
CAPSTONE PROJECT

AGENTIC AI FOR PERSONALIZED COURSE PATHWAYS

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PROBLEM STATEMENT

The Challenge - 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

SkillPilot is an Agentic AI solution that helps students navigate the overwhelming number of online learning resources by offering personalized course pathways.

Interest & Skill Assessment:

- Interactively identifies user interests (e.g., Frontend, Cybersecurity).
- Evaluates current skill levels using natural language understanding.

Personalized Roadmap Generation:

- Recommends learning paths from uploaded course materials (PDFs, docs).
- Updates roadmap dynamically based on user progress.

Agentic AI with LangGraph + IBM Watsonx:

- Uses LangGraph for reasoning and IBM Granite models for conversation.
- Utilizes Prompt Hub for personalized guidance.

Memory & Adaptation:

- Remembers user history to refine future suggestions.
- Learns and adapts in real time.

SYSTEM APPROACH

The "System Approach" section outlines the overall strategy and methodology for developing and implementing the personalized course pathway recommendation system using Agentic AI.

System Requirements

- IBM Watsonx Platform with Granite LLMs
- LangGraph framework with ReAct architecture

Libraries/Tools Used

- LangGraph (agent orchestration)
- Prompt Hub (dynamic prompting)

RESULT

The screenshot displays the IBM watsonx Agent web interface. At the top, a dark navigation bar includes the IBM watsonx logo, an 'Upgrade' button, and user account information for 'Swetha Senthilvel's Account' in 'Dallas'. Below this, a breadcrumb trail shows 'Deployment spaces / Skill_Piolt / watsonx Agent /'. The main header area features the 'watsonx Agent' title with a green 'Deployed' status and an 'Online' indicator. A tabbed interface at the bottom of the header shows 'API reference', 'Test', and 'Preview' (which is currently selected). On the right side of the chat area, there is a 'New chat +' button. The chat history shows a user message at 12:32 AM asking for guidance on Frontend Development. The watsonx Agent responds at the same time with a suggested learning path consisting of seven numbered steps. At the bottom, there is a text input field with the placeholder 'Type something...' and a send button.

IBM watsonx Upgrade Swetha Senthilvel's Account Dallas SS

Deployment spaces / Skill_Piolt / watsonx Agent /

watsonx Agent ✓ Deployed Online

API reference Test **Preview**

New chat +

S You 12:32 AM
I want to learn Frontend Development. Can you guide me?

watsonx Agent 12:32 AM
Based on the search results, here's a suggested learning path for Frontend Development:

1. Start with the basics: HTML, CSS, and JavaScript. You can find resources on GeeksforGeeks, MDN Web Docs, and W3Schools.
2. Learn about front-end development frameworks and libraries such as React, Angular, and Vue.js.
3. Practice building projects, such as a personal website or a to-do list app, to gain hands-on experience.
4. Learn about responsive web design, accessibility, and web performance optimization.
5. Familiarize yourself with front-end build tools such as Webpack, Gulp, and Grunt.
6. Learn about state management, routing, and API integration.
7. Read the Frontend Developer Handbook 2024 and the Ultimate Guide to Front-End Development to get a

Type something...

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watsonx Agent ✓ Deployed Online

API reference Test **Preview**

New chat +

S You 12:33 AM
I'm interested in Cybersecurity, but I don't know where to start.

watsonx Agent 12:33 AM
Here are some resources to get you started with Cybersecurity:

1. Online Courses and Tutorials: Websites like Udemy, Coursera, and edX offer a wide range of cybersecurity courses for beginners.
2. YouTube Channels: Channels like Cybersecurity 101, HackerSploit, and Professor Messer are great resources for learning cybersecurity concepts and techniques.
3. Blogs and Websites: Websites like Cybersecurity News, The Hacker News, and Dark Reading provide up-to-date information on cybersecurity threats, vulnerabilities, and best practices.
4. Online Communities and Forums: Communities like Reddit's netsec community, Stack Overflow's security community, and the Cybersecurity Subreddit are great places to ask questions, share knowledge, and learn from others.
5. Books: Books like "Cybersecurity 101" by Mark Stanislav, "Hacking: The Art of Exploitation" by Jon Erickson, and "The

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IBM watsonx Upgrade ? Swetha Senthilvel's Account Dallas SS

Deployment spaces / Skill_Piolt / watsonx Agent /

watsonx Agent ✓ Deployed Online

API reference Test **Preview**

New chat +

S You 12:34 AM
Can you suggest a roadmap for learning UI/UX from scratch?

watsonx Agent 12:34 AM
Here's a suggested roadmap for learning UI/UX from scratch:

1. Start with learning the design concepts, such as user research methodologies, design principles, and human-computer interaction.
2. Choose a UI design tool to learn, such as Figma, Sketch, or Adobe XD.
3. Create case studies and post them on platforms like Behance or Dribbble to showcase your work.
4. Learn about user experience (UX) design, including user research, wireframing, prototyping, and usability testing.
5. Practice designing for different platforms, such as web, mobile, and desktop applications.
6. Learn about design systems, accessibility, and inclusive design.
7. Join online communities, such as Reddit's r/UXDesign and r/Design, to connect with other designers, get feedback, and

type something...

