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# **IBM PROJECT**

## **PREDICTIVE MAINTENANCE OF INDUSTRIAL MACHINERY**

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**College Name & Department : MIT Academy of Engineering &  
Computer Engineering**

# OUTLINE

- Problem Statement
- Technology used
- Wow factor
- End users
- Result
- Conclusion
- Git-hub Link
- Future scope
- IBM Certifications

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# PROBLEM STATEMENT

Develop a predictive maintenance model for a fleet of industrial machines to anticipate failures before they occur. This project will involve analyzing sensor data from machinery to identify patterns that precede a failure. The goal is to create a classification model that can predict the type of failure (e.g., tool wear, heat dissipation, power failure) based on real-time operational data. This will enable proactive maintenance, reducing downtime and operational costs

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# TECHNOLOGY USED

IBM cloud lite services

IBM Cloud AutoAI

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## IBM CLOUD SERVICES USED

- IBM Cloud Watsonx AI Studio
- IBM Cloud Watsonx AI runtime
- IBM Cloud Agent Lab

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## WOW FACTORS

This model helps industrial stakeholders make faster, more informed maintenance decisions by identifying the type of failure in machinery early. It reduces diagnostic time, enables proactive planning, and increases machine availability.

Unique features:

Failure Type Detection: Classifies issues like tool wear, power failure, etc.

Cloud-Based: Scalable deployment on IBM Cloud.

Low-Code Workflow: Built using Watsonx AI Studio's visual tools.

Real-Time Ready: can be linked to live sensor streams.

Modular Design: Easily extendable to more failure types or tools.

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## END USERS

- Maintenance Teams
- Operations Managers
- Manufacturing Engineers
- OEMs (Original Equipment Manufacturers)

# SETTING UP

Set Google Chrome as your default browser and pin it to your taskbar

Set as default

IBM Cloud

Search resources and products...

Catalog

Manage

SHUBHAM SARWAR's A...

?

Resource list /

watsonx.ai Studio-gu


Add tags

Details

Actions

Manage

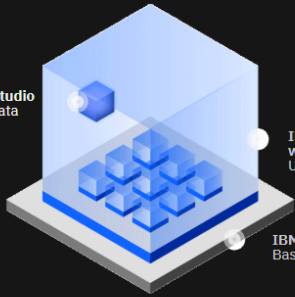
Plan



### watsonx.ai Studio in Cloud Pak for Data and watsonx

Build and deploy machine learning models on either platform. Work with foundation models on watsonx as a Service.

Launch in



IBM watsonx.ai Studio in Cloud Pak for Data and watsonx

IBM Cloud Pak for Data, watsonx Unifying platforms

IBM Cloud Base cloud infrastructure

IBM watsonx.ai Studio is part of IBM Cloud Pak for Data and watsonx, and serves as the AI capability of the data fabric architecture.

Helpful links

#### Documentation

Learn about tools, features, and how to perform a wide variety of Data and AI tasks.

Cloud Pak for Data →

#### Learning path

Start a step-by-step tutorial to get up and running quickly.

Cloud Pak for Data →

#### Videos

Watch videos to learn about watsonx.ai Studio.

Cloud Pak for Data →



# CREATING A PROJECT

Set Google Chrome as your default browser and pin it to your taskbar

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×

IBM watsonx.ai Studio

Search in your workspaces

To exit full screen, press and hold Esc

Upgrade

?

🔔

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Sydney ▾

SS

⋮

Create a project

Start with a new, blank project or select from where to import an existing project.

+ New

Local file

Sample

Define details

Name

Predictive-Maintenance

Description (optional)

What's the purpose of this project?

Tags (optional)

Add tags

Add tags to make projects easier to find. To add tags, separate them with commas and press Enter.

Define storage

1 Select storage service

Add

Add an object storage instance, and then return to this page and click Refresh.

Cancel

Create

# ASSOCIATING SERVICES

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IBM watsonx.ai Studio

Search in your workspaces

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SS

Projects / Predictive-Maintenance

Associate service

Choose an existing or add a new service to associate with your project.

1 x Default 2 x Locations

Find services

New service +

Name	Type	Plan	Location	Status	Group
<input checked="" type="checkbox"/> watsonx.ai Runtime-il ⓘ	watsonx.ai Runtime	Lite	Sydney	Not associated	Default

CancelAssociate

# DATA SOURCE

Set Google Chrome as your default browser and pin it to your taskbar

Set as default

IBM watsonx.ai Studio

Search in your workspaces

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Projects / Predictive-Maintenance / Predictive-Maintenance

Configure AutoAI experiment

Predictive-Maintenance

Add data source

Add files such as tabular data (CSV).

