International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Voice/Textual BOT Mobile App

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Abstract

In order to promote effective communication between users and other stakeholders through both structured and unstructured chat conversations, this study investigates the creation of a general Voice/Textual BOT mobile application for the iOS and Android platforms. The BOT can process precise, structured inquiries, like "What is my order status?" and get precise data from backend databases by using sophisticated Natural Language Processing (NLP). Additionally, it interprets the context and responds to unstructured inquiries like "status" by giving information like order progress, delivery updates, payment information, and more. Because of its scalable and flexible architecture, the program can be used for a variety of purposes and is compatible with a large number of software systems. This approach lays the foundation for next developments in conversational AI technology by improving user engagement, expediting information retrieval procedures, and facilitating cross-platform integration.

KEYWORD: Natural language processing, chatbots, virtual assistants, information retrieval, Android applications, artificial intelligence, voice recognition and generation.

I INTRODUCTION

It is often very challenging, time-consuming, and inconvenient to locate the relevant information on any institution or organization. Traditionally, human-to- human interactions are used to answer questions like these. Thus, as more questions are received, there is a corresponding rise in the wait time for answers, which lowers consumer satisfaction. Thanks to the recent advances in natural language processing and AI-based applications, this process can be made much quicker and easier by developing an AI Voice Assistant to undertake these tasks. This essay is to provide a quick and easy solution to this problem. The user and the virtual assistant continue their conversation in a natural way. Questions regarding our institute's professors, events, finances, courses, and infrastructure can be answered by it.

The virtual assistant, once it receives a question from the user, understands the situation and replies accordingly. This is done by first converting an English statement into a machine-friendly query, then extracting the relevant keywords, reviewing the required data, and lastly giving back the reply in a sentence in natural language. It answers the questions just as a human being would do.

For individuals who require assistance in general or are new to the institution, the virtual assistant offers a practical alternative. By automating tasks like responding to frequently asked questions that don't always call for humanitarian assistance, it also increases worker efficiency.

Chatbot Categorization according to Uses and Features

A. Rule-Based Chatbots (Scripted Chatbots)

There is no learning from the interaction, and these chatbots can only provide answers through their programming. Use cases: Basic customer support, FAQs, ordering systems, appointment scheduling.

B. AI-Based Chatbots (Conversational AI)

How they work: They are using NLP and ML, which enables the understanding and human-like response simulation. They learn from a conversation and interact to get better in time. Use cases: Provide more advanced customer support, virtual assistants, and more personalized user experience. Example: Siri, Alexa, or ChatGPT—these bots can understand complex queries and carry on a conversation.

C. Hybrid Chatbots

How they work: These combine the best of both rule- based and AI-driven approaches. They may start out following rules but then revert back into an AI capability if the conversation is more expansive than the predefined set. Use cases: Customer support in the case of most simple questions, but others more complex. Example: A chatbot that gives canned responses to mainly every commonly asked question but defers all other complex ones to a real agent.

D. Voice-Controlled Chatbots

How it works: Using voice recognition and natural language processing, these can converse with a user in voice Use cases: Smart home device, virtual assistants, or customer support through phone line

E. Chatbots for Social Media

In order to interact with users on social media platforms like Facebook Messenger, WhatsApp, and others, these bots are connected with such platforms.

A Voice and Textual Bot mobile application, which is more commonly a hybrid chatbot technology implementation, unifies voice and text-based communication. It enhances the performance to a certain extent in terms of user-interaction using advanced technologies like STT for converting spoken words into text and TTS for providing voice-based responses. Hybrid chatbots combine rule-based logic with machine learning algorithms to handle more structured queries such as FAQs while adapting to more complex natural- language inputs [1].

2. LITERATURE REVIEW

In the last couple of years, voice-enabled virtual bots have become highly advanced and widespread. Such sophisticated intelligent systems incorporate advanced techniques like machine learning, natural language processing, and automatic speech recognition. These systems are supposed to be able to understand the spoken language and respond just as people speak.

STT systems translate spoken language into written text, while TTS systems turn text responses back into natural-sounding speech. Voice bot technology is a sophisticated fusion of multiple AI domains[2].

