
IBM HACKATHON PROJECT

SMART FARMING AI AGENT

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OUTLINE

- Problem Statement
- Technology used
- Wow factor
- End users
- Result
- Conclusion
- Git-hub Link
- Future scope
- IBM Certifications

PROBLEM STATEMENT

Farmers face challenges in making informed decisions on crop selection, pest control, irrigation scheduling, soil health, and market trends. Lack of timely and personalized agricultural advice often leads to reduced crop yields, increased costs, and financial instability, especially for small and marginal farmers.

Proposed Solution:

An AI Agent for Smart Farming Advice, powered by RAG (Retrieval-Augmented Generation), supports small-scale farmers by delivering real-time, localized agricultural guidance. It retrieves trusted data on weather forecasts, soil conditions, crop recommendations, pest control measures, and current market prices from agricultural departments, meteorological sources, and agri tech platforms.

TECHNOLOGY USED

IBM cloud lite services

Natural Language Processing (NLP)

Retrieval Augmented Generation (RAG)

IBM Granite model

IBM CLOUD SERVICES USED

- IBM Cloud Watsonx AI Studio
- IBM Cloud Watsonx AI runtime
- IBM Cloud Agent Lab
- IBM Granite foundation model

WOW FACTORS

Personalized Farming Advice: Offers location-specific and crop-specific recommendations tailored to individual farmer needs.

Real-Time Decision Support: Uses live data (weather, soil, and market trends) for instant, actionable insights.

Multi-Language Support: Communicates in local languages, making it accessible to farmers across diverse regions.

Pest & Disease Early Detection: Identifies risks before they spread, saving crops and reducing pesticide costs.

Offline & Rural Connectivity Ready: Works even in areas with limited internet connectivity.
Sustainability Focus: Promotes optimized use of water, fertilizers, and pesticides, supporting eco-friendly farming.

Scalable & Adaptable: Can be deployed for various crops and regions with minimal customization.

END USERS

- Farmers
- Farmer Cooperatives & Associations
- Agri-Businesses & Input Supplier
- Agricultural Extension Officers

RESULTS

The screenshot displays the IBM watsonx interface. The top navigation bar includes the IBM watsonx logo, an 'Upgrade' button, a help icon, a notification bell, and a location dropdown set to 'Dallas'. Below this, the breadcrumb trail reads 'Projects / Smart Farming Agent / Smart Farming Agent'. The main interface is split into two panels. The left panel, titled 'Build', shows the configuration for an AI agent using the 'Model: granite-3-3-8b-instruct'. It features a 'Knowledge' section and a 'Tools' section with two buttons: 'Add a tool' and 'Create custom tool'. Under 'Added tools (5)', three tools are listed: 'Google search' (Retrieve information from the internet with the Google search engine.), 'DuckDuckGo search' (Retrieve information from the internet with the DuckDuckGo search engine.), and 'Wikipedia search' (Retrieve information from Wikipedia articles.). The right panel, titled 'Agent preview', shows a chat conversation. The user's message is 'Hey' (sent at 10:29 PM). The Smart Farming Agent's response is 'Hello! How can I assist you with smart farming today?' (sent at 10:29 PM). Below the response is a link '► How did I get this answer?' and a refresh icon. At the bottom of the chat is a text input field with the placeholder 'Type something...'. The 'Deploy' button in the top right is highlighted in blue.

IBM watsonx

Upgrade ?

Projects / Smart Farming Agent / Smart Farming Agent

Share feedback β Saving New agent + Deploy

Build AI Model: granite-3-3-8b-instruct

measures and current market prices from agricultural departments

Knowledge

Tools

Add a tool Create custom tool

Added tools (5)

Google search

Retrieve information from the internet with the Google search engine.

DuckDuckGo search

Retrieve information from the internet with the DuckDuckGo search engine.

Wikipedia search

Retrieve information from Wikipedia articles.

Agent preview

You: 10:29 PM

Hey

Smart Farming Agent 10:29 PM

Hello! How can I assist you with smart farming today?

► How did I get this answer?

Refresh

Type something...

RESULTS

Agent preview



Smart Farming Agent 10:29 PM

Hello! How can I assist you with smart farming today?

► How did I get this answer?



You: 10:30 PM

Best crop according to summer



Smart Farming Agent 10:30 PM

In summer, crops that are well-suited due to their heat tolerance include sweet corn, zucchini, pumpkins, okra, and various types of beans. However, the best crop can also depend on your specific region's soil conditions and market demands. I recommend checking with local agricultural departments or agri-tech platforms for more localized advice.

