
CAPSTONE PROJECT

MACHINE FAULT DIAGNOSIS AGENT

Presented By:

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OUTLINE

- Problem Statement
- Proposed System
- System Development Approach
- Result
- Conclusion
- Future Scope
- References

PROBLEM STATEMENT

■ Problem Statement No. 33 – Machine Fault Diagnosis Agent

This agent helps detect faults in machines like lathes, mills, or pumps based on vibrations, temperature, or unusual noises. It can answer: "Why is my CNC machine vibrating too much?" or "What could cause overheating in a hydraulic pump?". It suggests basic maintenance actions and safety precautions.

PROPOSED SYSTEM

❖ STEPS TO CREATE AI AGENT:: --

- First we log into the IBM Cloud and clear all the resources like storage etc.
- Then we go to the navigation menu where we select the watsonx service and from there we select the Watson.ai option.
- There we select the AI Agent >> --AI lab(Beta)>> --watsonx.ai home page.
- Scroll down and go to new project and add details.
- Associate watsonx.ai studio and watsonx.ai runtime service.
- Again go to watsonx.ai home page and go to the AI AGENT option.
- Here we can give our agent the tools and instruction.

❖ DEPLOYMENT OF THE AI AGENT::--

- After the model creation use
- Click on the deploy button at right top corner and create a deployment space
- After this deploy the project
- We can now preview our project and ask the agent questions

PROPOSED SYSTEM

- The proposed system aims to build an agent that can answer the queries related to the faults in a particular machine. The solution will consist of the following components:
- SERVICES USED:
 - We will use watsonx.ai service to create an agent that can help in MACHINE FAULT DIAGNOSIS.
 - We can use tools for our assistant like GOOGLESEARCH,WIKIPEDIA etc to gather information about particular machine fault.
- ARCHITECTURE USED:
 - ReAct
- FRAMEWORK USED:
 - LangGraph
- MODEL:
 - llama- 3-3-70b-instruct
- DATA:
 - The Agent will get input about Machine fault from user and the agent uses tools to give information about fault.

SYSTEM APPROACH

- ❖ The following services were used for the creation of the Machine Fault Diagnosis Agent :
 - IBM Cloud Lite services
 - IBM Granite AI model
 - Watsonx.ai service

▼

cloud.ibm.com/watsonx/overview

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IBM Cloud

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watsonx

Documentation

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ENG

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Documentation for IBM watsonx

dataplatfom.cloud.ibm.com/docs/content/wsj/getting-started/welcome-main.html?context=wx&audience=wdp

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IBM watsonx

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- Glossary

Documentation for IBM watsonx as a Service

Last updated: Jul 25, 2025

IBM watsonx as a Service is an experience where you build, deploy, and govern AI solutions with watsonx.ai and watsonx.governance.

To sign up or try a demo of watsonx.ai, go to the [watsonx.ai product page](#). If you are looking for watsonx.data, see [IBM watsonx.data documentation](#).

Developer Hub



Foundation models



AI agents

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Cookie Preferences

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Find information

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Supported foundation models

Building prompts

Automating tasks with AI agents

Agent Lab (beta)

Agent-driven chat

Coding generative AI solutions

Retrieval-augmented generation

Tuning models

Projects

Build an agent with Agent Lab: IBM watsonx

To build an AI agent, complete the following steps:

1. From the [watsonx.ai home page](#), choose a project, and then click the **New asset > Build an AI agent to automate tasks** tile.
2. Select a foundation model and optionally update model parameters. For details, see [Foundation model configuration](#).
3. To set up your agent, specify a name for the agent and describe the tasks the agent performs.
Optional: Add some sample questions that the user can submit to start interacting with the agent.
4. *Optional:* Select an icon and background image to customize how your agent appears in the **Agent Preview** pane.
5. Select the AI agent framework you want to use to create, deploy and, manage your agent.

Note: Currently, watsonx.ai offers LangGraph as the only framework choice.

Activate Windows
Go to Settings to activate Windows.

