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Research Article

An Artificial Intelligence Interactive Platform for Automated Chatbot with AI-Driven Innovation in Recipe Searching

Deep Jigneshkumar Ka Patel[*] [ID], **Shideh Yavary Mehr** [ID]

Department of Engineering and Applied Science, University of Wisconsin-Milwaukee, Milwaukee, USA

Abstract

Hunger's Heaven is an innovative culinary app that uses artificial intelligence to customize and enhance the experience of cooking at home. The app's robust data handling and seamless functioning are ensured by its development with Node.js and MongoDB. It stands out for having AI-driven features that adjust to users' unique dietary restrictions and taste profiles, providing dynamic recipe recommendations and astute, dynamic search capabilities. Not only do these features address individual preferences and health, but they also make careful meal planning and nutritional monitoring easier. To enhance the user experience even more, the app incorporates social networking features that let users interact with a community of experienced chefs and rookie cooks, as well as share culinary accomplishments. Further interactive components like cooking challenges with AI enhancements and achievement badges inspire users and provide a lively learning environment. Hunger's Heaven is the ultimate example of fusing technology and culinary art, offering a dynamic platform that puts community, safety, and the appreciation of inventive cooking first.

1. Introduction

The emergence of culinary applications has allowed cooking to move beyond the conventional confines of recipe books and cooking shows into a more interactive and social pastime in the digital age. Thanks to these apps, people from all over the world may now share their passion for cuisine in the virtual kitchen. Though there are a ton of recipes available on various applications, few allow users to participate and share their culinary creations with a worldwide audience. This discrepancy shows how the culinary app ecosystem lost out on a chance to promote greater participation and community building. In this changing market, Hunger's Heaven

stands out as a revolutionary solution. In addition to making, it easier to find new recipes, it also encourages users to contribute their distinctive dishes and share them with others. This feature is essential for switching people from being passive users to active participants in the creation of a dynamic, constantly-changing culinary legacy. These capabilities serve a wide range of users, from expert chefs to novice cooks, each of whom contributes their own special flavors and cooking methods. Hunger's Heaven distinguishes itself in the culinary app industry by emphasizing these elements and providing a secure, friendly atmosphere that supports

volunteerism and user-generated content. This strategy turns Hunger's Heaven into a center for shared enthusiasm and culinary innovation while simultaneously improving the user experience and encouraging a sense of pride and ownership among its community members. In addition, Hunger's Heaven incorporates sophisticated search features that let users filter recipes according to ingredients, cooking methods, and dietary restrictions, making it easier for everyone to locate what they need. Through user reviews and ratings, which assist users in honing their cooking techniques and sharing their culinary expertise, the app also promotes learning and development. Hunger's Heaven also often organizes themed cooking events and culinary challenges, which boost participation and foster a lively and competitive cooking environment. Hunger's Heaven stands out as a vibrant social network devoted to the art and science of cooking in addition to being a collection of recipes because of its dedication to cultivating an engaged and active user base.

2. Related Work

P. Thakur and S. Chandna proposed a method called [1] MISO hungry to address the finding recipe problem. For the past 1.8 million years, cooking has been vital to the development of culture and civilization. But because of the coronavirus epidemic, individuals have been motivated to improve their health and well- being because of the lockdown in several nations, including Germany. While doing this, looking for recipes turns out to become a common and necessary pastime since it enables people to cook food from all over the world. But with thousands of recipes accessible for a single dish, seeking recipes online is like searching in the wild. A person's life depends on traditional recipes. However, many recipes have been forgotten for a long time by young people who work or are away from home as students and have little time to cook. As a result, MISOhungry uses this platform to provide solutions to both user groups. The recipes are created by extracting information from food blogs on the internet, together with the nutritional values of the components. Children can also get traditional recipes from senior citizens on the same website. Research indicates that older people's generative activity is stimulated, and their happiness is sustained when they share recipes associated with memories. According to the survey, young people are interested in obtaining traditional recipes and would like to utilize this platform, which immediately bridges the generation divide in terms of recipe sharing, search, and management. The platform is also accessible to both user groups. MISO hungry facilitates cooking for both user groups, hence advancing the notion that" Happiness is Homemade."