RESULT:

The screenshot displays the IBM Watsonx Agent web interface. At the top, a dark navigation bar includes the IBM Watsonx logo, an 'Upgrade' button, help and notification icons, and user account information for 'Swetha Senthilvel's Account' in the 'Dallas' region. Below the navigation bar, a breadcrumb trail shows 'Deployment spaces / Skill_Piolt / watsonx Agent'. The main header for 'watsonx Agent' includes a green 'Deployed' status and an 'Online' badge. A tabbed interface at the bottom of the header shows 'API reference', 'Test', and 'Preview' (which is selected). On the right side of the chat area, there is a 'New chat +' button. The chat history shows a user message at 12:35 AM asking for domain suggestions, followed by an agent response at the same time providing a list of domains. A text input field at the bottom is labeled 'Type something...'. The interface is clean with a light blue gradient background for the chat area.

IBM watsonx Upgrade Swetha Senthilvel's Account Dallas \$5

Deployment spaces / Skill_Piolt / watsonx Agent

watsonx Agent ✓ Deployed Online

API reference Test **Preview**

New chat +


S You 12:35 AM
I'm a beginner in programming — what domain should I explore


watsonx Agent 12:35 AM
Based on the search results, it seems that there are various domains that a beginner in programming can explore. Some of the suggestions include:




- UI programming
- Tools programming
- Writing for different platforms
- Systems design/architecture
- Domain-driven design
- Machine learning







Type something...


RESULT:

 IBM watsonx

Upgrade ? 


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watsonx Agent  Deployed Online


API reference Test **Preview**

New chat +


 You 12:37 AM
Show me the path to become a Full Stack Developer


 watsonx Agent 12:37 AM
The path to becoming a Full Stack Developer involves learning the basics of HTML, CSS, and JavaScript, as well as mastering both front-end and back-end technologies. Here is a suggested roadmap:


1. Start by learning the basics of HTML, CSS, and JavaScript.
2. Choose a technology stack to work with, such as MEAN (MongoDB, Express, Angular, Node.js) or MERN (MongoDB, Express, React, Node.js).
3. Learn about front-end development, including UI/UX design, responsive design, and accessibility.
4. Learn about back-end development, including server-side programming, database management, and API design.
5. Practice building projects, starting with small ones and gradually moving on to more complex ones.
6. Learn about Git and GitHub, and use version control to manage your code.


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RESULT:







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watsonx Agent  Deployed Online

API reference Test **Preview**

New chat +

8. Consider taking online courses or attending workshops to improve your skills and knowledge.


9. Join online communities, such as Reddit's r/webdev, to connect with other developers, get feedback, and stay updated on industry trends.

10. Continuously learn and improve your skills, as the field of web development is constantly evolving.

Some recommended resources for learning full stack development include:

- FreeCodeCamp: A non-profit organization that offers a comprehensive curriculum in web development.
- Udemy: An online learning platform that offers a wide range of courses on web development.
- Coursera: An online learning platform that offers courses on web development from top universities.
- GitHub: A web-based platform for version control and collaboration.
- Stack Overflow: A Q&A platform for programmers.
- Reddit's r/webdev: A community of web developers that offers support, feedback, and resources.

Remember, becoming a Full Stack Developer takes time, effort, and dedication. Stay motivated, keep learning, and practice regularly to achieve your goals.

Type something... 

CONCLUSION

SkillPilot effectively addresses the challenge of navigating online learning by offering a personalized, AI-driven course roadmap. By leveraging Agentic AI with IBM Watsonx and LangGraph, it provides adaptive guidance based on individual learner goals and progress. This solution empowers students to take control of their learning journey with clarity and confidence.

FUTURE SCOPE

- Integrate real-time progress tracking using user performance analytics.
- Expand to support multilingual course recommendations and voice-based interactions.
- Enable integration with external platforms like Coursera, edX, or YouTube for live course suggestions.
- Incorporate skill certification suggestions and job-role mapping for career guidance.

REFERENCES

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- IBM Research. Granite Foundation Models Overview.
- LangChain Labs. LangGraph: Agentic Workflows for LLM-based Applications.
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- Meta AI. LLaMA 3 Model Technical Report.
- Roadmap.sh. Structured Learning Roadmaps for Developers.
- IBM Corporation. IBM Cloud Lite: Free Tier Platform for AI Deployment.

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THANK YOU