
CAPSTONE PROJECT

ECO LIFESTYLE AGENT

Presented By:

**1. Anshika Aggarwal – Dr. Akhilesh Das Gupta Institute of
Professional Studies(B.Tech-IT)**

OUTLINE

- **Problem Statement**
- **Proposed System/Solution**
- **System Development Approach** (Technology Used)
- **Algorithm & Deployment**
- **Result (Output Image)**
- **Conclusion**
- **Future Scope**
- **References**

PROBLEM STATEMENT

Example: An Eco Lifestyle Agent, powered by RAG (Retrieval-Augmented Generation), empowers users to adopt a greener lifestyle through personalized, practical suggestions. It retrieves sustainable living tips, eco-friendly product recommendations, local recycling guidelines, and government schemes from trusted environmental sources. Users can ask natural language questions such as “How can I reduce plastic use at home?” or “What are eco-friendly travel options in my city?” and receive instant, actionable guidance.

PROPOSED SOLUTION

The **Eco Lifestyle Agent** uses **Retrieval-Augmented Generation (RAG)** to help users live more sustainably. It retrieves eco-friendly tips, recycling guidelines, green product suggestions, and government schemes from trusted sources.

✓ Key Features:

- **Natural Language Q&A** : Users ask questions like “How can I reduce plastic at home?” and get instant, fact-based answers.
- **RAG Architecture** : Combines document retrieval (Watson Discovery or vector DB) with IBM Granite models for contextual responses.
- **Personalized Help** : Offers local recycling info and tailored advice.

🎯 Benefits:

- Promotes eco-awareness
- Saves user time
- Delivers accurate, action-focused guidance

SYSTEM APPROACH

➔ User Interaction

- Users interact through a AI interface on a website or app.
- They ask natural language questions like “How can I reduce plastic use at home?”

➔ Retrieval (RAG)

- The system retrieves relevant, factual content from eco-focused sources such as government policies, verified blogs, recycling databases, and sustainability guidelines.
- A vector database or Watson Discovery is used for efficient and accurate information retrieval.

➔ Generation (LLM)

- The retrieved documents and user query are passed to IBM’s Granite language model.
- It generates a clear, context-aware, and actionable response.

➔ Response Delivery

- The generated answer is displayed to the user in real time through the chat interface.

ALGORITHM & DEPLOYMENT

✓ Algorithm Selection:

- For the Eco Lifestyle Agent, we use a **Retrieval-Augmented Generation (RAG)** architecture. This combines:
- A **retriever** that finds relevant documents matching the user's eco-related question.
- A **generator** (IBM Granite LLM) that synthesizes a personalized, context-aware response using both the user's query and the retrieved documents.
- **Justification:**
- The eco-lifestyle domain requires up-to-date, fact-based answers.
- RAG allows combining static knowledge (trusted sources) with dynamic query understanding, producing reliable and customized guidance.

✓ Data Input:

- The input to the algorithm consists of:
- **User Query:** Free-form natural language question from the user, e.g., "What eco-friendly cleaning products can I use?"
- **Contextual Features:**
 - Optional location data (city) for local recycling or policy info.
 - Retrieved documents containing tips, policies, or eco guides relevant to the query.

ALGORITHM & DEPLOYMENT

✓ Training Process:

- The retriever component is built by embedding documents (e.g., government schemes, eco guides) into a **vector database** using pretrained embedding models.
- The generator (Granite LLM) is **not fine-tuned** in this version but used in zero-shot or few-shot mode for new queries.
- The retriever is evaluated with sample queries to check precision/recall of relevant docs.
- The RAG system is **iteratively tested** with sample questions; retrieval and prompt templates are adjusted based on answer quality.

✓ Prediction Process:

- When a user submits a question, the system retrieves the top-k relevant documents from the vector DB.
- It combines the user's question with the retrieved snippets into a prompt.
- The prompt is sent to the Granite model, which generates an answer.
- The system then post-processes the response (optional: formatting or adding links) and returns it to the user in the chatbot UI.
- Real-time user queries and retrieved knowledge allow dynamic, personalized predictions without needing retraining for each new question.

ALGORITHM & DEPLOYMENT

Deployment

■ Frontend

- A chatbot UI embedded on a website or app.
- Users interact with the Eco Lifestyle Agent in natural language.

