

**A MAIN PROJECT REPORT ON**  
**Nutrient Recommendation System for Personalized**  
**Diet**

**Submitted in partial fulfilment for the award of the degree of**

**BACHELOR OF TECHNOLOGY**

in

**Computer Science and Engineering**

By

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**Department of Computer Science and Engineering (Accredited by N.B.A.)**

**SRI VASAVI ENGINEERING COLLEGE (Autonomous)**

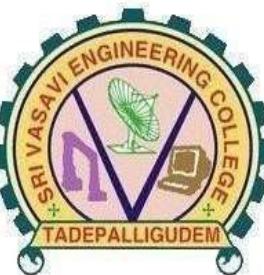
**Pedatadepalli, Tadepalligudem-534101, A.P**

**2024-2025**

# **SRI VASAVI ENGINEERING COLLEGE (Autonomous)**

**Department Of Computer Science and Engineering**

**Pedatadepalli, Tadepalligudem**



## **Certificate**

This is to certify that the Major Project Report entitled "**Nutrient Recommendation System for Personalized Diet**" submitted by **Md. Abubakar Siddiq(21A81A05B0), G. R V Phani Varma (21A81A0585), B. Vijay (21A81A0505), K. Rishik Reddy (21A81A0598), A. C Naga Sai (21A81A0502)** for the award of the degree of Bachelor of Technology in the Department of Computer Science and Engineering during the academic year 2024-2025.

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Professor & HOD.

**External Examiner**

## **DECLARATION**

We hereby declare that the Major Project report entitled "**Nutrient Recommendation System for Personalized Diet**" submitted by us to Sri Vasavi Engineering College (Autonomous), Tadepalligudem, affiliated to JNTUK Kakinada in partial fulfilment of the requirement for the award of the degree of B. Tech in Computer Science and Engineering is a record of Bonafide project work carried out by us under the guidance of, **Mrs. D S L Manikanteswari**. We further declare that the work reported in this project has not been submitted and will not be submitted, either in part or in full, for the award of any other degree in this institute or any other institute or University.

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## Abstract

The **Nutrient Recommendation System for Personalized Diet** is an innovative solution that combines Generative AI and advanced AI Agent to deliver highly adaptive, culturally relevant, and personalized dietary recommendations. By analyzing diverse multi-dimensional user data including age, gender, weight, height, health history, dietary goals (e.g., weight loss, weight gain, or condition management), activity levels, allergies, regional preferences, and food availability the system provides precise, user-centered guidance. Unlike previous systems like the **Personalized Diet Recommendation**, which employ traditional machine learning models to generate basic nutritional advice. Our project offering dynamic daily meal plans for breakfast, lunch, and dinner, along with calorie counts tailored to the user's health goals. It calculates the user's current caloric intake needed to maintain their Weight management and healthy lifestyle, and suggests adjusted caloric targets to achieve gradual weight loss or weight gain.

Additionally, the system incorporates regional and cultural dietary preferences, ensuring recommendations are practical and relevant to users' lifestyles. If the user chooses to include exercise, the system will provide a customized workout plan based on the number of days they plan to work out per week, detailing exercise types, duration, intensity, and ensuring alignment with the user's nutrient recommendations for an integrated fitness and nutrition plan. Leveraging advanced technologies such as Transformers architecture model, this project bridges the gap between user expectations and technological capabilities, offering a comprehensive, effective, and innovative approach to personalized health and nutrition management.

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## **Chapter-1**

### **INTRODUCTION**

## **1.1 Introduction:**

AI is transforming health and wellness with personalized nutrition and fitness recommendations. The AI-Powered Nutrient Recommendation System provides goal-oriented meal plans and workouts based on user inputs like age, gender, and dietary preferences. Using machine learning and AI agents, the system generates customized plans, ensuring a seamless and effective health management experience. Its scalable design allows future integration of advanced nutrition, fitness tracking, and wellness features, making it a powerful tool for personalized well-being.

## **1.2 Objective:**

The AI-powered personalized diet and fitness system aims to provide customized meal and workout plans tailored to individual health needs. It leverages Generative AI and advanced AI agents to analyze factors like age, gender, weight, dietary goals, activity levels, and allergies to deliver precise dietary recommendations. The system dynamically generates daily meal plans with calorie tracking and nutritional balance, ensuring a sustainable and goal-oriented approach. Additionally, it customizes workout routines based on user preferences, offering structured exercise plans aligned with dietary goals to enhance overall health and wellness.

### **1.3 Scope:**

The AI-powered personalized diet and nutrition planning system tailors meal plans using user-specific data such as age, gender, weight, health history, dietary goals, activity levels, allergies, and regional food preferences. It features real-time calorie and nutrient tracking, dynamically adjusting recommendations for weight management and overall health. By integrating AI-driven personalization, the system ensures scientifically backed meal and fitness plans, aligning workouts with dietary goals for optimal wellness. Its scalability allows for future enhancements like advanced health analytics, wearable integrations, and predictive insights. A user-friendly mobile interface enables seamless meal tracking, fitness monitoring, and continuous AI-driven recommendations, promoting long-term health and well-being.

### **1.4 Outline**

Chapter 1	Introduction
Chapter 2	Literature Survey
Chapter 3	System study and Analysis
Chapter 4	System Design
Chapter 5	Technologies
Chapter 6	Implementation
Chapter 7	Testing
Chapter 8	Screenshots
Chapter 9	Conclusion and Future Work
Chapter 10	References
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## **Chapter-2**

### **LITERATURE SURVEY**

## 2.1 Literature Survey

S.No	Authors	Research paper	Published Year	Techniques used	Conclusion
1	Asst Prof. Mrs. D. Navya Narayana Kumari, T. Praveen Satya, B. Manikanta, A. Phani Chandana, Y. L.S Aditya	Personalized Diet Recommendation System Using Machine Learning	February 2024	<ul style="list-style-type: none"> <li>➤ Nearest Neighbor Algorithm</li> <li>➤ Fast API</li> <li>➤ Streamlit</li> <li>➤ Standard Scaler</li> <li>➤ Cosine Similarity</li> </ul>	Implemented software for diet and healthy living advice. Highlights the importance of nutritional counseling.
2	Vijay Jaiswal	A new approach for recommending healthy diet using predictive data mining algorithm	March 2019	<ul style="list-style-type: none"> <li>➤ Decision Tree Learning Algorithm</li> <li>➤ Random Tree</li> </ul>	The study shows that Random Tree works well on classification problems with non-repeated values. It considers factors like food preferences, fitness goals, and nutrient content to map daily menu planning.
3	Butti Gouthami, Malige Gangappa	A Nutritional Diet Recommendation System Using User Interest	2020	<ul style="list-style-type: none"> <li>➤ USDA Nutrition Data Set</li> <li>➤ BMI Calculation</li> </ul>	Uses USDA nutrition database and user food intake to determine personalized diet recommendations.
4	Rachel Yera Toledo, Ahmad A. Alzahrani, Luis Martinez	A Food Recommendation System Based on Nutritional Information and User Preferences	July 2019	<ul style="list-style-type: none"> <li>➤ Optimization Techniques</li> </ul>	Generates daily meal plans based on user preferences and nutritional data. Ensures diverse and optimized diet plans.

S.No	Authors	Research Paper	Published Year	Techniques Used	Conclusion
5.	Mrinmoy Roy, Srabonti Das, Anica Tasnim Protity	OBESEYE: Interpretable Diet Recommender for Obesity Management using Machine Learning and Explainable AI	2023	Linear Regression, Support Vector Machine (SVM), Decision Tree, Random Forest, XGBoost, LightGBM	Proposed a system predicting individual nutrient requirements, considering comorbidities and physical conditions, to promote healthy diet plans for obesity management.
6.	Abolfazl Ajami, Babak Teimourpour	A Food Recommender System in Academic Environments Based on Machine Learning Models	2023	Decision Tree, k-Nearest Neighbors (kNN), AdaBoost, Bagging	Implemented a hybrid recommender system using collaborative filtering, content-based, and knowledge-based models to recommend university menu items to students based on their profiles and dietary preferences.
7.	Madhumita Veeramreddy, Ashok Kumar Pradhan, Swetha Ghanta, Laavanya Rachakonda, Saraju P. Mohanty	NUTRIVISION: A System for Automatic Diet Management in Smart Healthcare	2024	Faster Region-based Convolutional Neural Network (Faster R-CNN)	Introduced a system combining computer vision and machine learning to identify food items, estimate quantities, and provide comprehensive nutritional information for personalized diet management.
8.	Prerana Madhira, Harshini Kotapati, Batta Kavya, S. Mounasri	Diet Recommendation System Using Machine Learning	2022	Machine Learning Algorithms	Introduced a system that calculates recommended diets by analyzing nutrient datasets based on BMI values and identifying nutritional deficits from daily food consumption.

**Chapter-3**

**SYSTEM STUDY AND ANALYSIS**

### **3.1 Problem Statement:**

Traditional diet and fitness planning lacks personalization, often providing generic recommendations that fail to align with individual health needs. Existing solutions do not effectively consider multiple factors such as dietary restrictions, fitness levels, allergies, and regional food availability, leading to ineffective or unsustainable health plans. Additionally, manual tracking of calories and workouts is time-consuming and prone to inaccuracies. The absence of an AI-driven system results in inefficient meal and fitness planning, making it challenging for users to achieve their health goals. A **Nutrient Recommendation System for Personalized Diet** is essential to bridge this gap by delivering precise, dynamic, and scientifically backed nutrition and exercise recommendations tailored to each user's unique requirements.

### **3.2 Existing System:**

The current dietary and fitness planning systems rely on generic meal plans and workout routines that fail to account for individual differences such as age, health conditions, allergies, and activity levels. Users often struggle with inaccurate calorie tracking and lack real-time adjustments to their dietary needs. Additionally, existing platforms lack integration between nutrition and fitness, making it difficult to align meal plans with workout goals. The absence of AI-driven personalization reduces user engagement and effectiveness, leading to unsustainable health habits. Addressing these limitations is crucial for improving accuracy, customization, and long-term adherence to health plans.

### **3.3 Limitations of Existing System:**

The current dietary and fitness planning systems have significant limitations, including a lack of personalized meal recommendations, leading to ineffective or unsustainable dietary habits. Inaccurate calorie and nutrient tracking results in misleading guidance, affecting health outcomes. The absence of seamless integration between nutrition and fitness makes it difficult for users to align their diet with workout routines. Additionally, these systems fail to adapt dynamically to changes in user preferences, activity levels, or dietary goals. Without AI-driven customization and real-time adjustments, users face challenges in maintaining long-term adherence to a healthy lifestyle.

### **3.4 proposed System:**

The proposed **Nutrient Recommendation System for Personalized Diet** enhances dietary and fitness management through advanced AI-driven meal and workout customization. It leverages AI agents to generate dynamic, personalized meal plans based on factors like age, weight, dietary goals, and activity levels. Additionally, it integrates real-time calorie and nutrient tracking, ensuring precise dietary recommendations. The system also offers AI-generated workout plans tailored to individual fitness objectives, creating a seamless connection between nutrition and exercise. This holistic approach ensures optimal health management, making personalized wellness more accessible and effective.

### **3.5 Advantages of Proposed System:**

The **Nutrient Recommendation System for Personalized Diet** provides a tailored approach to health management. It generates **customized meal and workout plans** based on user-specific factors like dietary goals, activity levels, and allergies. The system ensures **real-time calorie and nutrient tracking**, offering precise dietary guidance. AI-driven **dynamic adjustments** adapt plans based on progress and user feedback. The integration of fitness recommendations enhances overall wellness, aligning exercise routines with personalized nutrition. This **automated, data-driven approach** improves health outcomes, making nutrition and fitness planning more efficient, accessible, and effective.

### **3.6 Functional Requirements:**

The system includes various functional modules to ensure a seamless and efficient user experience.

- **Personalized Diet & Nutrition Module:** Generates **custom meal plans** based on age, weight, dietary goals, allergies, and activity levels.
- **Dynamic Meal Planning Module:** Provides **daily meal recommendations** with real-time calorie and nutrient tracking.
- **Customized Workout Module:** Suggests **exercise routines** aligned with dietary plans, specifying workout type, duration, and intensity.
- **AI-Powered Recommendation System:** Continuously **adapts meal and workout plans** based on user progress and feedback.
- **Downloadable Excel Format:** Generates and provides diet plans and workout plans in an Excel format for easy access, customization, and offline use.

### **3.7 Non- Functional Requirements:**

- **Performance:** Ensures **fast response times** with minimal delay in generating personalized meal and workout plans.
- **Accuracy:** Delivers **precise and reliable** dietary and fitness recommendations using AI-driven calculations.
- **Scalability:** Supports **multiple users concurrently**, allowing seamless expansion as demand grows.
- **User Experience:** Provides an **intuitive and easy-to-navigate** interface for personalized health management.
- **Security:** Implements **encryption and authentication** to safeguard user data and prevent unauthorized access.
- **Reliability:** Ensures **high system uptime** with minimal downtime and quick recovery from failures.
- **Compatibility:** Works seamlessly across **various devices and platforms**, including web and mobile applications.
- **Maintainability:** Designed for **easy updates and modifications**, allowing future enhancements without major overhauls.

These non-functional requirements ensure that the system remains **efficient, secure, and user-friendly**, supporting long-term usability and growth.

### **3.8 Hardware Requirements:**

- ❖ System : Core i3 or above
- ❖ RAM : 4GB or above

### **3.9 Software Requirements:**

1. Operating System: Windows 7+
2. Programming Language: Python 3.11
3. Libraries: crewai==0.100.1, streamlit==1.42.0, langchain-core==0.3.34, langchain-groq==0.2.4, XlsxWriter
4. Client-side Requirements: Browser: Any Compatible browser device.