A. Kumar, B. Kotak, U. Pachaury, P. Patel, and P. Shah reviewed in [2] and in the modern world, people are always competing with one another to improve their standard of living by working as hard as they can to increase their income. But it is common to see him sacrificing his health in the hustle for money, and eating on the go has become popular and has supplanted the iconic cook by your own tradition. Cooking at home on our own guarantees the highest quality food, which in turn guarantees good health. In contrast, the fast-food culture has led to an increase in the consumption of fast food, which negatively impacts an individual's health and consequently lowers their productivity at work. Our goal in drafting this paper is to provide a social commerce platform that will assist individuals worldwide in solving the challenge.

Chatbot for food preferences modeling and recipe recommendation is another method that was proposed in [3] of article A΄. M. F. M. This article outlines the key procedures and difficulties involved in developing a chatbot for an aging population-focused nutritional recommendation system. Natural Language Understanding (NLU), Dialogue Management, Preference Modeling, and Ingredient Matching and Extraction are the four main components we found. We have tested transformer-based models in the creation of the NLU and Dialogue Management components to solve the unique issues of a chatbot for this domain. Additionally, we investigated the modeling of user preferences using word embeddings and nutritional knowledge bases in conjunction with sentiment analysis. When used to simulate food preferences, sentiment analysis algorithms accurately captured users' true emotions. These elements were all assessed separately using the proper metrics. Also, consumers successfully tested the built chatbot, and their feedback was gathered through usability and user experience surveys. Usability test results demonstrate how well-integrated the components were. For both the System Usability and the User Experience Questionnaires, the scores attained exceeded the benchmark levels.

Z. Y. Shahraki in reference [4] presents a proposed method called Modeling and analysis of wireless networks with interference management. Wireless technologies are integrated into next-generation wire- less networks to meet huge data loads and seamless communication. Since interference has always been the primary barrier to wireless communication, precisely describing the interference field is crucial to the development and implementation of wireless networks. An increasingly vital technique for the study of wireless networks is stochastic geometry. Stochastic geometry, which was first widely used to model wireless and ad hoc sensor networks, has more recently been used to analyze cellular and heterogeneous cellular networks. Using methods from stochastic geometry, we build in this dissertation tractable analytical frameworks for the modeling and analysis of interference management strategies in wireless networks.

M. Kamber and D. Shah on reference [5] presents Computer-based intelligence, or conversational human-caused awareness, has gained a lot of popularity recently since it allows people to collaborate with PCs in ways that are like those of humans. Many industries, including healthcare, finance, and retail, have implemented conversational simulated intelligence into their websites to reduce labor-intensive

tasks and enable voice communication with end users. It gives customers the ability to quickly resolve urgent problems and obtain expert cooperation to free up time for more difficult problems. This work introduces the Natural Language Processing Chatbots Cooking Assistance, a conversational expert that provides corresponding recipes based on the information provided by users. By providing relevant recipes, Natural Language Processing Chatbots Cooking Assistance is expected to help users get rid of leftover ingredients in the refrigerator. Natural Language Processing Chatbots Cooking Assistance lets users type in the name of a dish, region, cuisine, and individual ingredients. It then generates a recipe list based on the arrangement and addition of the user-provided requirements. The chatbot is put together using the Spiracular Programming interface to find recipes that correspond to the search query and the Google Dialog Flow stage to understand the client's expectations. This study discusses the engineering, utility, and shortcomings of Natural Language Processing Chatbots for Cooking Assistance.

F. Alloatti, A. Bosca, L. Di Caro, and F. Pieraccini in reference [6] Therapeutic Education (TE) is a crucial component in the care of individuals with diabetes. The goal of patient education (TE) is to enable patients to take charge of their own care plans. Thanks to the deployment of innovative information technology systems like conversational agents (CAs), there are now alternate modes of delivering instructional content in addition to the conventional ones. In this regard, we introduce the AIDA project, which consists of two distinct CAs together to act as a TE tool for individuals with diabetes. Two components make up the Artificial Intelligence Diabetes Assistant (AIDA): a speech-based dialog system and a chatbot. A scientific board has produced and approved their content. The voice-based AIDA Cookbot offers recipes that fit a diabetic patient's diet, while the text-based AIDA Chatbot offers a wide range of information regarding diabetes. We give a detailed account of the technology used, the process of developing both agents, and how the public uses them. The first conversational agents designed to serve diabetic patients, clinicians, and caregivers in Italian are the freely downloadable AIDA Chatbot and AIDA Cook-bot.

