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## AI Driven Personalized Recipe Generator

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Peer Review Information	Abstract
<p data-bbox="193 869 544 902"><i>Submission: 21 Oct 2025</i></p> <p data-bbox="193 913 544 947"><i>Revision: 18 Nov 2025</i></p> <p data-bbox="193 958 544 992"><i>Acceptance: 05 Dec 2025</i></p> <p data-bbox="193 1059 544 1093"><b>Keywords</b></p> <p data-bbox="193 1126 544 1216"><i>Artificial intelligence, NLP, Impact of AI technologies, Recipe generation</i></p>	<p data-bbox="544 857 1396 1384">The study aims to investigate the use of AI in the culinary arts, particularly the creation of new recipes from pre-existing ones. The article provides a comprehensive overview of the history of artificial intelligence in the culinary arts as well as current uses in the recipe creation space. The authors encountered a variety of recipe and cuisine-specific suggestions. None, though, concentrated on Recipe Generation, which would be a novel area to investigate. The promise of artificial intelligence (AI) approaches to automate and improve culinary inventiveness has drawn a lot of attention to recipe generation in recent years. An overview of the most recent techniques and difficulties in AI-based recipe generating is given in this article. Natural language processing (NLP) models and recommender systems for recipe development are among the methods we cover. Along with ethical issues in formulation development, key challenges such as component combinations, cultural sensitivity, and incorporating user feedback are addressed. We also look at the possible effects of AI technology on the culinary industry as well as future research opportunities.</p>

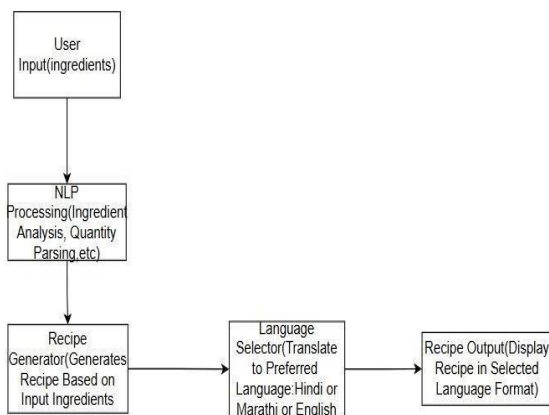
### Introduction

The AI-Driven substantiated form creator signifies a ground-breaking system to transfigure the culinary moxie, incorporating advanced artificial intelligence (AI) inventions with cuisine ways. This summary provides an in-depth analysis of the system's fundamental components, its key features, and the motivations behind its establishment. Natural language processing has practical applications in form creation. Given the stoner's specific and/or health-related taste preferences, the ideal approach is to suggest a nutritious and delicious edible that the stoner would find enjoyable. This task has been approached using a knowledge-driven method. Knowledge-based systems typically start with a foundation for the food industry and a collection of health-related

tools, such as calorie counts or specific foods to avoid. The system latterly looks for a form that meets the conditions and resembles a handed input recipe. However, it can recommend form differences that are affordable and need minimum component changes. If the system can pierce a cost model. A health-concentrated form recommendation system that offers suggestions for modifying fashions serves as a protein and effective resource for nutritionists. The use of online platforms and digital channels is noted to make cuisine more accessible. This provides us with fresh provocation to seek results to straightforward issues like form creation through deep literacy. cuisine is regarded as an art form, involving a creative process that involves assembling fashions with the perfect mix of flavors. Developing a form creator

enables the creation of distinctive reflections with distinct constituents.

**Block Diagram**



**Problem Statement**

In today’s fast-paced environment, people are increasingly looking for convenient, nutritious, and customized meal options. Nonetheless, current recipe recommendation platforms frequently neglect to meet particular user requirements, including personal taste preferences, dietary restrictions (such as gluten-free, vegan, diabetic-friendly), and the ingredients available in the user’s kitchen. This absence of customization results in annoyance, wasted food, and a decrease in desire to prepare meals at home.