It helps many industries through the efficiency and simplicity offered by voice-enabled virtual bots. Virtual bots are utilized in customer service, for example, to automate repetitive questions, make product recommendations, and help with troubleshooting—all while cutting down on wait times and providing round- the-clock assistance. Businesses may scale their customer service operations with these bots and yet provide excellent responsiveness. The usage of virtual assistants in the healthcare industry is growing for non- clinical duties like making appointments, reminding patients to take their medications, and providing basic health information. As an example of how speech bots can be useful in therapeutic settings, some are even able to offer conversational therapy to assist mental health[3].

In terms of personal productivity, virtual assistants such as Google Assistant, Amazon Alexa, and Apple's Siri aid users with managing everyday activities, setting reminders, controlling smart home appliances, and retrieving information with basic voice queries. These bots are frequently integrated into different consumer electronics to improve user efficiency and convenience. Voice bots in education are also starting to be used to provide tailored quizzes, enable interactive learning experiences, and even modify information according to the responses and progress of the student[4].

Even with all of the advantages, there are still a lot of issues that must be resolved. A significant challenge is guaranteeing high voice recognition accuracy. Accents, dialects, background noise, and even speech barriers can make these systems far less successful. While it has improved accuracy on current deep learning-based ASR models, even in noisier or more real-world scenarios, further development is possible. Contextual understanding is also a major barrier. Most voice bots can only work with straightforward transactional questions; however, most of them become confused by complicated, multi-turn conversations, where they tend to fail or struggle to appropriately react to a response. Their usefulness in situations requiring more sophisticated understanding is limited by this constraint, which also makes it difficult for them to have lengthy conversations[5]. There is also ongoing study on emotional intelligence. The user experience can be greatly impacted by speech bots' inability to identify and react to emotional cues, even though many of them can produce useful responses. For instance, the ability of a bot to distinguish between satisfaction and irritation based on tone, pitch, and tempo may lead to more satisfying and sympathetic interactions. In addition, voice-enabled virtual bots raise serious privacy and security concerns, especially when those bots deal with sensitive data such as personal information or health information. Data privacy laws such as GDPR and HIPAA have put pressure on developers to create safe systems that preserve user information and uphold confidence. Another promising direction is multilingual voice bots that can flip between languages and adjust to different cultural circumstances. This will make it possible for virtual assistants to better serve international markets and make themselves accessible to non-native speakers.

Furthermore, researchers are examining whether explainability in AI systems is necessary, which is closely tied to the method by which bots generate their output. As such systems mature, it will be imperative to ensure consumers can understand the reasoning behind the judgments made by a voice bot, particularly in domains like healthcare or finance where choices might have life-and-death implications[6].

PROPOSED METHOD

Users can input their queries into a textbox, and the application will retrieve relevant content from the database, displaying the results through a messaging interface. The system is clean, efficient, and simple. Users can add customized content further to the database based on their needs to make the functionality of the application complete. This is another very crucial feature because this makes the chatbot become a very effective and versatile tool in handling queries.

A. System Architecture The architecture of the BOT mobile application has been designed to provide a flexible, scalable, and open framework supporting both the Android and iOS platforms. This architecture has focused on the smooth communication through both voice and text between BOT and users so that the structured and unstructured queries are provided accurate responses efficiently. The application architecture is modular and the specific component plays the role of inputting language processing, data retrieval, and creating an appropriate response for interaction. (Fig.1) The modularity allows integration with multiple backend systems and third-party APIs, thus allowing the architecture to grow and evolve

with change in requirements. [7]

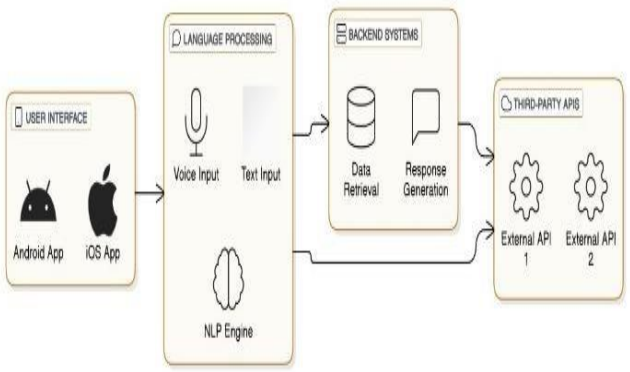

Fig 1: System Architecture of Chat Bot

B. Overview of Architecture

BOT mobile app architecture works as a cycle of interaction between the modules, keeping the user queries in hand and handling them accordingly

The UI Layer of the mobile app features an interface that helps users interact with the BOT through voice or text. Within this layer, there is offered user-friendly design that integrates voice recognition and messaging capabilities to support query types[8].