A. A. A. Weißensteiner in reference [7] presents that the swift progress of technology and innovation in Industry 4.0/5.0 has led to the mainstreaming of digitalization, which is revolutionizing several industries, enterprises, and services. In this sense, a growing number of businesses are using AI-enabled chatbots rather than human customer support representatives. One the one hand, using chatbots with AI capabilities can help cut down on customer wait times, increase productivity, and save expenses. However, it could also negatively impact consumers' experiences for reasons, such as lack of familiarity with the IT system or chatbots' inability to appropriately respond to customized requests. There is currently a dearth of quantitative research that could assist businesses in implementing this innovative technology in their customer service, even though numerous qualitative analyses have been conducted to examine the advantages and difficulties of employing AI-enabled chatbots for businesses as well as to uncover the opinions and experiences of customers. To close this gap, we create a discrete event simulation model in this paper that measures the efficacy of AI-enabled chatbots using the AnyLogic simulation software package. Through scenario analyses, we provide managerial implications regarding average time in system, response rate, satisfaction level, and cost savings. Consequently, this approach can assist businesses in comprehending the effects of implementing AI-enabled chatbots in their customer support.

In reference [8] J. Grudin and R. Jacques mentioned that the search for artificial general intelligence gave rise to several initiatives, such as the creation of task-oriented chatbots that provide additional information or services in particular domains and intelligent assistants created by tech businesses. With the emergence of low-latency networking, progress sped up and then sharply picked up speed a few years ago. Task-focused chatbots, which promise more engaging interfaces than robotic answering systems and can meet our increasingly phone-based information needs, emerged as a prominent feature of machine intelligence in 2016. Countless numbers were constructed. It turned out to be more difficult than expected to create successful, non-trivial chatbots. These days, some developers create systems for human-chatbot (humbot) teams, in which humans answer complex questions. This paper describes conversational agent space, difficulties in meeting user expectations, potential contemporary design approaches, uses of human-bot hybrids, and implications for the goal of creating software with general intelligence.

D. D. Cutinha, N. N. Chiplunkar, S. Maved, and A. Bhat in reference [9] presents that a chatbot is a computer software that mimics a human interaction through a chat platform like WeChat, Slack, Facebook Messenger, and others. This allows businesses to provide engaging experiences that boost customer engagement. We develop a subscription-based chatbot development platform with authentication, authorization, and other key modules, all based on artificial intelligence. When it comes to interactions, it offers more intelligence than the current flow-based chatbot builders. According to their business requirements, brands can create their own custom chatbots on the platform and install them on any messenger app, including Facebook Messenger, WhatsApp, Telegram, WeChat, and others.

J. Cahn is [10] described that a chatbot is a conversational agent that translates text into voice or text messages using Natural Language Processing (NLP). This allows users to converse via text or voice instead of directly interacting with a live person. A rapidly expanding trend in artificial intelligence is chatbots, which are programs that converse conversationally with users and mimic human speech. Numerous sectors are striving to integrate artificial intelligence-driven solutions, such as chatbots, into their customer service operations to enhance customer satisfaction by providing expedited and cost-effective assistance. This paper is a survey of

published chatbots to identify knowledge gaps and areas that need further research and study. It begins with history and how it has evolved over time, then moves on to chatbot architectures to understand how they function and identify applications for them across many domains. Finally, it discusses limitations that shorten the chatbot's lifespan and how future work can improve the chatbot for optimal performance.

