CAPSTONE PROJECT

ECO LIFESTYLE AGENT

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OUTLINE

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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

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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:

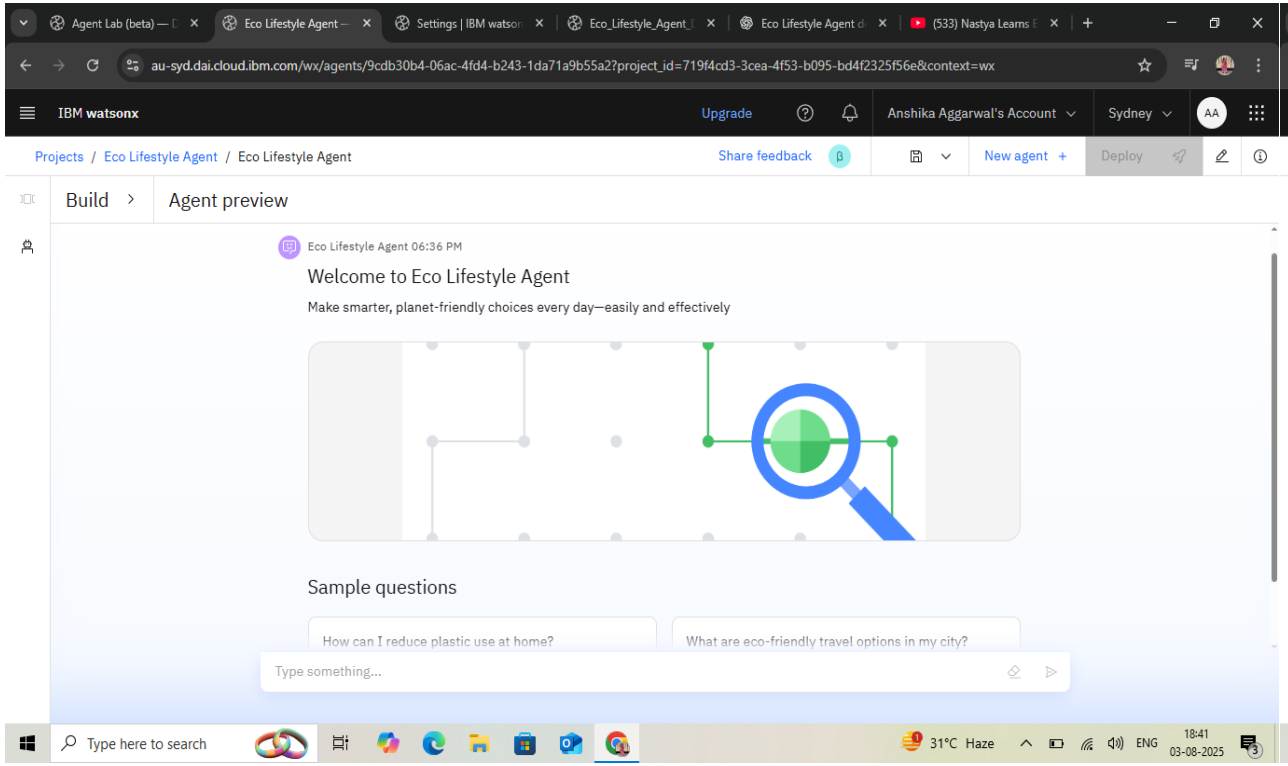
- When a user submits a question, the system retrieves the top-k relevant documents from the vector DB.
- It combines the user's question with the retrieved snippets into a prompt.
- The prompt is sent to the Granite model, which generates an answer.
- The system then post-processes the response (optional: 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.

