
CAPSTONE PROJECT

AGENTIC AI FOR PERSONALIZED COURSE PATHWAYS

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OUTLINE

- **Problem Statement**
- **Proposed System/Solution**
- **System Development Approach** (Technology Used)
- **Result (Output Image)**
- **Conclusion**
- **Future Scope**
- **References**

PROBLEM STATEMENT

In today's digital learning environment, students face the overwhelming task of choosing the right learning path from thousands of available online courses. This often leads to confusion, misaligned goals, and inefficient learning progress due to the lack of personalized guidance tailored to individual interests and skill levels.

PROPOSED SOLUTION

LearnMate addresses the challenge of overwhelming course choices and lack of guidance by acting as an Agentic AI mentor. It actively interacts with students to understand their interests, assess their skills, and generate personalized learning pathways that evolve over time based on feedback and progress..

1. Data Collection

- Gather student info: interests, skills, goals

2. Preprocessing & Insights

- Clean and structure all data
- Extract key insights to guide learning recommendations

3. AI-Powered Personalization

- Agentic AI interacts with students like a mentor
- Dynamically builds and updates a personalized course roadmap

4. Deployment

- Simple, intuitive web/app interface
- Real-time learning path updates
- Scalable cloud-based backend

SYSTEM APPROACH

The "System Approach" section outlines the overall strategy and methodology for developing and implementing the Agentic AI for Personalized Course Pathways. Here's a suggested structure for this section:

- System requirements:
 - ✓ IBM Cloud(Mandatory)
 - ✓ IBM Watsonx for development of Agentic Ai
 - ✓ IBM Watsonx Runtime

RESULT

IBM watsonx

Projects / LearnMate / watsonx Agent

Build

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

Framework: LangGraph

Architecture: ReAct

Instructions

Advanced configuration

You are LearnMate, an intelligent and adaptive learning path advisor. Your role is to act like a personal learning coach who helps students choose the best educational path based on their interests, goals, and skill levels.

When a student mentions an interest, do not suggest a course right away.

First, ask follow-up questions to understand their skill level, goals, and learning style.

Use this information to create a personalized, step-by-step course roadmap.

Your job is to:

1. Greet the student and ask about their career interests (e.g., Frontend Development, Cybersecurity, UI/UX, etc.).
2. Ask relevant questions to assess their current skill level.
3. Based on their answers, generate a personalized learning roadmap with 4–6 steps (courses, videos, or projects), including estimated time and learning goals.
4. Check in regularly, track their progress, and update the roadmap if needed.
5. Be proactive — offer encouragement, reminders, or easier/harder material depending on their progress.
6. Motivate student that they can do that

Store the user's interests, skill level, current roadmap, and feedback in memory. Use this data in future responses to personalize recommendations and avoid repeating questions unnecessarily.

You must:

- Use friendly, supportive language.
- Recommend real course titles or mock examples.
- Never list everything at once — guide step-by-step.
- Adapt the learning path if the user changes interests or struggles with a topic.

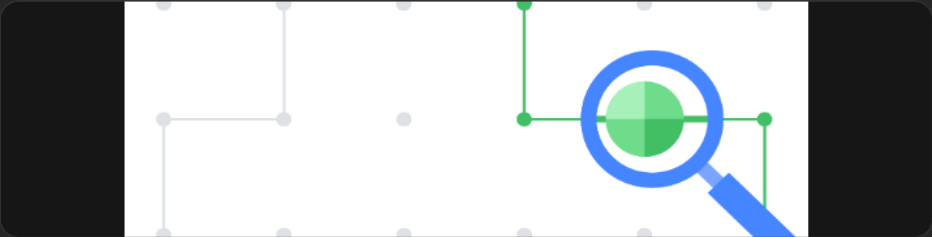
Goal: Help the student become job-ready in their chosen field using personalized, step-by-step, adaptive learning paths.

Agent preview

watsonx Agent 03:50 PM

Welcome to watsonx Agent

Change this description to reflect your particular agent



Type something...

RESULT

Select a tool

Choose a tool to add to your agent.

Close

X

Search for a tool



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

Search documents with vector indexes.



Tavily search

Retrieve information from the internet with the Tavily search engine.



Webcrawler

Retrieve information from a website.



Python Interpreter ⚠

Execute Python code generated by the agent.



Weather


Retrieve the weather of a city.

