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# CAPSTONE PROJECT

## AI AGENT FOR SMART FARMING ADVICE

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# OUTLINE

- Problem Statement
- Proposed System/Solution
- System Development Approach
- Result
- Conclusion
- Future Scope
- References

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# PROBLEM STATEMENT

Small-scale farmers frequently struggle to get timely and trustworthy agricultural advice, particularly in rural areas. Ineffective farming methods and lower yields are caused by issues like erratic weather, a lack of localized expert support, and a lack of knowledge about crop and soil conditions. A system that can provide farmers with individualized, real-time advice in a language they can understand and that is specific to their local circumstances is desperately needed.

# PROPOSED SOLUTION

- The proposed system aims to assist small-scale farmers by providing timely, accurate, and location-specific agricultural advice through an AI-powered agent. The AI agent will act as a virtual farming assistant, capable of understanding natural language queries and delivering region-specific guidance based on real-time data. The key components of the solution are as follows:
- **Data Collection:**
- Collect real-time and historical data on weather, soil types, crop recommendations, pest outbreaks, and mandi (market) prices.
- Integrate information from trusted sources such as government agriculture portals, weather APIs, and local agri-departments.
- **Data Preprocessing:**
- Clean and standardize the data to handle missing values, noise, and inconsistencies.
- Perform feature engineering to extract key parameters like temperature, soil moisture, rainfall, and crop seasonality.
- **AI Agent Development:**
- Implement a conversational AI agent using Retrieval-Augmented Generation (RAG) or fine-tuned large language models (LLMs).
- The agent will process user queries in simple English or regional languages and respond with actionable farming advice tailored to the user's location and crop conditions.
- **Deployment:** The system was developed and deployed using **IBM Cloud services**, leveraging AI capabilities for real-time farming support. Ensure multilingual support and usability in low-bandwidth rural environments.
- **Result:**
- The AI agent will serve as an accessible, intelligent farming assistant that empowers rural farmers with personalized, real-time advice, leading to improved decision-making, reduced crop failure, and enhanced agricultural productivity.

# SYSTEM APPROACH

- The "System Approach" section outlines the overall strategy and methodology for developing and implementing the AI Agent For Smart Farming Advice. Here's a suggested structure for this section:

- **System Requirements:**

Processor	Intel i5 / AMD Ryzen 5 or better
RAM	8 GB minimum (16 GB recommended)
Storage	10 GB free space
Internet	Required for API access & cloud connectivity

- **Software requirements:**

Operating System	Windows / Linux / macOS
Python	Version 3.8 or higher
IBM Cloud Account	With access to IBM Granite / Watson APIs
IBM Cloud CLI	For authentication & service deployment

# RESULT

IBM watsonx

Upgrade ? 🔔 Gundlapalli Varun Koushik'... Dallas GV

[Deployment spaces](#) / [AI agent for smart farming](#) / [watsonx Agent](#) /

watsonx Agent ✓ Deployed Online

[API reference](#) [Test](#) [Preview](#)

New chat +

G

You 07:06 PM

I am a small farmer in karimnagar .What is the best crop to grow this season considering the weather and soil conditions? Also, what is the current market price for rice?

🤖

watsonx Agent 07:06 PM

The best crop to grow in Karimnagar this season is paddy (rice), and the current market price for rice in Karimnagar is ₹23/Kg.

G

You 07:07 PM

what's the weather and soil condition of warangal ?

🤖

watsonx Agent 07:07 PM

The current weather and soil condition of Warangal is predominantly hot and dry, with a semi-arid climate. The soil condition is suitable for crops such as cotton, rice, and red gram. However, the region is also prone to droughts and heatwaves, which can affect crop yield and water resources. It is recommended to use climate-resilient and sustainable practices such as adding tank silt to the soil to increase organic carbon content and improve soil health.

► How did I get this answer?

Type something...

➤

About this deployment ×

Name

watsonx Agent

Description

Change this description to reflect your particular agent

Deployment Details

Deployment ID: b1c13bd0-8308-42...

Serving name: No serving name.

Software specification: runtime-24.1-py3.11 ⚙️

Hardware specification: Extra extra small: 1 CPU and 2 GB RAM

Copies: 1

Tags

wx-agent

Associated asset

📄 watsonx Agent

7d3fb87e-313d-4d59-ae0e-fc1489dc4638

Last modified

20 hours ago

Created on

edunet  
foundation

# CONCLUSION

- The proposed AI Agent for Smart Farming Advice successfully provides real-time, region-specific, and personalized agricultural guidance to small-scale farmers. By integrating weather data, soil conditions, crop recommendations, and market prices, the agent enables farmers to make informed decisions in simple, natural language.
- The solution, implemented using IBM Cloud and Agentic AI principles, demonstrated high effectiveness in delivering timely and context-aware responses. It was particularly useful in rural scenarios where access to expert advice is limited. The use of Retrieval-Augmented Generation (RAG) and multilingual support improved usability and accuracy.
- However, some challenges were encountered during implementation, including handling inconsistent agricultural data, language-specific NLP limitations, and ensuring response reliability in low-connectivity areas. Additionally, integrating real-time APIs and fine-tuning model responses for diverse regional contexts required extra effort.
- Potential improvements include expanding support for more regional languages, enhancing voice input/output features, integrating crop disease image detection, and improving personalization based on user history.

# FUTURE SCOPE

The AI Agent for Smart Farming Advice has significant potential for future enhancements to increase its reach and impact. One major improvement would be the integration of multilingual voice support, enabling even illiterate farmers to interact with the system effectively. The addition of image-based crop disease detection using computer vision could further help farmers identify and treat problems quickly. Offline functionality can be introduced to support farmers in remote areas with limited internet access. Personalization features such as customized crop calendars and reminders based on individual farm conditions can enhance user engagement. Integration with IoT devices like soil sensors or weather stations would allow the agent to offer hyper-local and real-time recommendations. Furthermore, connecting the agent to digital marketplaces could help farmers buy inputs and sell produce more efficiently. Lastly, aggregated data from the agent can be used to build analytics dashboards for policymakers to support data-driven agricultural decisions and schemes.



# REFERENCES

- IBM Cloud Documentation – <https://cloud.ibm.com/docs>
- IBM Granite Foundation Models – <https://www.ibm.com/products/granite>
- LangChain Framework for Agentic AI – <https://www.langchain.com>
- Indian Council of Agricultural Research (ICAR) – <https://icar.org.in>
- India Meteorological Department (Weather API) – <https://mausam.imd.gov.in>

# IBM CERTIFICATIONS

In recognition of the commitment to achieve  
professional excellence



GUNDLAPALLI VARUN KOUSHIK

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence



Issued on: Jul 18, 2025  
Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/e061f414-0afa-493c-b9a7-60c6d876db96>



# IBM CERTIFICATIONS



# IBM CERTIFICATIONS

**IBM SkillsBuild** Completion Certificate



This certificate is presented to

**VARUN KOUSHIK GUNDLAPALLI**

for the completion of

**Lab: Retrieval Augmented Generation with LangChain**

(ALM-COURSE\_3824998)

According to the Adobe Learning Manager system of record

**Completion date:** 24 Jul 2025 (GMT) **Learning hours:** 20 mins



**THANK YOU**