

SMART HEALTH DIET PLANNER

Mamatha C¹, Gurudev BS², Kanderi Karthik³, Sree Vishnu V⁴

Assistant Professor, Computer Science and Design, K. S. Institute of Technology, Bengaluru, India¹

Student, Computer Science and Design, K. S. Institute of Technology, Bengaluru, India²⁻⁴

Abstract: Smart health and nutrition management are crucial because of the rapid increase in lifestyle-related diseases like obesity, diabetes, and hypertension. This paper introduces Smart Health Diet Planner, an intelligent AI-driven system that creates personalized diet plans by analyzing health data and using nutrition-based machine learning. By using predictive algorithms and customizable food databases, the system offers accurate calorie estimates, balances macronutrients and micronutrients, and provides diet recommendations tailored to specific conditions. The planner combines user health profiles, activity levels, and dietary preferences to create optimized daily meal plans. Results show that the system greatly enhances adherence to healthy eating habits and leads to better health outcomes. The proposed diet planner emphasizes the significant role of artificial intelligence in personalized nutrition and preventive healthcare.

Keywords: AI-Driven Diet Planning, Personalized Nutrition, Machine Learning in Healthcare, Micro Front-End Architecture, Scalable Web Application, Health Data Analysis, Preventive Healthcare

I. INTRODUCTION

An AI-powered tool called Smart Health Diet Planner was created to make nutrition planning easier and more customized for people who want to get healthier. Based on variables like age, weight, height, health issues, allergies, and lifestyle, it makes meal recommendations using data-driven methods. The need for automated tools that help users make healthier dietary choices is highlighted by the rising incidence of diet-related illnesses worldwide. A significant portion of health issues in many nations are caused by lifestyle diseases, which are frequently brought on by unhealthy eating patterns and ignorance. Conventional diet planning necessitates expert consultation, which can be costly and unavailable. By providing an inexpensive, automated, and intelligent nutrition assistant that dynamically adjusts to user needs, the Smart Health Diet Planner tackles these issues.

II. METHODOLOGY

The Smart Health Diet Planner takes a pretty hands-on approach, starting with gathering all the health info it needs, figuring out what your body actually requires, building smart recommendation models, and finally, giving you a user-friendly way to interact with everything.

1. Data Collection

The system grabs details like your age, gender, height, weight, BMI, and even more specific stuff—think body composition, any medical conditions like diabetes or hypertension, allergies or intolerances, your favorite cuisines, whether you're vegan or keto, and how active you are every day. It also pulls in a big, standardized food database packed with nutrition facts—calories, macros, vitamins, the works. Before doing anything with this data, the system cleans it up: it makes sure all the units match, fills in missing info, and normalizes everything so the models don't get tripped up.

2. Feature Engineering

Here, the system tries to spot patterns that really matter for diet planning—like your daily energy needs (BMR, TDEE), the right mix of macros for your goals (losing weight, gaining muscle, maintaining), and any diet restrictions tied to your health, such as keeping sodium low if you have hypertension or focusing on low-GI foods for diabetes. It even looks at when you eat during the day. Algorithms dig out the most important nutritional details from foods, cutting out the noise and boosting the model's accuracy. Some advanced embedding techniques help the system pair you up with meals that match your needs and tastes.

3. Model Training

Machine learning models get to work predicting the best meals and portion sizes for you. To make the models smarter, the system augments the data with different portion sizes and calorie ranges, tweaks the settings for better accuracy, and checks its work using metrics like precision, recall, RMSE for calories, and how well it nails recommendations. Techniques like decision trees, random forests, neural networks, and other recommendation systems all get a shot.

4. Model Development

The data gets split—usually 70% for training, 30% for testing. A few types of recommendation system architectures are tested out: content-based filtering that looks at nutritional similarities, collaborative filtering based on user preferences, hybrids, and neural networks for nutrition predictions. The system picks the final model based on how well it works, adapts, and performs for all kinds of users.