T. Lalwani and S. Bhalotia in reference [11] presents that User interfaces for software programs include form-based, menu-driven, graphical user interface (GUI), command line, and natural language, among others. Although web-based and GUI user interfaces are common, there are times when a different kind of user interface is required. This is where a conversational user interface based on chatbots fits in. One type of bot that has been present on chat systems is the chatbot. They can be interacted with by the user using graphical user interfaces or widgets, and this is the direction of trend. They often offer a stateful service, meaning that each session's data is saved by the application. It is common to be unsure about where to go for information on a college's website. Information gets harder to obtain for someone who is not a worker or student there. A quick, standardized, and educational widget called a "college inquiry chat bot" was created to improve user experience on college websites and give them useful information. Natural language processing (NLP) and artificial intelligence (AI) techniques are being used to create chat bots, an intelligent system. It responds to questions about academics, examination cells, placement cells, users' attendance and grade point averages, and other random activities. It also boasts an efficient user interface.

J. Bozic, O. A. Tazl, and F. Wotawa in reference [12] described that Chatbots—that is, programs that can converse with people more comfortably and naturally using natural language—have grown in significance. This is because computational tools are now available for natural language interactions between computers and people that are starting to resemble interactions between people alone. As such, an increasing number of chatbots designed to assist humans with work organization and decision making are on the market. In this study, we mainly address the problem of confirming chatbots' communication capabilities. Specifically, we present an automated method for creating and executing communication sequences. The strategy is predicated on AI planning, wherein every action can be taken to be a question posed to the chatbot.

In reference [13] A. Mendes Samagaio, H. Lopes Cardoso, and D. Ribeiro outlined the key procedures and difficulties involved in developing a chatbot for an aging population-focused nutritional recommendation system. Natural Language Understanding (NLU), Dialogue Management, Preference Modeling, and Ingredient Matching and Extraction are the four main components we found. We have tested transformer-based models in the creation of the NLU and Dialogue Management components to solve the unique issues of a chatbot for this domain. Additionally, we investigated the

modeling of user preferences using word embeddings and nutritional knowledge bases in conjunction with sentiment analysis. When used to simulate food preferences, sentiment analysis algorithms accurately captured users' true emotions. These elements were all assessed separately using the proper metrics. Also, consumers successfully tested the built chatbot, and their feedback was gathered through usability and user experience surveys. Usability test results demonstrate how well-integrated the components were. For both the System Usability and the User Experience Questionnaires, the scores attained exceeded the benchmark levels.

In reference [14] Y.-J. Ahn, H.-Y. Cho, and S.-J. Kang presented stretchable and translucent electronics have been developed over the last ten years due to developments in materials science and the need for next-generation electronics. Stretchable and transparent form factors have given rise to novel applications like wearable sensors and smart contact lenses, which call for a broader and deeper investigation of materials and manufacturing techniques. To this end, a great deal of research has gone into creating materials and systems that are both optically transparent and mechanically stretchy. This article discusses recent developments in stretchable and transparent electronics, with a focus on the creation of substrates and electrodes made of stretchable and transparent materials.

D. Chowdhury, A. Roy, S. R. Ramamurthy, and N. Roy mentioned in reference [15] that maintaining a healthy diet and workout routine has become more difficult with the recent trend of working from home, making it even harder to manage a work-life balance. It has been demonstrated that skipping workout and nutrition regimens can have long-term negative impacts on one's health, such as obesity and shorter life spans. People currently plan their diets and exercise regimens around their schedules, which makes these chores difficult to stick to. Lack of time and planning causes users to abandon their ideas frequently. We offer CHARLIE, a chatbot that adapts to a user's schedule and uses their calendar to intelligently recommend diets and fitness goals to help with better planning for a fitness and diet regimen. Based on how much time users have remaining throughout the day and how many calories they burn; the CHARLIE recommendation system offers meals and exercise routines to users.

V. Pallagani, P. Ramamurthy, V. Khandelwal, R. Venkataramanan, K. Lakkaraju, S. N. Aakur, and B. Srivastava described in reference [16] that a basic human need, food plays a significant role in a society's health and financial stability. Because of this, the culinary industry is a well-liked use-case for highlighting decision-support (AI) capabilities in support of advantages like precision health, using instruments ranging from task-oriented chatbots to information retrieval interfaces. Here, an AI should be able to manage allergy-based substitutes, comprehend concepts in the food domain (such as recipes and ingredients), be resilient to cooking-related setbacks (such as butter browning), and deal with a variety of data modalities (such as text and photos). But since today's

recipes are treated like text documents, it is challenging for machines to comprehend, reason, and deal with ambiguity. Due to ambiguity and sparseness in the current textual materials, a more accurate depiction of the recipes is required. In this work, we address the creation of a machine-understandable rich recipe representation (R3) using natural language recipes in the form of plans.

