

# Electric Motor PM Temperature Prediction (Flask + ML)

Small Flask app and training scripts for predicting PM (Permanent Magnet) temperature from motor sensor inputs using Machine Learning.

## Repository Layout:

- app.py - Flask web application
- train\_model.py - Simple training script
- train\_model\_eval.py - Training with evaluation
- requirements.txt - Dependencies
- data/motor\_data.csv - Dataset
- model/decision\_tree\_model.pkl - Saved model
- model/scaler.pkl - Saved scaler
- templates/Manual\_predict.html - Manual input page
- templates/Sensor\_predict.html - Sensor page

## Setup:

```
pip install -r requirements.txt
```

## Training (Quick):

```
python train_model.py
```

## Training (Detailed):

```
python train_model_eval.py
```

## Features Used (Order Matters):

1. ambient
2. coolant
3. u\_d
4. u\_q
5. motor\_speed
6. i\_d
7. i\_q
8. stator\_yoke
9. stator\_winding

## Target:

pm (Permanent Magnet Temperature)

## Running the Web App:

```
python app.py  
Open http://127.0.0.1:5000
```

## Flask Routes:

```
GET / - Manual input page  
POST /predict - Prediction endpoint  
GET /sensor - Sensor page
```

## Prediction Notes:

- Inputs are scaled before prediction
- Model and scaler loaded at startup
- Ensure feature order matches training

## Recommended Improvements:

- Unify training scripts
- Add input validation
- Improve UI with units and limits
- Add logging and tests
- Use debug=False for production

## Troubleshooting:

- Verify model/scaler path
- Ensure 9 input features
- Check dataset location