■ Backend API

- Built with Flask or Node.js, hosted on IBM Cloud (e.g., Code Engine).
- Receives user queries, coordinates retrieval and generation, and sends responses back.

■ Retriever Service

- Uses Watson Discovery or a vector database (FAISS/Chroma) with embedded eco documents.
- Fetches relevant info based on the user's query.

■ LLM Inference

- Calls Granite foundation model on watsonx.ai to generate context-aware responses from retrieved content.

■ Integration Flow

- The backend assembles query + retrieved docs into a prompt, sends it to Granite, and returns the AI-generated answer to the chatbot frontend.

RESULT

Agent Lab (beta) — x Eco Lifestyle Agent — x Settings | IBM watsonx — x Eco_Lifestyle_Agent_ — x Eco Lifestyle Agent — x (533) Nasya Learns — x +

au-syd.dai.cloud.ibm.com/wx/agents/9cdb30b4-06ac-4fd4-b243-1da71a9b55a2?project_id=719f4cd3-3cea-4f53-b095-bd4f2325f56e&context=wx

IBM watsonx Upgrade ? Anshika Aggarwal's Account Sydney AA

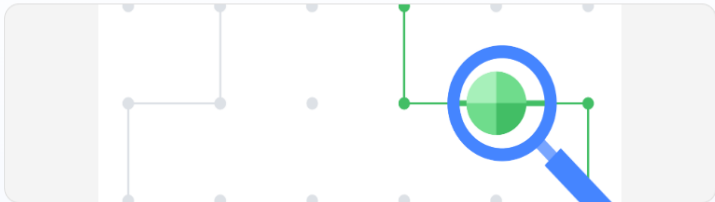
Projects / Eco Lifestyle Agent / Eco Lifestyle Agent Share feedback β New agent + Deploy

Build > Agent preview

Eco Lifestyle Agent 06:36 PM

Welcome to Eco Lifestyle Agent

Make smarter, planet-friendly choices every day—easily and effectively



Sample questions

How can I reduce plastic use at home? What are eco-friendly travel options in my city?

Type something...

Type here to search 31°C Haze 18:41 03-08-2025

Agent Lab (beta) — x Eco Lifestyle Agent — x NutriGlow/README — x Microsoft PowerPoint — x Agent Lab (beta) — x Eco Lifestyle Agent — x +

au-syd.dai.cloud.ibm.com/wx/agents/9cdb30b4-06ac-4fd4-b243-1da71a9b55a2?project_id=719f4cd3-3cea-4f53-b095-bd4f2325f56e&context=wx

IBM watsonx Upgrade ? Anshika Aggarwal's Account Sydney AA

Projects / Eco Lifestyle Agent / Eco Lifestyle Agent Share feedback β New agent + Deploy

Build > Agent preview

AA You: 10:36 PM

How can I reduce plastic use at home?

Eco Lifestyle Agent 10:36 PM

To reduce plastic use at home, you can start by making a few simple changes to your daily habits. Here are some easy habits to reduce plastic at home:

- Carry a reusable bag, bottle, and cutlery.
- Use bar soaps instead of liquid soap in plastic bottles.
- Buy in bulk to reduce packaging.
- Choose loose produce instead of pre-packaged items.
- Avoid disposable items like plastic cups and plates.

Additionally, you can also consider replacing plastic straws with metal or bamboo alternatives, and using refillable bottles and jars. Avoid products with excessive plastic wrapping, and opt for glass or steel containers for storage.

By making these small changes, you can significantly reduce your plastic use at home and contribute to a more sustainable lifestyle.

Type something...

Type here to search 29°C Light rain 22:36 03-08-2025

RESULT

The screenshot displays the IBM watsonx Agent Lab interface, showing the 'Agent preview' tab. The interface is split into two panes, each showing a chat conversation between a user (AA) and the 'Eco Lifestyle Agent'.

Left Pane Chat:

- User (AA):** You: 10:36 PM
How can I live a more eco-friendly lifestyle?
- Eco Lifestyle Agent:** 10:36 PM
To live a more eco-friendly lifestyle, you can start by reducing single-use plastics, conserving water and energy, and using public transport or bicycles. Adopt a plant-based diet when possible, buy local and organic produce, compost kitchen waste, and support sustainable brands. Participate in community clean-up drives and use energy-efficient appliances.