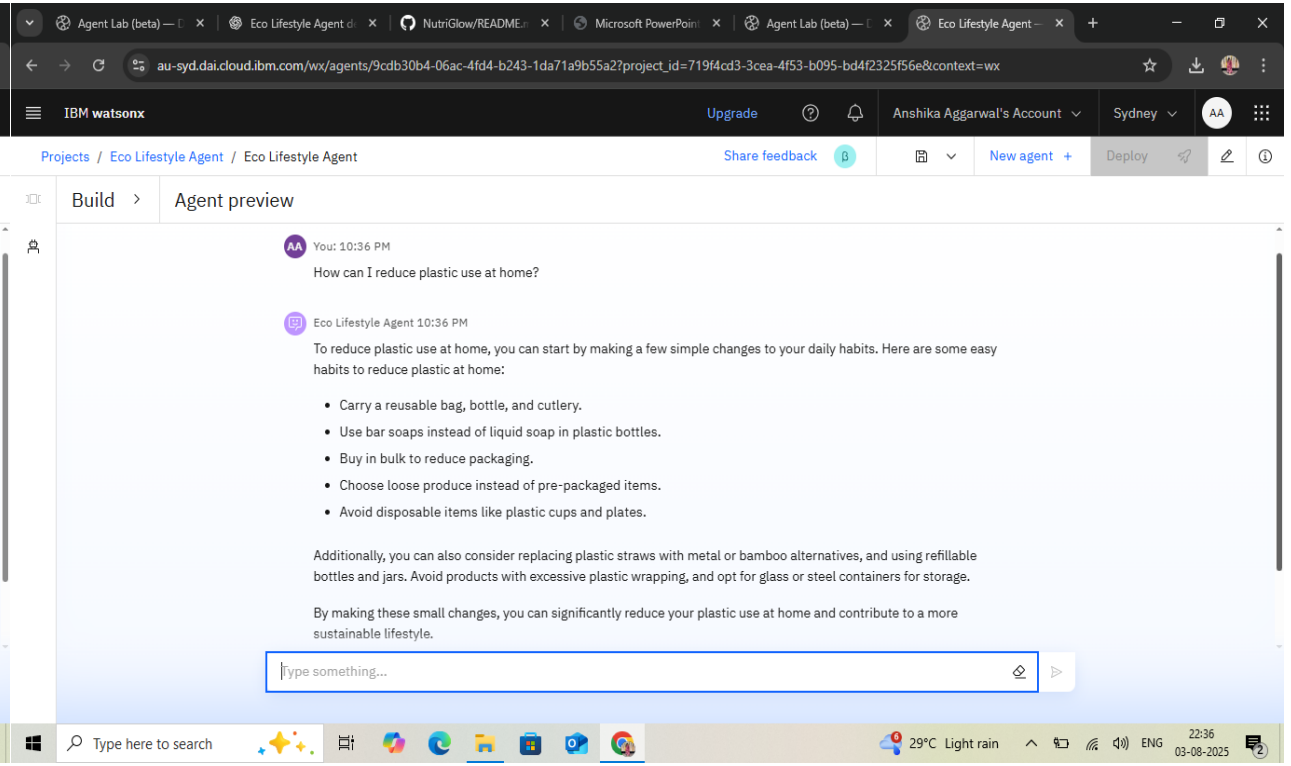
ALGORITHM & DEPLOYMENT

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