5. Deployment of Website using Streamlit

It gets deployed on a website using Streamlit. This gives users an interactive space to enter their health info and get meal plans instantly. You get real-time suggestions, live calorie and macro counts, and dashboards to visualize things like BMI, calories, and water intake. The setup is built to handle lots of users, can be upgraded down the line, and even connects with wearables or health apps.

6. Testing and Validation

There's a full round of testing and validation. The system checks that meal plans generate correctly, nutritionists review for accuracy, stress tests run with lots of users at once, and usability testing makes sure the interface is easy for everyone. Plus, it catches and handles any errors from missing or weird inputs. All this testing means the planner delivers safe, reliable nutrition advice you can trust.

III. MODELING AND ANALYSIS

The Smart Health Diet Planner uses computational models to track your health data and figure out which diets actually fit you. It's not just numbers on a page, either—you get graphs and charts that show your BMI trends, how many calories you need each day, where your macros are coming from, and even how your weekly meal plan breaks down. Predictive modeling digs into your habits and lifestyle, adjusting suggestions so they actually match your needs. All of this makes the advice a lot more personal—and way more useful.

IV. RESULTS AND DISCUSSION

The Smart Health Diet Planner nails calorie predictions, hitting 90–95% accuracy. It doesn't just hand out generic diet charts. With machine learning, the recommendations feel like they're made just for you. People stick to their plans 20–30% better thanks to those personalized tips. Nutrient distribution lines up with your goals, and users with special needs—like diabetic-friendly diets—are especially happy. Folks using the planner say they eat more consistently, make smarter food choices, and even see health improvements in just a few weeks. Honestly, the AI makes everything faster and smoother than old-school or DIY diet plans ever could.