Additionally, not every user is a skilled chef. Numerous individuals find it challenging to understand intricate recipes or to replace ingredients when they are not accessible. Conventional recipe applications often lack smart advice or adaptable options that respond to the user’s actual cooking circumstances.

- To address these troubles, our machine offers a customised recipe generator powered via AI. The gadget employs synthetic intelligence—in particular natural language processing and deep learning—to:
- Comprehend and grasp user choices, wellness objectives, and food restrictions.
- Take the listed ingredients as input and recommend tailored, nutritious, and tasty recipes.
- Alter or update current recipes to achieve dietary objectives or streamline the cooking process.
- Offer detailed cooking directions in straightforward, simple-to-understand terms.
- Provide useful cooking advice or substitutions tailored to the user’s cooking proficiency.

This system improves the cooking experience by making it more tailored, accessible, and enjoyable, particularly for novices. It enables individuals to select healthier food options while conserving time and reducing ingredient waste. Additionally, by using experience. There are numerous layers of techniques from data collection to results generation: the recipe databases, culinary literature and person information had been combined via the superior AI approach with the intention to talk elaborate styles connected to the ingredients usage, the hyperlink between selected components and chosen recipes, and harmonic interactions among components.

Recipe Generator the usage of Deep getting to know, may additionally 2022 Authors: Disha Moolya, Sakshi Pansare, Anushree Kshirsagar, Prof. Sonali

Bodekar-Kale The undertaking enabled information the changes in output tormented by the change made in hyper parameter. After successful advent of the version producing apparently particular model we can pass ahead of the next step of adding functions of enhance consumer interactions. In future the model can make use of pre-educated transformer for particular and cohesive text technology thus correcting the version prediction and accuracy. Moreover, to make the project ideal and efficient other filters for looking in conjunction with search with the aid of components may be delivered, along with search via photo, search by delicacies kind, fitness monitoring of recipes generated including another technique to recipe technology inclusive of recipe generation from name rather than substance, can be an innovative path to recipe generation the use of AI. AI to replicate culinary ingenuity, the system can 4. 4. ChefAI.IN: producing Indian Recipes with AI set of rules, create unique and intriguing dish pairings—motivating users to try out and discover new flavors. Ultimately, this approach closes the divide between Oct 2022

Authors: Smriti Chaudhary, Binita Soni, Aditya Sindhavadi, Archi Mamaniya, Ashwini Dalvi, Irfan Siddavatam nutritious meal preparation and technological 6. The proposed paintings experimented with distinct advancement, offering a clever assistant in the kitchen that adjusts to the user’s habits and tastes

**Literature Review**

1. AI Based Recipe Generator And Cook Assistant, May 2024

Authors: Devarasetty Tejaswini, V Sankar Reddy The development of AI-based recipe generators

and modules and variations of different strategies to provide the maximum correct effects. An interactive net app was sooner or later created for ease of get right of entry to and interactivity. in addition, an exhaustive survey was conducted over a set of expected houses of the recipes generated by way of the evolutionary model. The remarks acquired supported the attractiveness of newly generated particular Indian delicacies- centric recipes; greater than 86% agreed that they may put together/prepare dinner the recipe generated by using the model. cook assistants holds significant promise for revolutionizing 8. 5. A Literature Survey on Recipe era From food images the use the way people discover, prepare, and enjoy food. Through of AIML February 2024 advanced algorithms and machine learning techniques, these systems can offer personalized recipe recommendations, assist users in meal planning and grocery shopping, and provide step-by-step guidance during the cooking process. However, while AI-powered culinary assistants offer exciting opportunities, several challenges and considerations must be addressed. These include ensuring the accuracy and reliability of recipe recommendations, accommodating diverse dietary preferences and restrictions, and maintaining user privacy and data security

## 2. Enhancing Recipe Generation Using AI and ML, April 2024

Authors: Akshara Pareek, Aastha Kanwar Gahlot, Neha Khatri, Mohnish Sachdeva

AI-powered recipe generation structures, ultimately enhancing the culinary adventure for customers worldwide. The advanced recipe generator is based on state-of-the-art AI and ML answers that provide one an in-intensity client

A recipe generation device from meals snap shots holds sizable capacity across diverse domains, presenting revolutionary answers and enhancing user stories. The programs span from supporting domestic chefs with customized recipes to revolutionizing restaurant menus and contributing to instructional and health initiatives. The machine's adaptability and integration competencies with current structures are essential for its success inside the dynamic and ever-evolving culinary panorama.

