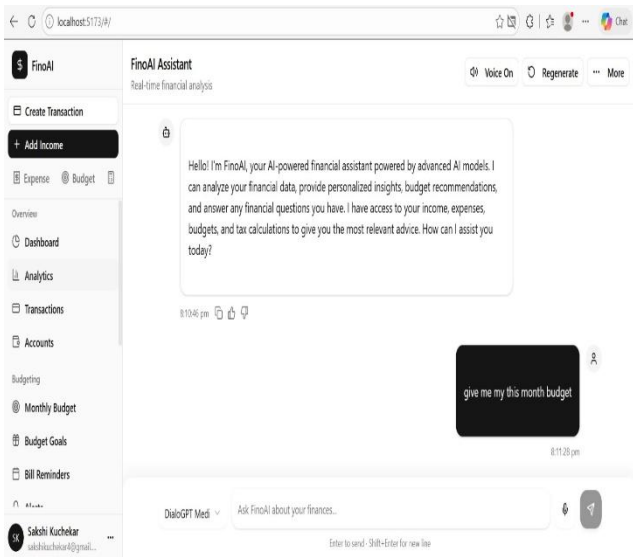


Fig. 2. User Interface

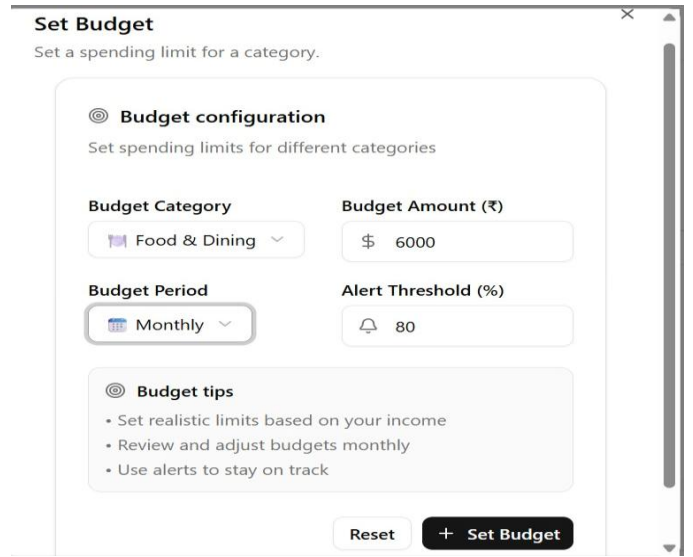


Fig3.Set Budget

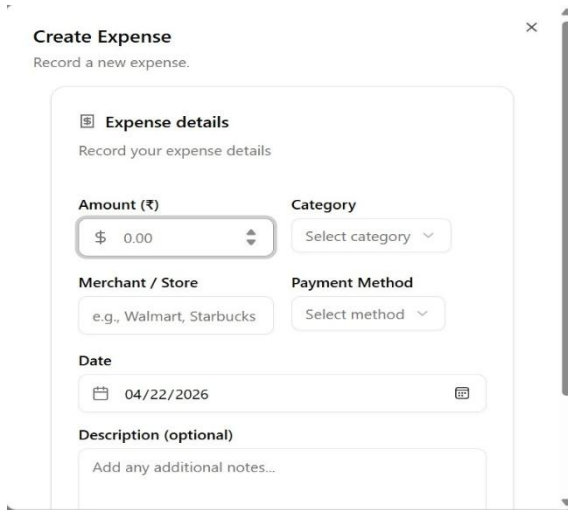


Fig. 5. Create Budget

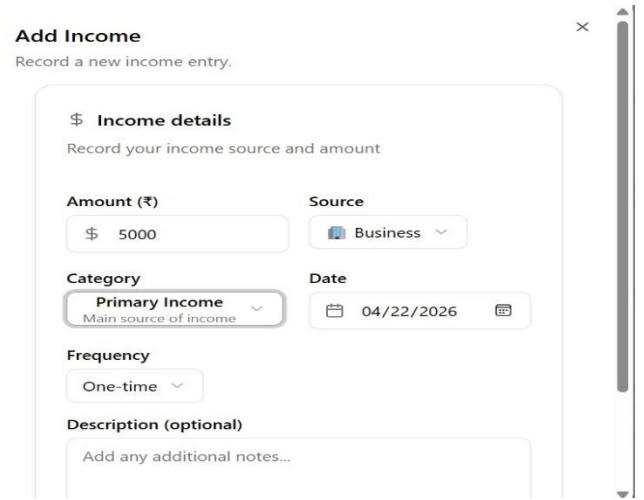


Fig. 6. Add Income Details

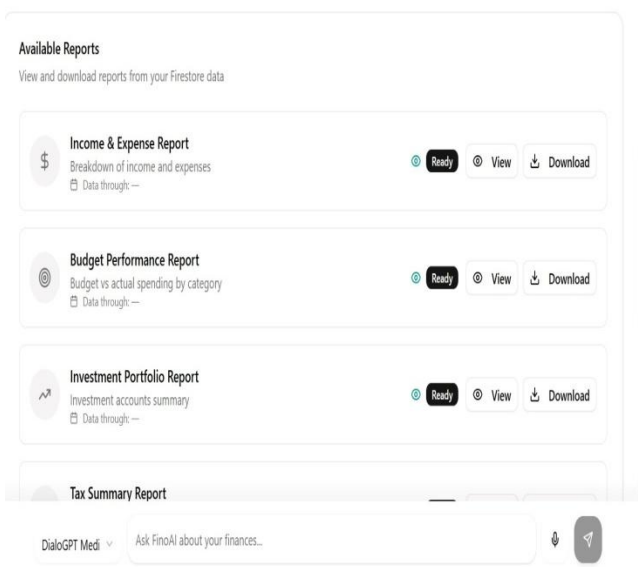


Fig. 7. Report UI

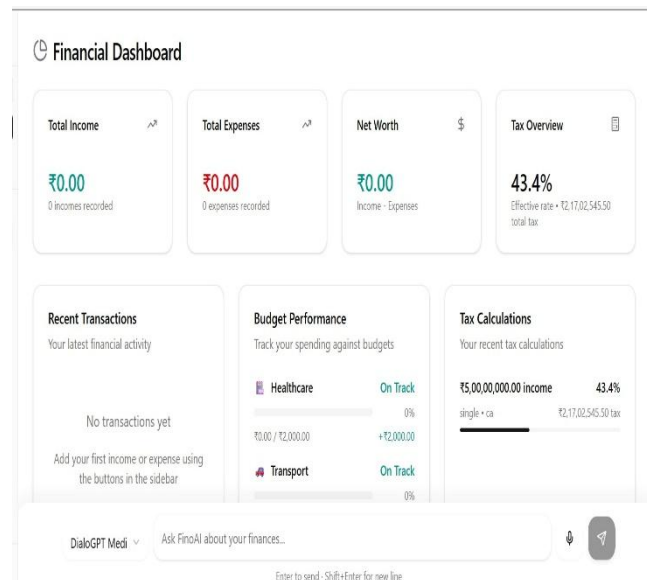


Fig. 8. Finanacial Dashboard

Conclusion

This system improves accessibility for people and it can save time and make budgeting easier for people, individuals, households, business, financial sectors etc. The voice-based budget assistance systems provide innovative and user-friendly ideas to manage their finances, tracking budgets through voice commands and speech recognition by using natural language processing and combining the voice recognition, it allows users to record and receive insights in a faster way and more conveniently. It proves to be a practical and efficient tool that can simplify the management in the business, educational systems and it can serve as a valuable project in the field of AI-driven applications. The system fills critical research gaps in voice commands and it contributes to the field of accessible technology, making it more efficient and more inclusive. This project addresses the growing need for intelligent financial management solutions and voice-controlled interfaces for e.g. Web Speech API, Natural Language Processing, Firebase Application, OpenAI API that provide comprehensive solutions. In conclusion, voice-based budget assistance is a useful and modern tool for managing everyday finances. It makes budgeting faster, more accessible, and more personalized, although it's best used alongside other financial tools for more advanced needs.

