IBM HACKATHON PROJECT

RESEARCH AGENT [GITHUB LINK] [APP LINK]

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OUTLINE

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

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PROBLEM STATEMENT

Academic and industrial researchers often spend a significant amount of time searching for relevant literature, reading and summarizing research papers, organizing references, and drafting reports. These repetitive tasks hinder productivity, delay insights, and introduce human error.

This project aims to solve this problem by building an AI-powered Research Agent that automates the research workflow using large language models (LLMs). The agent can understand research queries in natural language, autonomously search for relevant literature, summarize academic papers (including PDFs), extract references, and even assist in drafting hypotheses and sections of research papers.

By integrating web scraping, PDF reading, and LLM summarization (via Replicate), this agent significantly accelerates the research process, enhances accuracy, and empowers innovation.

TECHNOLOGY USED

- **Python** – Core backend and data handling.
- **Streamlit** – Web interface for interaction.
- **IBM Granite-3.3-8B-Instruct (Replicate API)** – LLM for research understanding and generation.
- **Web Scraper** – Extracts content from research sources.
- **PDF Reader (PyMuPDF)** – Reads and processes research papers.
- **Requests** – For API and HTTP communication.

IBM CLOUD SERVICES USED

- IBM Cloud Watsonx AI Studio
- IBM Cloud Watsonx AI runtime
- IBM Cloud Agent Lab
- IBM Granite foundation model

WOW FACTORS

🚀 Autonomous Paper Search - Finds and fetches relevant research papers with just a prompt.

🧠 LLM-Based Summarization - Uses IBM Granite 3.3 8B Instruct to summarize and interpret papers.

📄 PDF & Web Integration - Extracts insights from PDFs and web sources seamlessly.

🧪 Hypothesis Suggestions - Recommends potential research ideas instantly.

📎 Smart Citation Handling - Automatically extracts and organizes citation data.

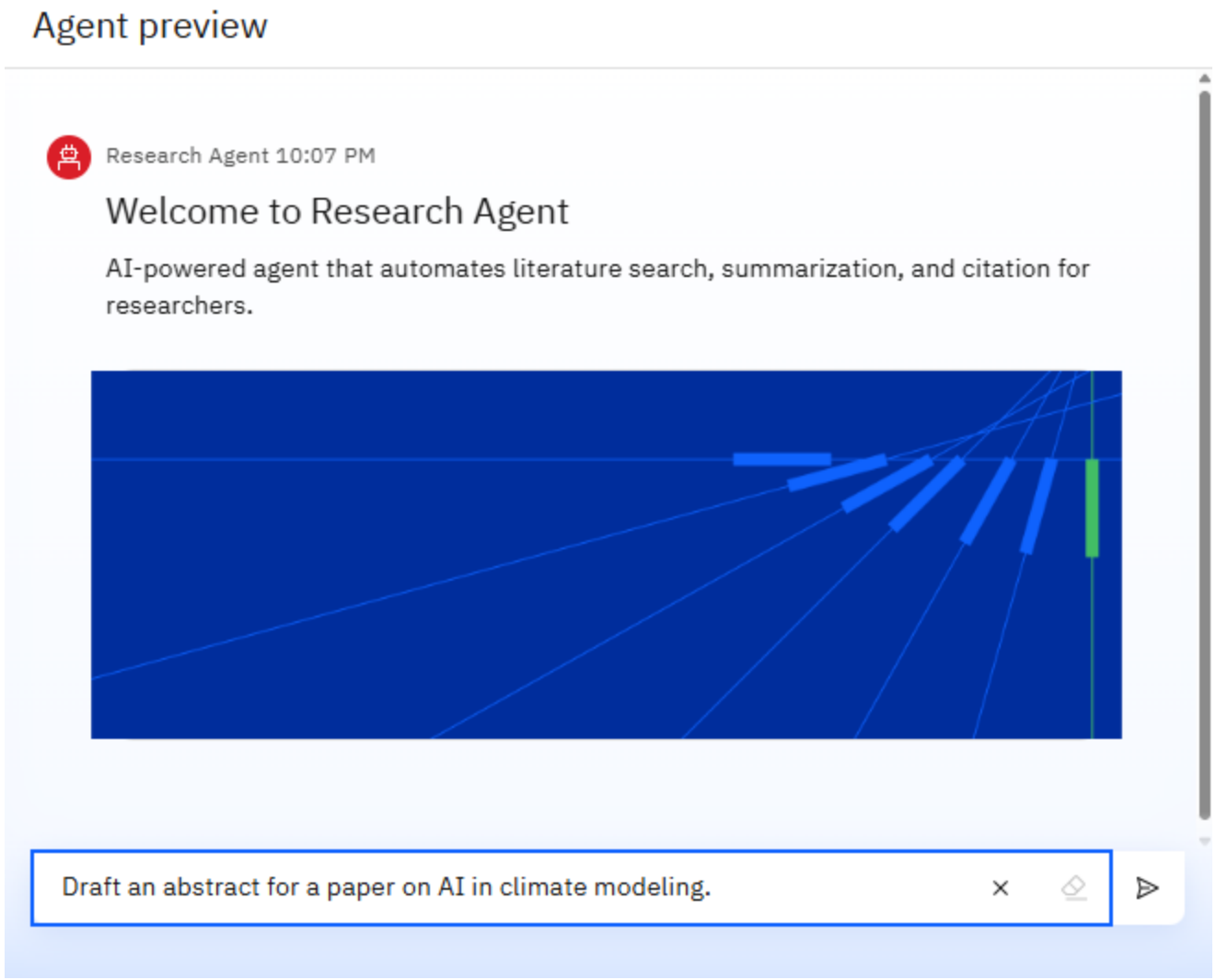
🌐 Streamlit UI - Easy, no-code interface for smooth user experience.