## **Chapter-4**

### **SYSTEM DESIGN**

## 4.1 System Architecture:

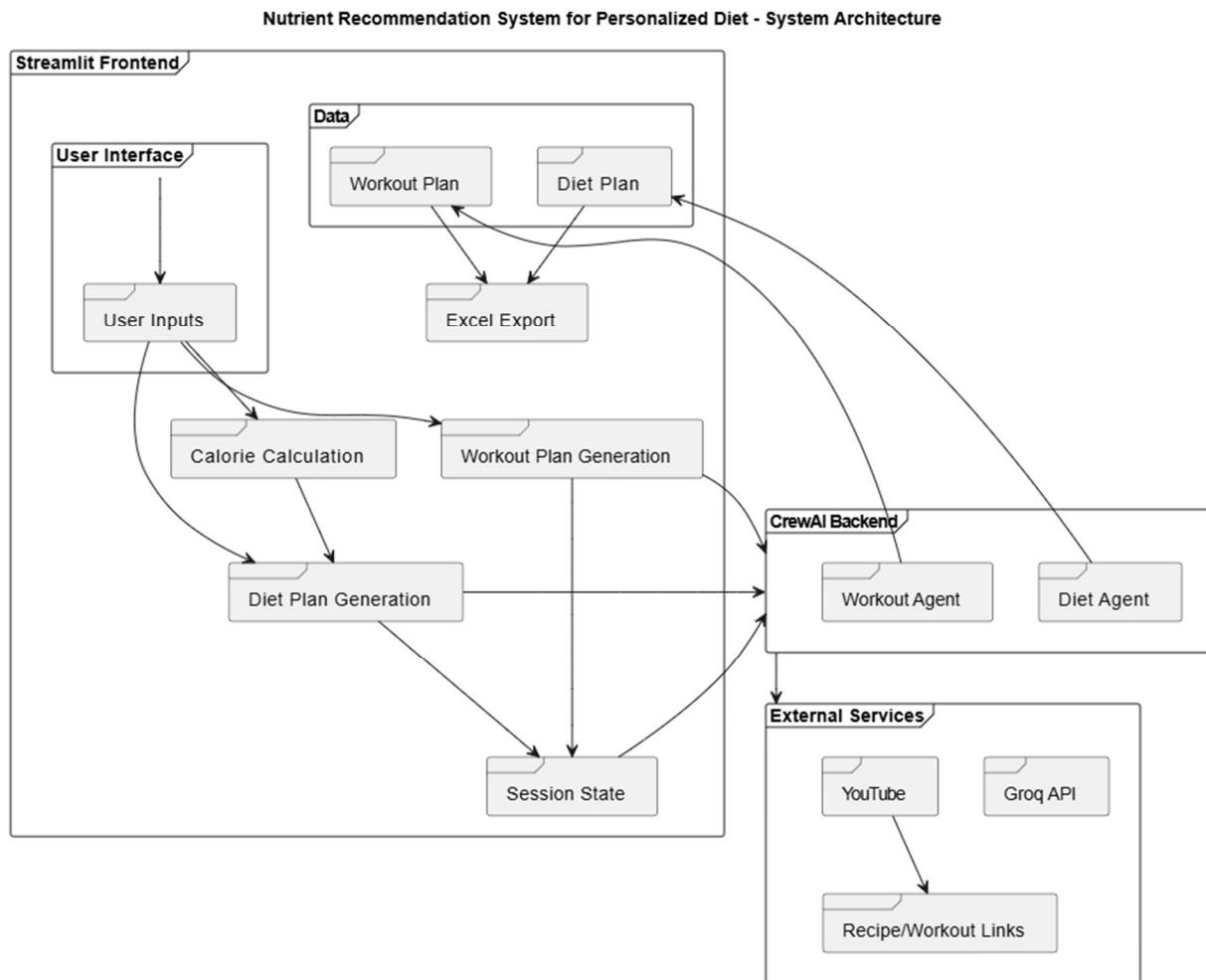


Fig 4.1 System Architecture

## 4.2 Use Case Diagram:

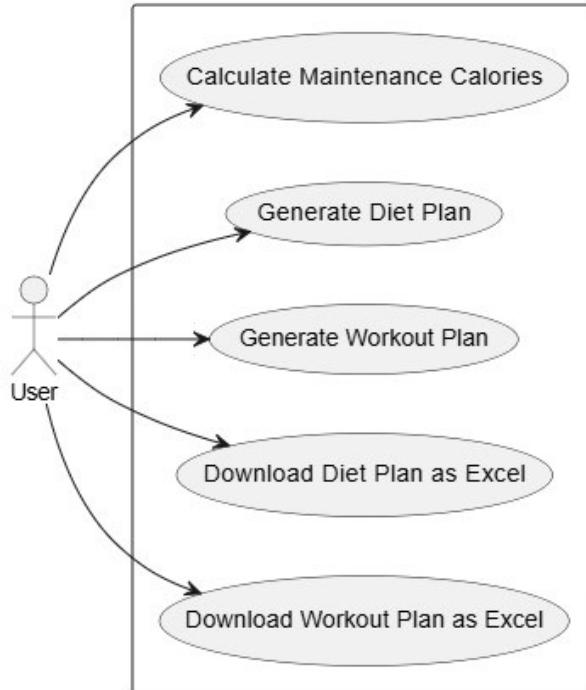


Fig 4.2 Use Case Diagram

## 4.3 Class Diagram:

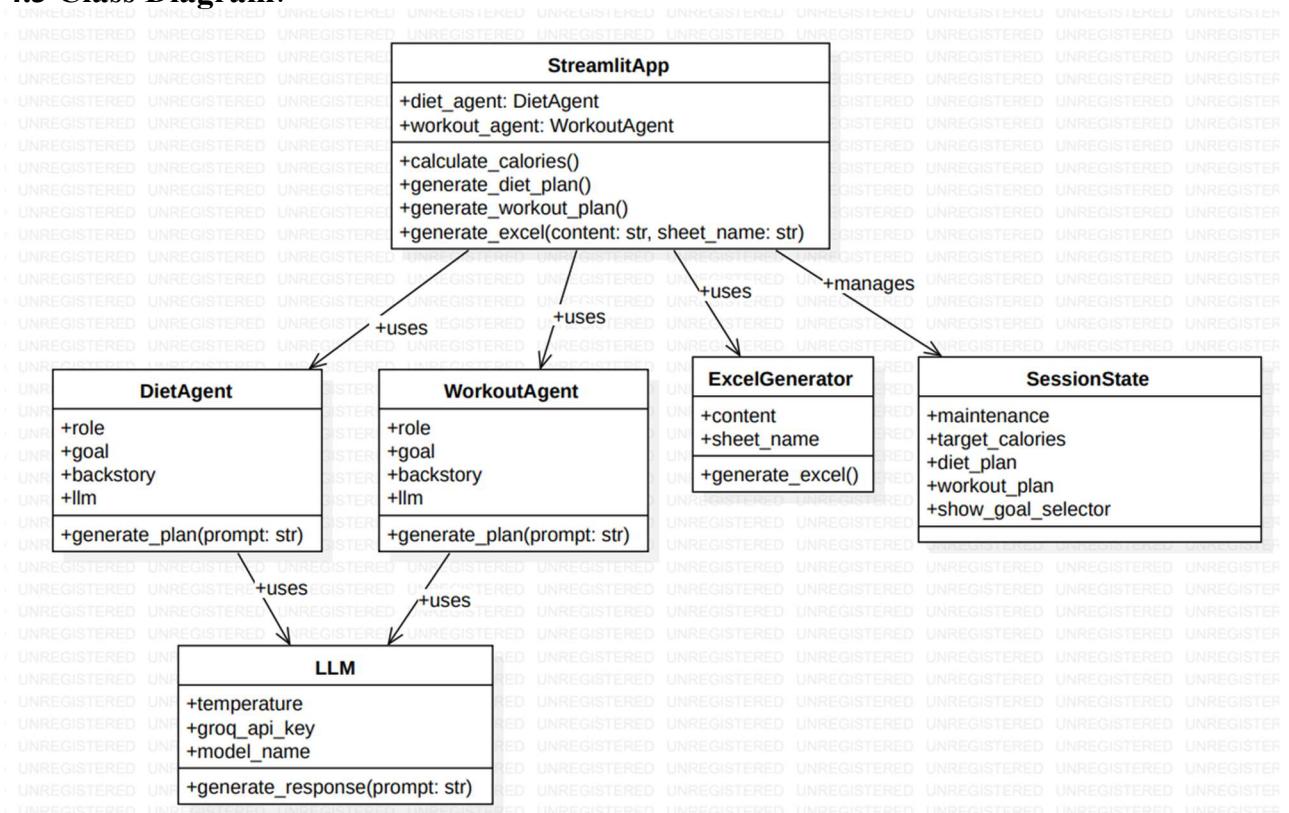


Fig 4.3 Class Diagram

#### 4.4 Activity Diagram:

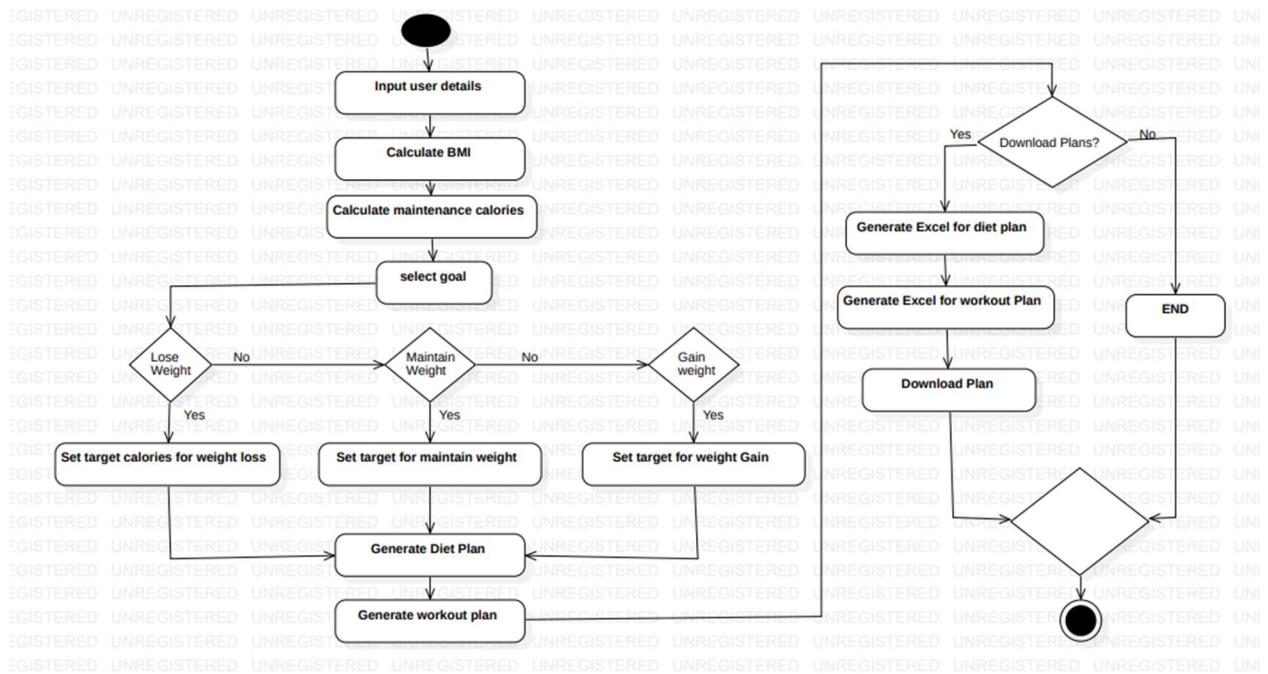


Fig 4.4 Activity Diagram

#### 4.5 Sequence Diagram of Customer:

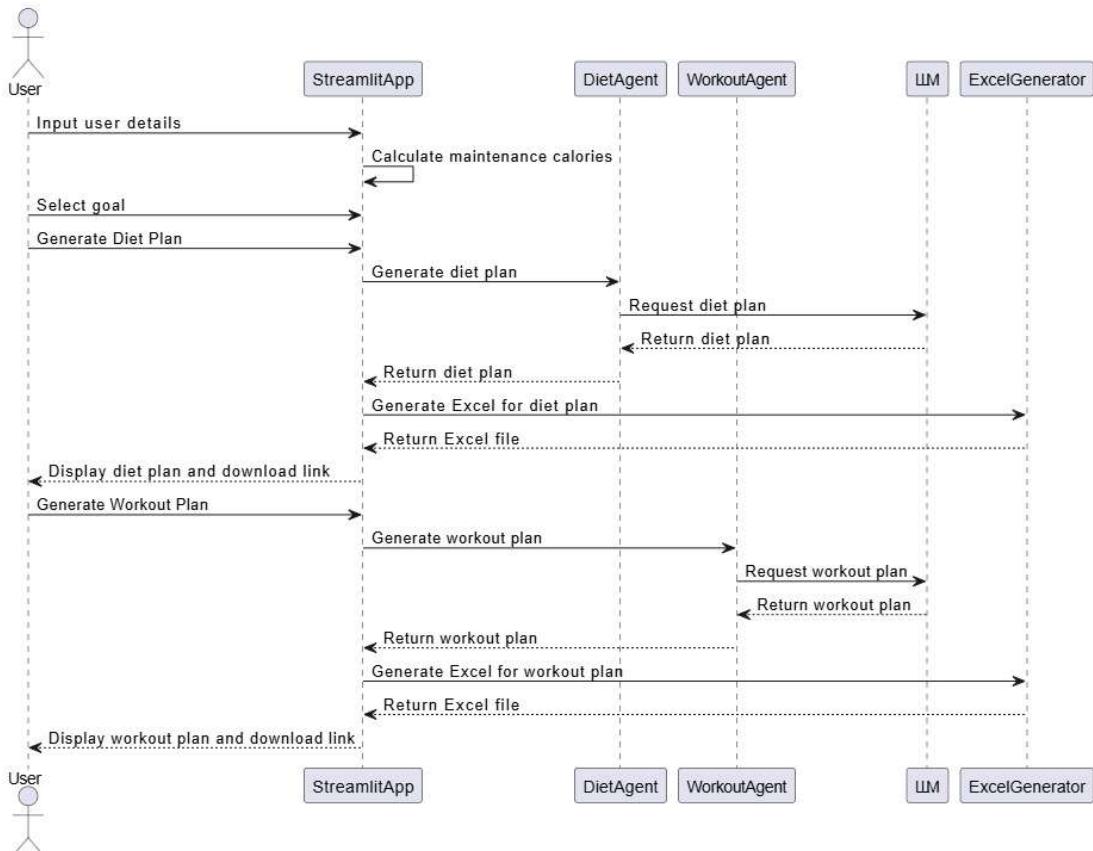


Fig 4.5 Sequence Diagram

#### 4.6 Component Diagram:

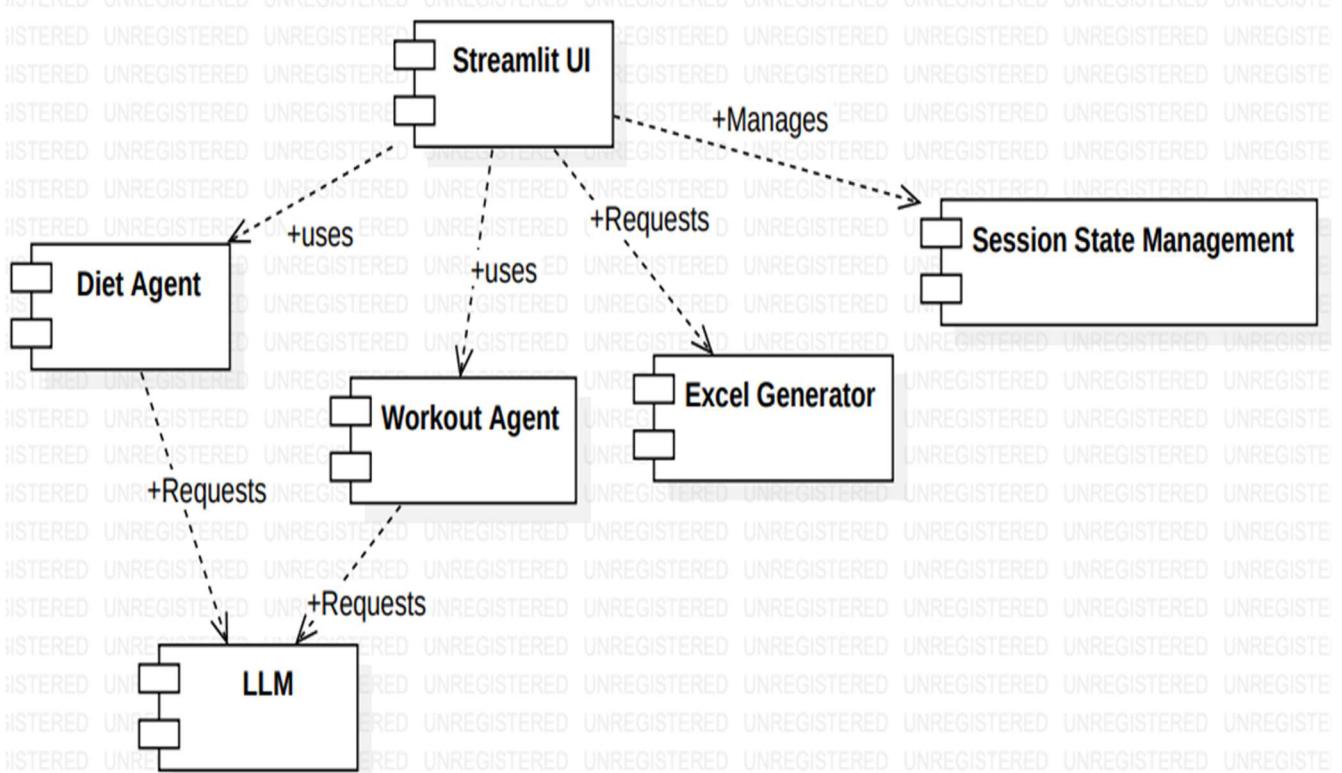


Fig 4.6 Component Diagram

#### 4.7 Deployment Diagram:

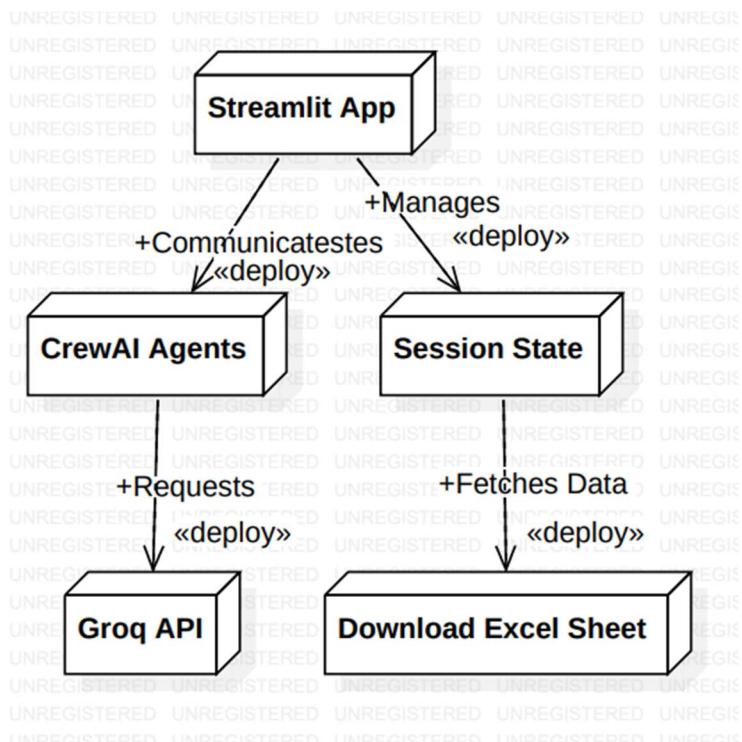


Fig 4.7 Deployment Diagram

## **Chapter-5**

### **TECHNOLOGIES**

## **5.1 Python:**

Python is a high-level, interpreted, general-purpose programming language developed by Guido van Rossum in 1991. It is known for its readability, simplicity, and versatility, making it suitable for a wide range of applications, including web development, automation, data science, artificial intelligence (AI), cybersecurity, and networking. Python's extensive libraries and frameworks make it the go-to choice for developers working in machine learning (TensorFlow, PyTorch), web development (Django, Flask), and automation (Selenium, PyAutoGUI). Its ability to integrate with C, C++, and Java further enhances its flexibility.

Because Python supports both object-oriented and functional programming, it is used by companies like Google, Facebook, Netflix, and NASA for various applications.

### **Key Features of Python:**

- Easy to Learn and Readable Syntax
- Dynamically Typed
- Interpreted Language
- Cross-Platform Compatibility
- Object-Oriented & Functional Programming
- Strong community support
- Third-Party Libraries & Frameworks
- Machine Learning & Data Science Friendly

### **Advantages & Disadvantages of Python:**

#### **Advantages:**

- Beginner-Friendly & Easy to Learn
- Extensive Libraries & Frameworks
- Automation & Scripting
- Highly Scalable

#### **Disadvantages:**

- Slower Execution Speed
- Higher Memory Consumption
- Limited for multi-threading
- Difficult to Convert to Standalone Executables

## **5.2 Streamlit:**

Streamlit is an open-source Python framework designed for building interactive web applications for machine learning and data science. It simplifies the development of data-driven applications without requiring extensive web development knowledge. Streamlit automatically updates the UI when the underlying Python code changes, making it highly efficient for rapid prototyping.

### **Key Features of Streamlit:**

- **Easy to Use:** Requires minimal code to create fully functional web applications.
- **Live Code Updates:** Automatically refreshes UI elements when the script is modified.
- **Interactive Widgets:** Offers a variety of built-in widgets like sliders, buttons, and forms for user interaction.
- **Integration with ML Libraries:** Works seamlessly with TensorFlow, PyTorch, and Scikit-learn.
- **Deployability:** Can be deployed with services like Streamlit Cloud, AWS, and Heroku.

### **Advantages & Disadvantages of Streamlit:**

#### **Advantages:**

- Quick and easy to build interactive applications.
- No need for frontend development skills.
- Compatible with various data visualization tools (Matplotlib, Plotly, etc.).

#### **Disadvantages:**

- Limited customization compared to full-fledged web frameworks like Flask or Django.
- Not ideal for complex, multi-page applications.

### **5.3 CrewAI:**

CrewAI is an advanced AI framework designed for orchestrating multiple autonomous AI agents to work collaboratively on tasks. It provides an efficient way to build AI-powered systems where different agents specialize in specific roles and communicate to achieve a shared goal.

#### **Key Features of CrewAI:**

- Multi-Agent Collaboration: Enables multiple AI agents to work together on complex workflows.
- Task Automation: Automates repetitive or intelligent decision-making tasks.
- Integration with LLMs: Works with AI models like OpenAI's GPT, Groq, and other language models.
- Customizable Agents: Supports defining specialized AI agents with unique responsibilities.
- Real-time Decision Making: Agents can adapt and improve their responses dynamically.

