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# **IBM SKILLSBUILD PROJECT**

## **RESEARCH AGENT**

**Presented By :**

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**Department : COMPUTER SCIENCE AND TECHNOLOGY**

# OUTLINE

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- TECHNOLOGY USED
- WOW FACTOR
- END USERS
- RESULT
- CONCLUSION
- GITHUB LINK
- FUTURE SCOPE
- IBM CERTIFICATIONS

# PROBLEM STATEMENT

## Current Challenge:

Researchers, students, and professionals struggle with:

- Rapidly increasing volume of academic publications.
- Difficulty in synthesizing multi-domain information quickly.
- Manual literature reviews being time-consuming and inefficient.

## Proposed Solution:

An AI-powered Research Agent using NLP + Retrieval-Augmented Generation (RAG), deployed on IBM Cloud with IBM Granite model, to:

- Search literature.
- Summarize papers.
- Organize references.
- Suggest hypotheses.
- Identify research gaps.

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# TECHNOLOGY USED

- IBM Cloud Lite Services
- Natural Language Processing (NLP)
- Retrieval-Augmented Generation (RAG)
- IBM Granite Foundation Model

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# IBM CLOUD SERVICES USED

- IBM watsonx.ai Studio
- IBM watsonx.ai Runtime
- IBM Granite Model
- IBM Cloud Object Storage

# WOW FACTORS

- Semantic Search across research papers, journals, datasets.
- Auto-Summarization of papers.
- Citation & Reference Analysis to trace influence.
- Research Recommendations based on current topics.
- Trend Analysis over time for keywords/domains.
- Collaboration Mapping for potential co-authors/institutions.


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# END USERS

- Academic Researchers
- Universities & Research Institutes
- Industry R&D Teams
- Educators


# RESULTS

### Agent preview


 Research Agent 12:47 AM

#### Welcome to Research Agent


A Research Agent is an AI system designed to assist with academic and scientific research tasks.



### Agent preview

 You: 11:00 PM

tell me something about solar system

 Research Agent 11:00 PM

The Solar System consists of the Sun and the objects that orbit it. The name comes from Sól, the Latin name for the Sun. It formed about 4.6 billion years ago when a dense region of a molecular cloud collapsed, creating the Sun and a protoplanetary disc from which the orbiting bodies assembled. The fusion of hydrogen into helium inside the Sun's core releases energy, which is primarily emitted through its outer photosphere. This creates a decreasing temperature gradient across the system. Over 99.86% of the Solar System's mass is located within the Sun.

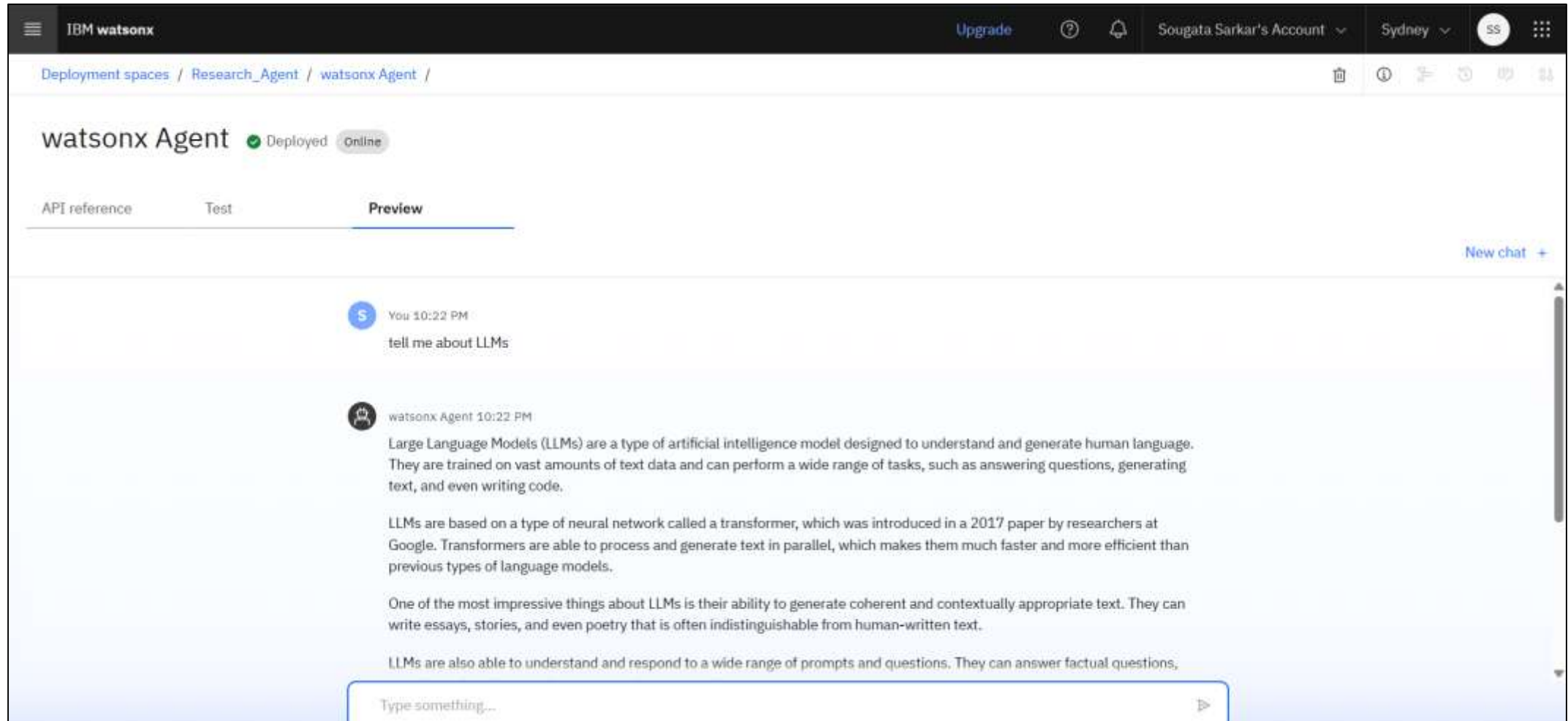
The most massive objects that orbit the Sun are the eight planets. Closest to the Sun in order of increasing distance are the four terrestrial planets – Mercury, Venus, Earth and Mars. Only the Earth and Mars orbit within the Sun's habitable zone, where liquid water can exist on the surface. Beyond the frost line at about five astronomical units (AU), are two gas giants – Jupiter and Saturn – and two ice giants – Uranus and Neptune. Jupiter and Saturn possess nearly 90% of the non-stellar mass of the Solar System.

