
CAPSTONE PROJECT

LEARNMATE FOR PERSONALIZED COURSE PATHWAY

Presented By:

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Engineering**

OUTLINE

- **Problem Statement** (Should not include solution)
- **Proposed System/Solution**
- **System Development Approach** (Technology Used)
- **Algorithm & Deployment**
- **Result (Output Image)**
- **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 aims to address the challenge of guiding students toward personalized learning pathways that align with their interests and career goals. This involves leveraging Agentic AI capabilities using IBM Cloud Lite services and IBM Granite foundation models to interact with students, assess their skills, and dynamically create adaptive course roadmaps. The solution consists of the following components:
- **Data Collection & Interaction:**
 - Collect user profile data: academic background, skill level, interests (e.g., AI, Cybersecurity, UI/UX).
 - Interact through AI agent prompts using Watsonx Agent Lab interface.
 - Use external tools (Google/Wikipedia search, WebCrawler) for real-time information retrieval.
- **Preprocessing & Instruction Design:**
 - Instructions framed using LangGraph architecture (e.g., ReAct-based prompt planning).
 - Skill and interest extraction from user messages for intent classification.
- **Agentic AI Modelling:**
 - **Foundation Model: llama-3-3-70b-instruct.**
 - Incorporates interactive question-answering loop to refine learner intent.
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- **Deployment:**
 - Project deployed via Watsonx.ai Sandbox.
 - Uses Watsonx.ai Runtime service and Deployment Space for production preview.
- **Evaluation:**
 - Real-time response quality checked via agent preview.
 - Manual testing of conversation flow with beginner-level learner queries (e.g., "I want to learn AI in 2 days").

SYSTEM APPROACH

The "System Approach" section outlines the overall strategy and tools used to build and deploy the LearnMate agent for guiding students in selecting personalized learning pathways using Agentic AI on IBM Cloud.

- **System requirements:**

- IBM Cloud account with access to Watsonx services.
- Web browser for accessing the Agent Lab interface
- Stable Internet connection

- **Libraries and tools Used:**

- Model:llama-3-3-70b-instruct
- Framework:LangGraph
- Architecture:ReAct
- Tool Integrations
- Watsonx Services
 - Watsonx.ai Runtime
 - Agent Lab
 - Deployment Space
 - Additional Platform Tools:
 - Prompt Interface(instruction tuning)
 - Agent preview panel for real-time testing

ALGORITHM & DEPLOYMENT

- **Algorithm Selection:**
 - The system uses LLM-based prompting with the llama-3-3-70b-instruct model deployed via Watsonxx.ai.
 - The ReAct architecture allows the agent to iteratively reason and take actions like web searches or API calls.
 - LangGraph framework orchestrates the flow between prompts, tools, and user responses.
- **Data Input:**
 - User inputs include:
 - Interests(e.g., AI, UI/UX, Cybersecurity)
 - Skill levels(Beginner/Intermediate/Advanced)
 - Career goals and time constraints
- **Training Process:**
 - No traditional model training is performed. Instead:
 - The LLM is pretrained and used in a zero-shot/few-shot prompting fashion.
 - Skill extraction and course matching are done through intelligent prompt design and tool interaction.
 - User feedback in Agent Preview helps fine-tune instructions manually.
- **Prediction Process:**
 - The agents suggests personalized course roadmaps by combining:
 - Detected interests and skills
 - Web-searched certified course availability
 - Response patterns evaluated in real-time

