

CAPSTONE PROJECT

Research agent

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OUTLINE

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- ▶ **Technology used**
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Problem Statement

Problem Statement No.1 - Research Agent

The Challenge- A Research Agent is an AI system designed to assist with academic and scientific research tasks. It can autonomously search for literature, summarize papers, and organize references.

Using natural language processing, it understands research questions and retrieves relevant information.

The agent can generate reports, suggest hypotheses, and even draft sections of research papers.

It saves time by automating repetitive tasks like citation management and data extraction.

Research Agents enhance efficiency, accuracy, and innovation in both academic and industrial R&D.

Technology used

Framework : LangGraph

Architecture : ReAct

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

AI Research Assistant: Revolutionizing Academic Discovery and Collaboration

This intelligent research assistant dramatically shortens the time spent on literature reviews, elevates the quality of academic insights, and guides early-stage researchers toward promising directions. By making scholarly knowledge more discoverable, contextual, and actionable, it also encourages meaningful interdisciplinary collaboration.

Key Features

Semantic Search

Intuitively searches across research papers, journals, and datasets using meaning-based queries rather than simple keywords.

Automatic Summarization

Instantly generates concise summaries of selected papers to help users grasp key findings without reading full texts.

Citation and Influence Analysis

Tracks citations to map the influence and evolution of ideas over time.

Smart Paper Recommendations

Suggests relevant research papers tailored to a user's current topic or area of interest.

Trend Analysis

Analyzes historical data to uncover emerging trends, keyword growth, and shifts in research focus.

Collaboration Mapping

Identifies potential collaborators, co-authors, or institutions working on similar topics to foster academic partnerships.

End users

- ▶ Academic Researchers
- ▶ Research Institutions and Universities
- ▶ Industry R&D Teams
- ▶ Educators

Results

IBM watsonx

Upgrade ⓘ ⚙️ Harshit Sharma's Account ▾ Dallas ▾ HS ⋮

Projects / ai / researchAgent

Share feedback ⓘ

Autosave on

New agent +

Deploy ⚙️ ⓘ

Saved agents

From ai

researchAgent

Ai buddy for study.

Build

AI Model: granite-3-3-8b-instruct ⌵ ⚙️ ⏪

Setup

Name

researchAgent

Description 19/100

Ai buddy for study.

Icon

Placeholder image

Agent preview

researchAgent 07:45 PM

Welcome to researchAgent

Ai buddy for study.

Type something... ⚙️ ➤

Results

IBM watsonx

Upgrade ⓘ 🔔 Harshit Sharma's Account ▾ Dallas ▾ HS ⋮

Projects / ai / researchAgent

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Build

AI Model: granite-3-3-8b-instruct ▾ ⚙️

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

Configuration

Framework

LangGraph ▾

Architecture

ReAct ▾

Instructions

Advanced configuration

You can autonomously search for literature, summarize papers, and organize references.
You can understand research questions and retrieves relevant information.
Generate reports, suggest hypotheses, and even draft sections of

Knowledge ▾

Tools ▾

Add a tool

Create custom tool

Agent preview

researchAgent 07:45 PM

Welcome to researchAgent

Ai buddy for study.

Type something...

🗨️ ▶️

Results

Advanced configuration

Agent instructions

Common instructions

Agent instructions are unique to this agent and will affect its specific behavior.

[Reset to default](#)



You can autonomously search for literature, summarize papers, and organize references.
You can understand research questions and retrieve relevant information.
Generate reports, suggest hypotheses, and even draft sections of research papers.
Automate repetitive tasks like citation management and data extraction.
Act research agents enhance efficiency, accuracy, and innovation in both academic and industrial R&D.

Cancel

Apply

Results

Advanced configuration

Agent instructions

Common instructions

Adding to agent instructions and define common behavior. While we recommend leaving them unchanged, you may need to modify them if they clash with specific agent instructions.

Reset to default

Respond to only academic questions.

Cancel

Apply

edunet
foundation

Results

IBM watsonx

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Projects / ai / researchAgent

Share feedback ⓘ Autosave on New agent + Deploy ⓘ

Saved agents

From ai

researchAgent
Ai buddy for study.

Build

AI Model: granite-3-3-8b-instruct ▾ ⚙ <

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.

Webcrawler

Retrieve information from a website.