There are a vast number of less massive objects. There is a strong consensus among astronomers that the Solar System has at least nine dwarf planets: Ceres, Orcus, Pluto, Haumea, Quaoar, Makemake, Gonggong, Eris, and Sedna. Six planets, seven dwarf planets, and other bodies have orbiting natural satellites, which are commonly called 'moons', and range from sizes of dwarf planets to the Earth's Moon to micrometers. There are small Solar System bodies such as asteroids.

edunet  
foundation



# RESULTS



The screenshot displays the IBM watsonx Agent web interface. At the top, the header includes the IBM watsonx logo, an 'Upgrade' button, a help icon, a notification bell, the user's account name 'Sougata Sarkar's Account', the location 'Sydney', and a user profile icon. Below the header, the breadcrumb navigation shows 'Deployment spaces / Research\_Agent / watsonx Agent'. The main content area features the 'watsonx Agent' title with a green 'Deployed' status and an 'Online' indicator. There are three tabs: 'API reference', 'Test', and 'Preview', with 'Preview' being the active tab. On the right side of the preview area, there is a 'New chat +' button. The chat interface shows a conversation where the user asks 'tell me about LLMs' at 10:22 PM. The watsonx Agent responds with a detailed explanation of Large Language Models (LLMs), their training on vast text data, their use of transformer neural networks, and their ability to generate coherent text and answer questions. The chat input field at the bottom is labeled 'Type something...'. The entire interface is set against a light blue background with a dark blue header.

IBM watsonx Upgrade ? Sougata Sarkar's Account Sydney SS

Deployment spaces / Research\_Agent / watsonx Agent

watsonx Agent Deployed Online

API reference Test **Preview**

New chat +

**S** You 10:22 PM  
tell me about LLMs

**watsonx Agent** 10:22 PM  
Large Language Models (LLMs) are a type of artificial intelligence model designed to understand and generate human language. They are trained on vast amounts of text data and can perform a wide range of tasks, such as answering questions, generating text, and even writing code.

LLMs are based on a type of neural network called a transformer, which was introduced in a 2017 paper by researchers at Google. Transformers are able to process and generate text in parallel, which makes them much faster and more efficient than previous types of language models.

One of the most impressive things about LLMs is their ability to generate coherent and contextually appropriate text. They can write essays, stories, and even poetry that is often indistinguishable from human-written text.

LLMs are also able to understand and respond to a wide range of prompts and questions. They can answer factual questions,


Type something...

# RESULTS

## Preview

Overall, LLMs are a powerful and exciting technology with a wide range of potential applications. They are already being used in a variety of fields, from customer service to content creation, and their use is likely to continue to grow in the coming years.

