# INVENTION DISCLOSURE FORM

Details of Invention for better understanding:

**1. TITLE:** AI RECIPI GENERATOR

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**Description of the Invention:**

The AI Recipe Generator is an innovative software application that utilizes artificial intelligence to generate personalized recipes based on user preferences, available ingredients, dietary restrictions, and nutritional goals. This smart system offers a seamless and intuitive way for users to create unique and diverse meal plans without extensive culinary expertise.

The AI-driven system leverages machine learning algorithms and natural language processing to analyse user input and generate customized recipes in real-time. It can recommend ingredient substitutions, suggest cooking techniques, and provide step-by-step instructions. Additionally, the AI can optimize recipes for specific dietary needs such as vegan, gluten-free, keto, or low-calorie diets.

**Key Features:**

1. **Personalized Recipe Generation:** Users can input preferences, available ingredients, and dietary restrictions to receive tailored recipes.
2. **Ingredient Substitutions:** The AI suggests alternative ingredients based on dietary needs and availability.
3. **Nutritional Analysis:** Provides detailed nutritional information for each recipe, including calorie count, macros, and micronutrients.
4. **Smart Meal Planning:** Users can create weekly meal plans based on dietary goals and ingredient availability.
5. **Cooking Guidance:** Step-by-step cooking instructions, including estimated cooking times and difficulty levels.
6. **AI-Powered Suggestions:** Recommends recipes based on user history, seasonality, and trending food options.
7. **Voice and Chat Integration:** Enables hands-free operation via voice assistants and chatbot interfaces.
8. **Multilingual Support:** Offers recipe generation in multiple languages for a global user base.
9. **Allergy Detection:** Alerts users if a recipe contains allergens and suggests alternatives.
10. **Integration with Smart Kitchen Devices:** Syncs with smart ovens, refrigerators, and other kitchen appliances to streamline cooking processes.

The AI Recipe Generator aims to revolutionize home cooking by making it more accessible, enjoyable, and tailored to individual needs. Whether users are looking for quick meals, gourmet dishes, or health-conscious options, this AI-driven solution ensures a hassle-free and creative culinary experience.

**A. PROBLEM ADDRESSED BY THE INVENTION:**

**Problem Addressed by the AI Recipe Generator**

Cooking can be a challenging task for many individuals, whether due to a lack of culinary knowledge, limited ingredients, dietary restrictions, or the need for creative meal ideas. The AI Recipe Generator aims to solve the following key problems:

1. **Lack of Cooking Inspiration**

Many people struggle to come up with new meal ideas, often resorting to the same recipes repeatedly. The AI generator provides fresh, innovative, and diverse recipe suggestions based on user preferences.

1. **Ingredient Optimization**

Users may have limited ingredients available and may not know how to combine them effectively. The AI can generate recipes based on what users already have, reducing food waste and promoting efficient meal planning.

1. **Dietary and Nutritional Needs**

People with dietary restrictions (e.g., vegan, gluten-free, keto) often find it difficult to discover suitable recipes. The AI generator customizes meal plans based on health goals, allergies, and specific dietary requirements.

1. **Time and Convenience**

Busy individuals may not have the time to browse through cookbooks or food blogs. The AI quickly provides step-by-step recipes, saving time in meal preparation and planning.

1. **Skill-Level Adaptation**

Some people may lack cooking expertise. The AI can generate recipes with varying difficulty levels and provide easy-to-follow instructions, making cooking more accessible for beginners.

1. **Cultural and International Cuisine Exploration**

The AI can introduce users to new cuisines and Flavors, expanding their culinary experiences with personalized recommendations.

By addressing these challenges, the AI Recipe Generator enhances the cooking experience, promotes healthier eating, reduces food waste, and simplifies meal preparation for users of all skill levels

* + 1. **OBJECTIVE OF THE INVENTION (Provide minimum two)**

1. **Personalized and Adaptive Recipe Creation**

The AI Recipe Generator aims to provide customized recipes based on user preferences, available ingredients, dietary restrictions, and nutritional goals. By analysing user inputs, the AI suggests meal options that cater to individual needs, ensuring a convenient and enjoyable cooking experience.

1. **Reduction of Food Waste through Smart Ingredient Utilization**

The invention helps users make the most of their available ingredients by suggesting recipes that prevent food waste. By generating meal ideas based on what users have on hand, the AI promotes sustainability and cost-effectiveness in meal planning.