Processing Layer: The Voice and Text Processing Module takes the input of the user and sends it to the NLU engine in a form that is compatible with the analysis. The processing layer ensures that the input data is prepared for accurate analysis.

Interpretation Layer: NLU/NLP Engine processes the preprocessed input to determine its intent, identify relevant entities, and know whether the query is structured or unstructured.

Data Retrieval Layer: The Backend Integration Layer collects relevant information-for example, order status- from the database or APIs and formats it for the Response Generation module[9].

Response and Feedback Layer: The module composes a structured, natural language response with a feedback loop in order to continue to improve understanding of user intent and interaction quality over time.

This architecture's open structure allows multiple databases or external APIs to be integrated, thus being adaptable across different applications and services

(Fig. 2).

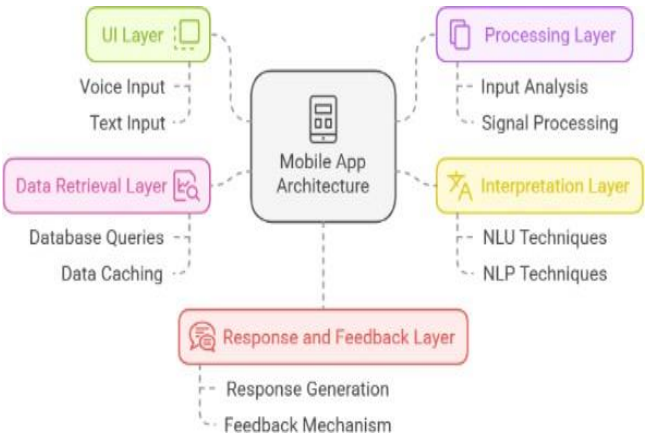

Fig 2: System architecture of the BOT mobile app

Key Components

Voice and Text Preprocessing Module: Elaborate on the module that captures and processes user input by voice or text, in which voice input is converted to text, as well as any NLP-related processing. Natural Language Understanding (NLU) and Processing (NLP).Engine Discuss the NLU/NLP engine, such as Rasa, Google Dialogflow, or custom-built NLP solutions, in terms of their ability to understand user queries, distinguish between the structured and unstructured nature of the queries, and give out the appropriate responses. Backend Integration Layer Describe the backend database layer created to pull information relevant to the type of query, like status for the order and for delivery.

II ADVANTAGES

Better User Experience: Voice and text capabilities are included in an intuitive UI Real-time and customized responses.

Diverse Uses: Is applicable to a variety of businesses, including banking, shipping, and e-commerce.

Development at a Low Cost: Cross-platform framework cut expenses and time.

Adaptable Design: Features and services may be added with ease thanks to modular architecture.

Increased Effectiveness in operations: Eliminates the need for manual intervention and automates client service. **Tailored for Businesses:** Integrating open architecture with a variety of enterprise software is supported.

Data-Based Understanding: Gives organizations actionable analytics to help them make decisions.

Worldwide Presence: Multilingual feature increases the app's user base[10].

IIIFEATURES

Text-Based Interaction:

The users can enter their queries into a text box for easy interaction with the chatbot.

Voice Response:

The chatbot responds with voice answers through text-to- speech technology, offering an interactive voice-based experience.

Dynamic Order Retrieval:

Check the status of orders by providing an order ID or a phone number. It ensures easy access to needed information. User-Friendly Interface:

It has an aesthetically designed and easy-to-navigate UI, built using HTML and CSS, making it easier to navigate through[11].

Multi-Platform Accessible:

The chatbot is accessible on the website through the implementation of the frontend with the help of HTML, CSS, and JavaScript. The chatbot is also available on mobile through React Native.

Database Access:

Real-time data rendering is enabled through MySQL and PHP, which allows the details of the order to be always correct and up-to-date.

IV TECHNOLOGIES USED

Frontend:

The structure of the interface is built with HTML, the design is with CSS, and JavaScript is used for handling the user input and sending requests to the backend as well as implementing text-to-speech

functionality.

Backend:

PHP is used for connecting the frontend to the MySQL database for processing the user queries and providing smooth communication between the user and the system. Database:

MySQL is used to store and retrieve dynamic order details based on user input, thus ensuring accurate and real-time data management.

