# AI-Powered Chatbot for Food Ordering System

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**Abstract—Adopting current technology is quite difficult for traditional restaurants especially for small enterprises that are having difficulty meeting the needs of other platforms A Google DialogFlow-powered chatbot that employs natural language processing NLP to deliver real-time engagement personalized meal modification and order fulfillment can get around this MySQL is used for data operations and FastAPI is used for the backend to support server-side operations By cutting down on wait times this approach improves the customer experience while simultaneously increasing production by allowing the restaurant to concentrate on raising quality Overall this study demonstrates how tiny enterprises may maintain their market competitiveness**

## I. INTRODUCTION

Traditional restaurants in the contemporary digital era are unable to adjust to antiquated technologies that do not provide seamless order handling and real time tracking These systems offer inadequate experience in resolving this issue The website incorporates an AI powered chatbot that expedites purchase processing and enhances consumer engagement It makes use of natural language processing NLP to offer personalized food recommendations and real time conversation help.

The primary objective is to maintain competitiveness and enhance the user experience of the architectures constituent parts while competing with bigger food companies

1 Dialogflow allows the chatbot to have conversations by interpreting user input using intents and entities

2 FastAPI facilitates backend processing functions such as order fulfillment user authentication and database integration

3 MySQL holds information to enhance user engagement

The fundamental component of the chatbot Dialogflow is in charge of processing and analyzing user input It makes use of functions like Fulfillment which initiates external APIs to complete requests such as making an order and Intent which ascertains the action the user wishes to take Webhooks facilitate smooth communication between the system and outside services by allowing Dialogflow and the backend to interact in real time FastAPI ensures that requests are processed effectively and securely by playing a key role in processing tasks including order fulfillment database integration and user authentication

Dialogflow sends the request to FastAPI for processing after captur user input By integrating User Authentication

unwanted access is prevented and only authorized users are able access certain services Dialogflow can interact with exter databases using API integration which makes it possible for chatbot to easily retrieve and update data By enabling the process of several requests at once asynchronous processing impro system efficiency and performance

The main database for storing user order and product information is MySQL Userdata gives the user a customized experience by containing contact details order history and profile information In order to facilitate order tracking and real-time updates order data is stored in MySQL Additionally menudata which includes item descriptions and prices is kept in the database and retrieved by the backend when required By ensuring faster data retrieval optimization techniques enable the system to manage several requests at once while still operating smoothly and effectively Furthermore MySQLs strong structure guarantees data dependability and integrity which makes it the perfect option for handling important data such as purchase histories customer preferences and product specifications

consider Chat Point a nearby eatery that finds it difficult to handle phone orders during peak hours Their website incorporates this chatbot I want two biryanis and one mango lassi clients may now say and the chatbot will process their order right away The order is updated in real time if the user requests Remove the mango lassi Additionally customers can track their order by inputting Track order ID 321 This lessens the labor for the employees while simultaneously giving clients a quick contemporary dining experience Zomato or Swiggy—keeping *Chat Point* relevant and competitive.

## II. METHODOLOGY

This system is designed to allow consumers to interact with a food ordering service using a chatbot interface powered by Dialog Flow with FastAPI acting as the backend to handle and process orders and MySQL acting as the database to store the data

1. Chatbot User Interface

The conversational interface via which users engage with the system is called Dialog Flow Users can place orders track orders and modify existing orders by interacting with the bot It decodes user input in natural language ascertains the objective eg making a new order adding or removing products or tracking an order and sends the data to the backend FastAPI

2 Putting the Backend Server together

The primary server that responds to Dialog Flow queries and houses the logic for managing meal orders is called FastAPI It processes the requests it receives from Dialog Flow and communicates with the MySQL database It oversees operations pertaining to orders Additionally FastAPI creates the proper answers to return to Dialog Flow which subsequently forwards them to the user

3 Data Management and Storage

All of the information about food items orders and order statuses is stored in MySQL FastAPI uses the database to retrieve information such as item prices store orders and monitor the progress and delivery status of orders It guarantees that the system can effectively handle several orders and that the order data is kept for a long time

4 Interaction with Users

To make a new order or find out the status of an existing one the user first engages with the chatbot DialogFlow DialogFlow communicates the pertinent information like the order ID or food items to FastAPI after determining the users intent such as placing an order changing an existing order or checking its progress After obtaining the information FastAPI handles the users request which could involve adding products to an order finishing an order or changing the orders status The database is then updated in accordance with the users actions either saving the order details or changing its status

The system updates the pertinent information in the database and the chatbot interface whenever something happens like changing or canceling an order Furthermore the system guarantees that clients receive precise and prompt updates on the progress of their orders Finally as the user base expands the system as a whole is built with scalability in mind allowing it to manage higher traffic