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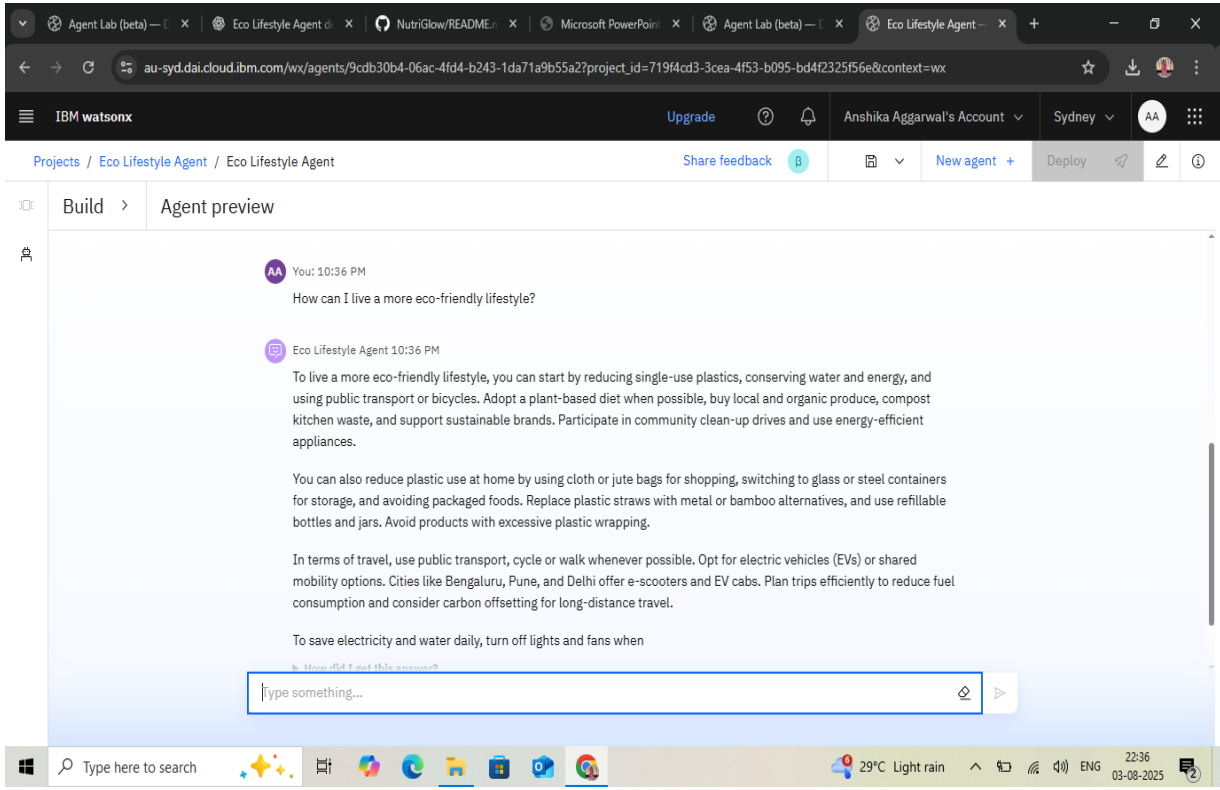
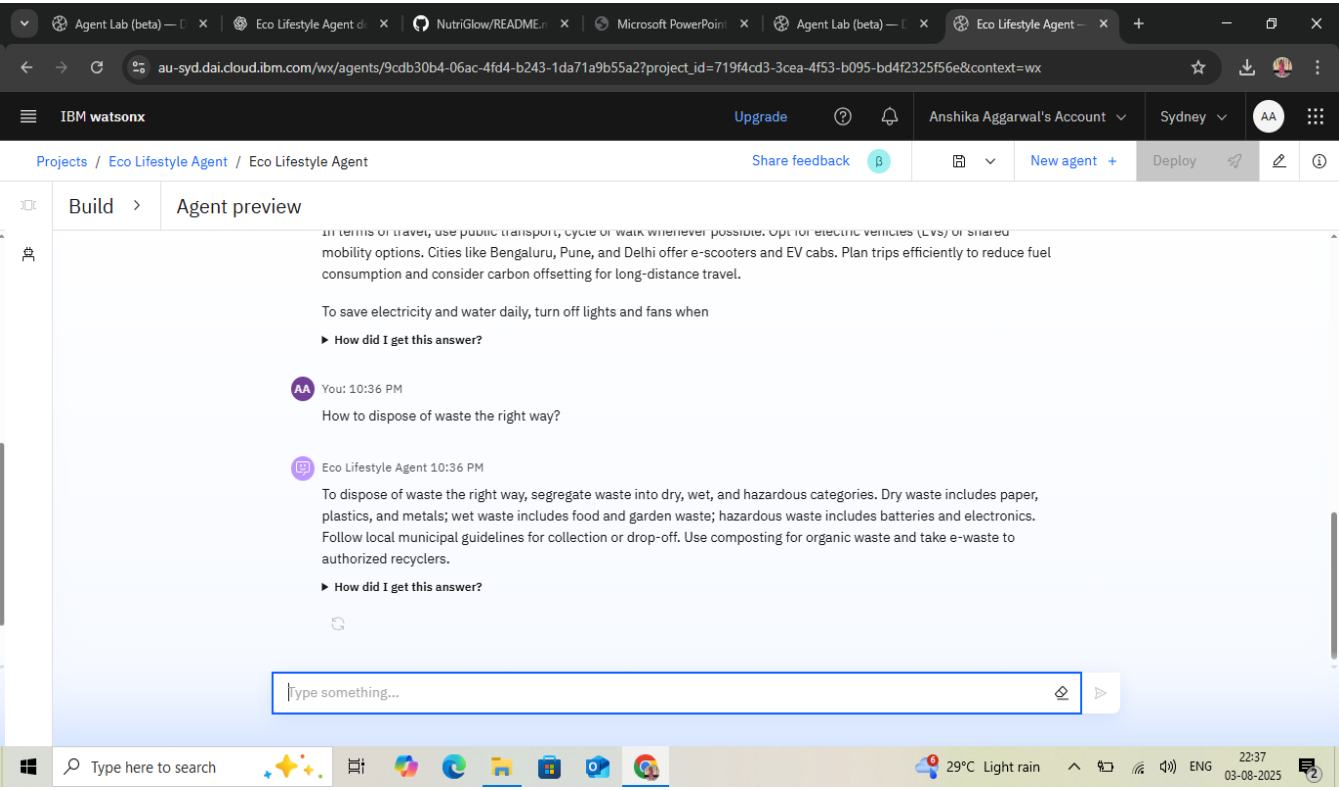
RESULT