END USERS

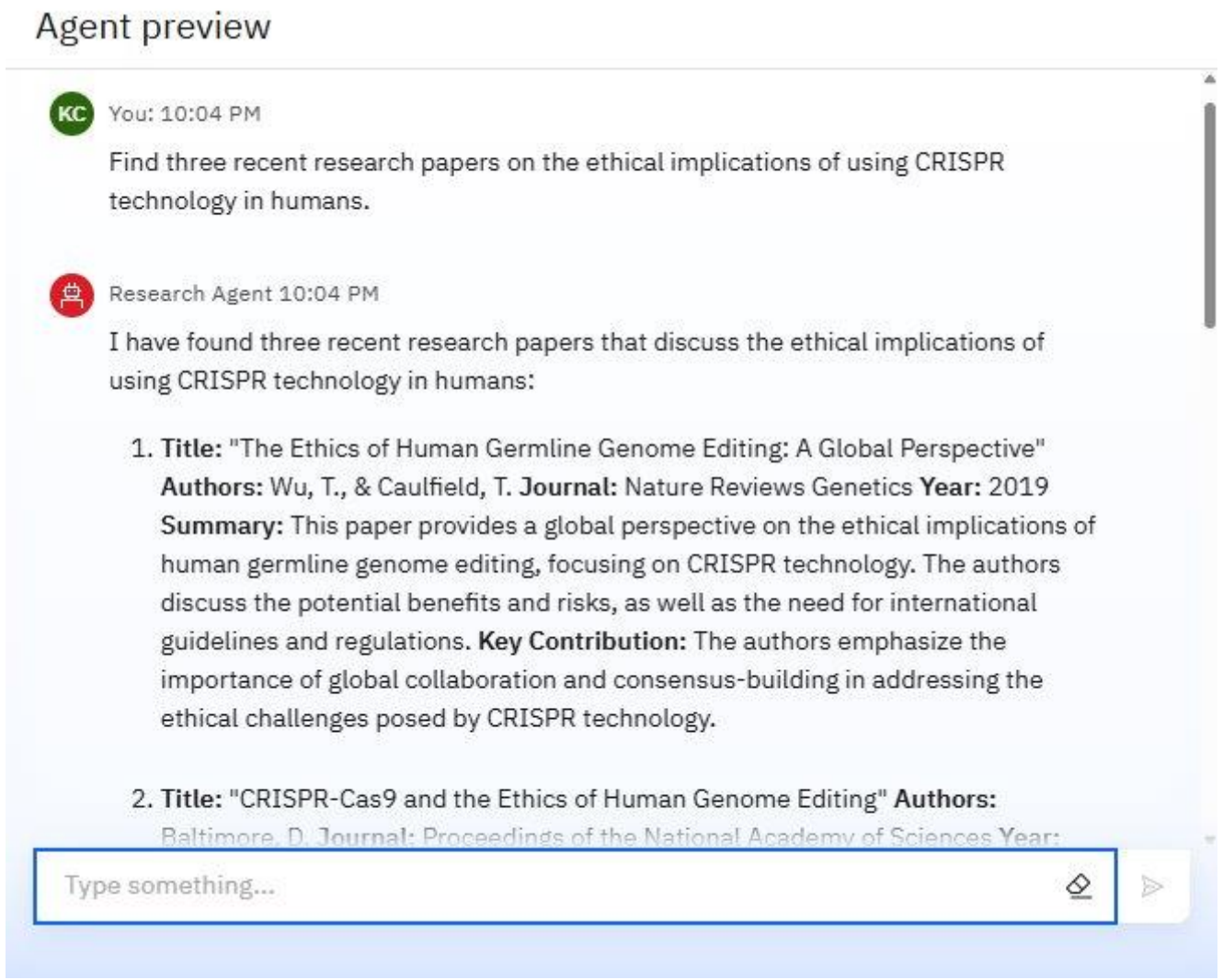
- Researchers & Scientists
- University Students
- Professors & Educators
- R&D Professionals (Industry)
- Academic Institutions & Libraries
- Science Journalists & Writers

RESULTS [App Link: https://research-agent-ibm.streamlit.app]

RESULTS


Agent preview
Research Agent 10:07 PM
Welcome to Research Agent
AI-powered agent that automates literature search, summarization, and citation for researchers.
Draft an abstract for a paper on AI in climate modeling.