3. Motivation and Goals

The mission of Hunger's Heaven was to create a lively food community where people could engage, exchange ideas, and benefit from one another's culinary experiences, turning cooking from a solitary hobby into a shared one. By enabling users to create content, the app hopes to empower users and transform them from passive users into active participants who feel a feeling of ownership and belonging. Using the most recent advancements in web development technology guarantees a smooth and reliable user experience, with features like social interactions and cooking challenges intended to boost user engagement. The app also prioritizes security and privacy to safeguard users' personal data and food preferences. Hunger's Heaven aspires to promote health-conscious living by providing comprehensive nutritional information and configurable meal plans, encouraging users to express their creativity and experimentation in the kitchen, and providing a personalized experience using powerful algorithms and user data. Hunger's Heaven strives to maintain its growth and continue to be a leading platform in digital culinary innovation by regularly upgrading in response to user input and technical advancements. This way, it will be able to suit the varied demands and tastes of its user base worldwide.

4. Target Audience

Hunger's Heaven is designed to cater to a wide range of culinary enthusiasts, characterized by their diverse interests, skills, and backgrounds [16-18]. The target audience includes:

4.1. Home Cooks

Individuals looking for inspiration and guidance to prepare daily meals or explore new recipes.

4.2. Culinary Beginners

Novices in the culinary world are seeking straightforward, step-by-step instructions and basic cooking techniques.

4.3. Foodies

Passionate food lovers and connoisseurs eager to discover unique recipes, share their culinary experiences, and connect with like-minded individuals.

4.4. Diet-Conscious Users

People with specific dietary requirements or preferences, such as vegetarian, vegan, gluten-free, or keto diets, look for tailored recipes.

4.5. Professional Chefs and Bakers

Culinary professionals are interested in sharing their expertise, connecting with the community, and discovering contemporary trends and ideas [19].

4.6. Tech-savvy Individuals

Users who prefer a digital platform for recipe management, social interaction, and culinary exploration, valuing a seamless and secure user experience.

This broad audience reflects the app's ambition to serve as a comprehensive platform for anyone interested in cooking, regardless of their skill level or culinary interest, fostering an inclusive and vibrant community.

5. Implementation

Hunger's Heaven must be carefully planned and carried out over the course of numerous phases for it to be implemented successfully. We use ReactJS for frontend and NodeJS for backend and MongoDB for database to build the application and Python programming is used to implement AI. The hardware requirements for the system is a computer with intel core I7 processor, 128GB SSD and 16GB RAM. The implementation phases are as below:

5.1. Design Phase

The design phase is essential in establishing Hunger's Heaven's fundamental architecture and making sure the program successfully satisfies both user and technological objectives.

5.1.1. Requirement Analysis

To determine the features and functionalities that stakeholders, including future users, would like to see in the application, the first phase entails gathering and analyzing their needs.

5.1.2. System Architecture

The back end, front-end, and database must be smoothly connected and able to support the demands of the program. This can be achieved by creating a salable and reliable system design. Choosing between a monolithic method and a microservices architecture depends on the complexity and scalability needs.

5.1.3. UI/UX Design

The design of user interfaces (UI) and user experiences (UX) depends on responsiveness, simplicity, and intuitiveness. Before development starts, stakeholders can see and comment on the application's design thanks to pre- liminary designs and prototypes made with programs Figma.

5.1.4. Technology Stack Selection

The program's needs, as well as its scalability and maintainability, determine which technology stack is best. This involves deciding on the front-end framework (React), database (MongoDB), backend language and framework (Node.js with Express), and additional tools and libraries that will be utilized during the development process.

5.2. Build Phase

The Build Phase involves the actual development of Hunger's Heaven, translating design and planning into a functional application.