#### **Advantages & Disadvantages of CrewAI:**

##### **Advantages:**

- Efficient for AI-driven task automation.
- Enhances problem-solving by leveraging multiple specialized AI agents.
- Scalable for enterprise applications.

##### **Disadvantages:**

- Higher complexity in setting up and managing agents.
- Requires advanced AI model integration.

## **5.4 XlsxWriter:**

XlsxWriter is a Python library for creating and writing Excel (.xlsx) files with advanced formatting, charts, and formulas. It is commonly used for generating reports, exporting data, and automating Excel-based workflows.

### **Key Features of XlsxWriter:**

- **Excel File Generation:** Creates .xlsx files programmatically.
- **Cell Formatting:** Supports custom styles, fonts, colors, and borders.
- **Charts & Graphs:** Allows users to generate interactive Excel charts.
- **Formula Support:** Enables writing Excel formulas dynamically.
- **Multiple Sheets:** Supports creating and managing multiple sheets in a workbook.

### **Advantages & Disadvantages of XlsxWriter:**

#### **Advantages:**

- Simple API for generating professional-looking Excel reports.
- No dependency on Microsoft Excel for file creation.
- Supports large-scale data exports efficiently.

#### **Disadvantages:**

- Does not support reading or modifying existing Excel files (only writes new files).
- Limited to .xlsx format (does not support older .xls formats).

## **Chapter-6**

### **IMPLEMENTATION**

## 6.1 requirements.txt:

```
crewai==0.100.1
streamlit==1.42.0
langchain-core==0.3.34
langchain-groq==0.2.4
XlsxWriter
pysqlite3-binary
chromadb
```

## 6.2 streamlit\_app.py

```
__import__('pysqlite3')
import sys
sys.modules['sqlite3'] = sys.modules.pop('pysqlite3')
import streamlit as st
from crewai import Agent, Task, Crew
from langchain_groq import ChatGroq
import xlsxwriter
from io import BytesIO
import os
# Set page configuration
st.set_page_config(
    page_title="Fitness & Nutrition Planner 🥑",
    page_icon="🥗",
    layout="wide"
)
# Apply custom CSS for background and card styling
st.markdown("""
<style>
/* Set background color similar to the uploaded design */
body {
    background-color: #FDF4EE; /* Light Peach Background */
}
/* Header container similar to the design */
.header-container {
    background: white;
    padding: 20px;
    border-radius: 15px;
    text-align: center;
    box-shadow: 0px 4px 10px rgba(0, 0, 0, 0.1);
    margin-bottom: 20px;
}
.header-container h1 {
    font-size: 3em;
    color: #000000; /* Red for emphasis */
    margin-bottom: 10px;
}
.header-container p {
    font-size: 1.5em;
    color: #333333; /* Dark Gray Text */
}
</style>
""")
```

```

/* Button Styling */
.stButton > button {
    background-color: #FF4B4B; /* Orange CTA Button */
    color: white;
    font-size: 1.2em;
    border-radius: 10px;
    padding: 12px 24px;
    border: none;
}
.stButton > button:hover {
    background-color: #FF4B4B;
}
/* Centered Section with Card Style */
.content-container {
    background: white;
    padding: 30px;
    border-radius: 15px;
    box-shadow: 0px 6px 15px rgba(0, 0, 0, 0.1);
    text-align: center;
    max-width: 800px;
    margin: auto; }

/* Feature List */
.feature-list {
    font-size: 1.3em;
    text-align: left;
    padding-left: 20px;
    color: #34495E;
}
.feature-list li {
    margin: 10px 0;
}
</style>
"""", unsafe_allow_html=True)
# Create header similar to the uploaded design
st.markdown("""
<div class="header-container">
    <h1> 🥗 Personalized Diet & Workout Planner 🏋️</h1>
    <p>Transform Your Lifestyle with Custom-Made Plans</p>
</div>
""", unsafe_allow_html=True)
# Initialize Groq and Agents
os.environ["GROQ_API_KEY"] = st.secrets.GROQ_API_KEY
GROQ_API_KEY = os.environ["GROQ_API_KEY"]
llm = ChatGroq(temperature=0, groq_api_key=GROQ_API_KEY, model_name="groq/llama-3.3-70b-versatile")
diet_agent = Agent(
    role='Nutrition Expert',
    goal='Generate personalized diet plans based on user inputs',
    backstory='Expert in nutrition science and meal planning with focus on Indian cuisine',
    verbose=True,
    llm=llm)
workout_agent = Agent(
    role='Fitness Trainer',
    goal='Create effective workout plans tailored to user goals',
    backstory='Experienced fitness coach specializing in home workouts',
    verbose=True,