RESULTS



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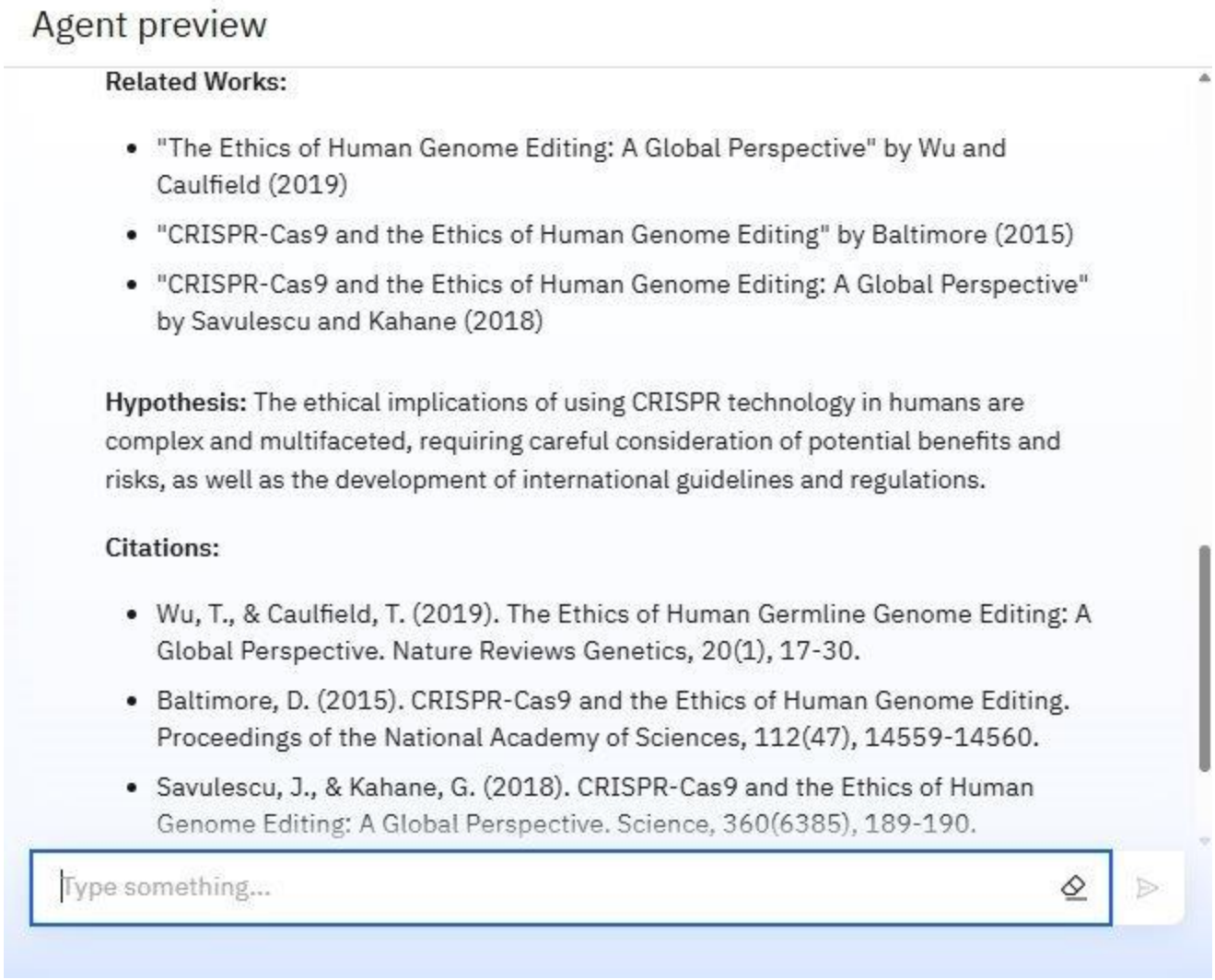
RESULTS



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CONCLUSION

- The **Research Agent** significantly enhances the **efficiency, accuracy, and speed** of academic and scientific research.
- By automating tasks like **literature search**, **summarization**, **citation handling**, and **hypothesis generation**, it reduces manual effort and accelerates innovation.
- Powered by advanced **LLMs**, **Replicate APIs**, and seamless **PDF/web integration**, it serves as a valuable tool for **students, researchers, and R&D teams** alike.
- This project demonstrates the transformative potential of **AI agents** in shaping the future of research and education.

