

## 1. Project Title: AI-Based Waste Segregation Awareness Assistant

## 2. Student Details

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- **Internship:** 1M1B – IBM SkillsBuild AI + Sustainability Virtual Internship

## 3. SDG Alignment

### Primary SDG:

- **SDG 12 – Responsible Consumption and Production**

### Secondary SDG (Optional):

- **SDG 11 – Sustainable Cities and Communities**

## 4. Project Context

Improper waste segregation is a common issue observed in households, hostels, campuses, and urban communities. Many people are unaware of how to correctly dispose of everyday waste items, leading to increased landfill waste, pollution, and inefficient recycling systems.

This project focuses on using Artificial Intelligence as an awareness and decision-support tool to guide users in segregating waste responsibly. The aim is not to build complex technology, but to apply AI thoughtfully to solve a real sustainability challenge.

## 5. Problem Statement

**How might we use AI to guide people in correctly segregating everyday waste items so that waste management becomes more sustainable and environmentally responsible?**

## 6. Target Users

- Students and hostel residents
- Households
- Campus communities
- Urban and semi-urban citizens

## 7. AI Solution Overview

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The AI-Based Waste Segregation Awareness Assistant allows users to input the name of a waste item (for example, “plastic bottle” or “used batteries”). The AI classifies the item into one of the following categories:

- Wet Waste
- Dry Waste
- Recyclable Waste
- E-Waste
- Hazardous Waste

Along with classification, the AI provides a simple explanation and a practical eco-friendly tip for responsible disposal.

No coding or datasets are required — the solution leverages **prompt-based AI** to deliver guidance in a safe, transparent, and responsible way.

## 8. AI Prompt / Logic

### Prompt Used in AI Platform:

You are an AI-Based Waste Segregation Awareness Assistant created to support sustainability and environmental responsibility.

Objective:

Help users correctly identify how to dispose of common waste items and promote responsible waste management practices aligned with sustainability goals.

Your responsibilities:

1. Understand the waste item mentioned by the user.
2. Classify the item into ONLY ONE of the following categories:
  - Wet Waste
  - Dry Waste
  - Recyclable Waste
  - E-Waste
  - Hazardous Waste
3. Clearly explain, in simple and non-technical language, why the item belongs to that category.
4. Provide one practical eco-friendly tip related to proper disposal or environmental benefit.
5. If the item could belong to multiple categories, recommend the safest and most sustainable disposal method.
6. If the item is unclear, give general guidance without guessing.

Ethical & Responsible AI Guidelines:

- Do not collect or request any personal or sensitive information.
- Avoid assumptions and biased statements.
- Be transparent and educational.
- Focus on awareness and guidance, not enforcement.
- Promote environmentally responsible behavior.

Response format (follow strictly):

Waste Item:  
Category:  
Explanation:  
Eco-Friendly Tip:

This prompt forms the core of the AI workflow and demonstrates how AI is applied responsibly to solve a sustainability problem.

## 9. Design Thinking Approach

### Stage 1: Empathize

- Users are often confused about correct waste segregation
- Lack of awareness leads to improper disposal
- Waste rules vary across regions, causing uncertainty

### Stage 2: Define

- **Problem:** Incorrect waste segregation at source
- **Users:** General public and students
- **Gap:** No simple, accessible guidance tool

### Stage 3: Ideate

- Conversational AI for instant guidance
- Simple classification with explanations
- Eco-friendly tips to promote sustainable behavior

### Stage 4: Prototype

- Prompt-based AI workflow
- Sample user inputs and outputs
- Flowchart showing AI logic

### Stage 5: Test & Refine

- Tested with multiple common waste items
- Ensured clarity and ethical response
- Improved explanations for simplicity and impact

## 10. Responsible AI Considerations

- **Fairness:** Avoids biased or discriminatory responses
- **Transparency:** Explains reasoning behind waste classification
- **Ethics:** Focuses on education and awareness, not enforcement
- **Privacy:** No personal or sensitive data is collected

Responsible AI is embedded in the design to ensure safe, ethical, and positive outcomes.