```

```

llm=llm)

# Session State Initialization
if 'app_state' not in st.session_state:
    st.session_state.app_state = {
        'maintenance': None,
        'target_calories': None,
        'diet_plan': None,
        'workout_plan': None,
        'show_goal_selector': False
    }

# Create tabs for better organization
tabs = st.tabs(["Personal Info", "Diet Planning", "Workout Planning"])
with tabs[0]:
    st.markdown("### 📄 Personal Information")
    col1, col2, col3 = st.columns([1, 1, 1])
    with col1:
        st.markdown("##### Basic Information")
        age = st.number_input("Age", min_value=10, step=1)
        gender = st.selectbox("Gender", ["Male", "Female"])
        weight = st.number_input("Weight (kg)", min_value=10.0)
    with col2:
        st.markdown("##### Height")
        height_feet = st.number_input("Height (Feet)", min_value=3, max_value=8)
        height_inches = st.number_input("Height (Inches)", min_value=0, max_value=11)
    with col3:
        st.markdown("##### Preferences")
        diet_type = st.selectbox("Diet Type", ["Vegetarian", "Vegan", "Non-Vegetarian"])
        budget = st.selectbox("Budget", ["Low", "Medium", "High"])
    st.markdown("##### Activity Level")
    activity_level = st.selectbox("Select your activity level", [
        "Sedentary (little/no exercise)",
        "Lightly Active (light exercise 1-3 days/week)",
        "Moderately Active (moderate exercise 3-5 days/week)",
        "Very Active (hard exercise 6-7 days/week)",
        "Extra Active (physical job & daily exercise)"
    ])
    dislikes = st.text_area("Food dislikes/allergies (comma separated)")

if st.button("Calculate Maintenance Calories", key="calc_calories"):
    with st.spinner("⌚ Calculating your maintenance calories..."):
        height_cm = (height_feet * 12 + height_inches) * 2.54
        if gender == "Male":
            bmr = 88.362 + (13.397 * weight) + (4.799 * height_cm) - (5.677 * age)
        else:
            bmr = 447.593 + (9.247 * weight) + (3.098 * height_cm) - (4.330 * age)
        activity_factors = {
            "Sedentary": 1.2,
            "Lightly": 1.375,
            "Moderately": 1.55,
            "Very": 1.725,
            "Extra": 1.9
        }
        activity_level_key = activity_level.split()[0]
        tdee = bmr * activity_factors[activity_level_key]
        st.session_state.app_state['maintenance'] = tdee
        st.session_state.app_state['target_calories'] = tdee
        st.session_state.app_state['show_goal_selector'] = True
        st.markdown(f"""

```

```

<div class="success-message">
    <h4> 🚀 Your Daily Calorie Needs</h4>
    <p>Maintenance calories: {tdee:.0f} kcal/day</p>
</div>
""", unsafe_allow_html=True)
with tabs[1]:
    st.markdown("### 🌟 Diet Planning")
    if st.session_state.app_state.get('show_goal_selector'):
        st.markdown("##### Select Your Goal")
        calorie_delta = 250
        goal_options = [
            f'Lose 0.25kg/week: {int(st.session_state.app_state["maintenance"] - calorie_delta)} kcal',
            f'Lose 0.5kg/week: {int(st.session_state.app_state["maintenance"] - 2 * calorie_delta)} kcal',
            f'Maintain: {int(st.session_state.app_state["maintenance"])} kcal',
            f'Gain 0.25kg/week: {int(st.session_state.app_state["maintenance"] + calorie_delta)} kcal',
            f'Gain 0.5kg/week: {int(st.session_state.app_state["maintenance"] + 2 * calorie_delta)} kcal'
        ]
        selected_goal = st.selectbox("Select your goal:", goal_options)
        target = int(selected_goal.split()[2])
        st.session_state.app_state['target_calories'] = target

    if st.button("Generate Diet Plan", key="gen_diet"):
        with st.spinner(" 📢 Creating your personalized diet plan..."):
            diet_prompt = f"""
                Create a 7-day {st.session_state.app_state['target_calories']} kcal {diet_type} meal plan for a {age}-year-old {gender}.
                StrictRequirements:
                - Indian cuisine with their quantity
                - Budget: {budget}
                - Avoid: {dislikes}
                - The selected calorie goal exactly among Breakfast, Lunch, Dinner, and Snacks
                - 4 meals/day (Breakfast, Lunch, Dinner, Snack) with detailed calories and nutrients
                - YouTube Recipe Video links for each meal in this
            """
            format:"https://www.youtube.com/results?search_query="
            - Format: Markdown table with columns: | Day | Meal | Description | Calories | Nutrients | Recipe Link |
            Link |
            - List day number only once before Breakfast row for each day
            - Use empty Day column for subsequent meals (Lunch, Snack, Dinner)
            - Example:
            | Day | Meal | Description | Calories | Nutrients | Recipe Link |
            |---|---|---|---|---|
            | 1 | Breakfast | ... | ... | ... |
            | | Lunch | ... | ... | ... |
            | | Snack | ... | ... | ... |
            | | Dinner | ... | ... | ... |
            """
            diet_task = Task(
                description=diet_prompt,
                expected_output="Markdown table with meal plan",
                agent=diet_agent
            )
            diet_crew = Crew(
                agents=[diet_agent],
                tasks=[diet_task],
                verbose=True)
            try:
                diet_result = diet_crew.kickoff()
                st.markdown("#### 📋 Your Personalized Diet Plan")

```



```

'bold': True,
'bg_color': '#C6EFCE',
'border': 1
})
cell_format = workbook.add_format({
    'border': 1,
    'text_wrap': True
})
row = 0
max_col_widths = {}
lines = content_str.split("\n")
for line in lines:
    if '|' in line:
        if '-|-' in line:
            continue
        cells = [cell.strip() for cell in line.strip('|').split('|')]
        for col, cell in enumerate(cells):
            max_col_widths[col] = max(
                max_col_widths.get(col, 0),
                len(cell))
        current_format = header_format if row == 0 else cell_format
        worksheet.write(row, col, cell, current_format)
        row += 1
    for col, width in max_col_widths.items():
        worksheet.set_column(col, col, min(width + 2, 50))
workbook.close()
return output.getvalue()
except Exception as e:
    st.error(f"Error generating Excel file: {str(e)}")
    return None
# Download Section
if st.session_state.app_state.get('diet_plan') or st.session_state.app_state.get('workout_plan'):
    st.markdown("### 📈 Download Your Plans")
    col1, col2 = st.columns(2)
    with col1:
        if st.session_state.app_state.get('diet_plan'):
            diet_excel = generate_excel(st.session_state.app_state['diet_plan'], "Diet Plan")
            if diet_excel:
                st.download_button(
                    label="📥 Download Diet Plan Excel",
                    data=diet_excel,
                    file_name="diet_plan.xlsx",
                    mime="application/vnd.openxmlformats-officedocument.spreadsheetml.sheet",
                    key="diet_plan_excel")
    with col2:
        if st.session_state.app_state.get('workout_plan'):
            workout_excel = generate_excel(st.session_state.app_state['workout_plan'], "Workout Plan")
            if workout_excel:
                st.download_button(
                    label="📥 Download Workout Plan Excel",
                    data=workout_excel,
                    file_name="workout_plan.xlsx",
                    mime="application/vnd.openxmlformats-officedocument.spreadsheetml.sheet",
                    key="workout_plan_excel")

```

## **Chapter-7**

### **TESTING**

## **7.1 Purpose of Testing:**

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, subassemblies, assemblies and/or a finished product. It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of tests. Each test type addresses a specific testing requirement.

## **7.2 Types of Testing:**

### **Unit testing:**

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application. It is done after the completion of an individual unit before integration. This is a structural testing that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

### **Integration testing**

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfactory, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

### **Functional testing**

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation and user manuals. Functional testing is centred on the following items:

Valid Input - identified classes of valid input must be accepted. Invalid Input Functions - identified functions must be exercised. Output - identified classes of application outputs must be exercised.

Systems/Procedures - interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identifying Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

### **System Testing:**

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

### **White Box Testing:**

White Box Testing is a testing in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It has a purpose. It is used to test areas that cannot be reached from a black box level.

### **Black Box Testing:**

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kinds of tests, must be written from a definitive source document, such as specification or requirements document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box you cannot see into it. The test provides inputs and responds to outputs without considering how the software works.

### **Unit Testing:**

Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases.

## TEST CASES:

S.NO	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail Criteria
1	Page Load	Open the app	The app should load without errors, displaying the welcome message and tabs.	Passed	Pass
2	Personal Info Input	Age: 25, Gender: Male, Weight: 70kg, Height: 5'8"	The inputs should be accepted and stored in session state.	Passed	Pass
3	Calculate Maintenance Calories	Click "Calculate Maintenance Calories"	Maintenance calories should be displayed based on entered data.	Passed	Pass
4	Select Diet Plan Goal	Select "Lose 0.5kg/week"	Target calories should update accordingly.	Passed	Pass
5	Generate Diet Plan	Click "Generate Diet Plan"	A personalized diet plan should be generated in Markdown format.	Passed	Pass
6	Generate Workout Plan	Click "Generate Workout Plan"	A customized workout plan should be generated in Markdown format.	Passed	Pass
7	Excel Download (Diet)	Click "Download Diet Plan Excel"	Excel file should be downloaded with proper formatting.	Passed	Pass
8	Excel Download (Workout)	Click "Download Workout Plan Excel"	Excel file should be downloaded with proper formatting.	Passed	Pass
9	API Key Handling	Modify GROQ_API_KEY	App should not crash and should handle API key errors gracefully.	Passed	Pass
10	Invalid Inputs	Enter negative age, invalid weight, etc.	App should show validation errors and prevent incorrect inputs.	Passed	Pass
11	Multiple Sessions	Refresh app and re-enter details	Previous session state should be reset correctly.	Passed	Pass
12	UI Responsiveness	Resize browser window	UI elements should adjust without breaking the layout.	Passed	Pass

**Chapter-8**  
**OUTPUT & SCREENSHOTS**

## Outputs:

### 8.0 Laptop View:

The screenshot shows the homepage of the "Personalized Diet & Workout Planner". At the top, there's a logo featuring a bowl of fruit and the text "Personalized Diet & Workout Planner" with a small superhero icon. Below the logo is a tagline "Transform Your Lifestyle with Custom-Made Plans". A navigation bar at the top includes links for "Personal Info", "Diet Planning", and "Workout Planning".

**Personal Information**

**Basic Information**

Age	Height	Preferences
10	3	Diet Type: Vegetarian
Gender: Male	Height (Inches): 0	Budget: Low
Weight (kg): 10.00		

**Activity Level**

Select your activity level: Sedentary (little/no exercise)

Food dislikes/allergies (comma separated):

**Buttons**: Calculate Maintenance Calories, Profile icon, Crown icon.

Fig 8.1 Home Page

This screenshot shows the "User Data & Calorie Calculating Page" of the planner. The layout is identical to the home page, with sections for "Personal Info", "Diet Planning", and "Workout Planning".

**Personal Information**

**Basic Information**

Age	Height	Preferences
21	5	Diet Type: Non-Vegetarian
Gender: Male	Height (Inches): 5	Budget: Low
Weight (kg): 71.00		

**Activity Level**

Select your activity level: Lightly Active (light exercise 1-3 days/week)

Food dislikes/allergies (comma separated):