* + 1. **STATE OF THE ART/ RESEARCH GAP/NOVELTY: Describe your invention fulfil the research gap?**

| Sr. No. | Patent ID | Abstract | Research Gap | Novelty |
| --- | --- | --- | --- | --- |
| 1. | AI-Based Recipe Recommendation Systems | This study explores AI-powered food recommendation engines that suggest recipes based on user preferences and dietary habits. | Existing systems primarily focus on static recommendations and lack real-time adaptation based on changing ingredient availability or user preferences. | The proposed AI recipe generator dynamically adjusts recipes based on available ingredients, dietary restrictions, and nutritional goals, ensuring real-time personalization. |
| 2. | Smart Meal Planning Applications | Research has analysed AI-driven meal planners that generate weekly meal schedules based on user inputs. | Many applications generate fixed meal plans and do not adapt to real-time pantry stock, seasonal ingredients, or user taste evolution. | The invention introduces an AI-driven, real-time meal planning system that learns from user behaviour and ingredient availability to optimize suggestions. |
| 3. | AI-Assisted Cooking for Dietary Management | Studies have explored AI applications in personalized nutrition, helping individuals follow specific diets like keto, vegan, or diabetic-friendly meal plans. | Current systems often focus on generic dietary recommendations and lack deep integration with user-specific nutritional needs and cooking skills. | This AI system enhances dietary adherence by providing step-by-step cooking assistance, adjusting recipes to skill levels, and offering ingredient substitutions for better compliance. |
| 4. | Food Waste Reduction through AI | Research highlights AI's potential in reducing food waste by suggesting recipes using leftover ingredients. | Existing solutions lack smart tracking of ingredient expiration and do not provide optimal combinations based on minimal waste strategies. | The AI recipe generator incorporates expiration tracking and waste-minimizing recipe suggestions, ensuring maximum utilization of available ingredients. |

**How This Invention Fulfils the Research Gap**

* Unlike existing solutions that provide static meal recommendations, this AI dynamically adapts to available ingredients, dietary needs, and real-time user preferences.
* The AI recipe generator reduces food waste by optimizing ingredient use and suggesting recipes based on expiration dates.
* It integrates smart learning to refine meal recommendations over time based on user behaviour, evolving dietary choices, and seasonal food availability.
* Unlike traditional meal planners, it adjusts recipes in real-time based on pantry stock, offering flexible, personalized cooking solutions.
  + 1. **DETAILED DESCRIPTION:**

**1. Overview**

The AI Recipe Generator is an intelligent system designed to generate customized recipes based on user preferences, available ingredients, dietary restrictions, and nutritional goals. It leverages machine learning, natural language processing (NLP), and a vast culinary database to provide tailored meal suggestions.

**2. Key Components of the Invention**

**A. Ingredient Recognition and Analysis**

* Users can input available ingredients manually or scan them using image recognition technology.
* The AI system categorizes ingredients based on freshness, type (vegetables, protein, grains, etc.), and expiration dates.
* It suggests the best possible recipes to optimize ingredient usage and minimize waste.

**B. Personalized Recipe Generation**

* The AI considers dietary preferences (vegan, keto, gluten-free, low-carb, etc.) and allergens when generating recipes.
* Users can specify cooking time, difficulty level, and the number of servings required.
* The AI dynamically adjusts recipes based on missing or alternative ingredients.

**C. AI-Driven Meal Planning**

* The system creates daily, weekly, or monthly meal plans based on nutritional goals.
* It balances macronutrients (carbohydrates, proteins, fats) and micronutrients (vitamins, minerals) for a healthier diet.
* Integration with smart grocery lists ensures that users receive shopping recommendations based on planned meals.

**D. Smart Cooking Assistance**

* Step-by-step cooking instructions are provided, with options for text, audio, or video guidance.
* AI-powered cooking tips help users with preparation techniques, ingredient substitutions, and flavour enhancement.
* The system adjusts cooking instructions based on the user's expertise (beginner, intermediate, expert).

**E. Food Waste Reduction Mechanism**

* The AI prioritizes recipes that use ingredients nearing expiration.
* It suggests portion adjustments to minimize leftovers.
* Integration with smart kitchen appliances allows real-time tracking of stored food items.

**F. Multilingual and Cultural Cuisine Adaptation**

* Users can explore recipes from different cuisines worldwide.
* AI can translate and adapt recipes based on regional availability of ingredients.
* Personalized recommendations consider local food traditions and seasonal ingredients.

**3. Technology Stack**

* Machine Learning & NLP: Used for ingredient recognition, recipe adaptation, and user preference learning.
* Computer Vision: Enables ingredient identification through image scanning.
* Cloud Integration: Stores user preferences, dietary history, and recipe recommendations for seamless access.
* IoT Compatibility: Connects with smart fridges and kitchen appliances for real-time ingredient tracking.

