
CAPSTONE PROJECT

LEARNMATE – AN AGENTIC AI FOR PERSONALIZED COURSE PATHWAYS

Presented By:
**Rahul Prasad – Maharaja Agrasen Institute of Technology –
Electronics and Communication Engineering**

OUTLINE

- Problem Statement
- Proposed System/Solution
- System Development Approach
- Algorithm & Deployment
- Result
- Conclusion
- Future Scope
- References

PROBLEM STATEMENT

Students often struggle to identify the right learning path that aligns with their interests and long-term goals due to the overwhelming number of online courses and a lack of personalized guidance. LearnMate aims to solve this by acting as an Agentic AI coach that interacts with students, understands their interests (like Frontend Development, Cybersecurity, UI/UX Design, etc.), assesses their current skill level, and dynamically builds a personalized course roadmap that adapts over time based on progress and preferences.

PROPOSED SOLUTION

- The proposed system addresses the challenge of navigating online learning by providing dynamic, personalized course pathways. Powered by IBM Watsonx.ai, the conversational AI agent interacts with students, understands their interests, skill level, and goals, and adapts its recommendations over time.. The solution will consist of the following components:
- **User Interaction:**
 - Engage students through natural language conversations.
 - Collect input on interests, skill level, and learning goals.
 - Use prompt engineering for guided, personalized dialogue.
- **Course Pathway Generation:**
 - Generate a 3-stage personalized roadmap:
 1. Foundation – Core concepts
 2. Intermediate – Tools & practice
 3. Advanced – Projects & certifications
 - Recommend curated content from platforms like Coursera, edX, freeCodeCamp.
- **Real-Time Retrieval:**
 - Use Google Search tool to fetch up-to-date course suggestions.
- **Adaptability:**
 - Adjust roadmap as users provide feedback or progress.
- **Deployment:**
 - Build and deploy the agent via Watsonx.ai and IBM Cloud Lite.
 - Associate Watsonx Runtime and enable preview/API access.
- **Evaluation:**
 - Evaluate based on user engagement and satisfaction.
 - Continuously refine based on feedback and learning outcomes.

SYSTEM APPROACH

The **System Approach** outlines the strategy and methodology for developing and implementing the LearnMate Agentic AI system to generate personalized learning pathways. The agent is built using Watsonx.ai on IBM Cloud Lite with integrated tools for user interaction, search, and adaptability.

- **System Requirements:**
 - IBM Cloud Lite Account
 - Watsonx.ai Project (Sandbox Mode)
 - Associated Watsonx.ai Runtime service
 - Modern web browser with internet access
 - Optional: Custom course document(s) for document search
- **Libraries / Services Used**
 - Watsonx.ai Agent Builder
 - Watsonx.ai Runtime Service
 - Google Search Tool (enabled within the agent)
 - (Optional) Document Search Tool (for internal resources)

ALGORITHM & DEPLOYMENT

- This section describes the approach used to design the intelligent agent, including the foundation model selection, prompt flow logic, and deployment using Watsonx.ai on IBM Cloud Lite.
- **Algorithm Selection:**
 - It uses Agentic AI architecture and is built using a Large Language Model (LLM) granite-3-3-8b-instruct, deployed through IBM Watsonx.ai.
- **User Input:**
 - Interest area (e.g., Frontend, Cybersecurity), Skill level (Beginner, Intermediate, Advanced), Goal (job, freelancing, certification)
- **Workflow:**
 - Agent asks guided questions
 - Generates a 3-stage roadmap: Foundation, Tools & Practice and Advanced/Certification.
 - Recommends real-time courses from trusted platforms
- **Tools Used:**
 - Prompt Tool and Google Search Tool
- **Deployment:**
 - Project built in Watsonx.ai sandbox
 - Linked to Watsonx Runtime service
 - Deployed via IBM Cloud Lite Deployment Space
 - Accessible via Preview and API

RESULT

IBM watsonx

Upgrade ?

Rahul Prasad's Account

Dallas

RP

Deployment spaces / Agentic_AI / LearnMate /

LearnMate Deployed Online


API reference Test **Preview**

New chat +

LearnMate 02:52 AM

Welcome to LearnMate

An AI coach that builds personalized course paths using interests, skills & real-time course data.



Quick start samples

I want to learn Frontend Development from scratch.


Suggest a roadmap to become a cybersecurity analyst.

Help me choose between UI/UX and Web Development.

Suggest free courses for ethical hacking

Type something...

RESULT

 IBM watsonx

Upgrade ⓘ 🔔

Rahul Prasad's Account ▾ Dallas ▾ RP

Deployment spaces / Agentic_AI / LearnMate /

LearnMate ✔ Deployed Online

API reference Test **Preview**

New chat +

 You 02:53 AM

Suggest a roadmap to become a cybersecurity analyst.

