Ideation Phase: Electric Motor Temperature Prediction using Machine Learning

1. Problem Identification

Electric motors are widely used in industries such as manufacturing, electric vehicles, robotics, and power plants. Overheating is one of the major causes of motor failure, leading to reduced efficiency, maintenance costs, and downtime. The goal of this project is to predict motor temperature using machine learning techniques before critical overheating occurs.

2. Project Objective

- Develop a machine learning model to predict electric motor temperature.
- Use sensor-based operational data for prediction.
- Enable early warning systems to prevent motor damage.
- Improve efficiency and reduce maintenance cost.

3. Data Requirements

- Voltage input
- Current input
- Torque
- Rotational speed (RPM)
- Ambient temperature
- Cooling system parameters
- Vibration measurements

4. Machine Learning Approaches

- Linear Regression – for baseline prediction.
- Decision Tree and Random Forest – for nonlinear relationships.
- Support Vector Regression – for high-dimensional data.
- Neural Networks (ANN/LSTM) – for time-series temperature prediction.

5. Innovation and Value Proposition

The innovative aspect of this project lies in predictive maintenance. Instead of reacting to overheating events, the system proactively predicts temperature rise patterns. This enables industries to schedule maintenance, avoid sudden breakdowns, and increase motor lifespan.

6. Feasibility and Implementation Plan

- Collect dataset from sensors or public datasets.
- Perform data preprocessing and feature engineering.
- Train multiple ML models and compare performance (MAE, RMSE).
- Deploy best model using Flask or Streamlit.
- Integrate model with real-time sensor data.