**Calorie Calculation Result**

⌚ Your Daily Calorie Needs

Maintenance calories: 2355 kcal/day

**Buttons**: Profile icon, Crown icon.

Fig 8.2 User Data & Calorie Calculating Page

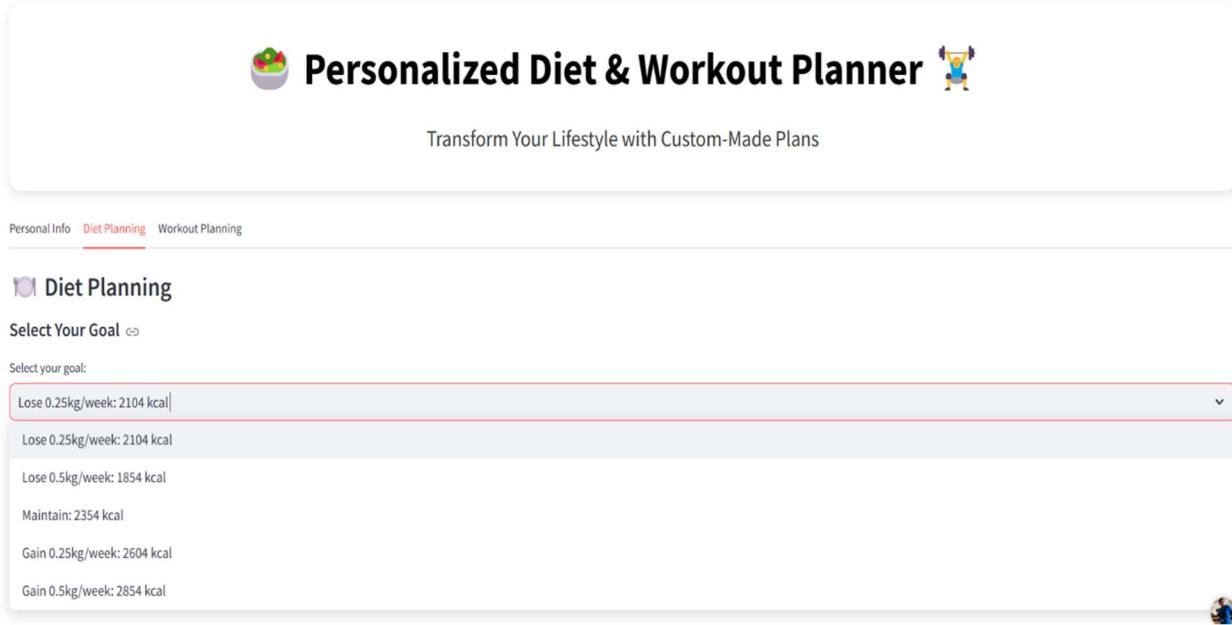


Fig 8.3 Diet Plan Goal Selection Page

Day	Meal	Description	Calories	Nutrients	Recipe Link
1	Breakfast	Poha with vegetables and eggs	420	Carbs: 60g, Protein: 20g, Fat: 15g	<a href="https://www.youtube.com/results?search_query=poha+with+vegetables+and+eggs+recipe">https://www.youtube.com/results?search_query=poha+with+vegetables+and+eggs+recipe</a>
	Lunch	Brown rice with chicken curry and mixed vegetables	540	Carbs: 70g, Protein: 35g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=brown+rice+with+chicken+curry+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=brown+rice+with+chicken+curry+and+mixed+vegetables+recipe</a>
	Snack	Roasted chana and fruit salad	160	Carbs: 30g, Protein: 10g, Fat: 5g	<a href="https://www.youtube.com/results?search_query=roasted+chana+and+fruit+salad+recipe">https://www.youtube.com/results?search_query=roasted+chana+and+fruit+salad+recipe</a>
	Dinner	Whole wheat roti with fish fry and mixed vegetables	484	Carbs: 50g, Protein: 30g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=whole+wheat+roti+with+fish+fry+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=whole+wheat+roti+with+fish+fry+and+mixed+vegetables+recipe</a>
2	Breakfast	Idlis with sambar and coconut chutney	400	Carbs: 60g, Protein: 15g, Fat: 10g	<a href="https://www.youtube.com/results?search_query=idlis+with+sambar+and+coconut+chutney+recipe">https://www.youtube.com/results?search_query=idlis+with+sambar+and+coconut+chutney+recipe</a>
	Lunch	Chicken biryani with raita	560	Carbs: 70g, Protein: 30g, Fat: 25g	<a href="https://www.youtube.com/results?search_query=chicken+biryani+with+raita+recipe">https://www.youtube.com/results?search_query=chicken+biryani+with+raita+recipe</a>
	Snack	Boiled eggs and carrot sticks	140	Carbs: 10g, Protein: 15g, Fat: 5g	<a href="https://www.youtube.com/results?search_query=boiled+eggs+and+carrot+sticks+recipe">https://www.youtube.com/results?search_query=boiled+eggs+and+carrot+sticks+recipe</a>
	Dinner	Whole wheat roti with chicken kebabs and mixed vegetables	504	Carbs: 50g, Protein: 35g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=whole+wheat+roti+with+chicken+kebabs+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=whole+wheat+roti+with+chicken+kebabs+and+mixed+vegetables+recipe</a>
3	Breakfast	Upma with vegetables and eggs	380	Carbs: 55g, Protein: 15g, Fat: 15g	<a href="https://www.youtube.com/results?search_query=upma+with+vegetables+and+eggs+recipe">https://www.youtube.com/results?search_query=upma+with+vegetables+and+eggs+recipe</a>

Fig 8.4 Diet Plan Generation Page

A	B	C	D	E	F
Day	Meal	Description	Calories	Nutrients	Recipe Link
1	Breakfast	Poha with vegetables and eggs	420	Carbs: 60g, Protein: 20g, Fat: 15g	<a href="https://www.youtube.com/results?search_query=poha+with+vegetables+and+eggs+recipe">https://www.youtube.com/results?search_query=poha+with+vegetables+and+eggs+recipe</a>
3	Lunch	Brown rice with chicken curry and mixed vegetables	540	Carbs: 70g, Protein: 35g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=brown+rice+with+chicken+curry+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=brown+rice+with+chicken+curry+and+mixed+vegetables+recipe</a>
4	Snack	Roasted chana and fruit salad	160	Carbs: 30g, Protein: 10g, Fat: 5g	<a href="https://www.youtube.com/results?search_query=roasted+chana+and+fruit+salad+recipe">https://www.youtube.com/results?search_query=roasted+chana+and+fruit+salad+recipe</a>
5	Dinner	Whole wheat roti with fish fry and mixed vegetables	484	Carbs: 50g, Protein: 30g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=whole+whole+roti+with+fish+fry+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=whole+whole+roti+with+fish+fry+and+mixed+vegetables+recipe</a>
6	2	Idlis with sambar and coconut chutney	400	Carbs: 60g, Protein: 15g, Fat: 10g	<a href="https://www.youtube.com/results?search_query=idlis+with+sambar+and+coconut+chutney+recipe">https://www.youtube.com/results?search_query=idlis+with+sambar+and+coconut+chutney+recipe</a>
7	Lunch	Chicken biryani with raita	560	Carbs: 70g, Protein: 30g, Fat: 25g	<a href="https://www.youtube.com/results?search_query=chicken+biryani+with+raita+recipe">https://www.youtube.com/results?search_query=chicken+biryani+with+raita+recipe</a>
8	Snack	Boiled eggs and carrot sticks	140	Carbs: 10g, Protein: 15g, Fat: 5g	<a href="https://www.youtube.com/results?search_query=boiled+eggs+and+carrot+sticks+recipe">https://www.youtube.com/results?search_query=boiled+eggs+and+carrot+sticks+recipe</a>
9	Dinner	Whole wheat roti with chicken kebabs and mixed vegetables	504	Carbs: 50g, Protein: 35g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=whole+whole+roti+with+chicken+kebabs+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=whole+whole+roti+with+chicken+kebabs+and+mixed+vegetables+recipe</a>
10	3	Upma with vegetables and eggs	380	Carbs: 55g, Protein: 15g, Fat: 15g	<a href="https://www.youtube.com/results?search_query=upma+with+vegetables+and+eggs+recipe">https://www.youtube.com/results?search_query=upma+with+vegetables+and+eggs+recipe</a>
11	Lunch	Brown rice with lentil soup and mixed vegetables	520	Carbs: 70g, Protein: 20g, Fat: 15g	<a href="https://www.youtube.com/results?search_query=brown+rice+with+lentil+soup+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=brown+rice+with+lentil+soup+and+mixed+vegetables+recipe</a>
12	Snack	Fresh fruit salad	120	Carbs: 30g, Protein: 5g, Fat: 0g	<a href="https://www.youtube.com/results?search_query=fresh+fruit+salad+recipe">https://www.youtube.com/results?search_query=fresh+fruit+salad+recipe</a>
13	Dinner	Whole wheat roti with fish curry and mixed vegetables	480	Carbs: 50g, Protein: 30g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=dosa+with+fish+curry+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=dosa+with+fish+curry+and+mixed+vegetables+recipe</a>

Fig 8.5 Diet Plan Excel Sheet Page

Fig 8.6 Workout Plan Selection Page

## Your Personalized Workout Plan

Day	Exercise	Duration/Reps	Target Area	Video Link
1	Burpees	3x12	Full Body	<a href="https://www.youtube.com/results?search_query=burpees+for+beginners">https://www.youtube.com/results?search_query=burpees+for+beginners</a>
	Mountain Climbers	3x30s	Core	<a href="https://www.youtube.com/results?search_query=mountain+climbers+exercise">https://www.youtube.com/results?search_query=mountain+climbers+exercise</a>
	Jumping Jacks	3x30s	Cardio	<a href="https://www.youtube.com/results?search_query=jumping+jacks+workout">https://www.youtube.com/results?search_query=jumping+jacks+workout</a>
2	Squats	3x12	Legs	<a href="https://www.youtube.com/results?search_query=squats+for+beginners">https://www.youtube.com/results?search_query=squats+for+beginners</a>
	Push-ups	3x12	Chest	<a href="https://www.youtube.com/results?search_query=push+ups+for+beginners">https://www.youtube.com/results?search_query=push+ups+for+beginners</a>
	Lunges	3x12 (per leg)	Legs	<a href="https://www.youtube.com/results?search_query=lunges+exercise">https://www.youtube.com/results?search_query=lunges+exercise</a>
3	Plank	3x1min	Core	<a href="https://www.youtube.com/results?search_query=plank+exercise+for+beginners">https://www.youtube.com/results?search_query=plank+exercise+for+beginners</a>
	Dumbbell Rows	3x12	Back	<a href="https://www.youtube.com/results?search_query=dumbbell+rows+exercise">https://www.youtube.com/results?search_query=dumbbell+rows+exercise</a>
	Bicycle Crunches	3x12	Core	<a href="https://www.youtube.com/results?search_query=bicycle+crunches+exercise">https://www.youtube.com/results?search_query=bicycle+crunches+exercise</a>

### 4-Week Progression Plan:

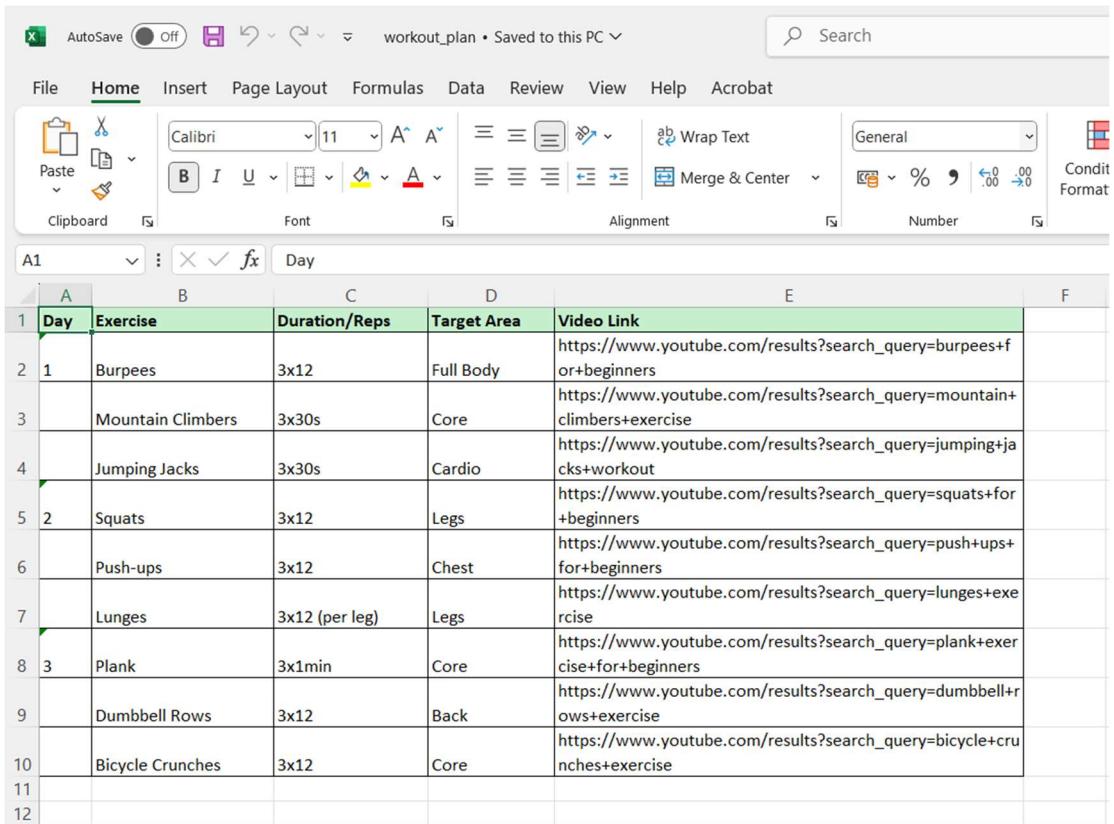
- Week 1: Start with the given workout plan and focus on completing the exercises with proper form.
- Week 2: Increase the duration of cardio exercises (Burpees, Mountain Climbers, Jumping Jacks) by 15 seconds.
- Week 3: Increase the number of reps for strength exercises (Squats, Push-ups, Lunges, Dumbbell Rows, Bicycle Crunches) by 3.
- Week 4: Increase the number of sets for all exercises by 1 and aim to complete the workout plan with minimal rest between exercises.

**Note:** Warm up before each workout with 5-10 minutes of light cardio and stretching. Rest for 60-90 seconds between sets, and 120-180 seconds between exercises. Adjust comfort level. It's also essential to maintain a balanced diet and stay hydrated to support weight loss goals. Consult a healthcare professional before starting any new exercise.

## Download Your Plans

[Download Diet Plan Excel](#) [Download Workout Plan Excel](#)

Fig 8.7 Workout Plan Generation Page



A	B	C	D	E	F
1	Day	Exercise	Duration/Reps	Target Area	Video Link
2	1	Burpees	3x12	Full Body	<a href="https://www.youtube.com/results?search_query=burpees+for+beginners">https://www.youtube.com/results?search_query=burpees+for+beginners</a>
3		Mountain Climbers	3x30s	Core	<a href="https://www.youtube.com/results?search_query=mountain+climbers+exercise">https://www.youtube.com/results?search_query=mountain+climbers+exercise</a>
4		Jumping Jacks	3x30s	Cardio	<a href="https://www.youtube.com/results?search_query=jumping+jacks+workout">https://www.youtube.com/results?search_query=jumping+jacks+workout</a>
5	2	Squats	3x12	Legs	<a href="https://www.youtube.com/results?search_query=squats+for+beginners">https://www.youtube.com/results?search_query=squats+for+beginners</a>
6		Push-ups	3x12	Chest	<a href="https://www.youtube.com/results?search_query=push+ups+for+beginners">https://www.youtube.com/results?search_query=push+ups+for+beginners</a>
7		Lunges	3x12 (per leg)	Legs	<a href="https://www.youtube.com/results?search_query=lunges+exercise">https://www.youtube.com/results?search_query=lunges+exercise</a>
8	3	Plank	3x1min	Core	<a href="https://www.youtube.com/results?search_query=plank+exercise+for+beginners">https://www.youtube.com/results?search_query=plank+exercise+for+beginners</a>
9		Dumbbell Rows	3x12	Back	<a href="https://www.youtube.com/results?search_query=dumbbell+rows+exercise">https://www.youtube.com/results?search_query=dumbbell+rows+exercise</a>
10		Bicycle Crunches	3x12	Core	<a href="https://www.youtube.com/results?search_query=bicycle+crunches+exercise">https://www.youtube.com/results?search_query=bicycle+crunches+exercise</a>
11					
12					

Fig 8.8 Workout Plan Excel Sheet Page

**Chapter-9**

**CONCLUSION and FUTURE WORK**

## **9.1 Conclusion:**

This project is an AI-powered nutrition and fitness planner that uses Crew AI agents to generate personalized diet and workout plans based on user inputs. The app allows users to input their age, height, weight, gender, diet type, activity level, and food dislikes to receive a customized diet plan. Additionally, users can select their workout goal and generate a workout plan. The app also provides the option to download the generated plans in Excel format.