Weather

Retrieve the weather of a city.

Agent preview

researchAgent 07:45 PM

Welcome to researchAgent

Ai buddy for study.

Type something...

Results

IBM watsonx

Upgrade ?

Harshit Sharma's Account

Dallas

HS

Deployment spaces / database / researchAgent

Deployments

Code

Schema

🔍 Search

↻ New deployment

Name	Type	Status	Tags	Last modified
<div>🔗</div> <div>researchAgent</div>	Online	<div>✔️</div> <div>Deployed</div>	<div>wx-agent</div> <div>✎</div>	<div>3 minutes ago</div> <div>Harshit Sharma (You)</div>

About this asset

Name

researchAgent

Description

Ai buddy for study.

Asset Details

Type: python

AI service ID: b82487e6-3e20-4d...

Software specification: runtime-24.1-py3.11

Tags

wx-agent

Last modified

3 minutes ago by Harshit Sharma

Created on

Jul 31, 2025 by Harshit Sharma

Items per page: 20

1-1 of 1 items

1 of 1 pages

Results

IBM watsonx

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[Deployment spaces](#) / [database](#) / [researchAgent](#) /

researchAgent ✔ Deployed Online


< reference Test **Preview**

New chat +

researchAgent 07:48 PM


Welcome to researchAgent

Ai buddy for study.




Type something... ➤

About this deployment ×

Name 


researchAgent

Description 


Ai buddy for study.

Deployment Details


Deployment ID: 553aa19d-8f05-49...

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 

 [researchAgent](#)

b82407e6-3e20-4def-a282-00912de0763c

Results

IBM watsonx

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Dallas

HS

[Deployment spaces](#) / [database](#) / [researchAgent](#) /

researchAgent ✓ Deployed Online

< reference

Test

Preview

New chat +

H You 07:48 PM

hi

researchAgent 07:48 PM

1: Thinking...

Steps created by Agent

Type something...

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wx-agent

Associated asset

researchAgent

b82407e6-3e20-4def-a282-00912de0763c

Results

Agent preview



You 07:48 PM

What is ai



Research Agent 07:48 PM

Artificial Intelligence (AI) refers to the ability of computer systems to perform tasks that typically require human intelligence, such as learning, problem-solving, and decision-making. In essence, AI aims to create machines that can mimic human-like cognitive functions. This includes reasoning, perception, language understanding, and the capacity to learn from experience.

Type something...



Results

Deployed AI Agent

The screenshot displays the IBM Watsonx interface for a deployed AI agent named 'researchAgent'. The agent is shown as 'Deployed' and 'Online'. The 'Preview' tab is active, showing a chat history. The user asks: 'Give me a simple hypothesis about plants and sunlight.' The Research Agent responds with two hypotheses:

- Hypothesis: Plants grow taller when they receive more sunlight.**
 - **Independent Variable:** Amount of sunlight received.
 - **Dependent Variable:** Height of the plants.
 - **Source:** [Brainly](#)
- Hypothesis: Light helps plants grow.**
 - **Prediction:** If I put my plants in the warm sun, they will grow faster.
 - **Source:** [LinkedIn - Lukas Vermeer](#)

Below the second hypothesis, a third hypothesis is partially visible: 'Hypothesis: If plants receive more sunlight, then they will be taller than those received less light.' The input field at the bottom contains the text 'Type something...'.

Conclusion

- ▶ The agent can generate reports, suggest hypotheses, and even draft sections of research papers.
- ▶ It saves time by automating repetitive tasks like citation management and data extraction.
- ▶ Research Agents enhance efficiency, accuracy, and innovation in both academic and industrial R&D.

GitHub Link

ZenoZeus (Harshit Sharma) · GitHub

https://github.com/ZenoZeus/IBM_SKILLBUILD_AI_ML

FUTURE SCOPE

- ▶ Multilingual Research Support
- ▶ Voice-Activated Research Assistant
- ▶ Real-Time Collaboration Features
- ▶ Research Gap and Novel Topic Identification
- ▶ Integration with Publishing Platforms
- ▶ AI-Assisted Paper Drafting

IBM Certifications



IBM Certifications



IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Harshit Sharma

for the completion of

**Lab: Retrieval Augmented Generation with
LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 29 Jul 2025 (GMT)

Learning hours: 20 mins

THANK YOU