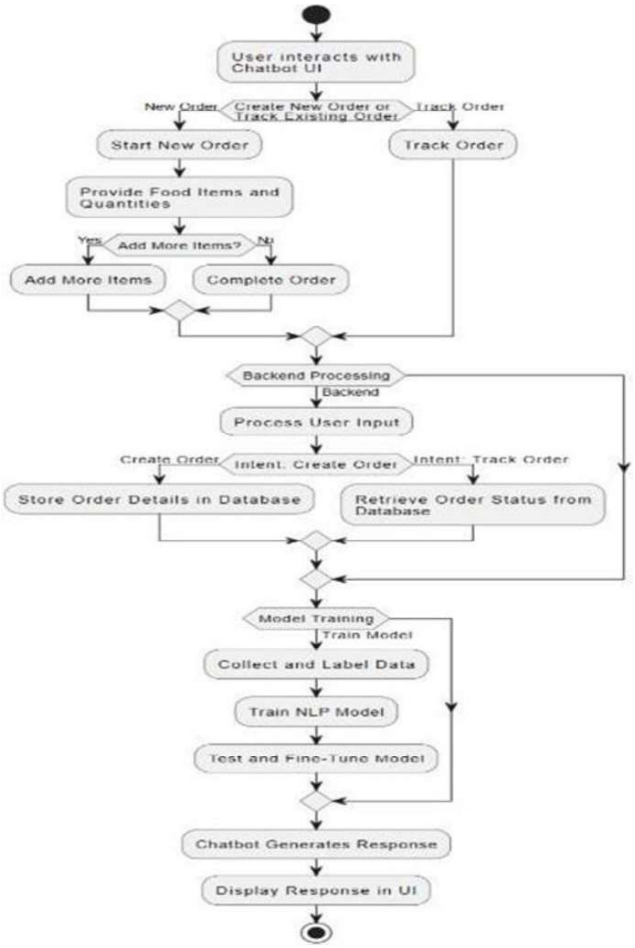


Figure 1: Workflow of the proposed Food Ordering System

## III. SYSTEM DESIGN

A smooth ordering experience for users is made possible by the system architectures multiple layers which include the frontend backend and Dialogflow integration The menu is displayed order placement choices are provided and user interaction is made possible by the frontend Users can peruse the menu items which include Pav Bhaji Chole Bhature Pizza Mango Lassi Masala Dosa Biryani Vada Pav Rava Dosa and Samosa using its clear and easy-to-use design A contact area containing information like the restaurants address and phone number is part of the frontend

The Dialogflow integration serves as a conduit between the backend system and user input It handles user requests in natural language including making new orders modifying or removing goods finishing existing orders and monitoring the status of those orders Among its several purposes are new order order add order remove order complete and track order Dialogflow maps the users request to the relevant backend functionality using these intents when the user engages with the chatbot FastAPI powers the backend and manages the ordering processs central logic FastAPI receives processes and communicates with the MySQL database when a user places an order It contains instructions for adding food products to an order taking items out of an order finishing the order and monitoring the orders progress Order

information such as food products quantities and order statuses is a stored in the backend For continuous tracking orders are kept memory in a dictionary After an order is finished it is saved to MySQL database

Important data including user profiles order details food items amounts and order status are stored in the database MySQL The backend communicates with the database to capture the information change the order status to in progress and save the finished order Error management is another feature of the system that makes sure the user is informed to place a new order if an order cannot be processed

In conclusion the system is made to be scalable and responsive with FastAPI acting as the backend for database administration and business logic and Dialogflow managing natural language processing A smooth experience from order initiation to completion is provided by the backend which manages the complexities of order administration while the frontend provides a simple user interface

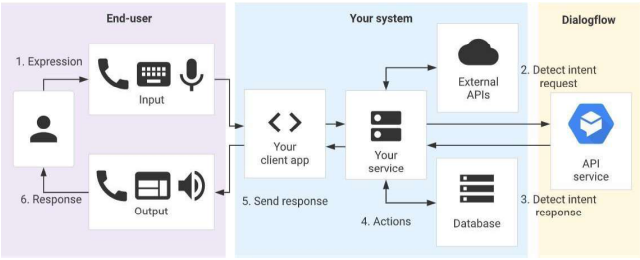


Figure 2: System design of the proposed Food Ordering System

## IV. RESULTS AND DISCUSSION

Every part of the system has been successfully put into place and is functioning as a whole Order placing modification and tracking are made seamless by the Dialogflow integrations efficient processing of user inputs and the frontends clear menu presentation FastAPI-powered backend processes Dialogflow requests and communicates with the MySQL database to store and retrieve order information The system enables users to finish their orders add or delete goods and monitor the order status with real-time updates There is room for improvement though In order to scale the existing in-memory storageof orders may Must switch to a more reliable method of managing heavy traffic Error handling might be improved even more particularly when there are network or database problems To support more concurrent users the systems performance might need to be optimized Dynamic suggestions and individualized interactions could improve the user experience HTTPS and appropriate authentication methods should be used to improve security protections particularly for sensitive data like payments Reliability needs to be further tested especially when managing edge cases and load testing To increase user engagement retention the system can be extended in the future to incorporate features like payment integration purchase history real-time order tracking and personalized suggestions These enhancements will guarantee that the system can grow efficiently offer a smooth user experience and preserve security and dependability in production settings even though it is now operational