6. Select the architecture that implements agentic AI reasoning.

PROJECT MACHINEFAULT1_AGENT

The screenshot shows the IBM Watsonx web interface for a project named 'MachineFault1_Agent'. The browser address bar shows the URL: `datapatform.cloud.ibm.com/projects/ec6e983c-c757-49a6-8074-d2371372c139?context=wx`. The user is logged in as 'Rishika J's Account' from 'Dallas'. The interface has a top navigation bar with 'IBM watsonx' and a sidebar with 'Projects / MachineFault1_Agent'. Below the sidebar, there are tabs for 'Overview', 'Assets', 'Jobs', and 'Manage', with 'Overview' selected. The main content area is titled 'Start working' and features four recommended actions: 'Add users as collaborators', 'Add data to work with', 'Chat and build prompts with foundation models', and 'Tune a foundation model with labeled data'. Below these actions, there are three panels: 'Jump back in' showing assets, 'Resource usage' showing usage for the month, and 'Your documentation' with a 'New!' badge and a link to 'Open Documentation editor'. The bottom of the screen shows a Windows taskbar with various application icons and a system clock indicating 19:40 on 30-07-2025.

Agent Lab (beta) — Docs | IBM x MachineFault1_Agent — Project x +

← → ↻ 📄 datapatform.cloud.ibm.com/projects/ec6e983c-c757-49a6-8074-d2371372c139?context=wx 🔍 ☆ 🛡️ Incognito Finish update ⋮

☰ IBM watsonx ⓘ 🔔 Rishika J's Account ▾ Dallas ▾ R.

Projects / MachineFault1_Agent ⬆ ⬇ 👤 ⓘ ⌚ 💬 ⚙️

Overview Assets Jobs Manage

Start working Recommended ▾

👤+ Add users as collaborators →

📄 Add data to work with →

[...] Chat and build prompts with foundation models →

🔧 Tune a foundation model with labeled data →

View all Collapse ^

Jump back in By all ▾

Assets that you create with tools show here. See all assets, including data assets, on the Assets page.

Resource usage ⓘ

For this month in this project

0 CUH

0 Tokens

Your documentation New!

Get started with your documentation

You can create and manage documents about work that you do in this project.

Open Documentation editor →

Activate Windows
Go to Settings to activate Windows.

Type here to search

19:40
30-07-2025

dunet foundation

THIS IS THE PREVIEW OF MACHINEFAULT AGENT BEFORE DEPLOYMENT 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, and user information for 'Rishika .s Account' in 'Dallas'. The breadcrumb trail shows 'Projects / MachineFault1_Agent / Agent Lab'. The main interface is split into two panels. The left panel, titled 'Build', shows the 'AI' model 'llama-3-3-70b-instruct' and a list of 'Added tools (4)': 'Google search', 'DuckDuckGo search', 'Wikipedia search', and 'Webcrawler'. Each tool has a description and a trash icon. The right panel, titled 'Agent preview', shows a chat history. The first message is from 'watsonx Agent' at 04:05 PM: 'Hi, How can I help you?'. The second message is from 'You' at 04:06 PM: 'Why is my cnc machine vibrating so much'. The third message is from 'watsonx Agent' at 04:06 PM: 'The provided search results suggest that CNC machine vibration can be caused by a variety of factors, including improper grip, faulty equipment maintenance, inadequate or excessive clamping force, and uneven cutting tool engagement. To reduce vibration, it is recommended to check the clamping force, ensure proper workpiece securing, and adjust the cutting tool parameters. Additionally, maintaining the machine's motors and ensuring proper alignment can help minimize vibration. If the issue persists, it may be necessary to consult a professional for further diagnosis and repair.' The chat input field at the bottom contains the text 'Type something...'. An 'Activate Windows' watermark is visible in the bottom right corner of the chat area.

Agent Lab (beta) — Docs | IBM x Agent Lab — MachineFault1_Ac x +

dataplatform.cloud.ibm.com/wx/agents?context=wx&project_id=ec6e983c-c757-49a6-8074-d2371372c139

Incognito Finish update

IBM watsonx Upgrade ? Bell Rishika .s Account Dallas R.