5.2.1. Backend Development

(i). Node.js and Express

The Express framework, which makes building API endpoints easy and flexible, is used in the Node.js backend. For a smooth user experience, Express increases the backend' s capacity to handle asynchronous re- quests, middleware integration, and route management.

(ii). MongoDB Database

Because MongoDB is schema-less, it can store a variety of recipe data, user profiles, and interaction styles with flexibility. This is why it was chosen. A scalable cloud database solution that guarantees data availability and security is offered by using MongoDB Compass.

(iii). Authentication and Security

To provide secure authentication, stateless verification, and session management, JWT (JSON Web Tokens) are used. User passwords are kept safe thanks to bcrypt's password hashing technology. To further safeguard user information and privacy, OAuth for social media logins and HTTPS protocols are included.

5.2.2. Frontend Development

(i). React Framework

Because of its component-based architecture, the frontend makes use of the React framework, which makes it easier to create a dynamic and responsive user interface. Even when users interact with the intricate aspects of the application, React's quick rendering and updating technology guarantees

a seamless user experience.

(ii). State Management

Redux or Context API are used for state management, based on the intricacy of the com- ponent interaction. By offering a centralized repository for maintaining the state of the program, this method facilitates data sharing between components.

(iii). Responsive Design

A responsive design is produced using CSS frameworks like Bootstrap or Material-UI, guaranteeing that the application is aesthetically pleasing and usable on a range of screens and devices.

5.2.3. Integration and Deployment

(i). API Communication

RESTful APIs are used by the frontend and backend to facilitate CRUD operations for user profiles, recipes, and community interactions. To send HTTP queries from the frontend to the backend services, utilize Axios or the Fetch API.

(ii). Deployment

Services like Netlify or Vercel are used for the front end of the application, and Heroku is used for the back end. These platforms are user-friendly, automatically scaled, and integrated with Git and other version control systems.

(iii). Continuous Integration and Delivery

By automating the testing and deployment process, CI/CD pipelines—such as those built with Jenkins, GitHub Actions, or GitLab CI/CD—ensure the timely and dependable delivery of application updates.

5.2.4. Integration of AI Features

(i). Personalized Recipe Recommendations

Make recipe recommendations to consumers based on their taste profiles, historical interactions, and nutritional preferences.

(a) Steps in Implementation

A. Data gathering: Compile user information on dietary restrictions, past searches, favorite recipes, and comments from users.

B. Model Development: Construct a recommendation system using machine learning techniques. Hybrid models, content-based filtering, and collaborative filtering are common techniques.

C. Model Training: Make use of previous user data to train the model. Retrain the model often to consider fresh information and enhance suggestions.

D. Integration: Incorporate the recommendation engine into the backend of the application. Make use of API endpoints to deliver real-time, customized recipe recommendations.

(b) Tools & Technology

A. Python: For creating machine learning models.

B. Libraries: Consider using PyTorch, TensoFlow, or Scikit-Learn for creating recommendation systems.

C. NumPy and Pandas: For numerical operations and data manipulation.

(ii). Smart Search Feature

Make the search process more efficient and straightforward by improving the search feature to recognize and adjust to user preferences over time.

(a) Steps in Implementation

A. Search Algorithm Development: Put into practice a search algorithm that interprets and parses user queries using natural language processing (NLP).

B. Semantic Search: Rather than depending only on keyword matching, incorporate semantic search capabilities by utilizing natural language processing (NLP) models to understand the context and subtleties of user queries.

C. Learning User Preferences: Include a feedback loop that notices information from how users engage with search results, such as the recipes they examine, bookmark, or find appealing.

D. Continuous Learning: Make use of online learning strategies that allow the model to be updated automatically as new data is received, negating the need for retraining.

(b) Tools & Technology

A. Elasticsearch: For powerful search functionality.

B. Hugging Face Transformers' BERT or GPT: For comprehending natural language user inquiries.

C. Python: For creating backend applications with AI features.

5.3. Testing Phase

The Testing Phase is critical to ensure the application is reliable, secure, and user-friendly before its launch.

5.3.1. Unit Testing

Using testing frameworks such as Mocha for Node.js and Jest for React, unit tests are developed and run for individual components and methods. This guarantees that every component of the application functions properly when used alone.

