

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 Temperature Prediction using Machine Learning	
Defining CS: strategy TTR Int. Netcam CC	1. CUSTOMER SEGMENT(S) CS <ul style="list-style-type: none"> Maintenance Engineers Plant Managers Equipment Maintenance Staff 	2. JOBS-TO-BE-DONE / PROBLEMS J&P <ul style="list-style-type: none"> Unexpected motor overheating and failures No predictive tools to forecast motor temperature Reactive maintenance instead of preventive maintenance High maintenance costs due to unplanned downtime 	5. AVAILABLE SOLUTIONS AS <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 J&P <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 	9. PROBLEM ROOT CAUSE RC <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) 	7. BEHAVIOUR BE <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 TR <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 	6. CUSTOMER CONSTRAINTS CC <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 	8. BEHAVIOUR BE <ul style="list-style-type: none"> Perform routine checks for motor temperature manually Rely on plant alarms for overheating Charts and graphs for visualizing motor temperature trends
	4. EMOTIONS: BEFORE / AFTER EM <ul style="list-style-type: none"> Before Worried about motor reliability, Reactive maintenance 	7. YOUR SOLUTION SL <ul style="list-style-type: none"> Machine Learning model that predicts electric motor temperature 	8. CHANNELS of BEHAVIOUR CH
Defining CS: strategy TTR		8.3 OFFLINE SL <ul style="list-style-type: none"> Manual thermometer checks Fixed alarm systems Logging data in maintenance logs 	
4. RIGGERS: EM <ul style="list-style-type: none"> Worried about motor reliability Reactive maintenance Confident in predictions, Proactive maintenance efforts 		6.1 ONLINE <ul style="list-style-type: none"> Use web interface for easy data input and output ML based prediction using sensor data Charts and graphs for visualizing motor temperature trends 	

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 R^2 score
- Future-ready architecture for IoT sensor integration and automated alert.