

IBM HACKATHON PROJECT

SMART STUDENT ASSISTANT AGENT

Presented By:

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OUTLINE

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

PROBLEM STATEMENT

Students and researchers often face difficulties when engaging with complex academic texts, research articles, and scholarly materials. Understanding dense language, extracting key points, and formatting citations are time-consuming and mentally demanding tasks, especially for those in non-English-speaking or underserved communities. These learners typically lack access to smart tools that provide personalized academic support. The absence of real-time, intelligent academic guidance creates a gap that hinders learning efficiency, productivity, and overall comprehension in academic environments.

Proposed Solution:

To bridge this gap, we propose a Smart Student Assistant Agent built using IBM Watsonx.ai and Retrieval-Augmented Generation (RAG). This AI-powered assistant allows users to upload academic documents and receive accurate summaries, contextual answers, and auto-generated citations in formats like APA, MLA, and IEEE. The assistant focuses solely on academic content, filtering out non-academic domains such as banking or travel. With multilingual support, a secure cloud-based infrastructure via IBM Cloud, and real-time interaction capabilities, the solution provides accessible, ethical, and efficient academic assistance to students and researchers across diverse educational backgrounds.

TECHNOLOGY USED

- **IBM Watsonx.ai** – For natural language understanding and agent creation
- **IBM Granite Foundation Models** – To generate human-like, context-aware responses
- **Retrieval-Augmented Generation (RAG)** – For document-based Q&A
- **Watsonx Vector Index** – To search and retrieve relevant content from PDFs
- **Natural Language Processing (NLP)** – Enhances interpretation and conversation quality
- **IBM Cloud Object Storage** – For secure storage of academic documents
- **IBM Cloud Lite** – For hosting and deploying the application
- **IBM Cloud IAM** – To manage secure access control for users and services

IBM CLOUD SERVICES USED

- **Watsonx.ai Studio** – For building, training, and deploying the AI assistant
- **IBM Granite Foundation Models** – To power natural language generation and understanding
- **Watsonx Vector Index** – Enables Retrieval-Augmented Generation from uploaded documents
- **IBM Cloud Object Storage** – Securely stores academic PDFs and project assets
- **IBM Cloud IAM (Identity and Access Management)** – Manages user and service-level access
- **IBM Cloud Lite Account** – Free-tier environment for development and deployment

WOW FACTORS

- **Academic-only focus** – Filters out non-educational queries (e.g., banking, travel, entertainment)
- **Document-grounded answers** – Uses Retrieval-Augmented Generation (RAG) for reliable, source-based responses
- **Powered by IBM Granite LLM** – Provides intelligent, human-like academic support
- **Multilingual-ready** – Can be expanded to support learners in regional and global languages
- **Auto citation generation** – Supports APA, MLA, and IEEE formats
- **Built entirely on IBM Cloud** – Scalable, secure, and efficient architecture
- **Handles off-topic input smartly** – Responds with polite redirection when outside academic scope
- **Supports student success** – Improves comprehension, productivity, and research outcomes

END USERS

- **Undergraduate and postgraduate students** – For academic assistance and research support
- **Teachers and professors** – To simplify content explanation and research summarization
- **Academic researchers** – For quick understanding and citation generation
- **Thesis and journal writers** – To streamline reading, referencing, and knowledge extraction
- **Non-English-speaking learners** – With future support for multilingual interactions
- **Educational NGOs and foundations** – To support underserved students
- **Schools, colleges, and institutions** – For integrated digital learning tools
- **Self-help groups and rural learners** – To promote inclusive education access

RESULTS

The screenshot displays the IBM Watsonx Agent Lab interface. The top navigation bar includes the IBM Watsonx logo, a 'Projects' dropdown, and the current project path: 'Smart student agent AI / Agent Lab'. The main interface is split into two panels: 'Build' on the left and 'Agent preview' on the right.

Build Panel:

- Model:** Set to 'granite-3-3-8b-instruct'.
- Knowledge:** A section for adding vector indexes. It shows a 'Clear chat' button and a dropdown menu with 'AD group 18 poster'. A note states: 'If you want to add a vector index to the agent, clear the agent preview chat.'
- Tools:** A section for adding custom tools. It includes buttons for 'Add a tool' and 'Create custom tool'.
- Added tools (6):** A list of tools with settings and delete icons:
 - 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.
 - Document search - AD group 18 poster:** Search documents with vector indexes.