5.3.2. Integration Testing

Integration tests evaluate how well- integrated and dependable the various components of the ap- plication are. Testing database integration, front-end-backend communication, and API endpoints are all included in this.

5.3.3. User Acceptance Testing (UAT)

Real users test the application in a controlled setting as part of UAT. Input is obtained to find any defects, usability problems, or enhancements required to guarantee the application fulfills user expectations.

5.3.4. Performance and Security Testing

While security testing finds flaws in the application to thwart prospective attacks, performance testing verifies the application's stability and responsiveness under a range of circumstances.

5.3.5. Continuous Testing

When tests are automatically executed with every code update, as part of a continuous integration and delivery (CI/CD) pipeline, the application's quality is maintained throughout the development process.

This all-encompassing strategy, which starts with the design phase and continues with the build and testing phases, guarantees that Hunger's Heaven is designed to match its goals and offers food fans a smooth, entertaining, and safe platform.

6. Simulation and Results

Following extensive development and testing, the program moves onto the simulation phase, when real-world simulations are used to assess its functionality and performance. The results of the web application are below:
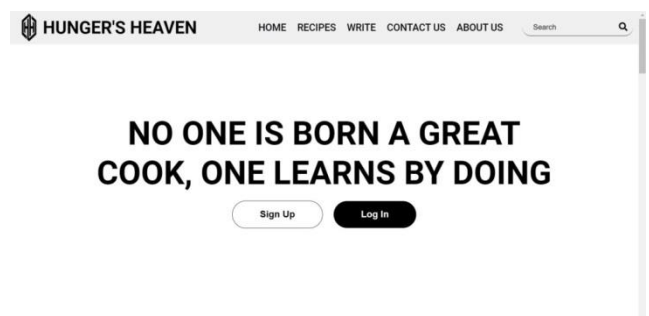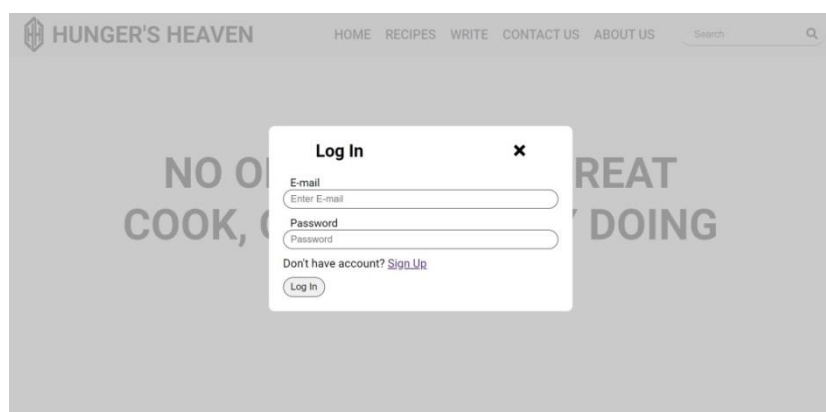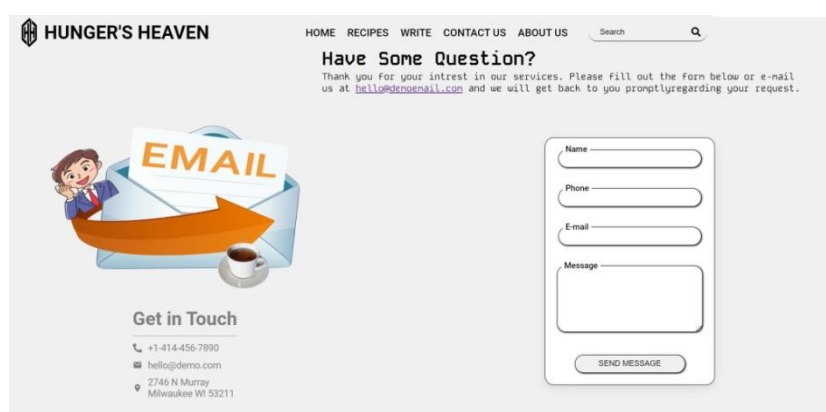

Figure 1. Home Page.

