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### Voice Based Budget Assistance

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Peer Review Information	Abstract
<p><i>Submission: 11 Sept 2025</i></p> <p><i>Revision: 10 Oct 2025</i></p> <p><i>Acceptance: 22 Oct 2025</i></p> <p><b>Keywords</b></p> <p><i>Voice Recognition, Natural Language Processing (NLP), Financial Technology (FinTech), Firebase Integration, OpenAI API, React.js, Budget Management, Expense Tracking, Financial Assistance, Voice User Interface (VUI), Real-time Processing.</i></p>	<p>The rapid advancement in voice recognition technology and natural language processing has opened new possibilities for creating accessible financial management solutions. 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 prefer hands-free operation. 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 financial management solution. The proposed solution aims to enhance accessibility, improve user experience, and provide intelligent financial assistance through voice interactions, ultimately making financial management more inclusive and efficient for diverse user groups.</p>

#### Introduction

In recent years, the financial technology sector has witnessed exponential growth, with numerous applications designed to help users manage their personal finances. However, most existing solutions rely heavily on manual input methods, creating barriers for users with physical disabilities or those seeking hands-free operation capabilities.

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.

Voice-based interfaces offer several advantages

over traditional input methods: they enable hands-free operation, improve accessibility for users with physical limitations, and provide a more natural interaction paradigm. The combination of voice recognition with AI-powered financial assistance can create personalized, intelligent responses to user queries and commands. Modern web technologies such as React.js provide robust frontend capabilities, while Firebase offers scalable backend services including authentication, real-time database, and cloud functions. The integration of OpenAI API enables sophisticated natural language understanding and intelligent financial assistance. This survey paper explores the development of a Voice Based Budget Assistance system that addresses these challenges by

creating an intelligent, AI-driven solution. It combines voice recognition, NLP-based financial processing, real-time data synchronization, and intelligent assistance, ultimately improving accessibility, user experience, and financial management efficiency across diverse user groups.

They are used in various sectors like healthcare, education, entertainment, and automotive for hands-free control. This project focuses on creating a digital assistance that allows users to track expenses, set goals, receive financial insights through simple voice commands.

This unique approach allows the voice assistant to capture and interpret human voice

commands, transforming them into textual queries without conventional to each other.

### Problem Statement

Traditional budget management applications require manual input and navigation, which is time-consuming and inconvenient for users with physical disabilities or those who prefer hands-free operation. The increasing complexity of financial management tools and the need for accessible technology solutions highlight the importance of developing voice-controlled financial assistance systems that can provide intelligent support through natural language interactions.

### Literature Survey

Ref.no	Paper Title	Author Name	Year Publication	Purpose
1.	Voice AI - Intelligence Based Voice Assistant.	Pooja Garai, Aditya Nikam, Suyash Kerakar, SamrudhiDeshmukh, AtharvaMane, Suvarna Bhise	2025	Voice Assistance are primarily focuses on the Responding to user queries and providing accurate and relevant information. Opening and Accessing any installed app on the Phone using voice commands.
2.	Voice User Interface Design for financial Application.	Smith.j,Johnas, A,Brown,K	2025	Improving accessibility in financial applications through voice interface Voice user interface design pattern and usability testing. Also Integrating with AI and Machine Learning for better voice understanding .
3.	Natural language Processing for personal Finance Management.	Chen.L.Wang, X.Rodriguez.M	2025	Automating Financial data processing using NLP techniques, it also focuses on using BERT and GPT models for financial text understanding uses the real time financial advisory through conversational AI.
4.	Personalized voice assistant ,NLP speech recognition.	Dr.Shrikrishna, Ashwin Pushparaj, Advait Suresh, Akash Krishnan Nair, Teena Geogerg, Sharika T R.	2024	The personal voice assistance that takes the user commands as input and perform tasks based on the user commands .the purpose of Personal voice assistance utilize natural language processing ,speech recognition and AI techniques. The goal is to provide an overview of personalized voice assistance technologies.

