

# ► MealPlan Assistant Bot

Task-Oriented Dialog System Prototype



*Module: Special Topics in Language Technology Multimodal and Dialogue Systems and Voice Assistants*

By *Panagiotis Fasoulidis*

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## 01 ► Purpose of the chatbot

- The main purpose of the **MealPlan Assistant** is to support users with a very common daily problem: deciding what to eat, giving recipe ideas and nutrition info. Instead of browsing multiple websites or apps, users can interact with a single chatbot that provides quick and direct answers.
- The assistant is designed to be fast, easy to use, and focused on practical information rather than complex recommendations.



## Chatbot's Capabilities



The chatbot supports three core functionalities.

- First, it can generate simple meal plans for today, tomorrow or for the whole week.
- Second, it can suggest real recipes based on ingredients provided by the user.
- Third, it can return nutrition information, such as calories and macronutrients, for specific foods.

In addition, the bot supports basic conversational features such as greetings, help messages and polite responses to unsupported questions.

## 03 ► Scenarios



### First Scenario

**Meal plan suggestions**  
(**deterministic mock task**).

The user asks for a meal plan (today / tomorrow / weekly).  
The bot returns a predefined plan through simple mock actions.



### Second Scenario

**Recipe search by ingredient**  
(**real-world API**).

The user requests recipes using an ingredient. The response changes depending on the ingredient and the API output.



### Third Scenario

**Nutrition information (real-world dataset).**

The user asks for calories/macros of a food (e.g., "calories in banana").  
The chatbot looks up values in a local Kaggle CSV nutrition dataset (calories, protein, fat etc.).

## 04 ► Data sources



The chatbot integrates **two** real-world data sources

For recipes, it uses the public **API of TheMealDB**, which provides structured information about meals and ingredients. In particular, TheMealDB provides structured information about recipes. It includes: recipe name and category, list of ingredients and measurements, cooking instructions, additional metadata (e.g. cuisine type).

For nutrition data, it uses a public **CSV dataset** from Kaggle that includes calories and macronutrients for many foods: calories (energy in kcal), protein, carbohydrates, fat (all per 100g).

## 05 ► Conversation Samples

### Mockup Meal Plan

### MealPlan Assistant Bot

Virtual Assistant

Backend: Rasa + Python Actions

Hi! 🍌

How are you today?

Hello

I am not good

I'm sorry I hear that 😞 I'm here for you. Maybe some good food can help lift your mood.

What do you want to do?

1. Meal plan (today / tomorrow / weekly)
2. Recipes by ingredient
3. Nutrition info (calories/macros)

Examples:

- "meal plan for today"
- "meal plan for tomorrow"
- "weekly meal plan"
- "recipes with chicken"
- "calories in banana"

I want a meal plan

Sure 😊 Do you want for \*today\*, \*tomorrow\*, or the \*whole week\*?

for today

Today's meal plan:

- Breakfast: Yogurt + oats
- Lunch: Chicken salad
- Dinner: Lentil soup

What do you want to do?

1. Meal plan (today / tomorrow / weekly)
2. Recipes by ingredient
3. Nutrition info (calories/macros)

weekly plan, please

Weekly plan:

Mon: Chicken + rice

Tue: Pasta

Wed: Soup

Thu: Salad

Fri: Fish

Sat: Beans

Sun: Roast chicken

Thank you


You're welcome 😊 I'm here if you need anything else.

# API for recipes

I want recipe npw

Sure. Which ingredient do you want for the recipe? (e.g., chicken, rice, potatoes, cucumber)

strawberries

 Eton Mess

Ingredients:

- 500g strawberries
- 400ml double cream
- 3 x 7.5cm meringue nests
- 1 tbsp ginger cordial
- sprigs of fresh Mint

Instructions:

Purée half the strawberries in a blender. Chop the remaining strawberries, reserving four for decoration.


Whip the double cream until stiff peaks form, then fold in the strawberry purée and crushed meringue. Fold in the chopped strawberries and ginger cordial, if using.

Spoon equal amounts of the mixture into four cold wine glasses. Serve garnished with the remaining strawberries and a sprig of mint.

What do you want to do?

1. Meal plan (today / tomorrow / weekly)
2. Recipes by ingredient
3. Nutrition info (calories/macros)

what can I cook with rice

 Beef Banh Mi Bowls with Sriracha Mayo, Carrot & Pickled Cucumber

Ingredients:

- White Rice
- 1 Onion
- 1 Lime
- 3 Garlic Clove
- 1 Cucumber
- 3 oz Carrots
- 1 lb Ground Beef
- 2 oz Soy Sauce

Instructions:

Add'l ingredients: mayonnaise, sriracha

1

Place rice in a fine-mesh sieve and rinse until water runs clear. Add to a small pot with 1 cup water (2 cups for 4 servings) and a pinch of salt. Bring to a boil, then cover and reduce heat to low. Cook until rice is tender, 15 minutes. Keep covered off heat for at least 10 minutes or until ready to serve.