## **9.2 Future Enhancement:**

- Integration with Wearable Devices.
- Advanced Analytics
- Expansion of Crew AI Agents
- Voice Assistant Integration
- Multilingual Support

**Chapter-10**  
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**Chapter-11**  
**PAPER**

# Nutrient Recommendation System for Personalized Diet

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**Abstract:** The Personalized Diet Nutrient Recommendation System is a novel solution that combines advanced AI agents and generative AI to provide diet suggestions that are adaptive and culturally relevant. The system takes into account a range of user information, including age, sex, weight, diet aims, activity levels, allergies, and geographical location preferences, to create dynamic meal plans. The project combines real-time calorie tracking with personalized exercise suggestions, taking a more holistic approach than traditional systems. The installation, methodology, and performance of the system in delivering personalized nutritional suggestions are described in this paper.

**Keywords:** Machine Learning, AI Agents, Generative AI, Personalized Diet, and Nutrient Recommendations.

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## I. INTRODUCTION

AI-Powered Nutrient Recommendation System is revolutionizing the health and wellbeing sector by leveraging sophisticated artificial intelligence and machine learning algorithms to create bespoke nutrition and fitness programs depending on factors specific to each individual, including age, sex, lifestyle, and diet. In contrast to general health advice, this system computes user information real-time, such that the advice given is specific to individual needs and objectives. With the use of AI, it detects nutritional deficiencies, recommends nutrient-dense meal plans, and even provides exercise routines that are consistent with the user's overall health goals. Beyond personal use, this platform is an effective tool for healthcare providers, nutritionists, and fitness trainers, enabling them to create data-driven, personalized wellness programs, track patient progress, and offer actionable insights for improved health outcomes. Moreover, its low cost makes it an economically desirable option for the individual as well as healthcare organizations willing to lower the burden of medical costs with preventive measures. With rising healthcare costs, the AI-Powered Nutrient Recommendation System fills the gap between technology and health by making customized health solutions more accessible, effective, and powerful.

## II. LITERATURE SURVEY

[1] In February of the year, the paper suggested a system that assists in recommending personalized diets based on Machine Learning methods. It encompasses features like Nearest Neighbor Algorithm, Fast API, Streamlit, Standard Scaler, and Cosine Similarity to provide a data-centric approach towards nutrition. The system substitutes conventional nutritional advice by providing real-time dietary recommendations on the basis of user input. It provides a clear vision of how AI can optimize health tracking, meal planning, and overall wellness in an effective and automated manner, making nutritional guidance more accessible and tailored.

[2] The paper in 2019 suggested a system emphasizing predictive data mining to suggest healthy meal plans based on Decision Tree Learning Algorithm and Random Tree. The research incorporates every aspect like food choice, fitness objectives, and nutrient content comparison to create a well-organized meal plan. It also describes the way Random Tree Algorithm accurately solves classification issues with non-repeated values and predicts with greater accuracy. This method automates meal planning on a daily basis, providing users with a concise, effective, and tailored method of ensuring a balanced diet.

[3] In 2020, the paper suggested a system personalized with nutrition diet recommendations according to user interest and medical conditions. It features major components like USDA Nutrition Database and BMI Calculation to provide data for food consumption and recommend optimized diets. The system assists in making the diet choice more automated while ensuring the nutritional needs are fulfilled as per the user's health record. It offers a systematic system of individualized meal planning that results in more precise, effective, and health-based dietary recommendations.

[4] In 2019, the paper suggested a system that creates optimized meal plans using nutritional data and user choice. It comprises features like Optimization Techniques that ensure macronutrient, micronutrient, and dietary limit balancing to provide a varied and balanced diet. The system ensures that users get customized meal plans according to their health requirements and food choices. This method becomes easier to manage diets, and users are able to lead a healthy life in an effective and organized manner.

### III. METHODOLOGY

#### A. System Structure

The system structure has various AI agents working together to produce customized diet and exercise regimens. The most important features are:

- User Profile Module: Receives input data like age, weight, dietary requirements, food allergies, and fitness objectives.
- Dietary AI Agent: Produces customized meal plans depending on user data and scientific nutrition principles.
- Fitness AI Agent: Suggests exercise regimens based on the user's level of fitness and dietary needs.
- Calorie Tracking Module: Calculates daily calorie needs and adjusts meal plans dynamically.
- Data Storage & Report Generation: Saves user data and outputs diet/workout plans in Excel format for the user's ease.

#### B. Implementation Details

- Programming Language: Python 3.11
- Frameworks & Libraries: Streamlit (UI), CrewAI (AI Agents), XlsxWriter (Report Generation)
- AI Models: Transformer-based AI model for meal planning and fitness guidance

#### C. AI Model Training

The AI models for dietary and fitness recommendations were trained on:

- Dataset: USDA Nutrition Database, Fitness Tracking Datasets
- Training Algorithm: Support Vector Machine Classifier.
- Evaluation Metrics: Accuracy, Mean Absolute Error (MAE), User Satisfaction Score.

### IV. EXISTING SYSTEM

Today's nutrition and fitness planning platforms depend on generic meal plans and exercise routines that do not accommodate factors such as age, health issues, allergies, and activity levels. Users get confused with incorrect calorie counting and no real-time dietary adjustments. Moreover, current platforms do not integrate nutrition and fitness, which hinders the synchronization of meal plans with fitness objectives. The lack of personalization with AI diminishes engagement and performance in users, making health behaviors unviable, and to increase accuracy, individualization, and long-term sustainability of health plans, the same needs to be addressed.

### V. PROPOSED SYSTEM

The proposed **Nutrient Recommendation System for Personalized Diet** enhances dietary and fitness management through advanced AI-driven meal and workout customization. It leverages AI agents to generate dynamic, personalized meal plans based on factors like age, weight, dietary goals, and activity levels. Additionally, it integrates real-time calorie and nutrient tracking, ensuring precise dietary recommendations. The system also offers AI-generated workout plans tailored to individual fitness objectives, creating a seamless connection between nutrition and exercise. This holistic approach ensures optimal health management, making personalized wellness more accessible and effective.

### VI. IMPLEMENTATION

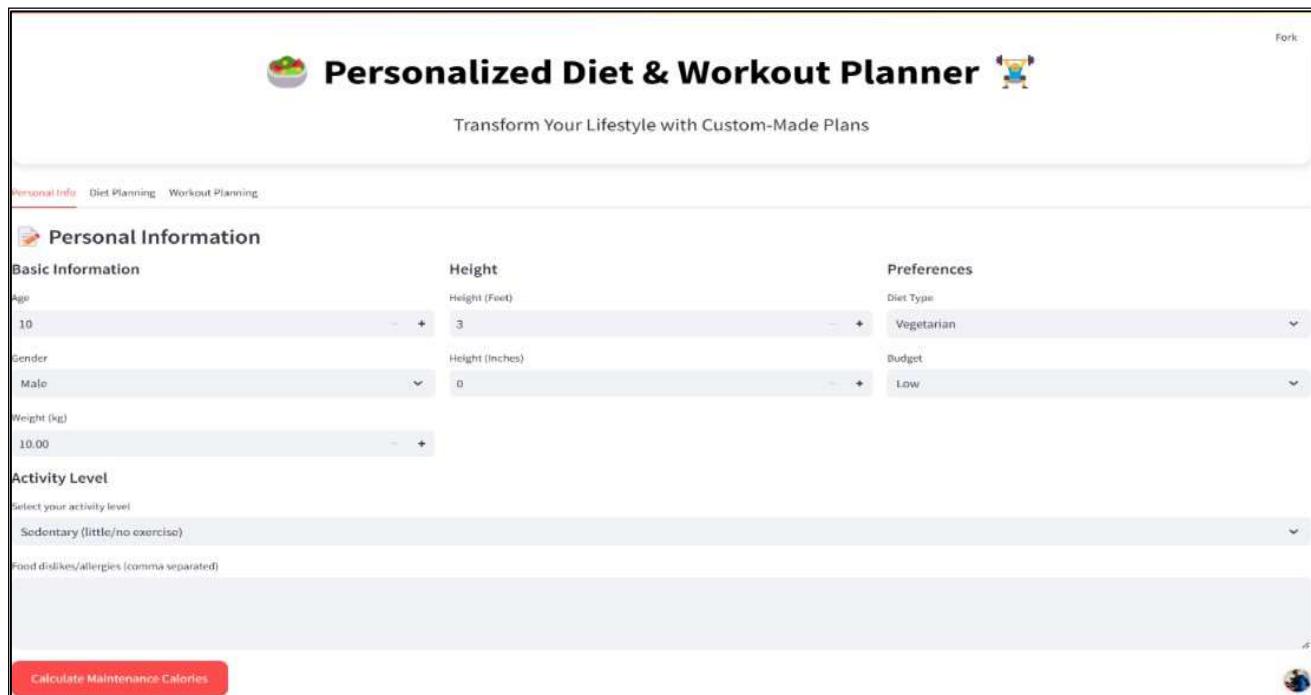
This project uses Streamlit for an interactive UI, Groq API with LangChain for AI-created meal and workout plans, and CrewAI for automating tasks. The created plans can be exported to Excel via xlsxwriter, giving users a formatted fitness guide. The main implementation steps are listed below:

- Step 1: Configuring Your Development Environment. Install dependencies needed in your project directory: pip install streamlit, crewai, langchain\_groq, xlsxwriter. Select a code editor such as VS Code or PyCharm. Open a new Python file, e.g., app.py, to start development.
- Step 2: User Interface (UI) building Create a welcome message and project introduction landing page. Design input forms to ask users to fill in their details (age, weight, height, goal, etc.). Add a tabbed navigation to toggle between: Diet Plan, Workout Plan, Export to Excel. Employ Streamlit widgets such as st.text\_input(), st.selectbox(), and st.button() for UI interactions.
- Step 3: Integrating AI for Meal & Workout Plans Install Groq API for AI-based plans with langchain\_groq. Establish CrewAI Agents for: Meal plan generation, Workout plan generation, Set up CrewAI. Tasks to create customized results based on user input.
- Step 4: Exporting Plans to Excel, Use xlsxwriter to format and export meal/workout plans to Excel. Include a download button to allow users to save their plans.

- Step 5: Deployment Test the app locally with: streamlit run app.py Deploy the project with Streamlit Cloud

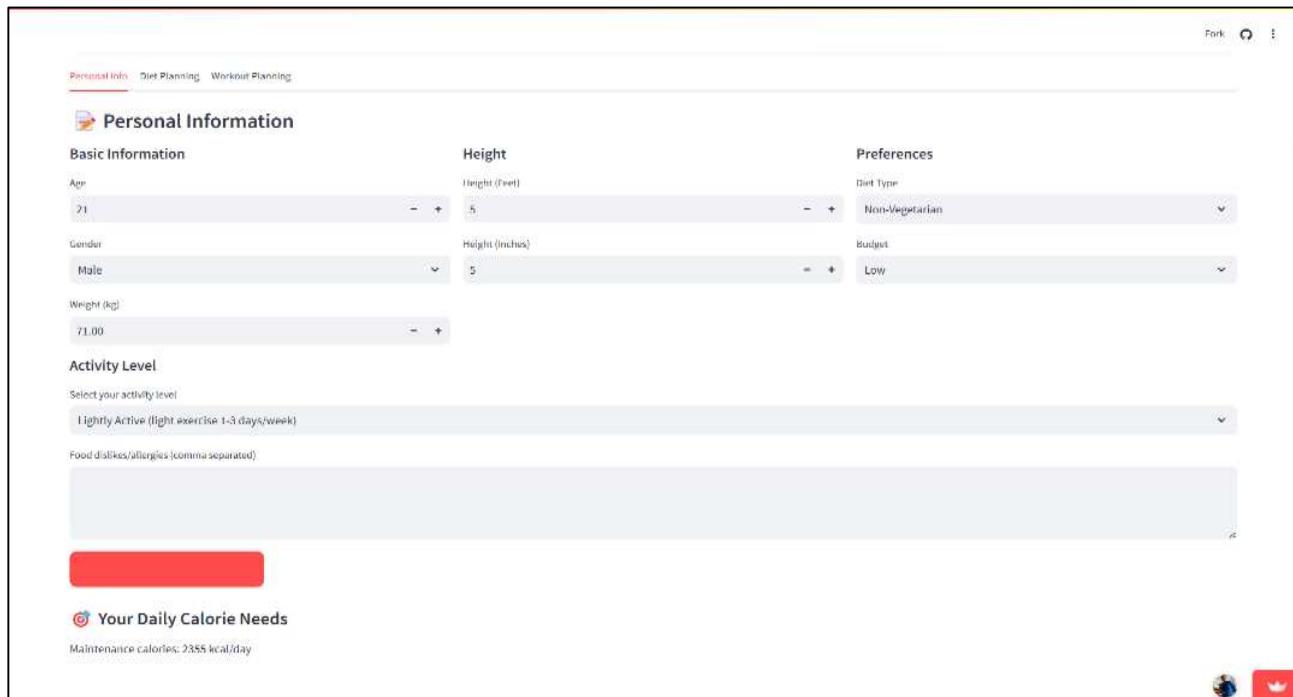
## VII. RESULT AND ANALYSIS

This study presents an AI-Powered Nutrition & Fitness Planner, which utilizes AI agents to generate personalized diet and workout plans based on user inputs. The application employs Streamlit for the user interface, CrewAI for task orchestration, and ChatGroq LLM for AI-based recommendations.