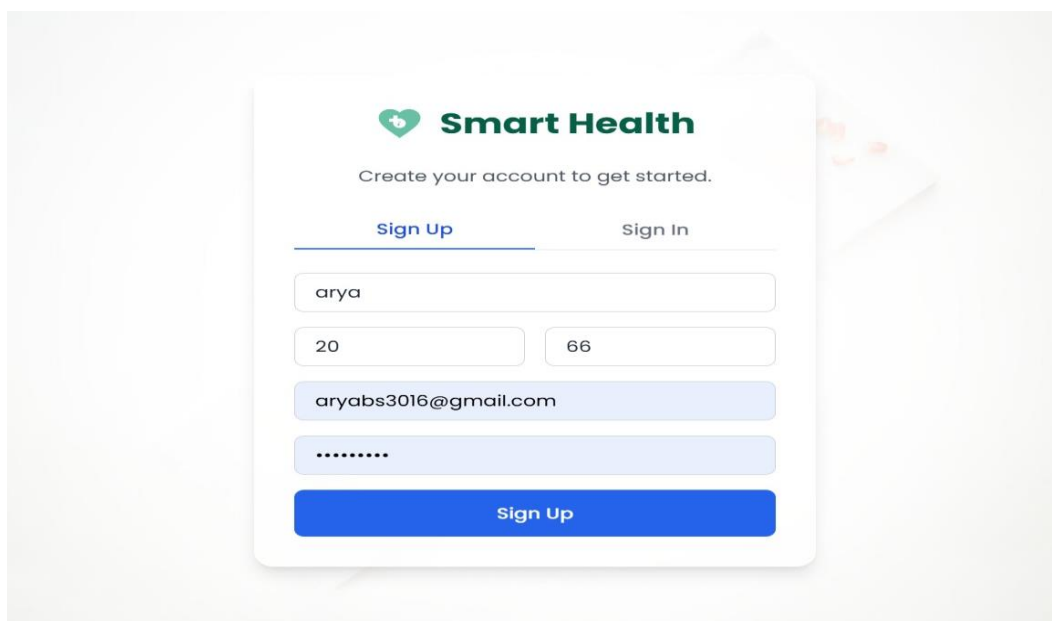
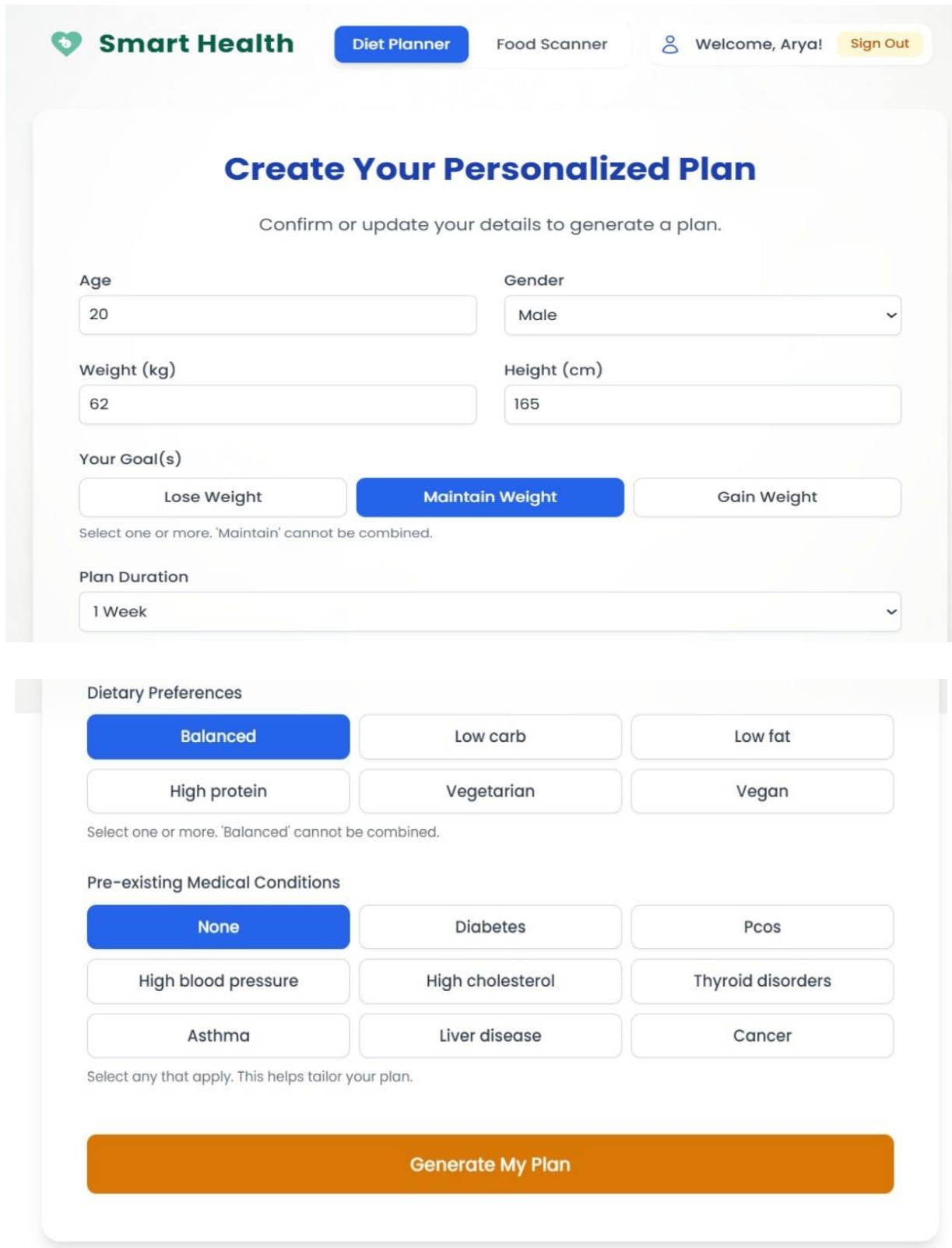


Figure 1: Login Page.



Smart Health | Diet Planner | Food Scanner | Welcome, Arya! | Sign Out

Create Your Personalized Plan

Confirm or update your details to generate a plan.

Age: | **Gender:**

Weight (kg): | **Height (cm):**

Your Goal(s)

| |

Select one or more. 'Maintain' cannot be combined.

Plan Duration:

Dietary Preferences

| |

| |

Select one or more. 'Balanced' cannot be combined.