2

Meanwhile, wash and dry all produce. Peel and finely chop garlic. Zest and quarter lime (for 4 servings, zest 1 lime and quarter both). Trim and halve cucumber lengthwise; thinly slice crosswise into half-moons. Halve, peel, and medium dice onion. Trim, peel, and grate carrot.



# Dataset for nutrition info

I want nutrition info

Sure. Which food would you like nutrition information for? (e.g., banana, oats, egg, rice)

carrot

Nutrition for Carrot Sticks (1 cup) (per 100g):

- Calories: 52.0 kcal
- Protein: 1.2 g
- Carbs: 12.3 g
- Fat: 0.3 g

What do you want to do?

1. Meal plan (today / tomorrow / weekly)
2. Recipes by ingredient
3. Nutrition info (calories/macros)

Nutrition for Tomato Soup (1 can) (per 100g):

- Calories: 170.0 kcal
- Protein: 4.0 g
- Carbs: 25.0 g
- Fat: 6.0 g

What do you want to do?

1. Meal plan (today / tomorrow / weekly)
2. Recipes by ingredient
3. Nutrition info (calories/macros)

how many calories are in banana

Nutrition for Banana (per 100g):

- Calories: 105.0 kcal
- Protein: 1.3 g
- Carbs: 27.0 g
- Fat: 0.4 g

What do you want to do?

1. Meal plan (today / tomorrow / weekly)
2. Recipes by ingredient
3. Nutrition info (calories/macros)

# Out-of-scope – Fallback - Insults

Hi

Hi! 🐼  
How are you today?

good

Great — I'm glad you're doing well! 😊  
What do you want to do?  
1. Meal plan (today / tomorrow / weekly)  
2. Recipes by ingredient  
3. Nutrition info (calories/macros)  
Examples:  
• "meal plan for today"  
• "meal plan for tomorrow"  
• "weekly meal plan"  
• "recipes with chicken"  
• "calories in banana"

tell me about football

I cannot help with such topics. I can only help with: 1) Meal plans (today / tomorrow / weekly), 2) Recipes by ingredient, 3) Nutrition info for specific foods

fuck you!

I can't continue with insults. If you want, we can continue politely.

idiot

I can't continue with insults. If you want, we can continue politely.

Is vegan diet healthier than omnivore?

I cannot help with such topics. I can only help with: 1) Meal plans (today / tomorrow / weekly), 2) Recipes by ingredient, 3) Nutrition info for specific foods

I am pregnant. What diet is safe? What should I eat?

I cannot help with such topics. I can only help with: 1) Meal plans (today / tomorrow / weekly), 2) Recipes by ingredient, 3) Nutrition info for specific foods

okay make a meal plan for this week

I want a meal plan

Sure 😊 Do you want for \*today\*, \*tomorrow\*, or the \*whole week\*?

tomorrow

Tomorrow's meal plan:

- Breakfast: Omelette
- Lunch: Tuna wrap
- Dinner: Rice + veggies

What do you want to do?

1. Meal plan (today / tomorrow / weekly)
2. Recipes by ingredient
3. Nutrition info (calories/macros)

hhjfhfngnvhn

Sorry, I didn't catch that. Ask me for a meal plan, recipe ideas or nutrition info.

Type a message

Send

hhjfhfngnvhn

Sorry, I didn't catch that. Ask me for a meal plan, recipe ideas or nutrition info.

give me a ketogenic diet

I can help with such topics. I can help with: 1) Meal plans (today / tomorrow / weekly), 2) Recipes by ingredient, 3) Nutrition info for specific foods

thanks

You're welcome 😊 I'm here if you need anything else.  
What do you want to do?

1. Meal plan (today / tomorrow / weekly)
2. Recipes by ingredient
3. Nutrition info (calories/macros)

Examples:

- "meal plan for today"
- "meal plan for tomorrow"
- "weekly meal plan"
- "recipes with chicken"
- "calories in banana"

goodbye

Bye! 🙋

who are you?

I'm a Rasa chatbot focused on meal plans, recipes and nutrition.

## Terminal interface (Rasa shell)

Bot loaded. Type a message and press enter (use '/stop' to exit):

Your input -> **Hi!**

Hi! 🙌

How are you today?

Your input -> **Good**

Great – I'm glad you're doing well! 😊

What do you want to do?

- 1) Meal plan (today / tomorrow / weekly)
- 2) Recipes by ingredient
- 3) Nutrition info (calories/macros)

Examples:

- "meal plan for today"
- "meal plan for tomorrow"
- "weekly meal plan"
- "recipes with chicken"
- "calories in banana"

Your input -> **meal plan for tomorrow**

Tomorrow's meal plan:

- Breakfast: Omelette
- Lunch: Tuna wrap
- Dinner: Rice + veggies

What do you want to do?

- 1) Meal plan (today / tomorrow / weekly)
- 2) Recipes by ingredient
- 3) Nutrition info (calories/macros)

Your input -> **meal plan for today**

Today's meal plan:

- Breakfast: Yogurt + oats
- Lunch: Chicken salad
- Dinner: Lentil soup

Your input -> **recipe with chicken**

👉 Brown Stew Chicken

Ingredients:

- 1 whole Chicken
- 1 chopped Tomato
- 2 chopped Onions
- 2 chopped Garlic Clove
- 1 chopped Red Pepper
- 1 chopped Carrots
- 1 Lime
- 2 tsp Thyme
- 1 tsp Allspice
- 2 tbs Soy Sauce
- 2 tsp Cornstarch
- 2 cups Coconut Milk
- 1 tbs Vegetable Oil

Instructions:

Squeeze lime over chicken and rub well. Drain off excess lime juice.