## 11. Expected Impact

- Increased awareness of proper waste segregation
- Improved recycling and composting practices
- Reduced landfill waste and environmental pollution
- Cleaner, more sustainable communities
- Easily scalable for campuses, households, and cities

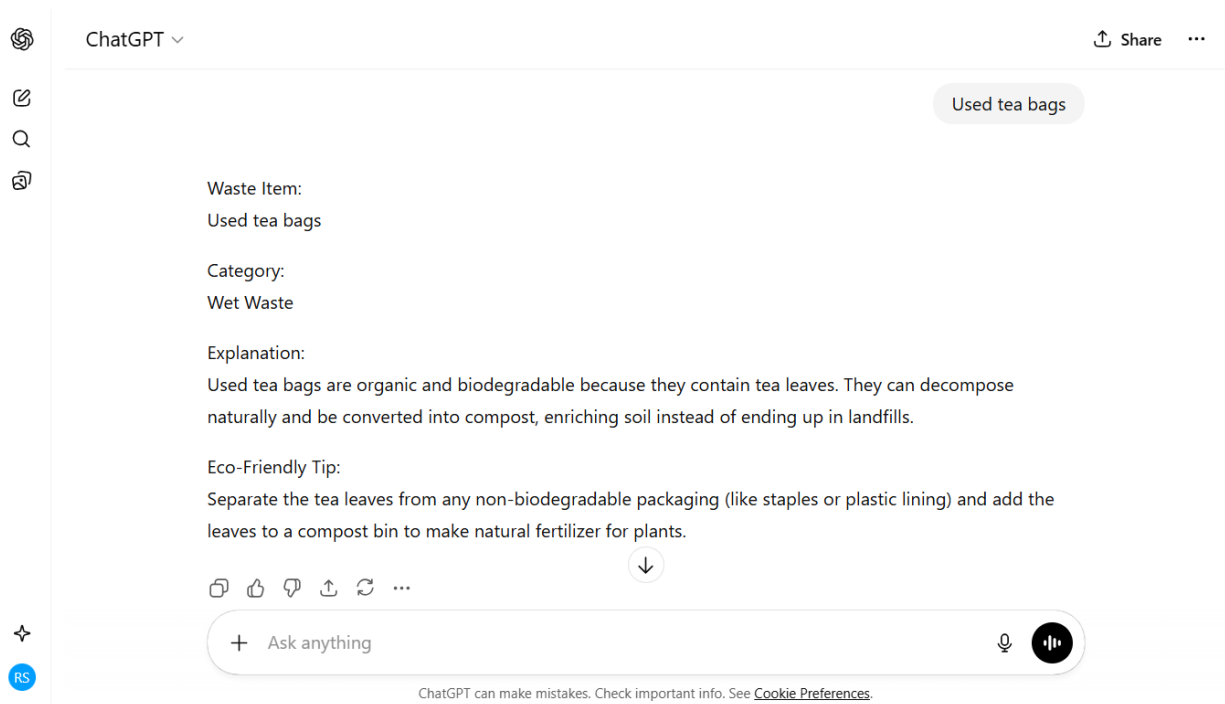
## 12. Prototype & Demonstration Screenshots

The following screenshots demonstrate the working AI prototype using prompt-based conversational AI.

**Figure 1: AI classifying wet waste**

User input: “Used tea bags”

AI output shows category: Wet Waste, with explanation and eco-friendly tip.