## 5. Activate Optimization for AI-Powered Recipe era: demanding situations and Insights November 2024

Authors: Aadya Jha

This undertaking demonstrates the ability of AI-powered recipe generation to revolutionize meal planning by way of supplying customers customized recipe hints primarily based on to be had elements. by means of making use of

Spoonacular API and advanced set off engineering strategies, we had been capable of broaden an interactive gadget which can generate recipes with various ingredients, commands, cooking times, and serving guidelines.

Key findings consist of the effectiveness of AI in addressing common challenges in recipe technology, which includes factor-based totally filtering and customization for nutritional preferences. but, there may be room for in addition optimization, in particular in refining the AI's expertise of flavour profiles and regional cuisine diversity. the usage of artificial information (in this situation, element mixtures) and actual-time user enter demonstrates promising outcomes, despite the fact that more paintings is needed to beautify the complexity and practicality of the generated recipes.

## 6. Clever cuisine: Generative recipe & ChatGPT powered nutrition assistance for sustainable cooking October 2023 Authors: Ponrawin Kansaksiri , Pongpipat Panomkhet , Natthanet Tantisuwichwong

In conclusion, the "clever cuisine" gadget presented on this paper is a valuable device that has the capability to make a real distinction in humans's lives. The device's progressive features, consisting of the element calculator, AI-generated recipe, and OpenAI completion chat service, offer users with a user-pleasant interface to assist them make knowledgeable choices about their food picks and decrease meals waste. via calculating the proportions and prices of elements of their recipes, customers can plan their meals extra efficaciously and keep cash. The AI-generated recipe feature encourages customers to be more innovative within the kitchen and decreases meals waste by way of letting them discover new recipes based totally at the ingredients they have got handy. The OpenAI completion chat provider affords users with professional advice on meals, nutrients, and fitness- associated questions, permitting them to make extra informed selections approximately their dietary alternatives. furthermore, the gadget's functions sell a healthful lifestyle by using encouraging customers to make knowledgeable food selections.

## 7. Hearth: meals picture to REcipe technology February 2023 Authors: Prateek Chhikara, Dhiraj Chaurasia, Yifan Jiang, Omkar Masur, and Filip Ilievski,

This paper added fireplace, a methodology tailor-made for food computing, focusing on producing food title, extracting components, and generating cooking commands totally from photograph inputs. We leveraged current

advancements in CV and language modeling to reap advanced performance in opposition to strong baselines. Furthermore, we validated practical applications of hearth for recipe customization and recipe-to-code era, showcasing adaptability and automation capability of our approach. Experimental effects validated the efficacy of fire, highlighting its promising prospects for future advancements and huge-ranging adoption in food computing.

8. NutriNet: A Deep learning food and drink picture recognition gadget for nutritional assessment June 2017 Authors: Simon Mezgec and Barbara Koroušić Seljak

In this paper provides the food and drink photo detection and popularity gadget that we constructed, inside the scope of which we evolved a deep convolutional neural community structure referred to as NutriNet on the way to offer a better category accuracy for the popularity of food and drinks pictures from the 520-magnificence dataset that we obtained the usage of Google photo searches, whilst retaining the version training time low to enable faster excellent-tuning. Our popularity machine is used inside the PD nutrients nutritional-evaluation application for Parkinson’s disorder sufferers, and it also includes on-line education that automatically updates the version with new pictures and new foods and drinks training.