Browse

Select from project

predictive\_maintenance.csv

Size: 518.57 KB

Configure details

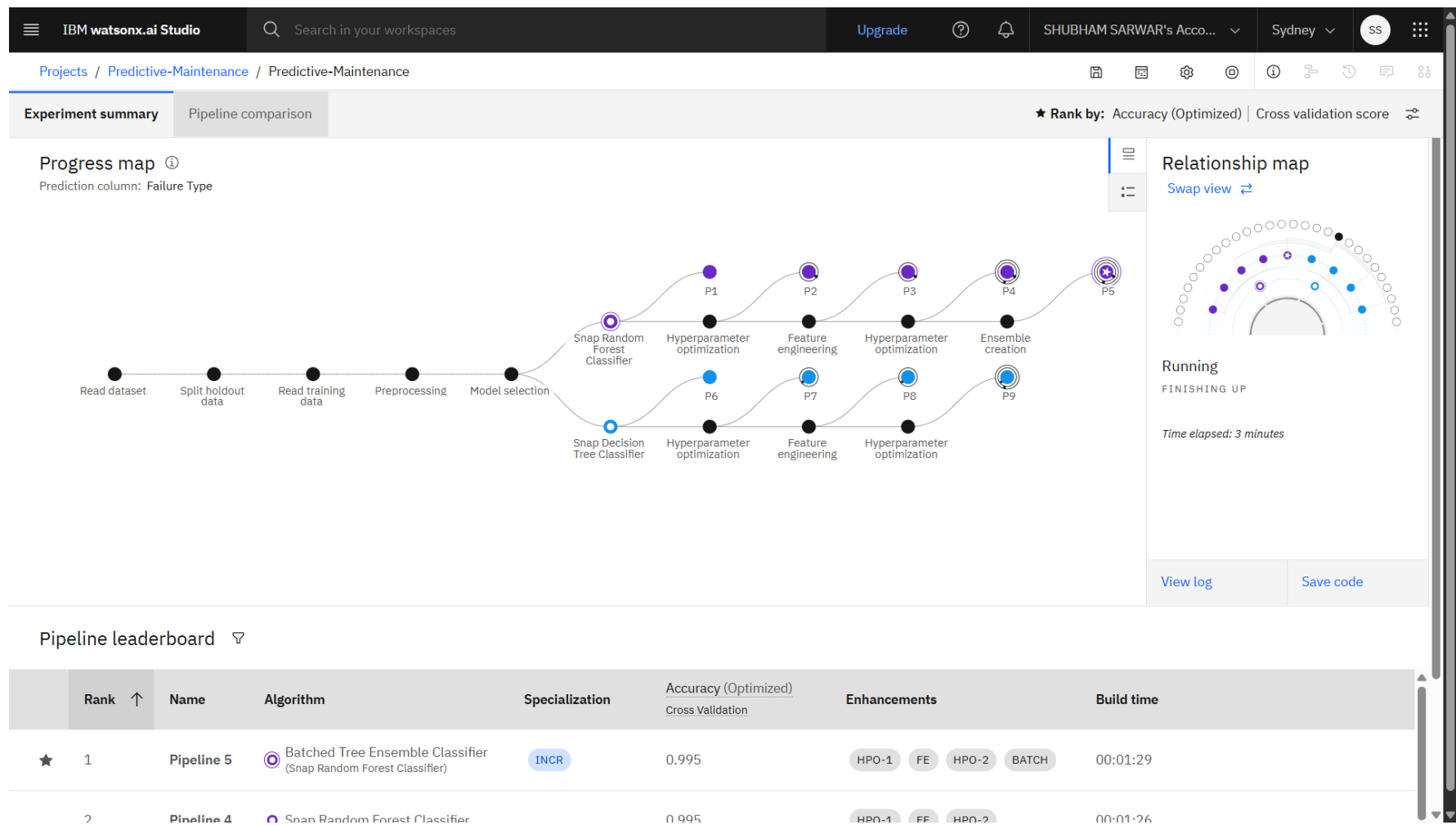
Create a time series analysis?