Agent preview Panel:

- Agent preview:** A list of network-related concepts with their definitions:
 - 1. Network Interface Card (NIC):** This is the hardware component that connects a device to a network, allowing it to send and receive data.
 - 2. Routers:** These devices forward data packets between computer networks. They connect at least two networks, such as two LANs or WANs or the local network and its wide area network (WAN) connection.
 - 3. Switches:** These devices connect devices together on a computer network by using packet switching to receive, process, and forward data to the destination device.
 - 4. Modems:** These are used to establish a connection to the Internet through telephone or cable lines.
 - 5. Hubs:** These are networking devices for connecting multiple Ethernet devices in a local area network (LAN). They operate at the physical layer of the OSI model and are largely obsolete, having been replaced by switches.
 - 6. Protocols:** These are rules that dictate how data is transmitted between different devices on a network. The most widely used protocol suite is TCP/IP (Transmission Control Protocol/Internet Protocol).
- Feedback:** A section with the text: 'If you have specific questions about computer networks, such as how they work, different types of networks, network security, or network design, feel free to ask!'. Below this is a link: '► How did I get this answer?' and a refresh icon.
- Input:** A text input field with the placeholder 'Type something...' and a 'Send' button.

RESULTS

The screenshot displays the IBM watsonx Agent Lab interface. The top navigation bar includes the URL `dataplatfrom.cloud.ibm.com/wx/agents?context=wx&project_id=ec30b166-7797-46fa-befa-69a96b296770`, the user profile 'Nagula Koushik Goud's Acc...', and location 'Dallas'. The main header shows 'Projects / Smart student agent AI / Agent Lab' and buttons for 'Share feedback', 'Unsaved', 'New agent', and 'Deploy'.

The interface is divided into two main panels:

- Build Panel:** Features a 'Model: llama-3-3-70b-instruct' dropdown. It includes a 'Quick start questions' section with a placeholder 'Add up to 4 quick start questions that your users can select.' Below this are expandable sections for 'Configuration', 'Knowledge', and 'Tools'. The 'Tools' section shows 'Added tools (4)' and includes a 'Google search' tool with the description 'Retrieve information from the internet with the Google search engine.'
- Agent preview Panel:** Displays a chat history with the following messages:
 - You:** 02:05 PM, 'hello'.
Smart Student Agent – Prohibited Actions: 02:05 PM. Response: 'The search results for "hello" include various music videos, products, and news articles. The top result is the official music video for Adele's song "Hello" on YouTube, followed by a link to Hello Products, a company that offers oral care products. There are also links to Lionel Richie's song "Hello" and HelloFresh, a meal kit delivery service. Additionally, there are news articles from HELLO! magazine, including the US edition, and a Wikipedia page for the song "Hello" by Adele.' Followed by a link 'How did I get this answer?'.
 - You:** 02:05 PM, 'i need python program'.
Smart Student Agent – Prohibited Actions: 02:05 PM. Response: 'This is a JSON response from the GoogleSearch function, which includes a list of search results for the query "hello". The results include links to music videos, products, news articles, and Wikipedia pages.' Followed by a link 'How did I get this answer?'.

The chat history also shows a detailed view of the JSON response for the second query:

```
1: {"q": "hello"}
2: Generating final answer
```

Both steps are marked with green checkmarks and labeled 'Steps created by Agent'.

RESULTS

dataplatform.cloud.ibm.com/wx/agents?context=wx&project_id=ec30b166-7797-46fa-befa-69a96b296770

IBM watsonx Upgrade ? Nagula Koushik Goud's Acc... Dallas

Projects / Smart student agent AI / Agent Lab Share feedback B Unsaved New agent + Deploy

Build

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

Knowledge

Vector index Clear chat

AD group 18 poster

If you want to add a vector index to the agent, clear the agent preview chat.

Tools

Add a tool Create custom tool

Added tools (6)

- 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.
- Document search - AD group 18 poster**

Agent preview

Deployment has started
Your AI service deployment has started.
[View status](#)
Timestamp 2:29:19 PM

- 1. Network Interface Card (NIC):** This is the hardware network, allowing it to send and receive data.
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- 6. Protocols:** These are rules that dictate how data is transmitted between different devices on a network. The most widely used protocol suite is TCP/IP (Transmission Control Protocol/Internet Protocol).

If you have specific questions about computer networks, such as how they work, different types of networks, network security, or network design, feel free to ask!

► How did I get this answer?

Type something...