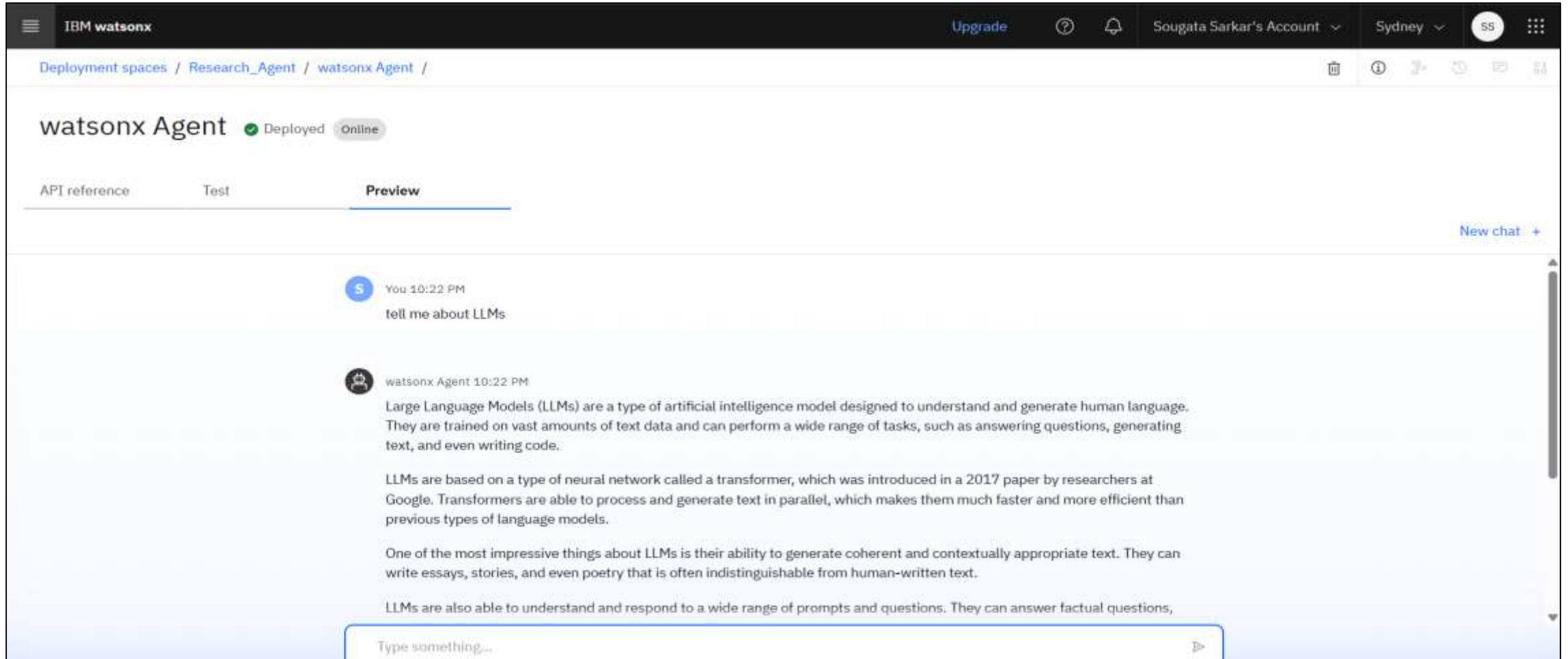
**S** You 10:23 PM  
give me the current temperature and weather in Kolkata

 watsonx Agent 10:23 PM  
The current weather in Kolkata is 101°F with a RealFeel® of 101°. The wind is blowing from the south at 8 mph, with gusts up to 11 mph. The humidity is 73%, which is considered dangerously humid.

► How did I get this answer?



# RESULTS



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IBM watsonx Upgrade ? ⓘ Sougata Sarkar's Account Sydney SS

Deployment spaces / Research\_Agent / watsonx Agent /

watsonx Agent ✓ Deployed Online

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# CONCLUSION

The Research AI Agent, deployed on IBM Cloud with watsonx.ai and the Granite model, streamlines literature search, summarization, and citation management. It identifies research gaps, drafts paper sections, and automates repetitive tasks, enabling researchers to focus on innovation. By enhancing efficiency, accuracy, and knowledge discovery, it demonstrates the transformative potential of AI-driven research tools in academic and industrial R&D.

# FUTURE SCOPE

- Multilingual research support.
- Voice-activated research assistant.
- Real-time collaboration features.
- Integration with publishing platforms.
- AI-assisted paper drafting.

# IBM CERTIFICATIONS



IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Sougata Sarkar

for the completion of

**Lab: Retrieval Augmented Generation with  
LangChain**

(ALM-COURSE\_3824998)

According to the Adobe Learning Manager system of record

**Completion date:** 30 Jul 2025 (GMT)

**Learning hours:** 20 mins

In recognition of the commitment to achieve  
professional excellence



# Sougata Sarkar

Has successfully satisfied the requirements for:

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## Journey to Cloud: Envisioning Your Solution

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Issued on: Jul 23, 2025  
Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/9b41ae91-a5d1-47a5-b698-ed0845e63588>





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## GITHUB LINK

<https://github.com/sougata-sarkar-dev/research-agent.git>



**THANK YOU**