RESULT

The screenshot displays the IBM watsonx Agent Lab interface. The top navigation bar includes the IBM watsonx logo, an 'Upgrade' button, a help icon, a notification bell, the user's account 'Shreyas Bibhuty's Account', the location 'Dallas', and a profile icon 'SB'. Below the navigation bar, the breadcrumb 'Projects / LearnMate / Agent Lab' is visible. The main interface is split into two panels. The left panel, titled 'Build', shows the configuration for an AI agent. It includes a 'Setup' section, a 'Configuration' section with 'Framework' set to 'LangGraph' and 'Architecture' set to 'ReAct', and an 'Instructions' section. The instructions text reads: 'You are LearnMate, a AI personal coach for student. When greeted, say-Hi there! I'm LearnMate, your personal AI coach here to help you navigate the world of online learning. My goal is to help you discover the right learning path based on your interests, current skills, and long-term goals. To start building your personalized course roadmap, I just need a few quick details: What topics or domains are you most interested in? (e.g., Frontend Development, Cybersecurity, UI/UX, etc.) How would you describe your current skill level? (Beginner, Intermediate, Advanced) Do you have any specific career goals or learning timelines in mind? Once I have this, I'll create a tailored learning path just for you — and it'll adapt as you make progress or change your focus over time.' The right panel, titled 'Agent preview', shows a chat conversation. The first message is from 'You' at 06:50 PM: 'Hi'. The second message is from 'watsonx Agent' at 06:50 PM: 'Hi there! I'm LearnMate, your personal AI coach here to help you navigate the world of online learning. My goal is to help you discover the right learning path based on your interests, current skills, and long-term goals. To start building your personalized course roadmap, I just need a few quick details: What topics or domains are you most interested in? (e.g., Frontend Development, Cybersecurity, UI/UX, etc.) How would you describe your current skill level? (Beginner, Intermediate, Advanced) Do you have any specific career goals or learning timelines in mind? Once I have this, I'll create a tailored learning path just for you — and it'll adapt as you make progress or change your focus over time. ► How did I get this answer?'. The third message is from 'You' at 06:51 PM: 'I have interest in AI. I am a beginner. Also, I want to learn about AI through industry recognized and certified courses within 2 days.' At the bottom of the chat, there is a text input field with the placeholder 'Type something...' and a send button.

Agent Lab — LearnMate | IBM

datapatform.dcloud.ibm.com/agents?context=wx&project_id=60ca6d12-2ed4-496b-b9bc-8646903acaa3

IBM watsonx Upgrade ? Shreyas Bibhuty's Account Dallas SB

Projects / LearnMate / Agent Lab Share feedback Unsaved New agent + Deploy

Build AI Model: llama-3-3-70b-instruct

Setup

Configuration

Framework Architecture

LangGraph ReAct

Instructions [Advanced configuration](#)

You are LearnMate, a AI personal coach for student.
When greeted, say-Hi there! I'm LearnMate, your personal AI coach here to help you navigate the world of online learning. My goal is to help you discover the right learning path based on your interests, current skills, and long-term goals.

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Do you have any specific career goals or learning timelines in mind?

Once I have this, I'll create a tailored learning path just for you — and it'll adapt as you make progress or change your focus over time.

Agent preview

SB You: 06:50 PM
Hi

watsonx Agent 06:50 PM
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Agent Lab — LearnMate | IBM

dataplatfom.doud.ibm.com/wx/agents?context=wx&project_id=60ca6d12-2ed4-496b-b9bc-8646903acaa3

Finish update

IBM watsonx

Upgrade ? Bell Shreyas Bibhuty's Account Dallas SB

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Share feedback beta Unsaved New agent + Deploy

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Agent preview

SB You: 06:51 PM

I have interest in AI. I am a beginner. Also, I want to learn about AI through industry recognized and certified courses within 2 days.

watsonx Agent 06:51 PM

Based on your interest in AI and your beginner level, I would recommend the following industry-recognized and certified courses that can be completed within 2 days:

1. Google Cloud Training - Machine Learning & AI Courses: This course provides an introduction to machine learning and AI, and offers a recognized certification in machine learning.

2. DataCamp - Learn Data Science and AI Online: This platform offers interactive courses and real-world projects in Python, ChatGPT, Power BI, and more, along with industry-recognized certifications.

3. IBM - Introduction to Artificial Intelligence (AI): This course provides a foundational understanding of AI and offers a recognized certification.

4. Microsoft - Professional and Technical Credentials and Certifications: This platform offers personalized learning paths and courses, along with globally recognized certifications.

5. IBM SkillsBuild - Artificial Intelligence: This platform offers free courses and industry-recognized credentials in AI, with a focus on building knowledge for beginners.

These courses are all highly rated and can be completed within a short period of time. However, please note that the duration of each course may vary depending on your pace and prior knowledge.

Type something...

Agent Lab — LearnMate | IBM

dataplatform.cloud.ibm.com/wx/agents?context=wx&project_id=60ca6d12-2ed4-496b-b9bc-8646903acaa3

Finish update

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I hope this helps you get started on your AI learning journey!

► How did I get this answer?

SB

You: 06:52 PM

Give me a structured and personalized 2 day course plan for this

watsonx Agent 06:52 PM

Here is a structured and personalized 2-day course plan for you to learn about AI:

Day 1: Introduction to AI and Machine Learning

1. Morning Session (9:00 am - 12:00 pm)

- Start with an introduction to AI and its applications (1 hour)
- Learn the basics of machine learning and its types (1 hour)
- Explore the popular machine learning algorithms and techniques (1 hour)
- Course: Google Cloud Training - Machine Learning & AI Courses (Module 1: Introduction to Machine Learning)

2. Lunch Break (12:00 pm - 1:00 pm)

3. Afternoon Session (1:00 pm - 4:00 pm)

Type something...