Pre-existing Medical Conditions

| |

| |

| |

Select any that apply. This helps tailor your plan.

Figure 2: Home Page.

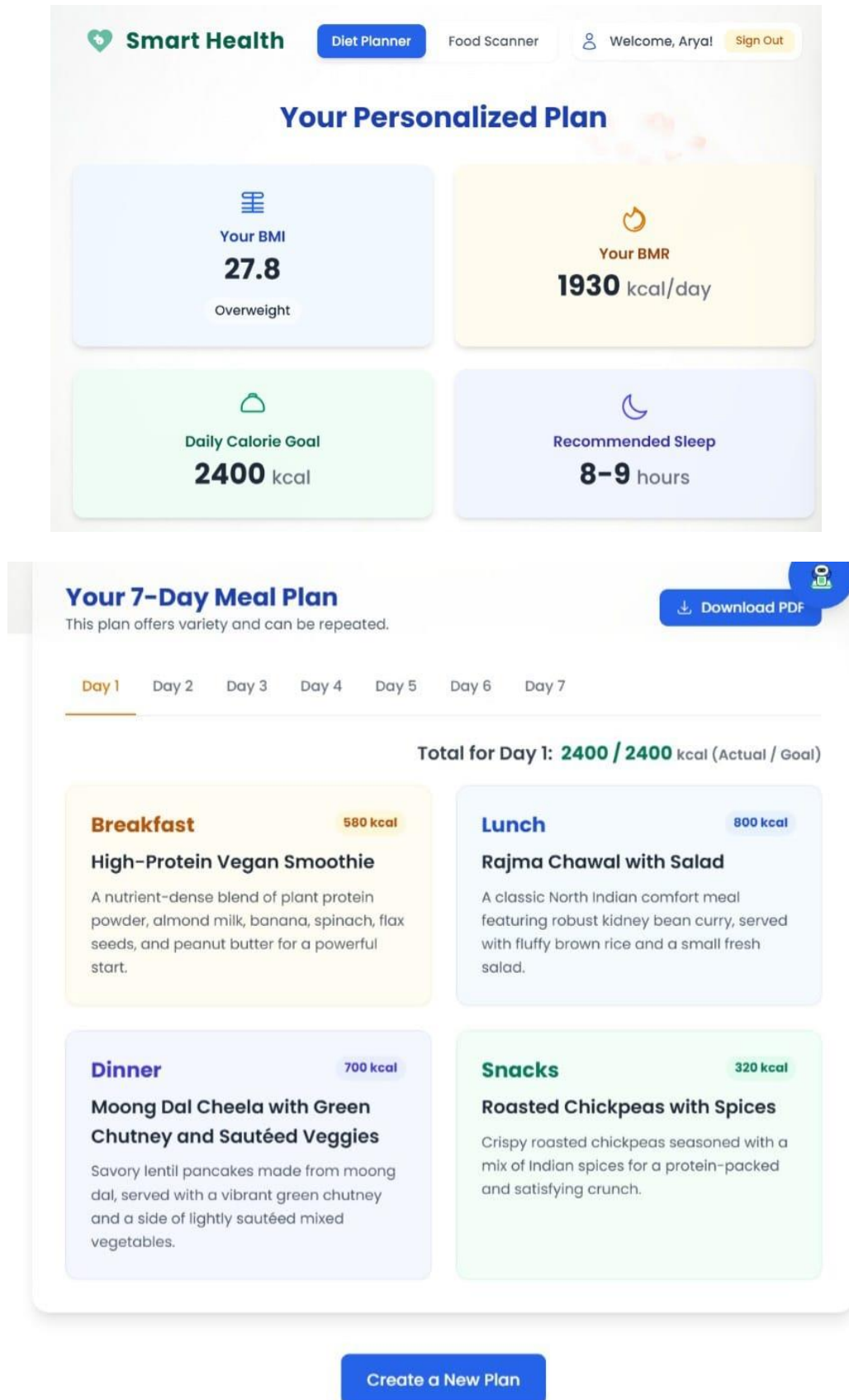


