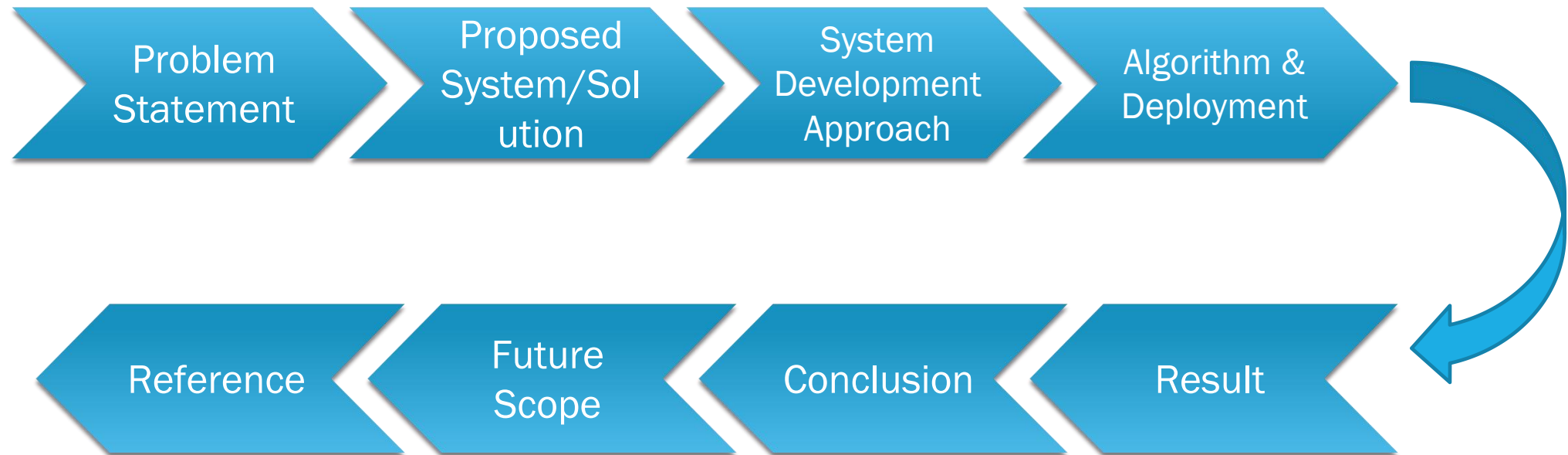

IBM HACKATHON PROJECT

SMARTFARMING AI AGENT

Presented By:
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DR BMN College of Home Science , Bachelor Of Computer
Applicaton (BCA)

OUTLINE



PROBLEM STATEMENT

- Small-scale farmers often face significant challenges due to limited access to real-time, localized, and actionable agricultural information. This knowledge gap hinders their ability to make timely and data-driven decisions regarding crop selection, soil preparation, pest management, and market selling strategies. Existing advisory systems are either inaccessible, generalized, outdated, or not available in local languages, leading to reduced yields, increased risk, and economic instability.



PROPOSED SOLUTION

To overcome the challenges faced by small-scale farmers, we propose the development of an AI-powered farming assistant built on Retrieval-Augmented Generation (RAG) architecture. This intelligent agent is designed to deliver real-time, localized agricultural guidance by dynamically retrieving verified data and generating personalized responses.

Real -Time Data Retrieval from Trusted Sources

- Agricultural departments
- Meteorological Services
- Commodity and mandi platform

Personalized Agricultural Guidance

- Local weather forecasts
- Soil conditions
- Suitable crop selection
- Pest control measures

Context-Aware Responses

- “Which crop is best to plant this season in my region?”
- “What is today’s mandi rate for tomatoes?”

Multilingual Natural Language Support

- Enables text interaction in local and regional languages, breaking language barriers for grassroots farmers.

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

This agent will significantly reduce guesswork, improve the quality of farming decisions, help small-scale farmers make timely choices, and foster inclusive, data-driven agriculture by making expert knowledge more accessible, localized, and actionable.

Impact:

- Reduces dependency on unreliable advice or guesswork
- Increases yield and income through data-backed decisions
- Empowers rural communities with accessible, tech-driven solutions
- Promotes climate-resilient farming through informed planning

END USERS

- Small-scale and marginal farmers Research Institutions and Universities
- Agricultural extension workers
- Farmer Producer Organizations (FPOs)
- NGOs and Agri-tech startups
- State or national agriculture departments
- Agri-students or grassroots innovators

RESULTS

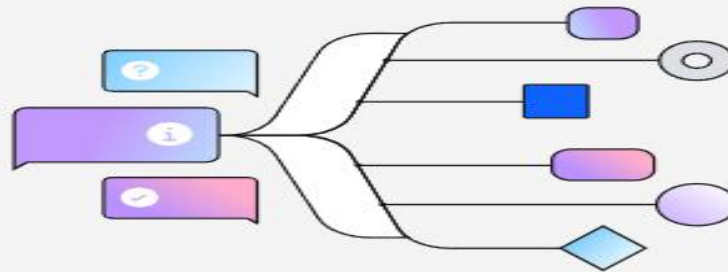
Agent preview



SmartFarming Agent 08:23 PM

Welcome to SmartFarming Agent

Hello! I am BotaniQ, your SmartFarming Buddy lets Revolutionizing the Way We Grow.