Projects / MachineFault1_Agent / Agent Lab Share feedback B Unsaved New agent + Deploy

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

Add a tool Create custom tool

Added tools (4)

Google search [Settings] [Trash]
Retrieve information from the internet with the Google search engine.

DuckDuckGo search [Trash]
Retrieve information from the internet with the DuckDuckGo search engine.

Wikipedia search [Settings] [Trash]
Retrieve information from Wikipedia articles.

Webcrawler [Trash]
Retrieve information from a website.

Agent preview

watsonx Agent 04:05 PM
Hi, How can I help you?
► How did I get this answer?

R. You: 04:06 PM
Why is my cnc machine vibrating so much

watsonx Agent 04:06 PM
The provided search results suggest that CNC machine vibration can be caused by a variety of factors, including improper grip, faulty equipment maintenance, inadequate or excessive clamping force, and uneven cutting tool engagement. To reduce vibration, it is recommended to check the clamping force, ensure proper workpiece securing, and adjust the cutting tool parameters. Additionally, maintaining the machine's motors and ensuring proper alignment can help minimize vibration. If the issue persists, it may be necessary to consult a professional for further diagnosis and repair.
► How did I get this answer?

Type something... [Send] [Activate Windows watermark]

DEPLOYMENT SPACE CREATION

The screenshot shows the IBM Watsonx web interface for creating a deployment space. The browser address bar displays `datapatform.cloud.ibm.com/ml-runtime/spaces/create-space?com`. The page title is "Create a deployment space" with a subtitle: "Use a space to collect assets in one place to create, run, and manage deployments".

The interface includes a sidebar with a "New" button and a "Local file" option. The main content area, titled "Define details", contains the following fields:

- Name:** A text input field containing "Fault_Agent".
- Description (Optional):** A text area with a character count of 0/100. The placeholder text is "What's the purpose of this space?".
- Deployment stage:** A dropdown menu currently set to "Development".
- Tags (optional):** A dropdown menu with the option "Find or create tags".
- Storage:** A dropdown menu currently set to "Cloud Object Storage-oc". A note below states: "Space will include integration with [Cloud Object Storage](#) for storing space assets."
- watsonx.ai Runtime (optional):** A dropdown menu currently set to "watsonx.ai Runtime-jv".

An "On-Screen Keyboard" window is overlaid on the right side of the page. The Windows taskbar at the bottom shows the search bar, task view button, and several application icons. A system tray at the bottom right displays the temperature (31°C), time (16:22), date (31-07-2025), and language (ENG). An "Activate Windows" watermark is visible in the bottom right corner of the application area.

Agent Lab (beta) | watsonx Agent | Fault_Agent | Home | IBM watsonx | Settings | IBM watsonx | Deployments | IBM w

datapatform.cloud.ibm.com/wx/home?context=wx

Incognito Finish update

IBM watsonx Upgrade ? Rishika's Account Dallas R.

Explore foundation models from IBM and other third-parties depending on your use case.
[Explore foundation models](#) →

- Data →
- Projects →
- Notebooks →
- Agents →

Jul 30, 2025 →

Token usage limit increased with the watsonx.ai Runtime Lite plan
Jul 30, 2025 →

Train your agent with knowledge content in Agent Lab
Jul 29, 2025 →

Recent work

Projects ↺ +

MachineFault1_Agent	21 h ago
Machinefault_agent	2 d ago
MachineFault_agent	2 d ago
Weather_Agent	2 d ago

Deployment spaces +

Fault_Agent
2 min ago

Activate Windows
Go to Settings to activate Windows.

Type here to search

File Explorer

31°C 16:25 31-07-2025

DEPLOYING THE AGENT

The screenshot shows a web browser window with multiple tabs. The active tab is 'watsonx Agent — Machine Fault 1', displaying the deployment configuration page for 'MachineFault1_Agent'. The page title is 'Deploy as an AI service'. Below the title, there is a brief instruction: 'Create an online deployment. If you want to edit code in notebook format before deploying, save as a deployment notebook. [Learn more.](#)'

The 'Define details' section contains the following fields:

- Deployment name:** A text input field containing 'watsonx Agent'.
- Target deployment space:** A dropdown menu with 'Fault_Agent' selected.
- Description (optional):** A text area with the placeholder text 'Change this description to reflect your particular agent'.