**4. User Interface & Experience**

* Mobile & Web Application: Available as an easy-to-use app with interactive recipe selection.
* Voice Assistance: Users can interact with the AI hands-free while cooking.
* Social Sharing: Allows users to share customized recipes and meal plans with friends or communities.

**5. Benefits of the AI Recipe Generator**

* Enhances Cooking Creativity: Provides endless meal ideas and alternative ingredients.
* Saves Time & Effort: Reduces meal planning stress by offering quick suggestions.
* Encourages Healthier Eating: Ensures balanced nutrition based on dietary goals.
* Minimizes Food Waste: Utilizes available ingredients efficiently to prevent spoilage.
* Adapts to Individual Needs: Personalizes recipes for various dietary restrictions and cultural preferences.

**Conclusion**

The AI Recipe Generator is a transformative solution that makes cooking more convenient, sustainable, and enjoyable. By integrating advanced AI technology with a user-friendly interface, it empowers individuals to cook smarter, eat healthier, and reduce food waste effectively.

**Privacy and Security**

Ensuring user data protection is a critical aspect of the AI Recipe Generator. The system is designed with robust privacy and security measures to safeguard personal information, prevent unauthorized access, and ensure compliance with data protection regulations.

**1. Data Privacy Measures**

* Minimal Data Collection: The AI only collects essential information (e.g., dietary preferences, saved ingredients, and cooking history) to enhance user experience without storing unnecessary personal details.
* User Anonymization: Personal identifiers are not linked to stored preferences, ensuring data remains anonymous.
* Data Access Control: Users can manage and delete their data at any time through privacy settings.

**2. Security Measures**

* End-to-End Encryption: All user interactions, including ingredient inputs and meal preferences, are encrypted during transmission and storage to prevent data breaches.
* Secure Authentication: Multi-factor authentication (MFA) and password protection are implemented to restrict unauthorized access.
* Cloud Security: If cloud storage is used, it complies with global security standards such as GDPR, CCPA, and ISO 27001 for secure data handling.

**3. Compliance with Data Protection Laws**

* General Data Protection Regulation (GDPR): Users can request data access, modification, or deletion.
* California Consumer Privacy Act (CCPA): Users are informed about data collection practices and can opt out of data sharing.

**4. Third-Party Integrations and Data Sharing**

* Limited Third-Party Access: If external integrations (e.g., smart appliances, grocery apps) are used, they must comply with strict security policies.
* No Unauthorized Data Sharing: User data is not sold or shared with advertisers or third parties without explicit consent.

**5. Secure AI Processing**

* Local Data Processing: Whenever possible, AI computations occur locally on the user's device to reduce cloud dependency and enhance privacy.
* AI Transparency: Users receive clear explanations on how recipe recommendations are generated, ensuring trust in AI decisions.

**Conclusion**

The AI Recipe Generator prioritizes user privacy, data security, and compliance with regulations to create a safe and trusted platform. With encrypted data handling, strict access controls, and transparency in AI-driven recommendations, the system ensures a secure and personalized cooking experience.

**RESULTS AND ADVANTAGES:**

**Results and Advantages of the AI Recipe Generator**

**1. Results Achieved**

The AI Recipe Generator has demonstrated significant improvements in meal planning, ingredient optimization, and user convenience. The key results include:

* **Personalized Meal Suggestions:** Users receive tailored recipes based on dietary preferences, ingredient availability, and cooking skill level.
* **Food Waste Reduction:** The AI effectively suggests recipes using ingredients nearing expiration, minimizing food wastage.
* **Healthier Eating Habits:** Users can select dietary goals (e.g., weight loss, muscle gain, balanced nutrition), and the AI recommends meals aligned with those needs.
* **Time-Saving Meal Planning:** Automated meal planning reduces the time spent searching for recipes and grocery shopping.
* **Increased Cooking Confidence:** Step-by-step instructions and substitution suggestions help users cook with ease, regardless of experience level.

**2. Key Advantages**

**A. Convenience and Efficiency**

**Instant Recipe Generation:** No need to browse cookbooks or online recipes; the AI provides instant suggestions.  
**Smart Grocery Management:** Integrates with shopping lists to suggest missing ingredients.  
**Quick Meal Planning:** Generates meal plans for the week based on user preferences and available ingredients.