The screenshot shows the homepage of the "Personalized Diet & Workout Planner". At the top, there's a logo of a bowl of fruit and the title "Personalized Diet & Workout Planner" with a small robot icon. Below the title is a subtitle "Transform Your Lifestyle with Custom-Made Plans". A "Fork" button is in the top right corner. The main area has tabs for "Personal Info", "Diet Planning", and "Workout Planning". Under "Personal Info", there are sections for "Basic Information" (Age: 10, Gender: Male, Weight (kg): 10.00), "Height" (Height (Feet): 3, Height (Inches): 0), and "Preferences" (Diet Type: Vegetarian, Budget: Low). There's also a dropdown for "Activity Level" set to "Sedentary (little/no exercise)". A "Calculate Maintenance Calories" button is at the bottom left. A "Food dislikes/allergies (comma separated)" input field is present but empty.

Fig 1: Home Page



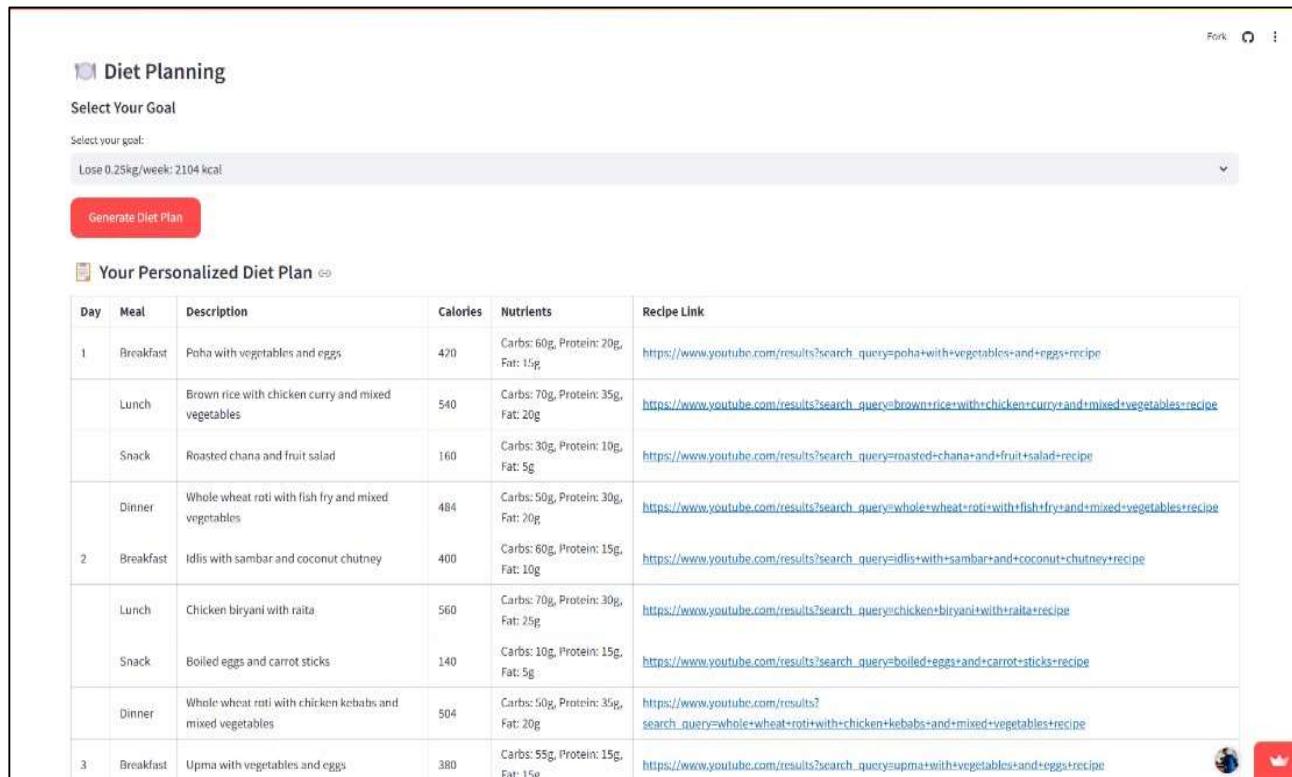
The screenshot shows the "User Data & Calorie Calculating Page". The "Personal Info" tab is selected. The "Basic Information" section shows Age: 21, Gender: Male, and Weight (kg): 71.00. The "Height" section shows Height (Feet): 5 and Height (Inches): 5. The "Preferences" section shows Diet Type: Non-Vegetarian and Budget: Low. The "Activity Level" dropdown is set to "Lightly Active (light exercise 1-3 days/week)". A large red button is at the bottom left. At the bottom, there's a section titled "Your Daily Calorie Needs" with the text "Maintenance calories: 2355 kcal/day". A "Food dislikes/allergies (comma separated)" input field is also present.

Fig 2: User Data & Calorie Calculating Page

#### ➤ Diet Plan Generation

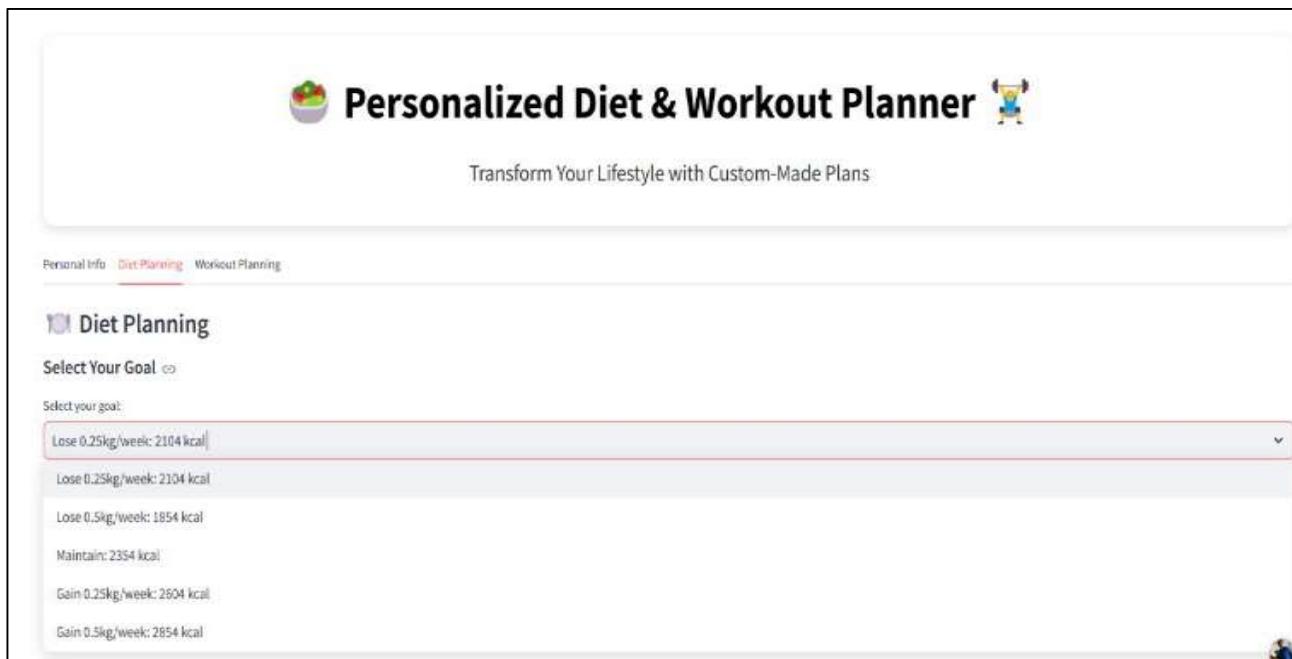
- The system calculates daily calorie requirements based on user details.
- A 7-day meal plan is generated, considering budget and food preferences.

- Each meal includes calories, nutrients, and YouTube recipe links.
- The plan ensures a balanced and nutritious diet based on Indian cuisine.



Day	Meal	Description	Calories	Nutrients	Recipe Link
1	Breakfast	Poha with vegetables and eggs	420	Carbs: 60g, Protein: 20g, Fat: 15g	<a href="https://www.youtube.com/results?search_query=poha+with+vegetables+and+eggs+recipe">https://www.youtube.com/results?search_query=poha+with+vegetables+and+eggs+recipe</a>
	Lunch	Brown rice with chicken curry and mixed vegetables	540	Carbs: 70g, Protein: 35g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=brown+rice+with+chicken+curry+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=brown+rice+with+chicken+curry+and+mixed+vegetables+recipe</a>
	Snack	Roasted chana and fruit salad	160	Carbs: 30g, Protein: 10g, Fat: 5g	<a href="https://www.youtube.com/results?search_query=roasted+chana+and+fruit+salad+recipe">https://www.youtube.com/results?search_query=roasted+chana+and+fruit+salad+recipe</a>
	Dinner	Whole wheat roti with fish fry and mixed vegetables	484	Carbs: 50g, Protein: 30g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=whole+wheat+roti+with+fish+fry+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=whole+wheat+roti+with+fish+fry+and+mixed+vegetables+recipe</a>
2	Breakfast	Idlis with sambar and coconut chutney	400	Carbs: 60g, Protein: 15g, Fat: 10g	<a href="https://www.youtube.com/results?search_query=idlis+with+sambar+and+coconut+chutney+recipe">https://www.youtube.com/results?search_query=idlis+with+sambar+and+coconut+chutney+recipe</a>
	Lunch	Chicken biryani with raita	560	Carbs: 70g, Protein: 30g, Fat: 25g	<a href="https://www.youtube.com/results?search_query=chicken+biryani+with+raita+recipe">https://www.youtube.com/results?search_query=chicken+biryani+with+raita+recipe</a>
	Snack	Boiled eggs and carrot sticks	140	Carbs: 10g, Protein: 15g, Fat: 5g	<a href="https://www.youtube.com/results?search_query=boiled+eggs+and+carrot+sticks+recipe">https://www.youtube.com/results?search_query=boiled+eggs+and+carrot+sticks+recipe</a>
	Dinner	Whole wheat roti with chicken kebabs and mixed vegetables	504	Carbs: 50g, Protein: 35g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=whole+wheat+roti+with+chicken+kebabs+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=whole+wheat+roti+with+chicken+kebabs+and+mixed+vegetables+recipe</a>
3	Breakfast	Upma with vegetables and eggs	380	Carbs: 55g, Protein: 15g, Fat: 15g	<a href="https://www.youtube.com/results?search_query=upma+with+vegetables+and+eggs+recipe">https://www.youtube.com/results?search_query=upma+with+vegetables+and+eggs+recipe</a>

Fig 3: Diet Plan Goal Selection Page



Day	Meal	Description	Calories	Nutrients	Recipe Link
1	Breakfast	Poha with vegetables and eggs	420	Carbs: 60g, Protein: 20g, Fat: 15g	<a href="https://www.youtube.com/results?search_query=poha+with+vegetables+and+eggs+recipe">https://www.youtube.com/results?search_query=poha+with+vegetables+and+eggs+recipe</a>
	Lunch	Brown rice with chicken curry and mixed vegetables	540	Carbs: 70g, Protein: 35g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=brown+rice+with+chicken+curry+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=brown+rice+with+chicken+curry+and+mixed+vegetables+recipe</a>
	Snack	Roasted chana and fruit salad	160	Carbs: 30g, Protein: 10g, Fat: 5g	<a href="https://www.youtube.com/results?search_query=roasted+chana+and+fruit+salad+recipe">https://www.youtube.com/results?search_query=roasted+chana+and+fruit+salad+recipe</a>
	Dinner	Whole wheat roti with fish fry and mixed vegetables	484	Carbs: 50g, Protein: 30g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=whole+wheat+roti+with+fish+fry+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=whole+wheat+roti+with+fish+fry+and+mixed+vegetables+recipe</a>
2	Breakfast	Idlis with sambar and coconut chutney	400	Carbs: 60g, Protein: 15g, Fat: 10g	<a href="https://www.youtube.com/results?search_query=idlis+with+sambar+and+coconut+chutney+recipe">https://www.youtube.com/results?search_query=idlis+with+sambar+and+coconut+chutney+recipe</a>
	Lunch	Chicken biryani with raita	560	Carbs: 70g, Protein: 30g, Fat: 25g	<a href="https://www.youtube.com/results?search_query=chicken+biryani+with+raita+recipe">https://www.youtube.com/results?search_query=chicken+biryani+with+raita+recipe</a>
	Snack	Boiled eggs and carrot sticks	140	Carbs: 10g, Protein: 15g, Fat: 5g	<a href="https://www.youtube.com/results?search_query=boiled+eggs+and+carrot+sticks+recipe">https://www.youtube.com/results?search_query=boiled+eggs+and+carrot+sticks+recipe</a>
	Dinner	Whole wheat roti with chicken kebabs and mixed vegetables	504	Carbs: 50g, Protein: 35g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=whole+wheat+roti+with+chicken+kebabs+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=whole+wheat+roti+with+chicken+kebabs+and+mixed+vegetables+recipe</a>
3	Breakfast	Upma with vegetables and eggs	380	Carbs: 55g, Protein: 15g, Fat: 15g	<a href="https://www.youtube.com/results?search_query=upma+with+vegetables+and+eggs+recipe">https://www.youtube.com/results?search_query=upma+with+vegetables+and+eggs+recipe</a>