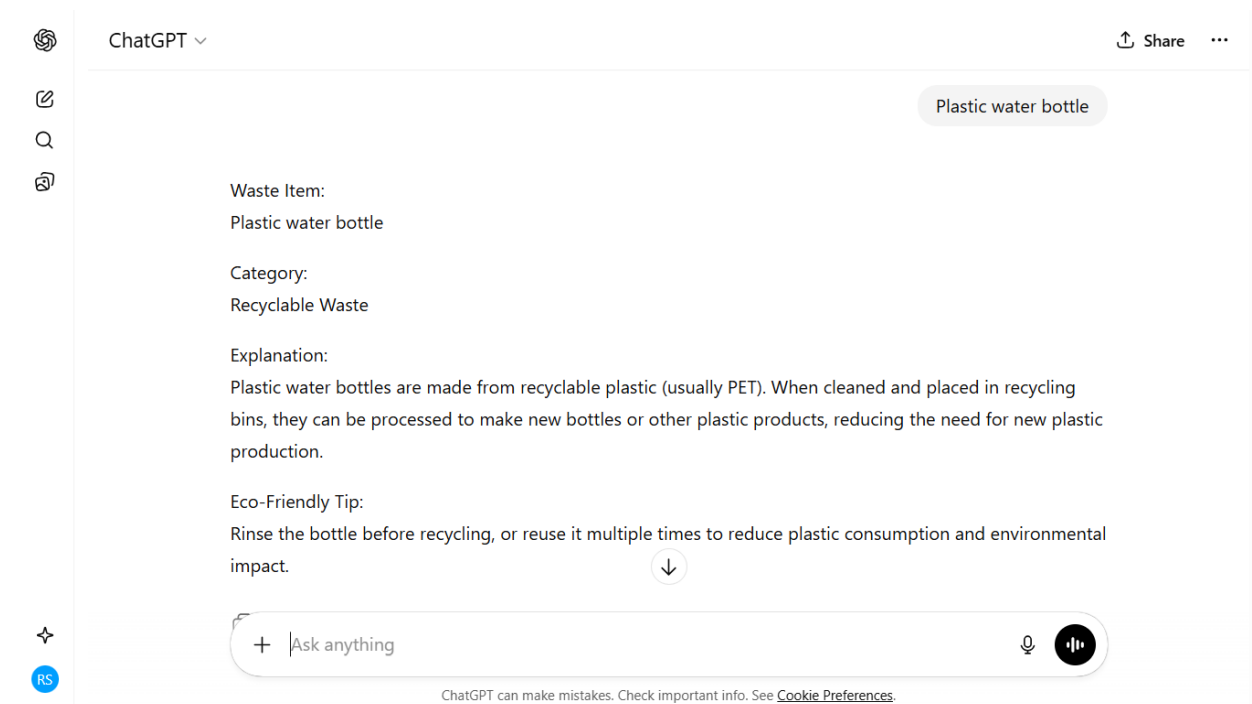


**Figure 2: AI classifying recyclable waste**

User input: “Plastic water bottle”

AI output shows category: Recyclable Waste, with explanation and tip.

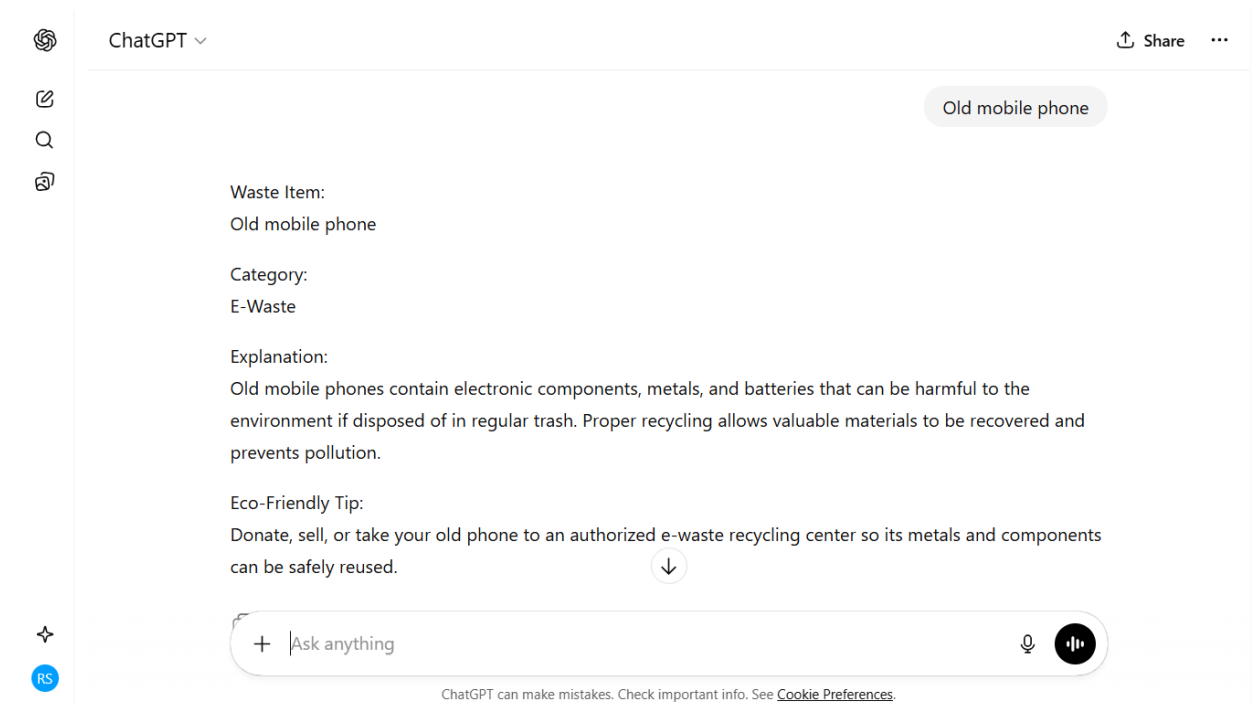
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**Figure 3: AI classifying e-waste**

