

---

# CAPSTONE PROJECT

## POWER SYSTEM FAULT DETECTION AND CLASSIFICATION USING MACHINE LEARNING

Presented By:

1. Darshil Pareek 2. JECRC University 3. (C.S.E)

# 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

- **Power distribution systems are prone to various types of faults such as line-to-ground, line-to-line, and three-phase faults. These faults can disrupt power supply and reduce system reliability. The challenge lies in accurately detecting and classifying these faults using electrical measurement data (voltage, current, phasors) to differentiate them from normal operating conditions, thereby ensuring the stability of the power grid.**

---

# PROPOSED SOLUTION

- Develop a machine learning model that classifies power system faults using the dataset provided. The model will process electrical measurements to identify the type of fault rapidly and accurately. This classification will help automate fault detection and assist in quicker recovery actions, ensuring system reliability.
- Key components:
- Data Collection: Use the Kaggle dataset on power system faults. Preprocessing: Clean and normalize the dataset.
- Model Training: Train a classification model (e.g., Decision Tree, Random Forest, or SVM).
- Evaluation: Validate the model using accuracy, precision, recall, and F1-score.

# SYSTEM APPROACH

The "System Approach" section outlines the overall strategy and methodology for developing and implementing the power system fault detection and classification. Here's a suggested structure for this section:

- System requirements :

- : IBM Cloud(mandatory)

- : IBM Watson studio for model development and deployment

- : IBM cloud object storage for dataset handling

# ALGORITHM & DEPLOYMENT

- **Algorithm Selection:**

  - Random Forest Classifier (or SVM based on performance)**

- **Data Input:**

  - Voltage, current, and phasor measurements from the dataset**

- **Training Process:**

  - Supervised learning using labeled fault types**

- **Prediction Process:**

  - Model deployed on IBM Watson Studio with API endpoint for real-time predict**

**RESULT**

IBM SkillsBuild Internship on x

SB4Academia\_Problem State x

Cropp\_Recommended — Fir x

Power System Faults Dataset x

SB4C AICTE Internship Batch x

CropRecommendation-Auto x

+

—

□

×

←

↺

https://eu-gb.dataplatform.cloud.ibm.com/ml-runtime/deployments/84c98b97-9583-4410-a9a3-25acc62100b8/test?space\_id=a3ce2263-774f-4eba-895a-28...

⋮

☆

⚙

🔊

☆

Sign in

⋮

🌐

☰ IBM watsonx.ai Studio

🔍 Search in your workspaces

Upgrade

?

🔔 1

Darshil Pareek's Account ▾

London ▾

DP

⋮

Deployment spaces / Final\_11 / P9 - Random Forest Classifier: Powersystem\_ML /

Cropp\_Recommended

✔ 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 ×

	e (°C) (double)	Wind Speed (km/h) (double)	Weather Condition (other)	Maintenance Status (other)	Component Health (other)	Duration of Fault (hrs) (double)	Down time (hrs) (double)
1		25	Windstorm	Pending			
2		15	Rainy	Completed			
3							
4							
5							

2 rows, 12 columns

Predict

Type here to search

🌟

🏠

📁

📅

📧

🌐

🔍

🔧

🔔

🔥

🌤 31°C Partly sunny

13:44

02-08-2025

ENG

🔊

🔌

📶

🖨

🗑

🗨 2

# RESULT

IBM watsonx.ai Studio

Deployment spaces / Final\_11 / P9 - Random Forest Classifier: Powersystem\_ML /

## Prediction results

Prediction type  
Multiclass classification

Prediction percentage

2 records

Overheating Transformer Failure

Confidence level distribution

Display format for prediction results  
☒ Table view ☐ JSON view ☐ Show input data

	Prediction	Confidence
1	Overheating	37%
2	Transformer Failure	35%
3		
4		
5		
6		
7		
8		
9		
10		
11		

Download JSON file



# RESULT

IBM SkillsBuild Internship on

SB4Academia\_Problem State

Cropp\_Recommended — Fir

Power System Faults Dataset

SB4C AICTE Internship Batch

CropRecommendation-Auto

https://eu-gb.dataplatform.cloud.ibm.com/ml-runtime/deployments/84c98b97-9583-4410-a9a3-25acc62100b8/test?space\_id=a3ce2263-774f-4eba-895a-28...

Sign in

sonx.ai Studio

Search in your workspaces

Upgrade

Darshil Pareek's Account

London

DP

spaces / Final\_11 / P9 - Random Forest Classifier: Powersystem\_ML /

Close

X

2 records

Overheating Transformer Failure

Confidence level distribution

Number of records

Confidence level

Display format for prediction results

Table view JSON view

Show input data

	Prediction	Confidence
1	Overheating	37%
2	Transformer Failure	35%
3		
4		
5		
6		
7		
8		
9		
10		
11		

Download JSON file

Type here to search

31°C Partly sunny

13:50

02-08-2025

edunet foundation

# REFERENCES

- Power system fault detection and classification are critical tasks to ensure reliable and stable operation of electrical grids. Traditional methods based on thresholding or impedance analysis often fall short under complex fault scenarios. With the advancement of artificial intelligence, machine learning (ML) techniques like support vector machines (SVM), decision trees, random forests, and deep learning models such as CNNs and LSTMs have shown promising results in identifying and classifying various types of faults, including line-to-ground, line-to-line, and high-impedance faults.

# IBM CERTIFICATIONS

In recognition of the commitment to achieve  
professional excellence



## Darshil Pareek

Has successfully satisfied the requirements for:

### Journey to Cloud: Envisioning Your Solution



Issued on: Jul 17, 2025

Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/d2969957-86c4-4749-9284-9149d57505e5>



# IBM CERTIFICATIONS

In recognition of the commitment to achieve professional excellence



## Darshil Pareek

Has successfully satisfied the requirements for:

### Getting Started with Artificial Intelligence



Issued on: Jul 17, 2025

Issued by: IBM SkillsBuild

Verify: <https://www.credly.com/badges/0b56d52c-edb3-4fc7-aa4a-c6fea157a4e7>



# IBM CERTIFICATIONS

IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Darshil Pareek

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**