Voice Output:

The Web Speech API is implemented to provide text-to- speech functionality. This will allow the chatbot to communicate with users through voice responses.

Mobile Application:

React Native is employed to create a mobile-friendly chatbot application. This ensures compatibility across both iOS and Android platforms.

The integration of these technologies guarantees that the chatbot is responsive, efficient, and accessible from various platforms in offering a seamless user experience.

V OBJECTIVES

1. To Provide Automated Greeting Responses:

One of the most significant goals for the chatbot is to accept basic user greetings such as "Hello," "Hi." The responses to the greeting are significant because they should establish a conversation and friendly interface so that it appears humanly accessible. Responses to greetings from the chatbot include the following: Hello! How can I help you today? Alright

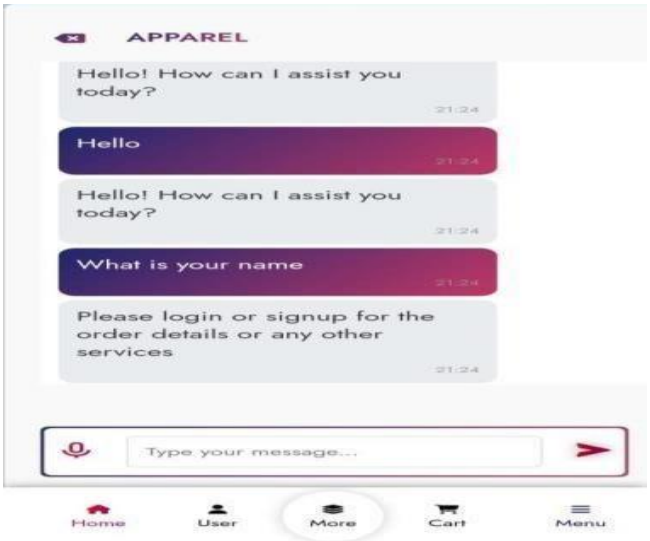

Fig 3: Automated Greeting Responses

To Retrieve Order Details Dynamically:

The chatbot would essentially fetch order details and list the same while prompting the customer for his phone number or the order ID; in this case, the facilities of knowing orders will be passed to the clients quickly without anyone's intervention.

Input: Users provide their order ID (e.g., #12345) or phone number (e.g., 9535914389).

Processing: The chatbot queries the MySQL database using the provided input.

Output: The chatbot returns relevant order details, such as: Order Status (e.g., "In Transit," "Delivered," or "Pending"). Order Date.
Delivery Details (e.g., estimated delivery date).

2. To Enable Dual Input and Output Functionalities:

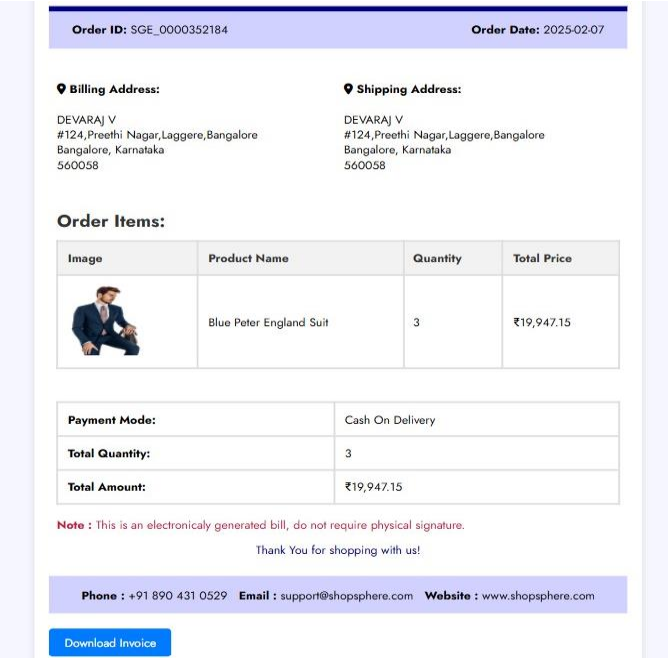

Fig 4: Order Retrieval Process

The chatbot supports two primary modes of interaction to enhance usability and accessibility:

1. Text-Based Input:

Users can type their queries into the chatbot interface. For example:
Typing “Hi” triggers a greeting response.
Typing an order ID or phone number retrieves the order details.