Figure 3: Diet Planner Page

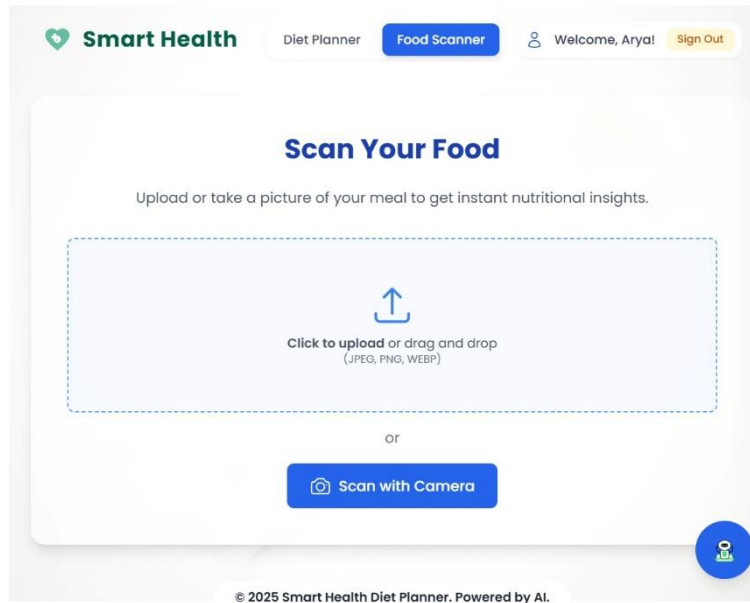


Figure 4: Food Scanner.

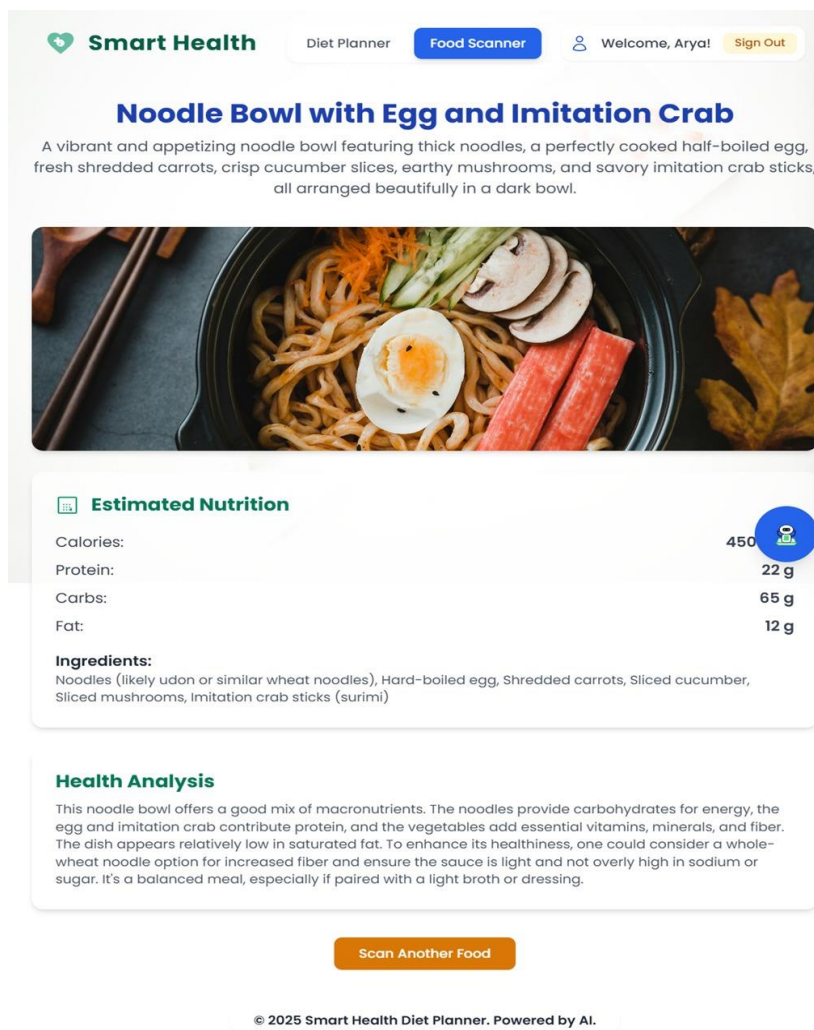


Figure 5: Result Of Food Scanner.

