

Project Design Phase

Problem – Solution Fit Template

Date	19 February 2026
Team ID	LTVIP2026TMIDS61980
Project Name	Electric Motor Temperature Prediction System
Maximum Marks	2 Marks

Problem – Solution Fit Template:

The Problem–Solution Fit ensures that the proposed system solves a real industrial problem by understanding user needs, operational challenges, and behavioral patterns. The Electric Motor Temperature Prediction System focuses on preventing motor failures through predictive analytics and intelligent monitoring.

Purpose:

- Reduce unexpected motor failures in industries
- Enable predictive maintenance instead of reactive maintenance
- Improve operational efficiency and equipment lifespan
- Provide early temperature prediction using machine learning
- Support data-driven decision-making for maintenance teams

Template:

Project Name: Electric Motor Temperature		Project Name: Electric Motor Tempet Prediction using Machine Learning	
1. CUSTOMER SEGMENT(S) <small>CS</small>	2. JOBS-TO-BE-DONE / PROBLEMS <small>J&P</small>	5. AVAILABLE SOLUTIONS <small>AS</small>	
<ul style="list-style-type: none"> ✖ Maintenance Engineers ✖ Plant Managers ✖ Equipment Maintenance Staff 	<ul style="list-style-type: none"> ▪ Unexpected motor overheating and failures ▪ No predictive tools to forecast motor temperature rise ▪ Reactive maintenance instead of preventive maintenance ▪ High maintenance costs due to unplanned downtime 	<ul style="list-style-type: none"> ✖ Manual temperature monitoring ✖ Fixed alarms triggered after critical temperature reached ✖ Complex predictive maintenance software (costly) 	
2. JOBS-TO-BE-DONE / PROBLEMS <small>J&P</small>	9. PROBLEM ROOT CAUSE <small>RC</small>	7. BEHAVIOUR <small>BE</small>	
<ul style="list-style-type: none"> ✖ Unexpected motor overheating and failures ✖ No predictive tools to forecast motor temperature rise ✖ Reactive maintenance instead of preventive maintenance ✖ High maintenance costs due to unplanned downtime 	<ul style="list-style-type: none"> ▪ Lack of predictive maintenance system ▪ Reliance on reactive threshold-based monitoring ▪ No tools to analyze and predict temperature rise ▪ Insufficient use of sensor data (voltage, current, speed, temperature) 	<ul style="list-style-type: none"> ▪ Perform routine checks on motor temperature manually ▪ Rely on plant alarms that alert only when overheating occurs ▪ Call maintenance crew only after problem appears ▪ Operational downtime for unplanned repairs 	
3. TRIGGERS <small>TR</small>	6. CUSTOMER CONSTRAINTS <small>CC</small>	8. BEHAVIOUR <small>BE</small>	
<ul style="list-style-type: none"> ✖ Frequent motor breakdowns due to overheating ✖ High repair costs and increased maintenance ✖ Unplanned production stops ✖ Pressure to reduce equipment downtime 	<ul style="list-style-type: none"> ▪ Budget limitations for costly predictive maintenance systems ▪ Lack of technical expertise among maintenance staff ▪ Sensitivity to new technology implementation ▪ Preference for simple, reliable solutions 	<ul style="list-style-type: none"> ▪ Perform routine checks for motor temperature manually ▪ Rely on real-time dashboards for complex seas ▪ Charts and graphs for visualizing motor temperature trends 	
4. EMOTIONS: BEFORE / AFTER <small>EM</small>	7. YOUR SOLUTION <small>SL</small>	8. CHANNELS OF BEHAVIOUR <small>CH</small>	
<ul style="list-style-type: none"> ✖ Before ✖ Worried about motor reliability, Reactive maintenance 	<ul style="list-style-type: none"> ▪ Machine Learning model that predicts electric motor temperature 	<ul style="list-style-type: none"> 6.1 ONLINE ✖ Use web interface for easy data input and output ✖ ML based prediction using sensor data ✖ Charts and graphs for visualizing motor temperature trends 	
4. RIGGERS: <small>EM</small>	8.3 OFFLINE <small>SL</small>		
<ul style="list-style-type: none"> ✖ Worried about motor reliability ✖ Reactive maintenance ✖ Confident in predictions, Proactive maintenance efforts 	<ul style="list-style-type: none"> ✖ Manuale thermometer checks ✖ Fixed alarm systems ✖ Logging data in maintenance logs 		

Customer Discovery Sheet – Electric Motor Temperature Prediction System

1. CUSTOMER SEGMENT(S)

Who is your customer?

- Industrial Plant Operators
- Maintenance Engineers
- Manufacturing Unit Managers
- Electrical Engineers

2. JOBS-TO-BE-DONE / PROBLEMS

Which problems does your system address?

- Sudden overheating of electric motors
- Unexpected equipment breakdowns
- Lack of early warning systems
- Manual monitoring of motor temperature
- High maintenance and repair costs
- Inefficient preventive maintenance planning

3. TRIGGERS

What motivates them to act?

- Frequent motor failures
- Production downtime losses
- Increased repair expenses
- Need for predictive maintenance solutions
- Requirement for efficient energy utilization

4. EMOTIONS: BEFORE / AFTER

Before:

- Worried about sudden machine failures
- Reactive maintenance approach
- Lack of confidence in manual monitoring
- Stress due to unexpected downtime

After:

- Confident with early temperature prediction
- Reduced maintenance stress
- Improved operational reliability
- Better planning of maintenance schedules

5. AVAILABLE SOLUTIONS

What exists today?

- Threshold-based alarm systems
- Manual temperature monitoring
- Periodic maintenance inspections
- Basic sensor monitoring without prediction capability

6. CUSTOMER CONSTRAINTS

What stops them from acting?

- High cost of advanced monitoring systems
- Limited AI adoption in traditional industries
- Lack of technical expertise
- Integration challenges with existing systems
- Resistance to technology transition

7. BEHAVIOUR

What do users do today to solve these problems?

- Monitor temperature manually at intervals
- Use fixed temperature alarms
- Perform maintenance only after failure occurs
- Depend on technician experience for decisions

8. CHANNELS OF BEHAVIOUR

8.1 ONLINE:

- Web-based prediction system (Flask application)
- Machine learning prediction dashboard
- Sensor data analysis tools

8.2 OFFLINE:

- Manual inspection of motors
- Scheduled maintenance logs
- Physical monitoring instruments

9. PROBLEM ROOT CAUSE

Why does the problem exist?

- Lack of predictive analytics in monitoring systems
- Dependence on threshold-based alerts
- Insufficient analysis of historical sensor data
- Absence of intelligent maintenance tools.

10. YOUR SOLUTION

What do you offer?

A Machine Learning-based Electric Motor Temperature Prediction System featuring:

- Data preprocessing and feature scaling using MinMaxScaler
- Regression models (Linear Regression, Decision Tree, Random Forest, SVR)
- Decision Tree model for accurate temperature prediction
- Flask-based web application for user interaction
- Real-time temperature prediction using input parameters
- Visualization and performance evaluation using RMSE and R² score
- Future-ready architecture for IoT sensor integration and automated alert.