2. Voice-Based Output:

The chatbot converts its text responses into voice output using speech synthesis technology, specifically the Web Speech API. For instance:
The chatbot reads out the response: “Here are the details of your order!”

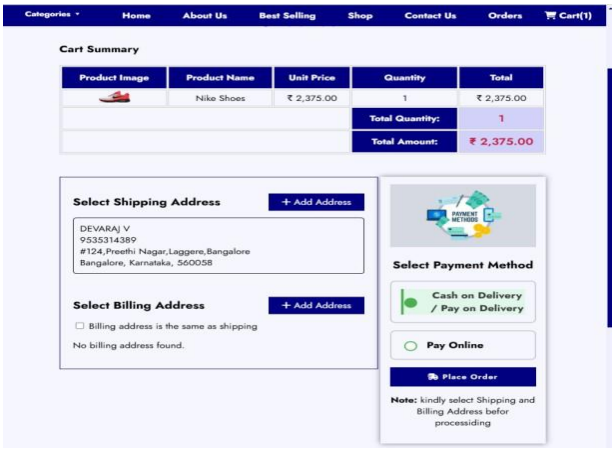

Fig 5: Textual based output

1. To Ensure Real-Time Communication with a Database:

A key technical objective is to ensure real-time data retrieval from a MySQL database. The chatbot connects to the backend, developed using PHP, which interacts with the database to fetch user-specific order details.The database contains the following fields: Order id-A unique identifier given to the order. Phone number-registered mobile number of the user. Customer name: The Name of the customer.Order details – The details of an order.

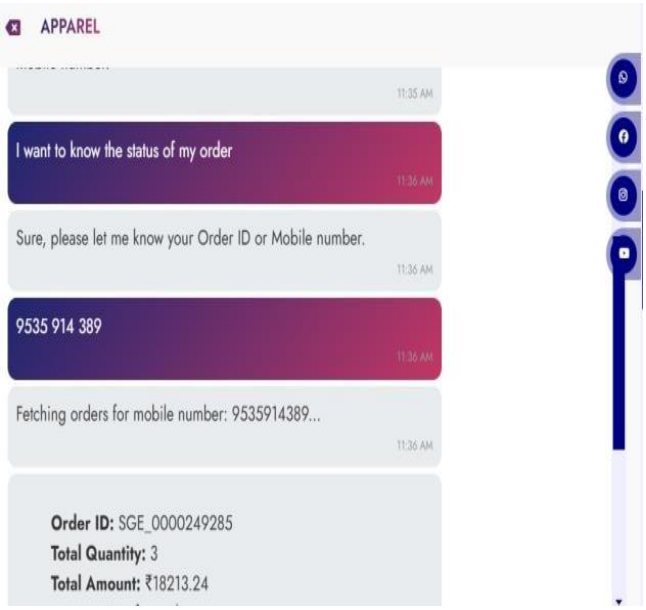

Fig 6: Real-time Database Communication

2. To Develop a Responsive and User-Friendly Interface:

This, second important goal, is to make the chatbot interface responsive and user-friendly. The frontend is built using HTML, CSS, and JavaScript to make it clean and user-friendly. There are the following components in the chatbot interface: A text input box for users to enter their queries.

A dynamic response area where the chatbot displays text responses.

Clear buttons or visual prompts for ease of navigation.