Fig 4: Diet Plan Generation Page

A	B	C	D	E	F	
1	Day	Meal	Description	Calories	Nutrients	Recipe Link
2	1	Breakfast	Poha with vegetables and eggs	420	Carbs: 60g, Protein: 20g, Fat: 15g	<a href="https://www.youtube.com/results?search_query=poha+with+vegetables+and+eggs+recipe">https://www.youtube.com/results?search_query=poha+with+vegetables+and+eggs+recipe</a>
3	Lunch	Brown rice with chicken curry and mixed vegetables	540	Carbs: 70g, Protein: 35g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=brown+rice+with+chicken+curry+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=brown+rice+with+chicken+curry+and+mixed+vegetables+recipe</a>	
4	Snack	Roasted chana and fruit salad	160	Carbs: 30g, Protein: 10g, Fat: 5g	<a href="https://www.youtube.com/results?search_query=roasted+chana+and+fruit+salad+recipe">https://www.youtube.com/results?search_query=roasted+chana+and+fruit+salad+recipe</a>	
5	Dinner	Whole wheat roti with fish fry and mixed vegetables	484	Carbs: 50g, Protein: 30g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=whole+wheat+roti+with+fish+fry+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=whole+wheat+roti+with+fish+fry+and+mixed+vegetables+recipe</a>	
6	2	Breakfast	Idlis with sambar and coconut chutney	400	Carbs: 60g, Protein: 15g, Fat: 10g	<a href="https://www.youtube.com/results?search_query=idlis+with+sambar+and+coconut+chutney+recipe">https://www.youtube.com/results?search_query=idlis+with+sambar+and+coconut+chutney+recipe</a>
7	Lunch	Chicken biryani with raita	560	Carbs: 70g, Protein: 30g, Fat: 25g	<a href="https://www.youtube.com/results?search_query=chicken+biryani+with+raita+recipe">https://www.youtube.com/results?search_query=chicken+biryani+with+raita+recipe</a>	
8	Snack	Boiled eggs and carrot sticks	140	Carbs: 10g, Protein: 15g, Fat: 5g	<a href="https://www.youtube.com/results?search_query=boiled+egg+s+and+carrot+sticks+recipe">https://www.youtube.com/results?search_query=boiled+egg+s+and+carrot+sticks+recipe</a>	
9	Dinner	Whole wheat roti with chicken kebabs and mixed vegetables	504	Carbs: 50g, Protein: 35g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=whole+wheat+roti+with+chicken+kebabs+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=whole+wheat+roti+with+chicken+kebabs+and+mixed+vegetables+recipe</a>	
0	3	Breakfast	Upma with vegetables and eggs	380	Carbs: 55g, Protein: 15g, Fat: 15g	<a href="https://www.youtube.com/results?search_query=upma+with+vegetables+and+eggs+recipe">https://www.youtube.com/results?search_query=upma+with+vegetables+and+eggs+recipe</a>
1	Lunch	Brown rice with lentil soup and mixed vegetables	520	Carbs: 70g, Protein: 20g, Fat: 15g	<a href="https://www.youtube.com/results?search_query=brown+rice+with+lentil+soup+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=brown+rice+with+lentil+soup+and+mixed+vegetables+recipe</a>	
2	Snack	Fresh fruit salad	120	Carbs: 30g, Protein: 5g, Fat: 0g	<a href="https://www.youtube.com/results?search_query=fresh+fruit+salad+recipe">https://www.youtube.com/results?search_query=fresh+fruit+salad+recipe</a>	
3	Dinner	Whole wheat roti with fish curry and mixed vegetables	480	Carbs: 50g, Protein: 30g, Fat: 20g	<a href="https://www.youtube.com/results?search_query=whole+wheat+roti+with+fish+curry+and+mixed+vegetables+recipe">https://www.youtube.com/results?search_query=whole+wheat+roti+with+fish+curry+and+mixed+vegetables+recipe</a>	

Fig 5: Diet Plan Excel Sheet Page

- *Workout Plan Generation*
- Users can select training days and fitness goals (Weight Loss, Muscle Gain, General Fitness).
- The system provides a home-based workout plan with exercise details, repetitions, and video links.
- The plan is designed for progressive improvement over four weeks.

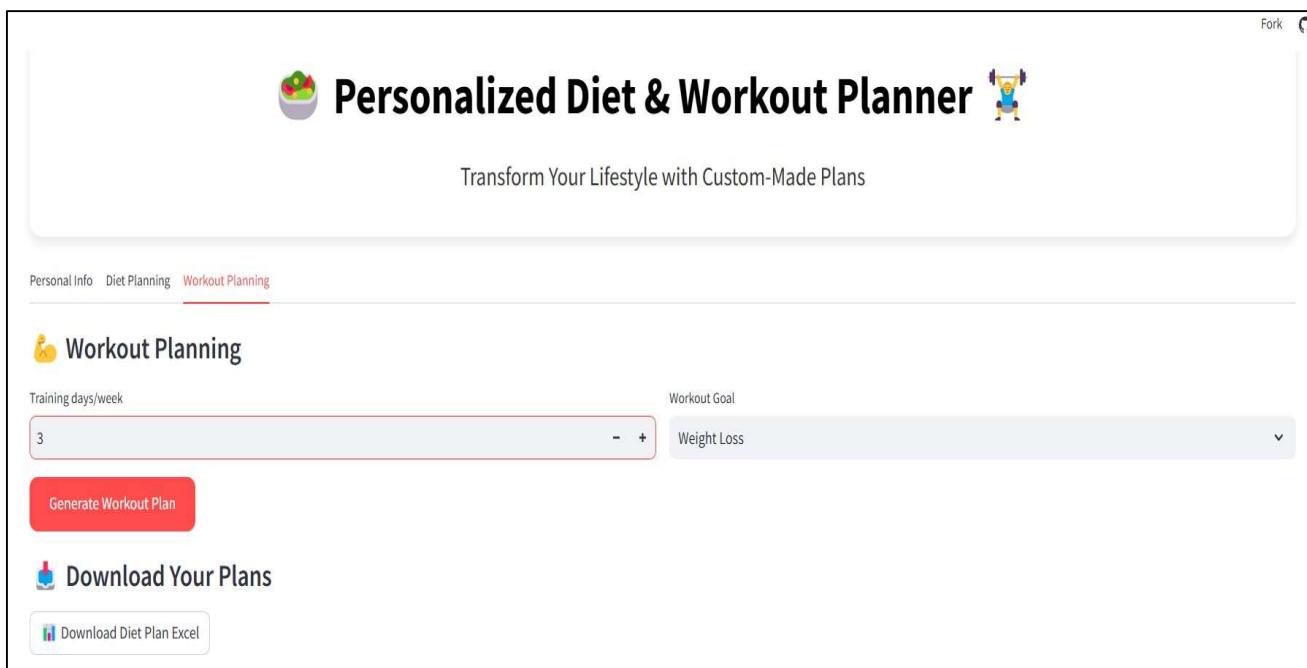


Fig 6: Workout Plan Goal Selection Page

Day	Exercise	Duration/Reps	Target Area	Video Link
1	Burpees	3x12	Full Body	<a href="https://www.youtube.com/results?search_query=burpees+for+beginners">https://www.youtube.com/results?search_query=burpees+for+beginners</a>
	Mountain Climbers	3x30s	Core	<a href="https://www.youtube.com/results?search_query=mountain+climbers+exercise">https://www.youtube.com/results?search_query=mountain+climbers+exercise</a>
	Jumping Jacks	3x30s	Cardio	<a href="https://www.youtube.com/results?search_query=jumping+jacks+workout">https://www.youtube.com/results?search_query=jumping+jacks+workout</a>
2	Squats	3x12	Legs	<a href="https://www.youtube.com/results?search_query=squats+for+beginners">https://www.youtube.com/results?search_query=squats+for+beginners</a>
	Push-ups	3x12	Chest	<a href="https://www.youtube.com/results?search_query=push+ups+for+beginners">https://www.youtube.com/results?search_query=push+ups+for+beginners</a>
	Lunges	3x12 (per leg)	Legs	<a href="https://www.youtube.com/results?search_query=lunges+exercise">https://www.youtube.com/results?search_query=lunges+exercise</a>
3	Plank	3x1min	Core	<a href="https://www.youtube.com/results?search_query=plank+exercise+for+beginners">https://www.youtube.com/results?search_query=plank+exercise+for+beginners</a>
	Dumbbell Rows	3x12	Back	<a href="https://www.youtube.com/results?search_query=dumbbell+rows+exercise">https://www.youtube.com/results?search_query=dumbbell+rows+exercise</a>
	Bicycle Crunches	3x12	Core	<a href="https://www.youtube.com/results?search_query=bicycle+crunches+exercise">https://www.youtube.com/results?search_query=bicycle+crunches+exercise</a>

**4-Week Progression Plan:**

- Week 1: Start with the given workout plan and focus on completing the exercises with proper form.
- Week 2: Increase the duration of cardio exercises (Burpees, Mountain Climbers, Jumping Jacks) by 15 seconds.
- Week 3: Increase the number of reps for strength exercises (Squats, Push-ups, Lunges, Dumbbell Rows, Bicycle Crunches) by 1.
- Week 4: Increase the number of sets for all exercises by 1 and aim to complete the workout plan with minimal rest between exercises.

Note: Warm up before each workout with 5-10 minutes of light cardio and stretching. Rest for 60-90 seconds between sets, and 120-180 seconds between exercises. Adjust comfort level. It's also essential to maintain a balanced diet and stay hydrated to support weight loss goals. Consult a healthcare professional before starting any new exercise.

**Download Your Plans**

[Download Diet Plan Excel](#) [Download Workout Plan Excel](#)

Fig 7: Workout Plan Generation Page

Day	Exercise	Duration/Reps	Target Area	Video Link
1	Burpees	3x12	Full Body	<a href="https://www.youtube.com/results?search_query=burpees+for+beginners">https://www.youtube.com/results?search_query=burpees+for+beginners</a>
2	Mountain Climbers	3x30s	Core	<a href="https://www.youtube.com/results?search_query=mountain+climbers+exercise">https://www.youtube.com/results?search_query=mountain+climbers+exercise</a>
3	Jumping Jacks	3x30s	Cardio	<a href="https://www.youtube.com/results?search_query=jumping+jacks+workout">https://www.youtube.com/results?search_query=jumping+jacks+workout</a>
4	Squats	3x12	Legs	<a href="https://www.youtube.com/results?search_query=squats+for+beginners">https://www.youtube.com/results?search_query=squats+for+beginners</a>
5	Push-ups	3x12	Chest	<a href="https://www.youtube.com/results?search_query=push+ups+for+beginners">https://www.youtube.com/results?search_query=push+ups+for+beginners</a>
6	Lunges	3x12 (per leg)	Legs	<a href="https://www.youtube.com/results?search_query=lunges+exercise">https://www.youtube.com/results?search_query=lunges+exercise</a>
7	Plank	3x1min	Core	<a href="https://www.youtube.com/results?search_query=plank+exercise+for+beginners">https://www.youtube.com/results?search_query=plank+exercise+for+beginners</a>
8	Dumbbell Rows	3x12	Back	<a href="https://www.youtube.com/results?search_query=dumbbell+rows+exercise">https://www.youtube.com/results?search_query=dumbbell+rows+exercise</a>
9	Bicycle Crunches	3x12	Core	<a href="https://www.youtube.com/results?search_query=bicycle+crunches+exercise">https://www.youtube.com/results?search_query=bicycle+crunches+exercise</a>

Fig 8: Workout Plan Excel Sheet Page

➤ *Exceptional Performance:*

Our project has demonstrated exceptional performance in terms of speed, user experience, personalization, and automation.

Speed:

The app provides real-time AI-generated diet and workout plans with minimal processing delay, making it an efficient solution for users.

➤ *User Experience:*

The intuitive interface is user-friendly, with easy-to-use tabs, dropdowns, and buttons that enable seamless navigation.

➤ *Personalization:*

The app's high level of personalization is achieved through customized meal and workout plans generated based on user input, preferences, and goals.

## REFERENCES

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- [3]. Butti Gouthami, Malige Gangappa. A Nutritional Diet Recommendation System Using User Interest. IJARET-2020.
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➤ *Automation:*

The AI-powered automation feature, utilizing CrewAI and Groq API, streamlines meal planning and workout scheduling, reducing manual effort significantly.

➤ *Security and Reliability:*

The app ensures API key security and follows structured data processing for accurate results, providing a secure and reliable experience.

➤ *Data Export Capability*

The data export capability allows users to download their plans in Excel format for offline access, making it a time-saving and convenient solution.

## VIII. CONCLUSION

Our project is an innovative AI-powered nutrition and fitness planner that leverages Crew AI agents to create personalized diet and workout plans tailored to individual users' needs. The app allows users to input their vital statistics, including age, height, weight, gender, diet type, activity level, and food dislikes, to receive a customized diet plan that meets their unique requirements. Furthermore, users can select their workout goal and generate a corresponding workout plan, complete with exercises and routines designed to help them achieve their fitness objectives. The app's user-friendly interface makes it easy for users to navigate and access their personalized plans, which can be downloaded in Excel format for convenient reference. By harnessing the power of AI and machine learning, our app provides users with a comprehensive and effective solution for achieving their health and wellness goals, whether they're looking to lose weight, build muscle, or simply maintain a healthy lifestyle. With its cutting-edge technology and user-centric design, our app is poised to revolutionize the way people approach nutrition and fitness planning.

## FUTURE ENHANCEMENT

In the future, enhancements for the platform will include integration with wearable devices, allowing users to seamlessly track their fitness metrics, heart rate, and activity levels in real-time. Advanced analytics will be introduced to provide deeper insights into user progress, enabling data-driven decisions for improved health and performance. The expansion of Crew AI agents will enhance automation and personalization, offering intelligent recommendations and support. Additionally, voice assistant integration will enable hands-free interaction, making it easier for users to navigate the platform and access information effortlessly. Multilingual support will also be implemented to cater to a diverse user base, ensuring accessibility and usability for people from different linguistic backgrounds. These features will collectively elevate the user experience, making fitness, nutrition, and wellness tracking more intelligent, convenient, and personalized.