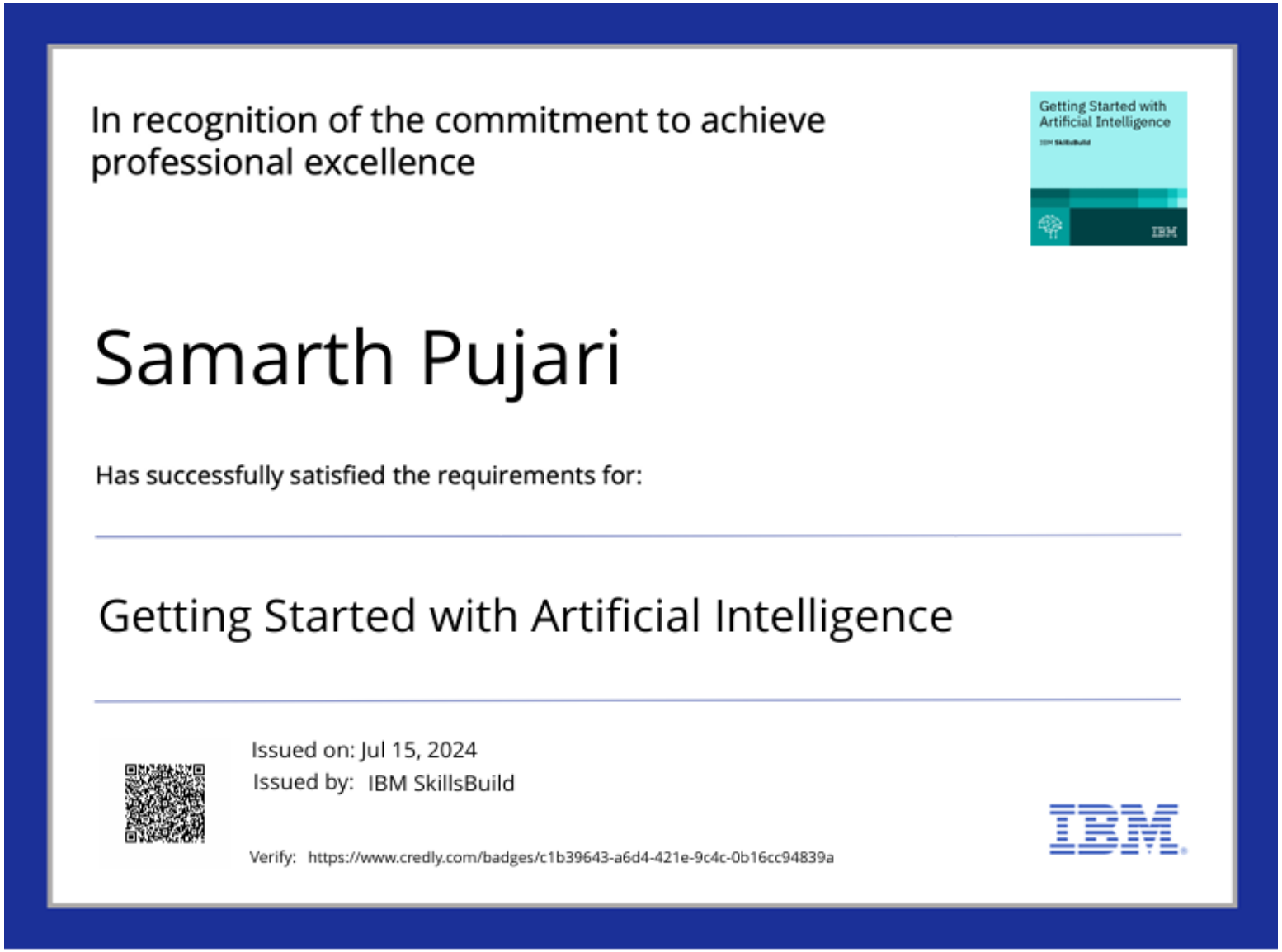
GITHUB LINK

- GitHub Link - https://github.com/Samarth4023/IBM-Internship-2.git

FUTURE SCOPE

- **Multimodal Capability**: Integrate support for diagrams, tables, and charts for richer document understanding and generation.
- **Voice Interaction**: Enable voice-based queries for hands-free research and accessibility.
- **Real-time Collaboration**: Add shared workspaces where multiple researchers can interact with the agent simultaneously.
- **Advanced Citation Management**: Auto-generate citations in multiple styles (APA, MLA, etc.) with BibTeX/EndNote export.
- **Integration with Research Databases**: Direct access to PubMed, arXiv, IEEE, Springer for high-quality papers.
- **Offline Document Indexing**: Allow users to add personal research papers or books to a local vector store for instant querying.

IBM CERTIFICATIONS



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IBM CERTIFICATIONS

IBM **SkillsBuild** Completion Certificate

This certificate is presented to

Samarth Ashok Pujari

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

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THANK YOU

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