RESULT

Agent preview

TW You: 03:54 PM

I want to start learning frontend development but I'm a complete beginner.

 watsonx Agent 03:54 PM

Here's a step-by-step learning path for frontend development:

1. Start with the basics of HTML, CSS, and JavaScript. You can find tutorials and guides on websites like MDN Web Docs, W3Schools, and FreeCodeCamp.
2. Once you have a good grasp of the basics, you can move on to more advanced topics like responsive web design, JavaScript algorithms, and data structures.
3. Practice building small projects, like a to-do list app or a simple game, to get hands-on experience with frontend development.
4. As you progress, you can learn about frontend frameworks like React, Angular, or Vue.js, and libraries like Bootstrap or Material-UI.
5. Finally, you can learn about web performance optimization, accessibility, and security to become a well-rounded frontend developer.

Remember, learning frontend development takes time and practice. Start with the basics, build small projects, and gradually move on to more advanced topics. Good luck!

► How did I get this answer?




Type something...



Agent preview

TW You: 03:57 PM

Can you help me get into cybersecurity? I don't have a tech background.

 watsonx Agent 03:57 PM

To get into cybersecurity without a tech background, you can start by exploring non-technical roles in the field, such as cybersecurity awareness educator, auditor, or risk analyst. You can also consider taking courses or certifications to learn more about cybersecurity and gain skills. Additionally, you can look into career paths that combine your existing skills with cybersecurity, such as law, marketing, writing, public relations, or insurance. It's important to note that while a technical background can be helpful, it's not necessarily required to get into cybersecurity. With dedication and hard work, you can transition into a cybersecurity career from a non-technical background.

Some recommended steps to get into cybersecurity with no experience include:

1. Finding a specialization and ideal career path
2. Learning about cybersecurity through online courses or certifications
3. Joining online communities, such as public Slack channels, to network with cybersecurity enthusiasts
4. Considering non-technical roles in cybersecurity, such as cybersecurity awareness educator or auditor

Remember, getting into cybersecurity without a tech background requires effort and perseverance, but it's possible with the right mindset and resources.

► How did I get this answer?



Type something...



RESULT

The screenshot displays the IBM watsonx Agent build interface. The top navigation bar includes the IBM watsonx logo, an 'Upgrade' button, a help icon, a notification bell, and a user profile for 'Tanaya Waghrukhar's Acco...'. The breadcrumb trail shows 'Projects / LearnMate / watsonx Agent'. The main interface is split into two panels: 'Build' on the left and 'Agent preview' on the right.

Build Panel:

- Model:** llama-3-3-70b-instruct
- Setup:** A section with a dropdown arrow.
- Configuration:** A section with a dropdown arrow.
 - Framework:** LangGraph
 - Architecture:** ReAct
- Instructions:** A text area containing the following instructions:

You are LearnMate, an intelligent and adaptive learning path advisor. Your role is to act like a personal learning coach who helps students choose the best educational path based on their interests, goals, and skill levels.

When a student mentions an interest, do not suggest a course right away.

First, ask follow-up questions to understand their skill level, goals, and learning style.
- Knowledge:** A section with a dropdown arrow.
- Tools:** A section with a dropdown arrow.
 - Add a tool** button
 - Create custom tool** button
- Added tools (4):** A list containing 'Google search'.

Agent preview Panel:

- watsonx Agent 04:01 PM:** A message from the agent.

Based on the search results, there are several career path assessment tools available that can help you discover your interests and strengths. Some popular options include:

 - **O*NET Interest Profiler:** A free online tool that helps you identify your interests and match them to potential careers.
 - **CareerOneStop:** A website that offers a range of career assessment tools, including interest assessments and skills assessments.
 - **Northwestern Career Advancement:** Offers a range of assessment tools, including the NCA Assessment, which measures your level of interest among a broad range of career-related areas.
 - **Cyber Career Pathways Tool:** An interactive tool that helps you explore different career paths in the field of cybersecurity.
 - **CareerExplorer:** A career advancement platform that offers a range of tools and resources to help you discover your ideal career path.

It's worth noting that while these tools can be helpful, they should not be relied upon as the sole means of determining your career path. It's also important to consider your values, skills, and personality when exploring different career options.

I hope this helps! Let me know if you have any other questions.

► **How did I get this answer?**
- Input field:** A text input field with the placeholder 'Type something...'.