Type something...

Word



RESULTS

Agent preview

hello



SmartFarming Agent 08:25 PM

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

► How did I get this answer?



You: 08:26 PM

tell me 3 smart farming tips that a poor farmer can also implement



SmartFarming Agent 08:26 PM

1. **Soil Testing:** A simple soil testing kit can help a farmer understand the nutrient content and pH level of their soil. This allows for targeted fertilizer application, reducing costs and environmental impact.
2. **Drip Irrigation:** Implementing a drip irrigation system can significantly save water and improve crop health. It delivers water directly to the plant roots, minimizing evaporation and runoff.
3. **Crop Rotation:** This practice can enhance soil fertility and control pests and diseases. By rotating crops, farmers can naturally replenish soil nutrients and disrupt pest life cycles.

These methods are cost-effective and can greatly improve farming efficiency and sustainability.

|Type something...



RESULTS

Agent preview

► How did I get this answer?



You: 08:27 PM

tell me rabi crops and list few tips also



SmartFarming Agent 08:27 PM

Rabi crops are those that are sown in winter and harvested in late spring or early summer. They are crucial for farmers in India as they provide a second source of income after the kharif season. Here are a few Rabi crops and some tips for their cultivation:

1. **Wheat:** It's one of the most important Rabi crops. Tips include timely sowing (usually October to November), maintaining optimal soil moisture, and using disease-resistant varieties.
2. **Barley:** This crop is relatively drought-resistant and can be grown in poorer quality soils. It's recommended to sow barley in early November and ensure proper weed management.
3. **Gram (Chickpea):** It's a good source of protein and can fix nitrogen in the soil. Sowing should be done in November-December, and regular irrigation is necessary until the crop establishes.
4. **Mustard:** It's a high-value Rabi crop. Planting in October-November with adequate soil preparation and weed management is recommended.
5. **Peas:** They are a cool-season crop and can be sown in November-December. Proper spacing

Type something...



Projects / AgentAI1 / Agent Lab

Share feedback 0

Unsaved

New agent +

Deploy

Build

AI

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

~

Agent preview



Add up to 4 quick start questions that your users can select.



Configuration

Framework

Architecture

LangGraph

ReAct

Instructions

Advanced configuration

Task: help with outgunning and resource allocation.

9. Continuous Learning & System Improvement

Task: Refine predictions and recommendations based on new data.

Task: Automatically update models and strategies for ongoing improvement.

Knowledge

Vector index

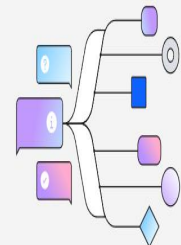
Seasonal Farming Calendar in India



SmartFarming Agent 08:31 PM

Welcome to SmartFarming Agent

Hello! I am BotaniQ, your SmartFarming Buddy lets Revolutionizing the Way We Grow.



Type something...



Battery status: 70% remaining

CONCLUSION

- Bridges the knowledge gap for small and marginal farmers
- Provides real-time, localized agricultural guidance using RAG
- Supports natural language interaction in regional/local languages
- Enables data-driven decision-making in crop selection, pest control, market pricing, etc.
- Promotes inclusive, modern, and sustainable agriculture
- Has the potential to transform rural farming and improve livelihoods at scale

GITHUB LINK

- https://github.com/KasPatra/SmartFarming_AgenticAI

FUTURE SCOPE

- Integration with IoT devices (e.g., soil sensors, weather stations) for real-time field data
- Mobile app deployment for easy farmer access, even in low-connectivity regions
- Personalized learning models based on individual farm data and past decisions
- Expansion to more languages and dialects for broader regional coverage
- Satellite data integration for remote crop health and weather monitoring
- Voice-enabled interaction for non-literate or elderly farmers
- Marketplace integration to connect farmers directly with buyers and suppliers
- Analytics dashboard for government agencies and NGOs to monitor trends and provide targeted support
- Sustainability monitoring to encourage eco-friendly farming practices
- Farmer training modules embedded in the agent for continuous learning

IBM CERTIFICATIONS

In recognition of the commitment to achieve
professional excellence



KOMAL PATRA

Has successfully satisfied the requirements for:

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IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Komal Patra

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

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THANK YOU