Combine tomato, scallion, onion, garlic, pepper, thyme, pimento and soy sauce in a bowl. Marinate for 1 hour.

Heat oil in a dutch pot or large saucepan. Shake off the seasonings as you remove excess oil.

Lightly brown the chicken a few pieces at a time in very hot oil. Place browned chicken in a bowl.

Drain off excess oil and return the chicken to the pan. Pour the marinade over the chicken. Cook for 5 minutes.

Mix

Your input -> **with rice**

• Beef Banh Mi Bowls with Sriracha Mayo, Carrot & Pickled Cucumber

Ingredients:

- White Rice
- 1 Onion
- 1 Lime
- 3 Garlic Clove
- 1 Cucumber
- 3 oz Carrots
- 1 lb Ground Beef
- 2 oz Soy Sauce

Instructions:

Add'l ingredients: mayonnaise, sriracha

1

Your input -> **nutrition info now**

Sure. Which food would you like nutrition information for? (e.g., banana, oats, egg, rice)

Your input -> **banana**

Nutrition for Banana (per 100g):

- Calories: 105.0 kcal
- Protein: 1.3 g
- Carbs: 27.0 g
- Fat: 0.4 g

What do you want to do?

- 1) Meal plan (today / tomorrow / weekly)
- 2) Recipes by ingredient
- 3) Nutrition info (calories/macros)

Your input -> **I want a diet with vegetables**

I cannot help with such topics. I can only help with: 1) Meal plans (today / tomorrow / weekly), 2) Recipes by ingredient

Your input -> **idiot**

I can't continue with insults. If you want, we can continue politely.

Your input -> **dfsdfjhdsd,fzs**

Sorry, I didn't catch that. Ask me for a meal plan, recipe ideas or nutrition info.

Your input -> **thank you**

You're welcome 😊 I'm here if you need anything else.

## 06 ► Error Handling & Robustness



The system includes basic robustness mechanisms:

- **API failures & timeouts:** recipe requests use try/except and timeouts. If the API is unavailable, the bot returns a clear message.
- **No results:** if no recipe or food is found, the bot informs the user and suggests trying again.
- **Slot validation:** forms ensure that required information is collected before executing actions.
- **Out-of-scope handling:** unsupported or inappropriate inputs are handled with polite fallback responses.

## 07 ► Design Decisions & Insights

The following design choices were adopted:

- Deterministic logic** instead of **LLM-based NLG**, in order to keep the system fast, predictable and easy to debug.
- Use of forms for slot collection**, so that the bot always receives the necessary information before executing actions.
- Separation of mock and real tasks**, with static meal plans and dynamic data only where needed (recipes and nutrition).
- Simple data representations**, focusing on essential information (calories and basic macros) instead of complex dietary analysis.

## 08 ► Limitations



The current system has some natural limitations, which are expected for a prototype system.

- a. Meal plans are static and not personalized, as the goal was to demonstrate task execution in academic context rather than build a full recommendation engine for a company.
- b. Nutrition information depends on the quality and coverage of the dataset, which is sufficient for demonstration purposes but not intended for medical or dietary advice.
- c. The assistant does not store user profiles or long-term preferences, in order to keep the system simple and transparent.
- d. An attempt to integrate LLM-based generation (via Ollama) was made in early stages, but this approach was abandoned due to unstable response times within Rasa actions. For this reason, deterministic logic was preferred to ensure reliability.

Overall, these choices allow the system to remain lightweight, understandable and suitable as an educational prototype.



## 09 ► Future Improvements



Future improvements could include **personalized meal plans based on user goals**, such as fitness level, dietary restrictions, lifestyle preferences and more recipe ideas.

The assistant could provide **alternative recommendations**, for example suggesting different recipes or meal plans if the user is not satisfied with the first response.

The system could support a **broader range of follow-up questions**, such as asking for variations of a recipe or simpler alternatives, making the interaction more flexible and natural.

An optional **LLM layer** could be added for more natural language generation, improving conversational quality without affecting core system reliability.

At an industry level, the system could also support **user authentication**, integration with **mobile applications** and **continuous learning** from user interactions. These extensions would transform the prototype into a scalable and production-ready and industry-based service.

## 10 ► Conclusions

This project presented a task-oriented chatbot for meal planning, recipe discovery and nutrition information. The system supports multiple interaction scenarios, integrates both external APIs and local datasets, and demonstrates a complete dialogue flow using intents, forms and custom actions.

Overall, the chatbot functions as a practical and usable prototype, showing how task-oriented dialogue systems can combine deterministic logic with real-world data sources. While the current version is intentionally simple, it provides a solid foundation that could be extended in the future with more personalization and advanced recommendation features.