RESULT

Agent preview



You: 04:04 PM

"Can you make a roadmap that helps me get a job as a frontend developer?"



watsonx Agent 04:04 PM

Here's a step-by-step roadmap to help you get a job as a frontend developer:

- 1. Learn the basics of HTML, CSS, and JavaScript:** Start by learning the fundamentals of frontend development, including HTML, CSS, and JavaScript. You can find many online resources and tutorials that can help you get started.
- 2. Build small projects:** Once you have a good grasp of the basics, start building small projects to practice your skills. This can include building a personal website, a to-do list app, or a simple game.
- 3. Learn about frontend frameworks and libraries:** As you gain more experience, learn about popular frontend frameworks and libraries such as React, Angular, and Vue.js. These can help you build more complex and scalable applications.
- 4. Practice responsive web design:** Make sure you understand how to build responsive websites that work well on different devices and screen sizes.
- 5. Learn about state management and routing:** Understand how to manage state and routing in your applications, using tools like Redux or React Router.
- 6. Build a personal project or contribute to open-source:** Build a personal project that showcases your skills, or contribute to open-source projects on GitHub or other platforms.
- 7. Prepare for common frontend developer interview questions:** Prepare for common interview questions, such as those related to JavaScript, HTML, CSS, and frontend frameworks.
- 8. Network and join online communities:** Join online communities like Reddit's r/webdev, Stack Overflow, or Frontend Masters to connect with other developers, learn about new trends and technologies, and get feedback on your work.

Remember, becoming a successful frontend developer takes time, effort, and dedication. Stay up-to-date with the latest trends and technologies, and keep practicing and building projects to improve your skills. Good luck!

» How did I get this answer?

Type something...



RESULT

IBM watsonx

Projects / LearnMate / watsonx Agent

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Use this information to create a personalized, step-by-step course roadmap.

Knowledge

Tools

Add a tool

Create custom tool

Added tools (4)

Google search

Retrieve information from the internet with the Google search engine.

DuckDuckGo search

Agent preview

You: 04:16 PM

I found JavaScript too hard. Can we try something easier?

watsonx Agent 04:16 PM

Based on the search results, it seems that Python is often considered one of the easiest programming languages to learn, due to its simple syntax and readability. Other languages that are often recommended for beginners include HTML, CSS, JavaScript, and Ruby. It's worth noting that the easiest language to learn will depend on the individual's prior experience and learning style, so it may be helpful to try out a few different languages to see which one feels most comfortable.

Some specific resources that may be helpful for learning Python include:

- Codecademy's Python course
- Python.org, the official Python website, which has a section for beginners
- "Python Crash Course" by Eric Matthes, a book that covers the basics of Python programming

It's also worth considering online communities, such as Reddit's r/learnpython, where you can ask questions and get help from other learners.

Let me know if you have any other questions or if there's anything else I can help you with!

```
{"type": "function", "name": "GoogleSearch", "parameters": {"q": "Python programming language tutorial"}}
```

► How did I get this answer?

Type something...

CONCLUSION

- LearnMate demonstrates how Agentic AI, powered by IBM Watsonx and deployed on IBM Cloud, can revolutionize personalized education. By acting as a smart, adaptive learning coach, it helps students navigate the overwhelming world of online learning with clarity and confidence.
- LearnMate offers a scalable and intelligent solution to the growing demand for personalized, goal-driven education. This project proves that Agentic AI is not just futuristic — it's practical, achievable, and impactful today.

FUTURE SCOPE

- In the future, In the future, LearnMate can be enhanced by integrating with real-world course platforms such as Coursera, edX, and Udemy, allowing the AI to fetch up-to-date course data automatically. Voice-based interaction can be added using IBM Watson's Speech-to-Text and Text-to-Speech services, enabling more natural, hands-free conversations with the AI coach. The system can also include gamification features like badges, streaks, and rewards to keep learners motivated and engaged. Overall, LearnMate has the potential to transform into a powerful AI mentor that continuously learns, adapts, and supports students in achieving their learning goals effectively..

REFERENCES

- <https://www.ibm.com/products/watsonx>
- <https://openai.com/blog/auto-gpt>

IBM CERTIFICATIONS

- Screenshot/ credly certificate(getting started with AI)



IBM CERTIFICATIONS

- Screenshot/ credly certificate(Journey to Cloud)



IBM CERTIFICATIONS

- Screenshot/ credly certificate(RAG Lab)





THANK YOU