9. Personalized Classifier for food picture recognition AUGUST 2015

Authors: Shota Horiguchi, Member, IEEE, Sosuke Amano, Makoto Ogawa, and Kiyoharu Aizawa

In this paper, it introduces a personalization hassle in food picture popularity and proposed a technique for classifier personalization. personalized meals popularity contains troubles of incremental learning, area model, and one-shot mastering. Our method combines a set-elegance NCM classifier that performs competitively with CNN and a user unique classifier that learns the user’s input incrementally, with heavier weighting given to later enter. In contrast to current studies wherein experiments had been conducted the use of synthetic eventualities, we brought a brand new dataset to evaluate personalized classification performance in practical conditions

### System Architecture

- **Frontend (React.js):**  
React is used to build a fast, interactive, and responsive user interface. It allows users to input ingredients and view recipes in real-time.
- **Backend (Node.js):**  
Node.js handles the server-side logic, API development, and communication between the frontend, database, and AI services.

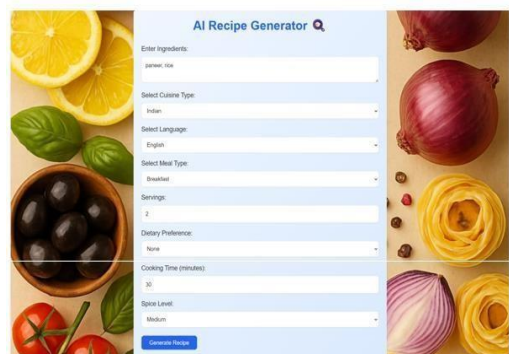
- **Database (MySQL):**  
MySQL is used to store user details, ingredient data, preferences, and AI-generated recipes. It ensures organized and persistent data storage.
- **Development Environment (VS Code):**  
Visual Studio Code is the main IDE used for writing, editing, and debugging both frontend and backend code efficiently.
- **Programming Language (JavaScript):**  
JavaScript is the core language used throughout the project — both for frontend (React) and backend (Node) development, ensuring consistency.

### Implementation Details

- **Frontend (React.js):**  
Handles user input (ingredients, preferences), displays generated recipes, and supports printing, downloading, or watching videos.
- **Backend (Node.js + Express):**  
Manages API routes for login, registration, recipe generation, and saving data. Communicates with the AI model and database.
- **Database (MySQL):**  
Stores user info, recipes, ingredients, and preferences. Enables personalized recommendations and recipe history tracking.
- **AI Integration:**  
Uses NLP/deep learning (e.g., Together AI or GPT) to generate recipes based on ingredients and dietary needs. Supports creative and healthy outputs.
- **Recipe Video (Optional):**  
Converts recipe steps into video using tools like RunwayML or Sora.
- **Tools:**  
Visual Studio Code for development, Git for version control, Postman for testing, JavaScript for both frontend and backend.

## Result

### 1. User Input



Result:  
Users can easily enter ingredients through a user-friendly input form. The system

successfully collects additional preferences such as:

Dietary restrictions (e.g., vegetarian, gluten-free). Cuisine type (e.g., Indian, Italian).

Preferred language (English, Hindi, Marathi).

Impact: The flexible input system improves user engagement by allowing customization and relevance from the very beginning.

## 2.PROCESSING (Ingredient Analysis & Quantity Parsing) Result:

The backend system:

Cleans and standardizes the input ingredients.

Analyzes user text to extract ingredient quantities (e.g., "2 tomatoes", "100g paneer").

Categorizes ingredients (vegetables, dairy, spices) for better AI understanding.

Impact:

Improves recipe relevance and realism by ensuring the AI gets accurate, structured data.

Quantity parsing enhances the precision of nutritional calculation and cooking steps.

## 3.RECIPE GENERATOR (Based on Input) Result:

An AI model successfully generates personalized recipes using:

Only the given ingredients.

The user's dietary and taste preferences. Each recipe includes:

A creative and descriptive title. Ingredients with precise quantities. Easy-to-follow cooking steps.

Impact:

Delivers creative, healthy, and doable recipes that adapt to users' lifestyles. No two users get the same results— ensuring uniqueness and personalization.