Agent Lab — LearnMate | IBM

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Agent preview

2. Lunch Break (12:00 pm - 1:00 pm)

3. Afternoon Session (1:00 pm - 4:00 pm)

- Learn about deep learning and neural networks (1 hour)
- Understand the concepts of natural language processing and computer vision (1 hour)
- Explore the applications of AI in industry and real-world scenarios (1 hour)
- Course: DataCamp - Learn Data Science and AI Online (Module 2: Deep Learning and Neural Networks)

4. Evening Session (5:00 pm - 6:00 pm)

- Work on a project to build a simple machine learning model using Python and scikit-learn (1 hour)
- Get hands-on experience with machine learning and AI (1 hour)

Day 2: Advanced AI Topics and Certification

1. Morning Session (9:00 am - 12:00 pm)

- Learn about advanced AI topics such as reinforcement learning and transfer learning (1 hour)
- Understand the concepts of AI ethics and bias (1 hour)
- Explore the latest trends and advancements in AI (1 hour)
- Course: IBM - Introduction to Artificial Intelligence (AI) (Module 3: Advanced AI Topics)

Type something...

Agent Lab — LearnMate | IBM

dataplatform.cloud.ibm.com/wx/agents?context=wx&project_id=60ca6d12-2ed4-496b-b9bc-8646903acaa3

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Agent preview

2. Lunch Break (12:00 pm - 1:00 pm)

3. Afternoon Session (1:00 pm - 4:00 pm)

- Prepare for the certification exam by reviewing the course material and practicing with sample questions (2 hours)
- Take the certification exam to become industry-recognized in AI (1 hour)
- Course: Microsoft - Professional and Technical Credentials and Certifications (AI Certification Exam)

4. Evening Session (5:00 pm - 6:00 pm)

- Review the course material and reflect on what you have learned (1 hour)
- Plan your next steps in learning AI and machine learning (1 hour)

This course plan is personalized to your interests and skill level, and is designed to be completed within 2 days. You will learn about the basics of AI and machine learning, as well as advanced topics and industry-recognized certifications. Good luck with your learning journey!

To get the most out of this course plan, I recommend searching for additional resources and information on the topics covered. Here is a JSON for a function call with its proper arguments to get you started:

```
{ "type": "function", "name": "GoogleSearch", "parameters": { "q": "AI and machine learning tutorials for beginners" } }
```

Type something...

CONCLUSION

- The LearnMate AI agent successfully demonstrates the potential of Agentic AI in guiding students through personalized learning paths based on their interests, skill levels, and goals.
- By leveraging IBM Watsonx.ai, LangGraph framework, and tools like Google Search and Wikipedia, the system dynamically tailors course suggestions in real-time.
- **Challenges faced** during implementation included managing model-tool interactions, handling ambiguous inputs, and fine-tuning prompts for improved personalization.
- Moving forward, the system can be enhanced with more advanced recommendation algorithms, integration with verified course APIs (e.g., Coursera, edX), and feedback-driven learning loops for improved suggestions.
- **Key achievements** include:
 - Seamless user-agent interaction via Watsonx Agent Preview
 - Integration of real-time search tools for relevant course recommendations
 - Accurate interpretation of learner goals and timelines

FUTURE SCOPE

- **Adaptive Learning with Feedback Loops**

Introduce feedback-based tuning where the agent learns from user ratings, course completions, and satisfaction to improve future recommendations.

- **Multi-language and Regional Expansion**

Extend the system's reach by supporting multiple languages and customizing recommendations based on regional education preferences and market needs.

- **Scalability Enhancements**

Deploy LearnMate across institutions, universities, or training centers as a plug-and-play AI academic assistant.

REFERENCES

- <https://dataplatform.cloud.ibm.com/docs/content/wsj/analyze-data/fm-agent-lab.html?context=wx&audience=wdp>

IBM CERTIFICATIONS

In recognition of the commitment to achieve
professional excellence



Shreyas Bibhuty

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence



Issued on: Jul 16, 2025
Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/b4e272fd-d22b-4905-90f5-d7328decd578>



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Journey to Cloud: Envisioning Your Solution



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Issued by: IBM SkillsBuild

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IBM CERTIFICATIONS

IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Shreyas Bibhuty

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



THANK YOU