 LearnMate 02:53 AM

To become a cybersecurity analyst, you'll need a blend of theoretical knowledge and practical skills. Here's a 3-stage roadmap for you:

Stage 1: Basics Start by understanding the fundamentals of cybersecurity. This includes learning about different types of cyber threats, security measures, and best practices.

- **Recommended Resources:**
- 'Computer Security Fundamentals' by William Stallings (Book)
- 'Introduction to Cybersecurity' by CompTIA (Online Course)

Stage 2: Intermediate Tools & Skills Once you have grasped the basics, move on to learning specific tools and techniques used in the field. Focus on areas like network security, ethical hacking, and incident response.


- **Recommended Resources:**
- 'Ethical Hacking and Penetration Testing: A Hands-On Introduction to Hacking' by Georgia Weidman (Book)
- 'Certified Ethical Hacker (CEH) Course' by EC-Council (Online Course)

Stage 3: Advanced Skills & Projects In this stage, you should aim to gain in-depth knowledge and practical experience. Consider specializing in a specific area of interest such as cloud security, malware analysis, or security architecture.

• Recommended Resources:

Type something... ➤







RESULT

 IBM watsonx

Upgrade ? 🔔

Rahul Prasad's Account ▾ Dallas ▾ RP

Deployment spaces / Agentic_AI / LearnMate /

LearnMate ✔ Deployed Online

API reference Test **Preview**

New chat +

Stage 2: Intermediate Tools & Skills Once you have grasped the basics, move on to learning specific tools and techniques used in the field. Focus on areas like network security, ethical hacking, and incident response.

- **Recommended Resources:**
 - 'Ethical Hacking and Penetration Testing: A Hands-On Introduction to Hacking' by Georgia Weidman (Book)
 - 'Certified Ethical Hacker (CEH) Course' by EC-Council (Online Course)


Stage 3: Advanced Skills & Projects In this stage, you should aim to gain in-depth knowledge and practical experience. Consider specializing in a specific area of interest such as cloud security, malware analysis, or security architecture.


- **Recommended Resources:**
 - 'Practical Malware Analysis' by Michael Sikorski and Andrew Honig (Book)
 - 'Cloud Security' by Srinivasan Sundara Moorthy (Online Course)
 - Participate in Capture The Flag (CTF) competitions to apply your skills in a practical, competitive environment.

Remember, continuous learning is key in the field of cybersecurity due to the rapidly evolving nature of threats. Stay updated with the latest trends and advancements.

To further personalize this roadmap, I would need to know your current skill level, areas of interest within cybersecurity, and your ultimate goal (e.g., job, freelancing, certification).

► How did I get this answer?



Type something... 

CONCLUSION

- LearnMate effectively demonstrates the use of Agentic AI to guide students through personalized learning journeys. By leveraging IBM Watsonx.ai and foundation models, the system interacts with users in natural language, understands their interests and goals, and generates a structured 3-stage roadmap tailored to their needs. The integration of tools like the Prompt Tool and Google Search Tool enables dynamic and relevant course recommendations in real time. Without requiring traditional machine learning training, the project showcases how prompt engineering can drive intelligent behavior. Overall, LearnMate simplifies the course selection process and enhances self-paced learning, making it a practical and impactful AI solution in the field of education.

FUTURE SCOPE

- In the future, LearnMate can be enhanced with deeper personalization using memory retention to track long-term learning progress and adapt recommendations over time. Integration with learning management systems (LMS) and user authentication can allow secure, institution-level deployment. Support for multilingual conversations and voice-based interaction could make the agent more accessible. Additionally, incorporating analytics dashboards for both learners and educators could help track engagement and outcomes. Over time, LearnMate could evolve into a comprehensive AI-powered learning assistant for schools, universities, and self-learners globally.

REFERENCES

- IBM Watsonx.ai Documentation – <https://www.ibm.com/cloud/watsonx>
- IBM Cloud Lite - <https://www.ibm.com/cloud/free>
- Coursera, edX, freeCodeCamp – Course recommendation platforms
- Google Search Tool integration – Used within Watsonx.ai Agent

IBM CERTIFICATIONS



IBM CERTIFICATIONS

In recognition of the commitment to achieve
professional excellence



Rahul Prasad

Has successfully satisfied the requirements for:

Journey to Cloud: Envisioning Your Solution



Issued on: Jul 20, 2025
Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/23f543cb-c292-4d17-b93e-b6786901fbe0>



IBM CERTIFICATIONS

IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Rahul Prasad

for the completion of

**Lab: Retrieval Augmented Generation with
LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 23 Jul 2025 (GMT)

Learning hours: 20 mins

THANK YOU