Enable this option to predict future activity over a specified date/time range. Data must be structured and sequential. [Learn more](#)

Yes

No

# SELECTING MODEL



# DEPLOYMENT

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Deployment spaces /

Predictive-Maintenance

OverviewAssetsDeploymentsJobsManage

Find assets

Import assets

New asset

1 asset

All assets

Asset types

Models

All assets

Name	Last modified
<div><div></div><div><a href="#">P5 - Snap Random Forest Classifier: Predictive-Maintenance</a></div><div>Machine learning model from AutoAI</div></div>	5 seconds ago Service

Items per page: 201-1 of 1 items

1 of 1 pages

https://au-syd.dai.cloud.ibm.com/ml-runtime/models/9bb2a141-47b7-4160-98e6-d15e0d396294?space\_id=65dadb08-b396-4b6d-a30f-87cd4611489c&context=cpdaas

# RESULTS

IBM watsonx.ai Studio

Search in your workspaces

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Deployment spaces / Predictive-Maintenance / P5 - Snap Random Forest Classifier: Predictive-Maintenance


Deployments

Model details

🔍 Search

↻

New deployment

Name	Type	Status	Tags	Last modified	
 <a href="#">Predictive-Maintenance</a>	Online	✔ Deployed	<a href="#">Add tags +</a>	21 seconds ago SHUBHAM SARWAR (You)	⋮

Items per page: 20 1-1 of 1 items

About this asset

Name

P5 - Snap Random Forest Classifier: Predictive-Maintenance

Description

No description provided.

Asset Details

Type: wml-hybrid\_0.1

Model ID: 9bb2a141-47b7-41...

Software specification: [hybrid\\_0.1](#)

Hybrid pipeline software specifications: [autoai-kb\\_rt24.1-py3.11](#)

Tags

Add tags to make assets easier to find.

Source asset details

Last modified  
52 seconds ago by Service

Created on  
Aug 4, 2025 by SHUBHAM SARWAR

[https://au-syd.dai.cloud.ibm.com/ml-runtime/deployments/4b0aa35a-3e80-408f-91ee-55248f68cf41?space\\_id=65dad08-b396-4b6d-a30f-87cd4611489c&context=cpdaas](https://au-syd.dai.cloud.ibm.com/ml-runtime/deployments/4b0aa35a-3e80-408f-91ee-55248f68cf41?space_id=65dad08-b396-4b6d-a30f-87cd4611489c&context=cpdaas)

# API REFERENCES

IBM watsonx.ai Studio

Search in your workspaces

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Deployment spaces / Predictive-Maintenance / P5 - Snap Random Forest Classifier: Predictive-Maintenance /

Predictive-Maintenance

Deployed Online

API reference

Test

Endpoints for scoring ⓘ

Private endpoint

https://private.au-syd.ml.cloud.ibm.com/ml/v4/deployments/4b0aa35a-3e80-408f-91ee-55248f68cf41/predictions?version=2021-05-01

Public endpoint

https://au-syd.ml.cloud.ibm.com/ml/v4/deployments/4b0aa35a-3e80-408f-91ee-55248f68cf41/predictions?version=2021-05-01

Bearer <token> ⓘ

IAM

Learn more

about the 2021-05-01 version query parameter

Code snippets

cURL

Java

JavaScript

Python

Scala

# NOTE: you must set \$API\_KEY below using information retrieved from your IBM Cloud account (https://au-syd.dai.cloud.ibm.com/docs/content/ibm/cloud/swagger/index.html)

export API\_KEY=<your API key>

export IAM\_TOKEN=\$(curl --insecure -X POST --location "https://iam.cloud.ibm.com/identity/token" \

--header "Content-Type: application/x-www-form-urlencoded" \

--header "Accept: application/json" \

--data-urlencode "grant\_type=urn:ibm:params:oauth:grant-type:apikey" \

--data-urlencode "apikey=\$API\_KEY" | jq -r '.access\_token')

# TODO: manually define and pass values to be scored below

curl --location "https://private.au-syd.ml.cloud.ibm.com/ml/v4/deployments/4b0aa35a-3e80-408f-91ee-55248f68cf41/predictions?version=2021-05-01" \

--header "Content-Type: application/json" \

About this deployment

Name

Predictive-Maintenance

Description

No description provided.

Deployment Details

Deployment ID: 4b0aa35a-3e80-40...

Serving name:

No serving name.