## V. CONCLUSION

The implemented system effectively manages food orders from placement to tracking by integrating the FastAPI backend Dialogflow and frontend It provides a user-friendly experience by processing user requests to add remove and fulfill orders While the MySQL database provides dependable order storage Dialogflows connection with the backend guarantees seamless communication To maximize performance under heavy traffic scalability error handling and security require further focus Although there is need for development in some areas the system offers a strong basis for a meal delivery service overall

Performance optimization and switching to more reliable storage options are two aspects of future development that will improve scalability Personalized recommendations and payment system integration will also enhance user engagement and experience

## REFERENCES

1. [Online] "NLP Chatbot for Order Assistance Using Dialog Flow," by V. M. B. Dr., T. A. I., Y. P. Satyanarayana, K. Kokane, T. Varale, R. Kumar, S. R. Sowmya, and S. S. Hegde, J. Comput. AI & Technol., vol. 12, no. 3, pp. 145–159, July 2024. Available: https://journal.esrgroups.org/jes/article/view/5624

2. "Implementing a Google Dialog Flow Chatbot for Restaurant Websites – A Serverless Approach with FastAPI," Int. J. Food Tech. & AI, vol. 8, no. 4, pp. 234–245, April 2024, by T. J. C. Prof. and P. Bhat [Online]. Available:https://iarjset.com/papers/implementing-a-google-dialogflow-chatbot-for-restaurant-websites-a-serverless-approach-with-fastapi/

3. "Enhancing User Experience: A Study on Dialog Flow Chatbot Implementation," by B. S. Reddy, A. Rajesh, D. Nitisha, T. Karthik, and P. R. Reddy, Jan. 2024, J. Adv. Softw. Eng., vol. 15, no. 2, pp. 112–126.[Online]. Available:https://ijsrem.com/download/enhancing-user-experience-a-study-on-dialogflow-chatbot-implementation/

4. [Online] "Natural Language Processing (NLP) Technology for Chatbot Website," by A. Puspitasari, A. N. Paradhita, Y. W. Tineka, V. Sulistyowati, N. K. S. Noriska, and Haryanto, Comput. Web Tech., vol. 11, no. 1, pp. 67–78, Jan. 2024. Available:https://www.researchgate.net/publication/383808215_Natural_Language_Processing_NLP_Technology_for_Chatbot_Website

5. In December 2023, J. Chen published "Model Algorithm Research Based on Python Fast API," in Comput. Web Tech.,

vol. 5, no. 2, pp. 321–335. [Online]. Accessible: https://bcpublication.org/index.php/FSE/article/vie w/5591

6. "Test Case Generation for Dialogflow Task-Based Chatbots," by R. G. Rapisarda, D. Ginelli, D. Clerissi, and L. Mariani, arXiv preprint arXiv:2503.05561, March 2025. [Online]. Accessible: https://arxiv.org/abs/2503.05561

7. "The Effect of Structural Equation Modeling on Chatbot Usage: An Investigation of Dialogflow," by V. T. Nguyen and C. T. H. Nguyen, arXiv preprint arXiv:2302.04093, February 2023. [Online].
Accessible: https://arxiv.org/abs/2302.04093

8. "Dialog-based Automation of Decision Making in Processes," arXiv preprint arXiv:2109.00822, Sep. 2021, B. Estrada-Torres,A. del-Río-Ortega, and M. Resinas.[Online]. Accessible: https://arxiv.org/abs/2109.00822

9. "Implementing a Pragmatically Adequate Chatbot in DialogFlow CX," by A. Dall'Acqua and F. Tamburini, in Proceedings of the First Workshop on Natural Language Processing for Human-Computer Interaction, Bologna, Italy, 2021, pp.1–6.[Online].
Accessible: https://ceur-ws.org/Vol-3033/paper10.pdf

10. "A Dialogflow-Based Chatbot for Karnataka Tourism," by N. M. M. Manjunath and S. Ravindra, Proceedings of the International Conference on Computational Intelligence, vol. 12, pp. 513–520, Nov. 2022. Accessible:
https://doi.org/10.1007/978-981-19-2350-0_49