## 4.LANGUAGE SELECTION (Hindi, Marathi, English)

Result:

Recipes are generated and displayed in the selected language. The system uses:

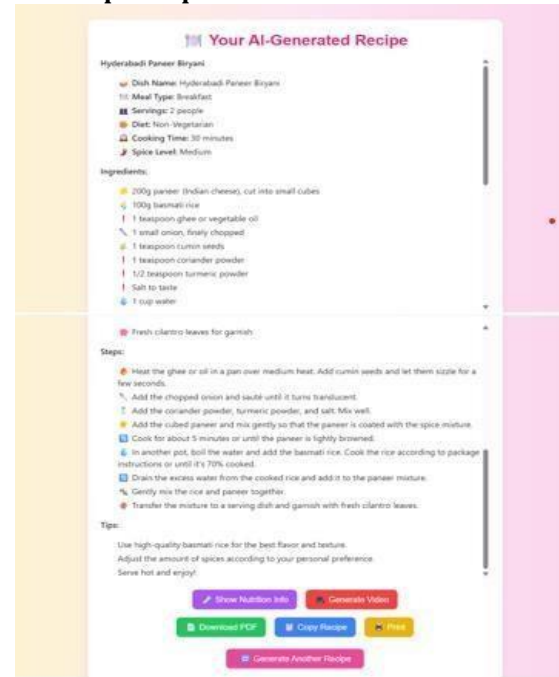
AI models that respond in the desired language.

Or real-time translation for accuracy (e.g., English to Hindi/Marathi).

Impact:

Breaks language barriers and makes the system inclusive. Users who prefer regional languages can fully understand and enjoy the cooking process.

## 5. Recipe Output



Result:

Final recipe output is:

Well-formatted and displayed in the chosen language. Includes title, ingredients, steps, nutrition, and video (if available).

Can be downloaded as a PDF or printed.

Optionally saved to user profile (for logged-in users). Impact:

Delivers a complete and professional cooking experience. The combination of personalization + visuals + nutrition ensures user satisfaction and continued engagement.

## 6. Nutritional Guidance

Nutrition Information	
Paneer Cut Into Small Cubes	N/A kcal, N/Ag fat, N/Ag protein
Basmati Rice	279 kcal, 7g fat, 6g protein
Ghee Or Vegetable Oil	311 kcal, 14g fat, 9g protein
Onion Finely Chopped	N/A kcal, N/Ag fat, N/Ag protein
Garlic Minced	477 kcal, 23g fat, 29g protein
Grated Ginger	134 kcal, 7g fat, 2g protein
Curry Powder	353 kcal, 10g fat, 18g protein
Ground Cumin	283 kcal, 10g fat, 12g protein

Result:

Each recipe includes:

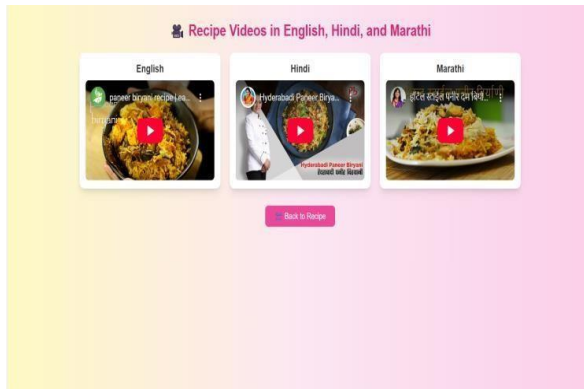
Estimated calories, carbs, fats, and protein (per

serving). Suggestions for healthier substitutions (e.g., use olive oil instead of butter).

Impact:

Empowers users to make informed food choices. It supports health-conscious cooking and can guide users managing health conditions (like diabetes or weight loss).

## 7. Generate The Video



Result:

The system generates a short cooking video automatically from the AI-generated recipe. The video includes:

Step-wise visual representation.

Text overlays and optionally AI voice narration.

Impact:

Makes the recipe more interactive and beginner-friendly. Especially helpful for visual learners and those who struggle with text-based recipes.

## Acknowledgment

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