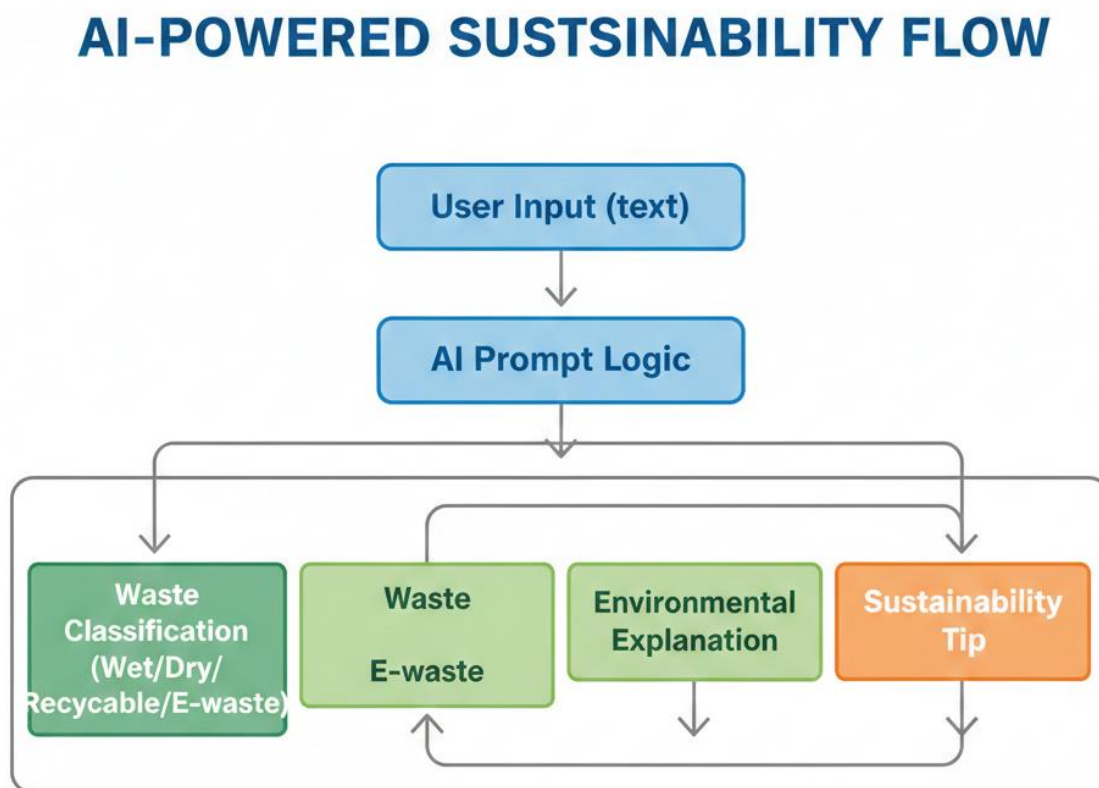
User input: “Old mobile phone”

AI output shows category: E-Waste, with explanation and tip.



**Figure 4: AI workflow diagram**

Flowchart showing: User Input → AI Prompt → Waste Classification → Explanation + Eco Tip



## 13. Impact Statement

If implemented widely, this AI assistant can help individuals make better waste disposal decisions, improve recycling and composting efficiency, reduce environmental pollution, and promote sustainable behavior in communities.

## 14. References / Tools Used

- **AI Platform:** IBM SkillsBuild AI Lab / ChatGPT
- **Guidelines:** 1M1B – IBM SkillsBuild AI + Sustainability Virtual Internship
- **Prompt Engineering:** Core logic for responsible AI workflow