You can also reduce plastic use at home by using cloth or jute bags for shopping, switching to glass or steel containers for storage, and avoiding packaged foods. Replace plastic straws with metal or bamboo alternatives, and use refillable bottles and jars. Avoid products with excessive plastic wrapping.

In terms of travel, use public transport, cycle or walk whenever possible. Opt for electric vehicles (EVs) or shared mobility options. Cities like Bengaluru, Pune, and Delhi offer e-scooters and EV cabs. Plan trips efficiently to reduce fuel consumption and consider carbon offsetting for long-distance travel.

To save electricity and water daily, turn off lights and fans when

Right Pane Chat:

- User (AA):** You: 10:36 PM
How to dispose of waste the right way?
- Eco Lifestyle Agent:** 10:36 PM
To dispose of waste the right way, segregate waste into dry, wet, and hazardous categories. Dry waste includes paper, plastics, and metals; wet waste includes food and garden waste; hazardous waste includes batteries and electronics. Follow local municipal guidelines for collection or drop-off. Use composting for organic waste and take e-waste to authorized recyclers.

▶ How did I get this answer?

The interface includes a 'Build' tab, a 'Share feedback' button, and a 'New agent' button. The bottom of the screen shows a Windows taskbar with the date 03-08-2025 and time 22:36.

RESULT

The image displays two side-by-side screenshots of the IBM watsonx Eco Lifestyle Agent interface, showing the agent's responses to user queries.

Left Screenshot:

- User Query:** "What can I recycle and how?"
- Agent Response:**
 - To recycle and how, you can start by checking your city municipality website or Swachh Bharat portal for information on recycling centers and eco stores near you. You can also use Google Maps with keywords like 'eco store', 'zero waste store', or 'e-waste recycling center' to find resources in your area.
 - When it comes to cleaning products, look for eco-labels like EcoMark or ingredients like vinegar, baking soda, and citric acid. Choose biodegradable, non-toxic brands to avoid harming the environment.
 - The government also offers various schemes to support green living, such as the FAME II subsidy for electric vehicles, the Solar Rooftop Yojana, and Unnat Jyoti by Affordable LEDs for All (UJALA). Swachh Bharat Abhiyan promotes cleanliness and waste segregation, and many state governments offer composting or rainwater harvesting incentives.
 - To compost kitchen waste at home, use a compost bin to collect vegetable peels, fruit
- User Follow-up:** "How did I get this answer?"

Right Screenshot:

- User Query:** "Are my cleaning products harmful to the environment?"
- Agent Response:**
 - Many conventional cleaners contain phosphates, bleach, and artificial fragrances which can harm waterways and indoor air quality. Check for eco-labels like EcoMark or ingredients like vinegar, baking soda, and citric acid. Choose biodegradable, non-toxic brands.
- User Follow-up:** "How did I get this answer?"

CONCLUSION

- The **Eco Lifestyle Agent**, powered by **Retrieval-Augmented Generation (RAG)** and IBM's **Granite foundation models**, provides an intelligent, user-friendly solution to promote sustainable living. By combining real-time document retrieval with advanced natural language generation, the agent delivers **personalized, reliable, and actionable eco-advice** to users worldwide.
- This system empowers individuals to make greener choices by providing guidance on reducing waste, saving energy, choosing eco-friendly products, and understanding local recycling and environmental policies. Its modular architecture, cloud deployment, and scalable design ensure that the solution can evolve to accommodate growing datasets, new environmental guidelines, and user needs.
- The Eco Lifestyle Agent serves as a practical example of how **AI can contribute positively to environmental awareness and social good**, helping communities transition towards a more sustainable future.

FUTURE SCOPE

➡ The Eco Lifestyle Agent can be enhanced by:

- Adding **user personalization** for location-based and habit-based tips
- Supporting **voice input** and **mobile apps** for wider accessibility
- Integrating a **carbon footprint tracker**
- Expanding the **knowledge base** with more verified eco sources
- Enabling **multilingual support** to reach diverse users

REFERENCES

- IBM watsonx.ai Documentation
<https://www.ibm.com/docs/en/watsonx>
- IBM Granite Foundation Models
<https://www.ibm.com/products/granite>
- IBM Cloud – Watson Assistant
<https://cloud.ibm.com/catalog/services/watson-assistant>
- Central Pollution Control Board (CPCB), India
<https://cpcb.nic.in>
- Ministry of Environment, Forest and Climate Change (MoEFCC), India
<https://moef.gov.in>
- United Nations Environment Programme (UNEP)
<https://www.unep.org>
- Swachh Bharat Mission – Government of India
<https://swachhbharatmission.gov.in>