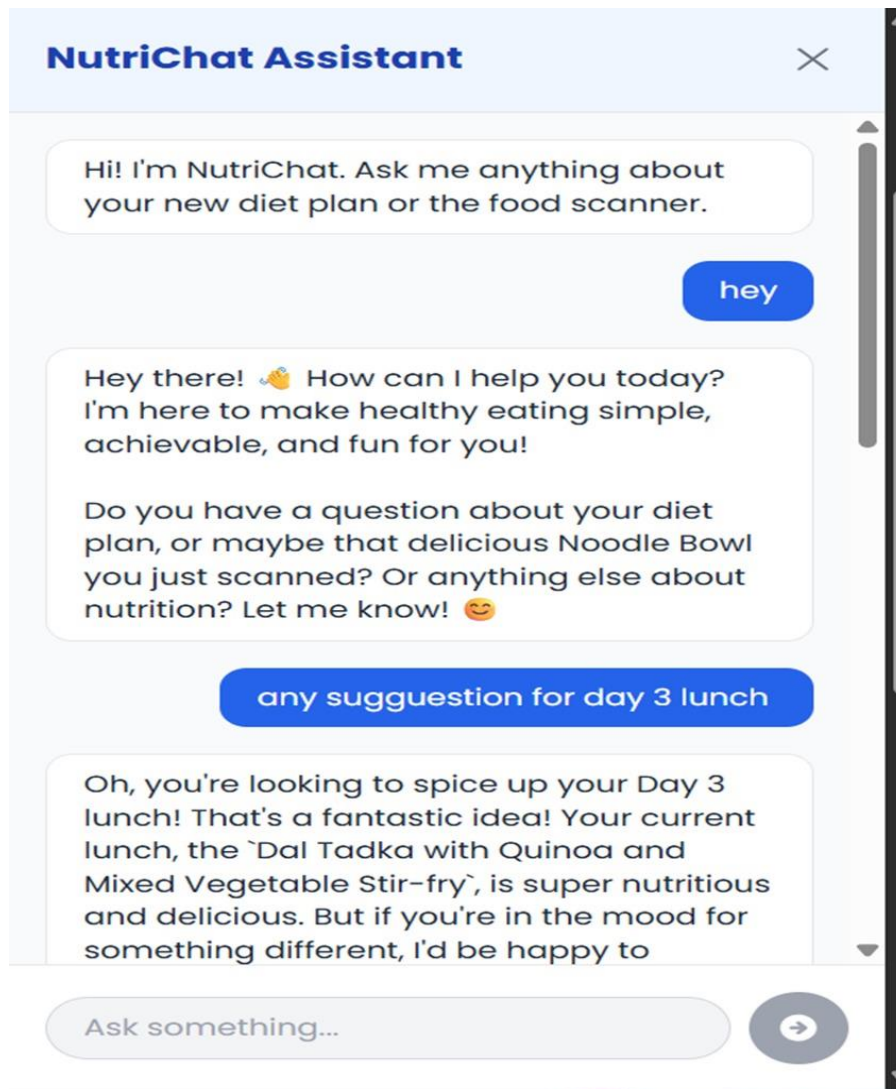


Figure 5: AI Assistant.

V. CONCLUSION

This project shows just how much AI can change the way we approach personalized nutrition and preventive healthcare. With the Smart Health Diet Planner, people get quick, accurate diet recommendations built on real nutritional science and machine learning. Plus, the whole thing's easy to use, whether you're in a clinic or just at home.

Looking ahead, adding features like wearable sensor integration, food recognition powered by AI, and real-time metabolic tracking could take this to another level. It's not just about making meal plans—it's about helping people take charge of their health, cut down on lifestyle diseases, and actually stick with long-term wellness.

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