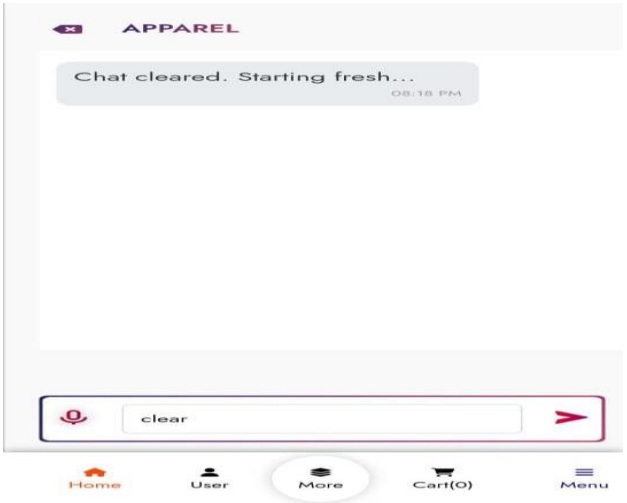

Fig 7: Additional Functionalities

VIII RESULT COMPARISON

Table 1: Comparison Table

Sl. No	Paper	Methodology	Proposed System
1	Ranoliya et al., [2]	Utilized MySQL database and PHP backend to fetch user-specific order details based on Order ID or phone number.	Optimized real-time database queries and introduced caching mechanisms for faster responses.
2	Luo et al., [6]	Integrated Web Speech API for text-to-speech and speech-to-text conversion.	Enhanced voice accuracy using customized NLP training and noise filtering techniques.
3	Omar Zahour et al ., [3]	Used rule-based and keyword-matching NLP to respond to customer queries.	Improved intent detection using advanced NLP models and machine learning algorithms.
4	Duong et al., [4]	Connected to a MySQL database via PHP to retrieve live order tracking information.	Introduced offline mode with local storage caching for previously fetched order details.
5	Wijaya et al., [5]	Developed a responsive UI with HTML, CSS, and JavaScript for smooth user experience.	Implemented AI-driven personalized recommendations and context-aware conversations.

IX FUTURE SCOPE

The future scope of a chatbot application for fetching order details may blossom into a multi-functional intelligent platform that will improve the user experience, increase its functionality, and integrate advance technologies.

Regarding user experience, the chatbot can introduce NLP so that it can be more naturally engaged with by users, thus allowing the conversation to feel more human-like rather than being on an automated system. The bot would be able to understand nuances, slang, and context, which would make it highly responsive to complex queries. Moreover, the chatbot can be multilingual and could reach a global audience and cater to people who cannot speak English. This technology would also include voice recognition, making it easy to check order details hands-free on the go or when one is multitasking[12].

For functional improvements, the chatbot could go beyond just fetching order details by allowing the user to edit, cancel, or expedite an order directly from the conversation interface. It could connect real-time tracking systems, where the chatbot gives real-time updates on the delivery status, estimated time of arrival, and even send notices about delays before the customer asks. Personalization features may include product recommendations based on previous purchases, improving cross-selling and upselling while enhancing customer satisfaction.

Industry-specific applications can also be developed for the chatbot. For instance, it can be designed specifically for the healthcare industry. The prescription order details can be handled, medical equipment can be tracked, or it can be used to schedule appointments. For the retail sector, it can offer details on sales, promotions, and store inventory. In the food delivery sector, it can be used to offer updates on orders in real-time. It can even accept tips or customer reviews. This

will make it helpful in many domains, thereby making it more usable and having a great market potential.

With increasing consciousness about the environmental issues, chatbots can have sustainability features on board. Chatbots may prompt customers about the latest eco- friendly package options or the carbon-neutral method of delivery while ordering their purchase. This could, in fact be an added benefit for conscious consumers of environment.

X CONCLUSION

The chatbot successfully automates the interactions among the users on the chatbot platform. Being text-based input and having the capability of voice output to enrich user experience and accessibility, it makes the process easier to run. It retrieves order details dynamically by connecting to a MySQL database via its PHP backend for guaranteed accurate responses. The modern web development tools such as HTML, CSS, JavaScript, and React Native are used to build a responsive application that seamlessly works across web and mobile platforms. Additionally, for voice responses, the use of the Web Speech API results in high interactivity and usability, which makes the chatbot a robust solution for enhancing customer support in e- commerce applications. Future enhancements could be in the form of advanced Natural Language Processing, integration with the most popular messaging platforms, and AI-driven features to better query handling. The chatbot workflow is an entire process, from user engagement, product discovery, personalized recommendations, cart management, order tracking, post-purchase support, and continuous improvement. Through technologies like NLP, AI, and integration with e-commerce platforms, businesses can make their customer experience seamless and efficient in terms of sales and customer satisfaction. This workflow does not only improve the shopping experience but also enables businesses to automate many tasks, reduce friction, and improve retention rates. [13] In summary, the Chatbot aims to automate customer interactions, making it easier for users to check their order status, as well as structured queries (like hi, hello, etc) and receive responses in both text and voice formats. The chatbot, by combining web and mobile technologies such as HTML, CSS, JavaScript, PHP, MySQL, and React Native, provides a robust solution for enhancing customer service in the industry. The introduction of dual functionalities, namely text input and voice output, ensures that the chatbot is accessible to a broader audience, while backend database integration ensures the accuracy of the order details retrieved. This project not only reduces operational costs for businesses but also enhances the overall user experience, making it a valuable addition to any e-commerce platform.[14]

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