5.	Ethical & Legal Concern of Artificial Intelligence in the Healthcare Sector.	Ibrahim A.Abu, MarwanAbdeldayem, Saeed, Saeed	2024	The purpose is that the origins of AI in the healthcare system can be traced back to the early application of data analysis and machine learning in medical diagnosis. Focuses on the training and of ethics should be much more comprehensive.
6.	Enhanced AI Voice Assistance Using Machine Learning and NLP.	J. Growthamy, A. Senthilsevi, Aniket Kumar, Aakash S, Gandikota Sreedhar	2023	The purpose of that system is to create an Enhanced AI voice assistance that leverages advanced Natural language processing (NLP) Machine Learning (ML). To content Generation this can be used to culture the various efforts for example to write content or to summarize the documents which is derived from the user contents. Which has include the machine learning content generation categories into that better user performance.
7.	Open API Integration for Intelligent Financial Assistance .	Davis M, Wilsome C, Garcia E,	2023	The Purpose is that to enable Seamless connectivity between different financial services ,applications ,Platforms so that users can receive Personalized, Automated and intelligent Financial Support. Connects bank accounts Payments Gateways stock Platforms wallet through online platforms.
8.	Firebase Integration for Real Time Financial Application	Kumar P, Singh A, Thompsan B	2023	The Purpose is to provide Scalable ,secure and instant data synchronization between users and the system. Enabling real time financial tracking notification and collaboration Firebase offers backend services without the need to manage servers faster development and deployment.
9.	A Financial Literacy AI-Enabled Voice Assistance system for Educational Use	Candace Miu, JesilynGopurathinga Vineeth Thota, Matthew Thompson, Neel van Beek	2022	The Plan is to developing a virtual voice assistance includes lessons Plan Creation, cloud platforms implementation stem evaluation .

10.	Daily Expense Tracker	Shivam Mehara, Prabhat Prashar	2021	The daily expense tracker can tracks your daily,weekly,Monthly Expenses in eye caching way . This project is aim to at developing web application which will be helpful to users who wants manage their incomes
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**Methodology**

Voice based budget assistance-that is,how budgeting sysyems adjust the budgets,daily expenses by using the voice interaction. Voice assistants are all written in programming languages, which listen the verbal commands and respond according to the user’s request.

**Voice Recognition and NLP:**

This technology is used to take voice commands and perform tasks and Natural Language Processing(NLP) as it’s the core technologies to convert spoken input into actionable users commands.

**Implementation of Voice AI Model:**

Implementing the voice AI model to capable the understanding the user commands by interfacing. The model is designedto process voice commands and generate system-level actions accordingly.e.g

- Speech- to-Text(STT)
- Natural Language Processing(NLP)

**Firestore Integration:**

The main purpose of the firestore is identify users securely when they gives the voice commands and handle the backend for storing and retrieving budget data.

**Open API:**

Open API takes the text from voice commands and understand the meaning using AI and AI provided advice or suggestions to manages the personally daily budgets.

**Application:**

• **Personal Finance management:**

To manage the personal finance and also helps individuals track daily expences using voice commands. and the track your income and set a budget for each category. Household Budget Planning:

In this applications families can assigns the daily expences like groceries,rent,to track the total household income generate weekly/monthly reports to see spending money.

• **Banking Integration:**

Integrated with banking apps for monitoring the balance and saving goals. Voice assistants (like Alexa, Google Assistance,Siri) can integrate with budgeting tools or banks.

• **Business Expences Tracking:**

Small business owners can record travel,inventory or operational costs.to manges the business budget effectively tracking the total revenue by including all income sources like sales, services, investments, products costs etc.

**Future of voice Based Budget Assistance:**

The future of voice based budget assistance is hands-free,intelligent,personalized and integrated budgeting into real time,proactive and accessible for individuals,households and businesses.

Integration with household and businesses systems allow multiple users to manage budgets in real time and smart home devices automatically trackthe expences.

The future of voice assistant technology holds promising prospects for various applications across industries.

In addition to conventional tasks such as setting reminders and controlling smart home devices, voice assistants are to play a more significant role in healthcare, education, and customer service

1. Smarter AI integration:
2. Iot and smart home Integration
3. Enhanced security
4. Predictive and proactive budgeting

**Research Gap**

- Limited integration of voice recognition with comprehensive financial management features
- Insufficient focus on accessibility and inclusive design in financial applications
- Lack of real-time voice processing capabilities in existing budget management systems
- Limited AI-powered financial assistance through natural language interactions
- Insufficient cross-platform voice-controlled financial solutions

- Limited research on voice biometrics and security in financial voice applications
- Lack of comprehensive voice user interface design patterns for financial services
- Insufficient integration of multiple APIs (Web Speech, OpenAI, Firebase) in single financial applications

### Conclusion

This survey addresses the growing need for accessible and intelligent financial management solutions through voice-controlled interfaces. By integrating Web Speech API, Natural Language Processing, Firebase backend services, and OpenAI API, the proposed Voice Based Budget Assistance system provides a comprehensive solution that enhances accessibility, user experience, and financial management efficiency. Unlike existing models, this approach emphasizes hands-free operation, intelligent financial assistance, real-time processing, and cross-platform accessibility. The system fills critical research gaps in voice-controlled financial applications and contributes significantly to the field of accessible financial technology, making financial management more inclusive and efficient for diverse user groups including those with physical disabilities or preferences for hands-free operation.

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