► How did I get this answer?



Type something...



RESULTS

Agent preview



You: 02:56 PM

Help me write an introduction for a paper on electric vehicles.



Research Agent 02:56 PM

Here are some recent research articles and news on artificial intelligence:

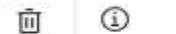
1. **MIT News:** In a new study, researchers discover the root cause of a type of bias in LLMs, paving the way for more accurate and reliable AI systems. [Read more](#)
2. **arXiv:** Harnessing AI Agents to Advance Research on Refugee Child Mental Health. [Read more](#)
3. **Stanford HAI:** News on how artificial intelligence improves patient care and expands research capacity. [Read more](#)
4. **Journal of Artificial Intelligence Research:** Current Issue on machine learning, natural language, planning and scheduling, robotics and vision, and uncertainty in AI. [Read more](#)
5. **ScienceDaily:** A team of researchers has shown that even small-scale quantum computers can enhance machine learning performance. [Read more](#)
6. **McKinsey:** The latest McKinsey Global Survey on AI finds that organizations are beginning to take steps that drive bottom-line impact. [Read more](#)
7. **Apple Machine Learning Research:** Overview of the latest advancements in machine learning and artificial intelligence. [Read more](#)

Type something...



Results

Deployment spaces / Smart Farming Agent / Smart Farming Agent /



Smart Farming Agent ✓ Deployed Online

API reference

Test

Preview



You 10:40 PM

Types of crops grown in different seasons



Smart Farming Agent 10:40 PM

The types of crops grown can vary greatly depending on the climate and geographical location. However, here's a general guideline for temperate regions:

1. **Spring:** Many farmers start with cool-season crops like lettuce, peas, radishes, spinach, and broccoli as soon as the ground can be worked. Later in spring warmer season vegetables such as tomatoes, peppers, eggplant, cucumbers are planted out after the last frost when soil temperatures have warmed sufficiently.
2. **Summer:** This is typically the growing season for most high water demanding crops including maize (corn), squash

Type something...



RESULTS

Deployment spaces / Smart Farming Agent / Smart Farming Agent /

Smart Farming Agent ✓ Deployed Online

API reference

Test

Preview

[Learn more](#) about the 2021-05-01 version query parameter

Code snippets

cURL

Java

JavaScript

Python

Scala


```
import java.io.*;
import java.net.MalformedURLException;
import java.util.Base64;
import java.util.HashMap;
import java.util.Map;
import java.net.HttpURLConnection;
import java.net.URL;
import java.nio.charset.StandardCharsets;
public class HttpClientTest {
    public static void main(String[] args) throws IOException {




        // NOTE: you must manually set API_KEY below using information retrieved from your IBM Cloud account







        String API_KEY = "<your API key>";
```

Show more

Results

 IBM watsonx


Upgrade ?   Dallas 

Deployment spaces / Smart Farming Agent / Smart Farming Agent /      


Smart Farming Agent ✔ Deployed Online

API reference Test **Preview**

New chat +


 You 10:40 PM

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Type something... 

CONCLUSION

- The AI agent helps farmers overcome the lack of timely and expert advice, ensuring informed decision-making in critical areas like crop selection, irrigation, and pest management.
- By integrating weather, soil, and market data, the agent enables precise and personalized recommendations, shifting farming from experience-based to evidence-based practices.
- Accurate guidance leads to improved crop yields, optimized resource usage, and reduced input costs, positively impacting farmer income.
- Encourages eco-friendly practices through optimal fertilizer, pesticide, and water usage, promoting sustainable agriculture.

GITHUB LINK

- <https://github.com/rahulrathaur2005/Smart-Farming-AI-Agent>

FUTURE SCOPE

- Multilingual support
- Voice & AR/VR Assistance
- Integration with IoT & Drones
- Global Crop Advisory
- Government & Policy Integration
- AI-Powered Marketplace

IBM CERTIFICATIONS

In recognition of the commitment to achieve professional excellence



Rahul Rathaur

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence



Issued on: Jul 16, 2025

Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/1a53f6eb-cb50-48d9-aba0-b162e05407fd>



IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Rahul Rathaur

for the completion of

Lab: Retrieval Augmented Generation with LangChain

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 19 Jul 2025 (GMT)

Learning hours: 20 mins



THANK YOU