**B. Personalization and Adaptability**

**Custom Recipes for All Diets:** Supports vegan, keto, gluten-free, low-carb, and other dietary needs.  
**Adjustable Cooking Instructions:** Modifies recipes based on the user's cooking experience and available kitchen equipment.  
**Real-Time Adaptation:** Suggests alternative ingredients in case of missing items.

**C. Food Waste Reduction and Sustainability**

**Utilizes Expiring Ingredients:** Prioritizes recipes using items nearing expiration.  
**Optimized Portion Control:** Adjusts recipe servings to prevent overcooking and leftovers.  
**Encourages Sustainable Cooking:** Promotes seasonal and locally available ingredient usage.

**D. Health and Nutrition Benefits**

**Balanced Nutrient Recommendations:** Ensures meals meet daily nutritional requirements.  
**Allergen and Sensitivity Awareness:** Warns users about potential allergens in suggested recipes.  
**Healthier Alternative Suggestions:** Recommends ingredient swaps for lower-calorie or nutrient-rich options.

**E. Smart Technology Integration**

**Voice and Image Recognition:** Users can input ingredients via voice commands or image scanning.  
**IoT and Smart Appliance Compatibility:** Connects with smart fridges and kitchen devices to track ingredients and suggest optimal cooking methods.  
**AI Learning and Improvement:** The system continuously learns from user preferences to improve future recommendations.

**Conclusion**

The AI Recipe Generator offers a **smarter, healthier, and more efficient** cooking experience. It enhances **personalized meal planning, minimizes food waste, and promotes healthier eating habits**, all while saving users time and effort in the kitchen.

Would you like to expand on any particular advantage? 😊

1. **WORKING PROTOTYPE/ FORMULATION/ DESIGN/COMPOSITION:**

**Working Prototype / Formulation / Design / Composition of the AI Recipe Generator**

**1. Working Prototype**

The AI Recipe Generator prototype consists of a web-based and mobile application powered by artificial intelligence, machine learning, and natural language processing. The system is designed to process user inputs, analyse ingredient availability, and generate optimized recipes based on personal preferences and dietary needs.

**A. Components of the Prototype**

1. **User Interface (UI)**
   * Interactive web and mobile app interface for easy user interaction.
   * Features include ingredient input, recipe browsing, meal planning, and cooking instructions.
2. **AI Algorithm & Database**
   * Uses **machine learning** to refine recipe recommendations based on user behaviour.
   * Includes a **comprehensive food database** with thousands of recipes, ingredient details, and nutritional values.
   * Implements **natural language processing (NLP)** to understand and respond to user queries.
3. **Ingredient Recognition System**
   * Users can manually enter ingredients or scan barcodes and images for AI-based ingredient identification.
   * The system tracks expiration dates and suggests recipes accordingly.
4. **Smart Recipe Generation**
   * Customizes recipes based on dietary preferences, ingredient availability, cooking time, and difficulty level.
   * Provides step-by-step instructions, cooking tips, and alternative ingredient suggestions.
5. **Integration with Smart Devices**
   * Connects with smart fridges, kitchen appliances, and grocery apps to track ingredient stock.
   * Uses IoT-based integration for real-time inventory updates.
6. **Security & Privacy Module**
   * Ensures encrypted data storage and compliance with GDPR and CCPA regulations.
   * Allows users to manage, edit, or delete personal data.

**2. Formulation / Algorithm Flow**

The AI Recipe Generator follows a structured algorithm for efficient recipe generation:

1. **User Input Collection**
   * Users input available ingredients, dietary restrictions, and preferences.
   * The system scans ingredient lists from smart appliances if connected.
2. **Ingredient Processing & Analysis**
   * The AI categorizes ingredients based on nutritional value, type, and expiration date.
   * Ingredient substitutions are suggested if necessary.
3. **Recipe Matching & Generation**
   * The system selects or generates a recipe that optimally uses available ingredients.
   * The AI adjusts portion sizes, cooking times, and difficulty levels.
4. **Step-by-Step Cooking Guide**
   * The AI provides cooking instructions in text, voice, or video format.
   * Users can interact with a chatbot or voice assistant for real-time cooking help.
5. **Continuous Learning & Optimization**
   * The AI refines future recommendations based on user feedback and cooking history.
   * Personalized meal plans improve over time based on usage patterns.

**3. Design & Composition**

**A. System Architecture**

The system consists of multiple interconnected components:

* **Frontend (User Interface):** Developed using **React Native** for cross-platform compatibility.
* **Backend (AI Processing):** Uses **Python (TensorFlow, Porch)** for machine learning and **Flask/Django** for API management.
* **Database:** Stores recipe data and user preferences using **MongoDB/PostgreSQL**.
* **Cloud Integration:** Hosted on **AWS/GCP/Azure** for scalable performance.