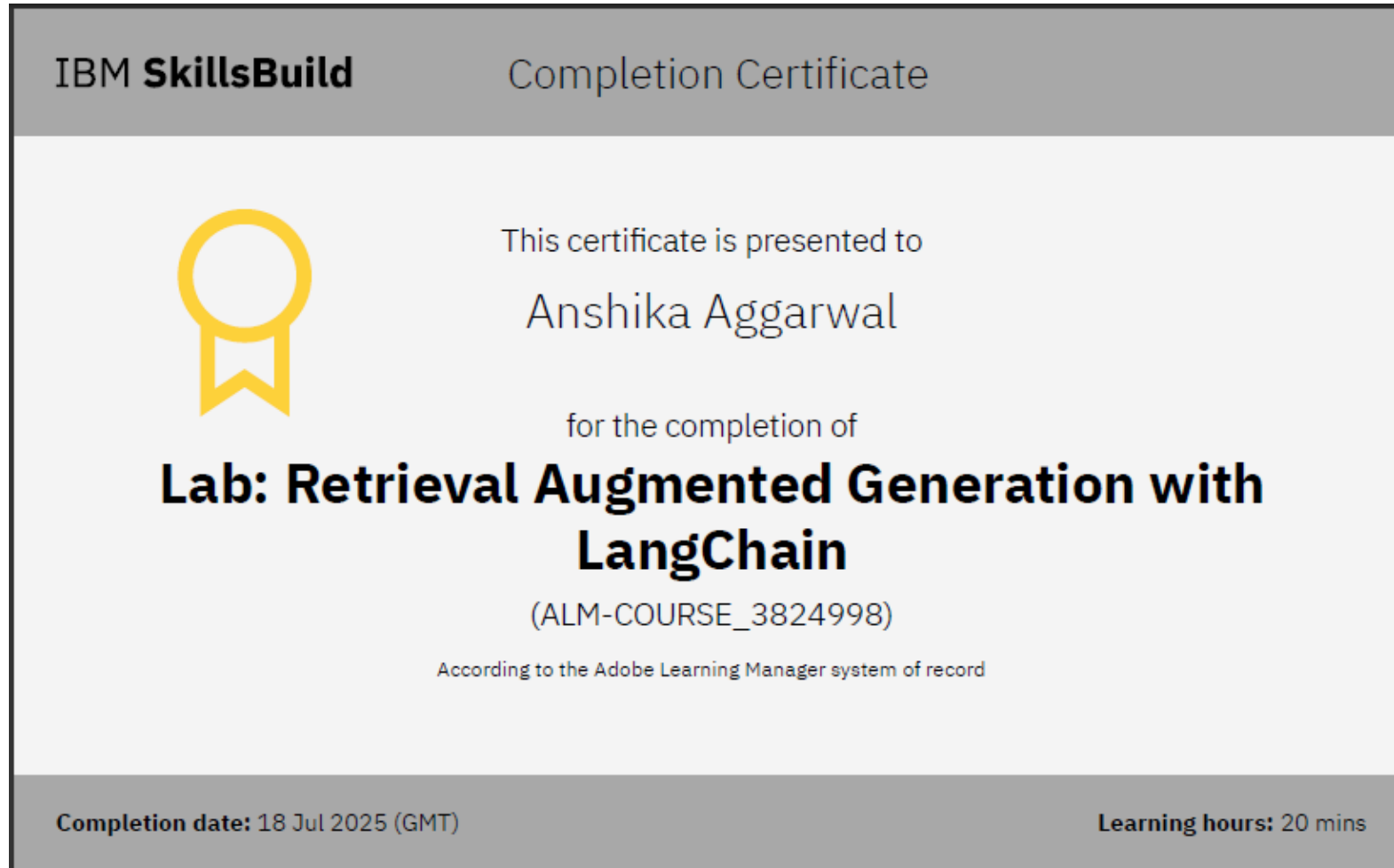
IBM CERTIFICATIONS



IBM CERTIFICATIONS



IBM CERTIFICATIONS





THANK YOU