RESULTS

Deployed AI Agent

The screenshot shows the IBM Watsonx interface for a deployed AI agent. The browser address bar displays the URL: `datapatform.cloud.ibm.com/ml-runtime/deployments/cb35c2b9-eafc-4319-b5ed-312e9a8e9e0d?space_id=591d4ff2-eb3e-4d1c-a7b6-37b801f84375&context=wx`. The page title is "Smart Student Agent – Prohibited Actions" with a green "Deployed" status and an "Online" label. The "API reference" tab is active, showing endpoints for inference. A "Public endpoint" is highlighted with a blue box, and a "Copy to clipboard" button is visible next to it. The "About this deployment" sidebar on the right provides details about the deployment, including its name, description, and specifications.

Deployment spaces / Research course subject / Smart Student Agent – Prohibited Actions" /

Smart Student Agent – Prohibited Actions" Deployed Online

API reference Test Preview

Endpoints for inferencing ⓘ

Private endpoint

Bearer <token> ⓘ

https://us-south.ml.cloud.ibm.com/ml/v4/deployments/cb35c2b9-eafc-4319-b5ed-312e9a8e9e0d/a1_service?...

https://us-south.ml.cloud.ibm.com/ml/v4/deployments/cb35c2b9-eafc-4319-b5ed-312e9a8e9e0d/a1_service?...

Public endpoint

https://us-south.ml.cloud.ibm.com/ml/v4/deployments/cb35c2b9-eafc-4319-b5ed-312e9a8e9e0d/a1_service?...

https://us-south.ml.cloud.ibm.com/ml/v4/deployments/cb35c2b9-eafc-4319-b5ed-312e9a8e9e0d/a1_ser...

Copy to clipboard

Learn more about the 2021-05-01 version query parameter

Code snippets

cURL	Java	JavaScript	Python	Scala
<pre># NOTE: you must set \$API_KEY below using information retrieved from your IBM Cloud account (https://datapatform.cloud.ibm.com/docs/content) export API_KEY=<your API key> export IAM_TOKEN=\$(curl --insecure -X POST --location "https://iam.cloud.ibm.com/identity/token" \</pre>				

About this deployment ⓘ

Name
Smart Student Agent – Prohibited Actions"

Description
This guideline outlines the specific actions and behaviors that the Smart Student Assistant Agent mu

Deployment Details
Deployment ID: cb35c2b9-eafc-43...
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
Smart Student Agent – Prohibited Acti
29d1511d-c546-4bf1-ac45-463fa7c32b17

Last modified
1 minute ago

CONCLUSION

- The Smart Student Assistant Agent provides real-time, AI-powered academic support.
- It simplifies research by summarizing documents and generating accurate citations.
- Built with IBM Watsonx.ai and Granite LLMs, ensuring intelligent and context-aware responses.
- Uses RAG (Retrieval-Augmented Generation) for reliable, document-based answers.
- Designed to operate strictly within the academic domain, avoiding irrelevant content.
- Supports future expansion with multilingual capabilities and LMS integration.
- Deployed securely on IBM Cloud, making it scalable, private, and accessible.
- Empowers students, educators, and researchers with efficient and ethical learning tools.

GITHUB LINK

- <https://github.com/Koushik744/smart-student-agent>

FUTURE SCOPE

- **Voice input integration** – Enable speech-to-text for hands-free academic queries
- **Mobile app or WhatsApp bot** – Extend access via popular platforms for convenience
- **Multilingual support** – Expand to regional and global languages using Watson Language Translator
- **Analytics dashboard** – Provide insights on usage, most asked topics, and learning gaps
- **Personalized learning recommendations** – Suggest content or papers based on student behavior
- **Integration with LMS platforms** – Connect with Google Classroom, Moodle, etc.
- **Auto-generated study guides** – Create summaries and key-point notes from full academic documents
- **Email/notification system** – Alert users about upcoming deadlines, new uploads, or topic suggestions
- **Enhanced privacy controls** – Role-based access and document-level encryption

IBM CERTIFICATIONS

Getting Started with Artificial Intelligence

IBM SkillsBuild



IBM

IBM CERTIFICATIONS

Journey to Cloud: Envisioning Your Solution

IBM SkillsBuild



IBM

IBM CERTIFICATIONS

IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

2311CS040123- NAGULA KOUSHIK GOUD

for the completion of

**Lab: Retrieval Augmented Generation with
LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 21 Jul 2025 (GMT)

Learning hours: 20 mins



THANK YOU