**B. User Experience Design**

* **Minimalist, intuitive design** for easy recipe navigation.
* **Customizable meal plans and ingredient tracking dashboards.**
* **Voice and image input options** for seamless user interaction.

**Conclusion**

The AI Recipe Generator prototype is a fully functional, AI-powered application designed for **efficient meal planning, personalized recipe suggestions, and food waste reduction**. With **advanced ingredient recognition, real-time adaptation, and IoT integration**, it offers a **smart and intuitive** cooking experience for users worldwide.

**Filing Options for AI Recipe Generator**

When filing a patent for the AI Recipe Generator, there are several options based on jurisdiction, scope of protection, and filing strategy. Here are the key filing options:

**1. National Patent Filing**

* File a patent in a specific country where protection is needed.
* Suitable if the invention will primarily be used in one country.
* Example:
  + **United States:** File with the **United States Patent and Trademark Office (USPTO)**.
  + **India:** File with the **Indian Patent Office (IPO)**.
  + **European countries:** File with individual national offices like the **UKIPO** (UK), **INPI** (France), etc.

**2. Regional Patent Filing**

* Protects the invention across multiple countries under a single application.
* Examples:
  + **European Patent (EP):** File with the **European Patent Office (EPO)** for protection in multiple EU countries.
  + **Eurasian Patent:** Covers countries like Russia, Kazakhstan, and others.
  + **ARIPO (African Regional Intellectual Property Organization):** Covers multiple African nations.

**3. International Patent Filing (PCT Application)**

* File under the **Patent Cooperation Treaty (PCT)** via **WIPO** (World Intellectual Property Organization).
* Provides protection in **over 150 countries**.
* Allows deferring national filings for up to **30 months**, giving time to decide in which countries to proceed.
* Ideal for global expansion and securing broad protection.

**4. Provisional vs. Non-Provisional Filing**

* **Provisional Patent Application:**
  + Establishes an early priority date.
  + Gives 12 months to file a full (non-provisional) application.
  + Less expensive initially, allowing time for further development.
* **Non-Provisional (Complete) Patent Application:**
  + Formal application that undergoes full examination.
  + Required for securing full patent rights.

**5. Alternative Protection Strategies**

* **Trade Secret Protection:** If the AI recipe algorithm is highly confidential, it may be kept as a **trade secret** instead of patenting.
* **Copyright & Trademark:**
  + Copyright can protect software code used in the AI system.
  + Trademark registration can secure the brand name and logo.

**Recommended Filing Strategy**

1. **File a Provisional Patent Application** (to secure an early priority date).
2. **Within 12 months, file a PCT Application** (if international protection is needed).
3. **Enter national/regional phases** in key markets (e.g., USPTO, EPO, IPO).

**KEYWORDS:**

**Keywords for AI Recipe Generator**

1. **AI Recipe Generator**
2. **Smart Meal Planning**
3. **Personalized Recipe Suggestions**
4. **Food Waste Reduction**
5. **Ingredient Recognition**
6. **AI-Powered Cooking Assistant**
7. **Dietary Preference Customization**
8. **Nutritional Meal Planning**
9. **Machine Learning in Cooking**
10. **Smart Kitchen Technology**
11. **Automated Recipe Recommendation**
12. **Health-Conscious Meal Planning**
13. **Real-Time Recipe Adaptation**
14. **Grocery List Optimization**
15. **IoT-Enabled Cooking**
16. **AI-Based Food Suggestions**
17. **Dynamic Recipe Customization**
18. **Cooking Assistance with AI**
19. **Natural Language Processing in Recipes**
20. **Smart Cooking App**

### **CONCLUSION:**

The **AI Recipe Generator** is a cutting-edge innovation that leverages artificial intelligence, machine learning, and IoT to revolutionize meal planning and cooking experiences. By providing **personalized recipe recommendations, ingredient optimization, and dietary customization**, this system enhances convenience, reduces food waste, and promotes healthier eating habits.

The invention addresses key research gaps by integrating **real-time ingredient recognition, dynamic meal adaptation, and smart kitchen connectivity**—features that are not fully explored in existing solutions. With strong **privacy, security, and compliance measures**, it ensures user data protection while delivering an intuitive and intelligent cooking assistant.

From a patenting perspective, various **national, regional, and international filing options** are available to protect the invention, ensuring its commercial viability and long-term innovation impact. The AI Recipe Generator stands as a **game-changer in smart cooking technology**, making meal preparation more **efficient, accessible, and sustainable** for users worldwide.