Software specification:

hybrid\_0.1 ⓘ

Hybrid pipeline software specifications:

autoai-kb\_rt24.1-py3.11

Copies:

1

Tags

Add tags to make assets easier to find.

Associated asset

P5 - Snap Random Forest Classifier: Pr...

9bb2a141-47b7-4160-98e6-d15e0d396294

Last modified

38 seconds ago

Created on

Aug 4, 2025

# TESTING

Service Details

Predictive-Maint

Inbox (2,549) - Z

Telegram Web

SB4Academia\_Pr

Week3\_Day03\_S

(4) WhatsApp

Download histor

+

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au-syd.dai.cloud.ibm.com/ml-runtime/deployments/4b0aa35a-3e80-408f-91ee-55248f68cf41/test?space\_id=65dadbb08-b396-4b6d-a30f-87cd4611489c&context=cpd... ☆

📁

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🔖

S School Error

MITAOE: Log in to t...

Google Scholar

Dashboard - EdClub

HackerRank - Onlin...

Online Professional...

freecodecamp - You...

X Week 0 - Scratch | C...

Free eBooks | Projec...

NPTEL

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All Bookmarks

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Deployment spaces / Predictive-Maintenance / P5 - Snap Random Forest Classifier: Predictive-Maintenance / 🗑️ ⓘ 🔄 📄 🧩

## Predictive-Maintenance ✔ Deployed Online

API reference **Test**

### Enter input data

Text JSON

Enter data manually or use a CSV file to populate the spreadsheet. Max file size is 50 MB.  
[Download CSV template](#) ↓ [Browse local files](#) ↗ [Search in space](#) ↗ Clear all ×

	UDI (double)	Product ID (other)	Type (other)	Air temperature [K] (double)	Process temperature [K] (double)	Rotational speed [rpm] (double)	Torque [Nm] (double)	Tool wear
1	9	M14868	M	298.3	308.7	1667	28.6	18
2				298.8	309.1	1378	54.4	165
3			M	300.1	298.8 320.3	1500	60	23

3 rows, 9 columns

Predict



# RESULTS

The screenshot displays the IBM Watson AI Studio interface. The browser address bar shows the URL: `au-syd.dai.cloud.ibm.com/ml-runtime/deployments/4b0aa35a-3e80-408f-91ee-55248f68cf41/test?space_id=65dad08-b396-4b6d-a30f-87cd4611489c&context=cpd...`. The page title is "Prediction results". Below the title, there are radio buttons for "Table view" (selected) and "JSON view", and a toggle for "Show input data". The table has two columns: "prediction" and "probability". The first three rows show "No Failure" with various probability arrays. The bottom right corner of the modal has a "Download JSON file" button.

	prediction	probability
1	No Failure	[0,1,0,0,0]
2	No Failure	[0,0.9997901439666749,0,0,0.00020986357703804971,-7.543712987612139e-9]
3	No Failure	[0,0.9,0,0.1,0]
4		
5		
6		
7		
8		
9		

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## CONCLUSION

- Developed a **classification model** to predict the **type of machine failure**, using historical sensor data.
- Implemented and trained the model with **IBM Cloud AutoAI**, requiring minimal manual tuning.
- Used **Watsonx AI Studio**, **AI Runtime**, and **Agent Lab** to manage, run, and deploy the solution on IBM Cloud Lite.
- The model helps **identify what kind of maintenance is needed**, enabling quicker fault resolution.

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# FUTURE SCOPE

- Multi-Label Classification
- Time Series Support
- Model Retraining
- Integration with IoT
- Broader Failure Taxonomy

# IBM CERTIFICATIONS

In recognition of the commitment to achieve  
professional excellence



## SHUBHAM SARWAR

Has successfully satisfied the requirements for:

### Getting Started with Artificial Intelligence



Issued on: Jul 18, 2025  
Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/693599c8-4539-4cd2-8462-65983aa0f7ab>



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Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/cae0bdb0-fe12-461e-a94e-7ce25b058a30>



IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Shubham Sarwar

for the completion of

**Lab: Retrieval Augmented Generation with  
LangChain**

(ALM-COURSE\_3824998)

According to the Adobe Learning Manager system of record

**Completion date:** 18 Jul 2025 (GMT)

**Learning hours:** 20 mins

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## GITHUB LINK

GitHub Link: <https://github.com/ShubhamSarwar/Predictive-Maintenance-of-Industrial-Machinery.git>



**THANK YOU**