References

1. Saranya, S., Jency, J., Aparna, V., Priya Dharshini, E., & Lavanya, S. "Voice AI-Intelligence Based Voice Assistant." *International Journal of Scientific Research in Science and Technology* (2025).
2. Kumar, R., & Singh, A. "Ethical AI and Voice Assistant Using Machine Learning NLP." *Journal of Recent Innovations in Computer Science and Technology* (2025).
3. Patil, R., & Deshpande, S. "Ethical Legal Concern of Artificial Intelligence in the Healthcare Sector." *International Journal of Advanced Research in Science and Engineering* (2024).
4. Sharma, P., & Verma, A. "Survey on Personalized Voice Assistant." *International Journal of Computer Applications* (2024).
5. Singh, V., & Mehta, R. "Enhanced AI Voice Assistance Using Machine Learning and NLP." *International Journal of Computer Science and Information Security* (2022).
6. Gupta, N., & Kumar, S. "Research and Analysis on Voice-Based System with Machine Learning." (2022).
7. Patel, A., & Shah, K. "Daily Expense Tracker." *International Journal of Computer Science and Mobile Applications* (2023).
8. Saranya, S., & Lavanya, S. "AI-Powered Voice Assistant for Banking Systems." *International Journal of Scientific Research in Science and Technology* (2021).
9. Lathe, J. "AI-Driven Budgeting Tools: Improving Financial Planning and Savings." *International Journal of Research in Applied Science and Engineering Technology* (2021).
10. Deepthi, C. G., Shetty, J. J., Jain, I. B. S., Lakshmi, C. R., & Kumar, D. R. K. "AI-Powered Finance Management Platform." *International Journal for Research in Applied Science and Engineering Technology* (2021).