Figure 2. Login Page.

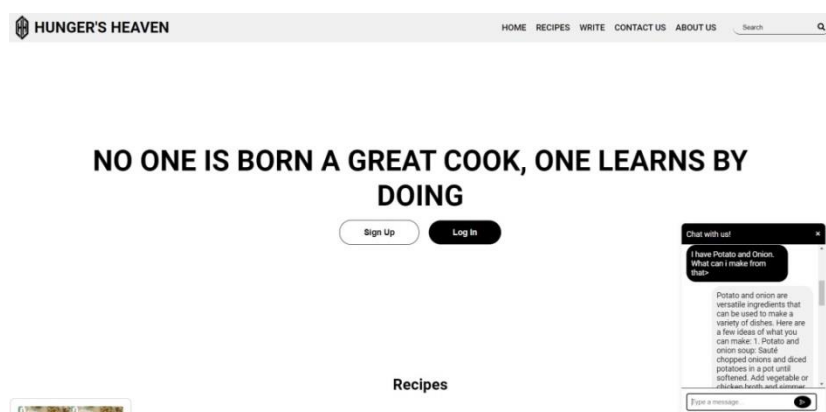

Figure 3. Help Page.

Figure 4. Chatbot.

7. Conclusion

In conclusion, our project successfully developed a recipe application that has an automated chatbot to help home cooks and food connoisseurs with customized cooking guidance. A scalable and responsive backend and user interface, respectively, were made possible by the combination of React and Node.js. Using natural language processing, the chatbot provides dietary advice, recipe recommendations, and real-time culinary advice. Positive user reviews emphasize how the chatbot improves cooking and encourages inventiveness in the kitchen. By supporting a variety of dietary requirements, this software not only makes meal preparation easier but also promotes healthier eating practices. It therefore represents a significant advancement in digital cooking tools. A major factor in lowering the complexity and intimidation frequently connected with cooking is the application's

capacity to engage users in discussion. For people who are new to cooking or want to broaden their culinary skills, this function is especially helpful. Cooking becomes more inclusive and tailored to each user's needs thanks to the chatbot's ability to grasp user preferences and dietary constraints. The chatbot's technology also makes sure that the support is current with the newest culinary trends and methods in addition to being helpful. By successfully fusing digital innovation with culinary arts, the project's utilization of innovative technology sets a standard for the food technology industry. The enthusiastic response from consumers highlights how much the kitchen needs these kinds of interactive, helpful tools.

Figure 5. Add Recipe Page 1.

Figure 6. Add Recipe Page 2.

8. Future Work

We might think about concentrating on areas that can increase functionality, guarantee scalability, and enhance user experience while making future improvements and work on my recipe app. Here are a few suggestions for upcoming projects:

8.1. User Personalization

Introduce machine learning algorithms to recommend recipes based on user preferences, past searches, and saved recipes. Permit users to alter profile information, such as food choices and allergy avoidance.

8.2. Social Features

Include a feature that allows users to post recipes straight from the app to social media. Permit users to leave comments on recipes, follow other users, and post their own customized versions of the recipes.

8.3. Integration with Grocery Services

Collaborate with supermarket delivery services to enable customers to place ingredients straight from a recipe in their shopping carts for delivery home. Provide a tool that allows customers to manage their pantry, tracking ingredients they currently own and receiving recipe suggestions based on them.

Abbreviations

API	Application Programming Interface
CI/CD	Continuous Integration/Continuous Delivery, and Continuous Deployment
NLU	Natural Language Understanding
UI/UX	User Interfaces and User Experiences
HTTPS	Hyper Text Transfer Protocol
NLP	Natural Language Processing
UAT	User Acceptance Testing
SSD	Solid State Drive
RAM	Random Access Memory

Author Contributions

Deep Jigneshkumar Ka Patel: Conceptualization, Formal Analysis, Methodology, Resources, Software, Writing – original draft, Writing – review & editing

Shideh Yavary Mehr: Conceptualization Formal Analysis, Methodology, Project administration, Supervision, Validation, Visualization

Conflicts of Interest

The authors declare no conflicts of interest.

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