At the bottom right of the form, there are two buttons: 'Cancel' and 'Deploy'. A Windows security notification is visible in the bottom right corner, stating 'Activate Windows. Go to Settings to activate Windows.'

AGENT DEPLOYED

Fault_Agent

Overview Assets **Deployments** Jobs Manage

Name	Type	Status	Asset	Asset type	Tags	Last modified
watsonx Agent	Online	✓ Deployed	watsonx Agent	Ai service	wx-agent	45 seconds ago Rishika . (You)

Items per page: 20 1–1 of 1 items

Activate Windows
Go to Settings to activate Windows.

RESULT

The screenshot displays the IBM Watsonx Agent deployment interface. The browser address bar shows the URL: `dataplatfom.cloud.ibm.com/ml-runtime/deployments/89bcbfa6-bad0-4138-b4cc-41c2099ed01d/implementation?space_id=015a3956-0f8...`. The page title is "watsonx Agent" with a status of "Deployed Online".

Under the "API reference" tab, the "Endpoints for inferencing" section lists two private endpoints and two public endpoints, all pointing to `https://us-south.ml.cloud.ibm.com/ml/v4/deployments/89bcbfa6-bad0-4138-b4cc-41c2099ed01d/ai_service?version=2021-05-01` and `https://us-south.ml.cloud.ibm.com/ml/v4/deployments/89bcbfa6-bad0-4138-b4cc-41c2099ed01d/ai_service_stream?version=2021-05-01`. A "Bearer <token>" field is also present, containing the text "IAM".

Below the endpoints, a "Code snippets" section is visible, with tabs for "cURL", "Java", "JavaScript", "Python", and "Scala". The "cURL" tab is currently selected.

The bottom of the image shows a Windows taskbar with various application icons and a system tray displaying the date and time as 16:35 on 31-07-2025.

The screenshot displays the IBM watsonx Agent web application. At the top, there's a navigation bar with tabs for "Agent Lab (beta)", "watsonx Agent", "Fault_Agent", and others. The main header shows the deployment path: "Deployment spaces / Fault_Agent / watsonx Agent". Below this, the "watsonx Agent" status is shown as "Deployed" and "Online". A tabbed interface at the bottom includes "API reference", "Test", and "Preview", with "Preview" being the active view. The chat area shows a user asking, "Hi, Can you tell me the major problems that cnc machines face". The agent responds with a list of seven common issues: code errors, lack of maintenance, vibration or chatter, chuck fixture clamping problems, incompatible cutting tools or settings, poor lubrication, and machine vibration issues. An input field at the bottom prompts the user to "Type something...". A Windows taskbar is visible at the very bottom, indicating the time is 16:33 on 31-07-2025.

CONCLUSION

The Machine Fault Diagnosis Agent has the ability to detect and diagnose faults in industrial machinery such as lathes, mills and pumps by analyzing key factors like vibrations , unusual noises etc . It enhances efficiency by offering clear answers to specific fault related questions and gives basic maintenance steps and safety measures . This project can have problems due to insufficient data about fault which can lead to wrong information and steps against a particular fault , for improvement we can used IOT or real time monitoring with this project so we can get the actual fault that is happening in the particular machine

FUTURE SCOPE

- The future scope of the Machine Fault Diagnosis Agent includes expanding its capabilities into self maintenance by integrating real time sensor data and machine learning for early fault detection. It can evolve to support voice commands and visual input for a more intuitive user experience(LVM).

REFERENCES

- IBM Cloud
- Watsonx.ai
- Google Search
- DuckDuck Go
- Wikipedia
- WebCrawler

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7/24/25, 6:25 PM

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Completion Certificate



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Rishika .

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