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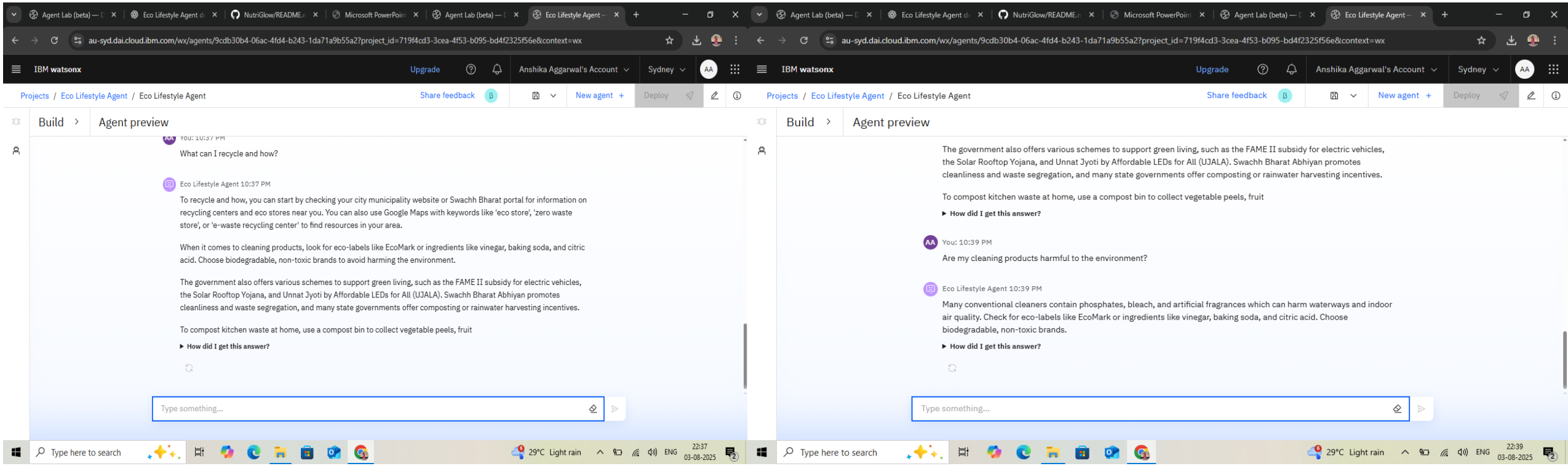
RESULT



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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

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IBM **SkillsBuild** Completion Certificate

This certificate is presented to

Anshika Aggarwal

for the completion of

Lab: Retrieval Augmented Generation with LangChain

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 18 Jul 2025 (GMT) **Learning hours:** 20 mins

THANK YOU

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