Machine Learning-Based Multivariate Fault Detection and Diagnosis (FDD) Method

EECOMOBILITY (ORF) & HEVPD&D CREATE

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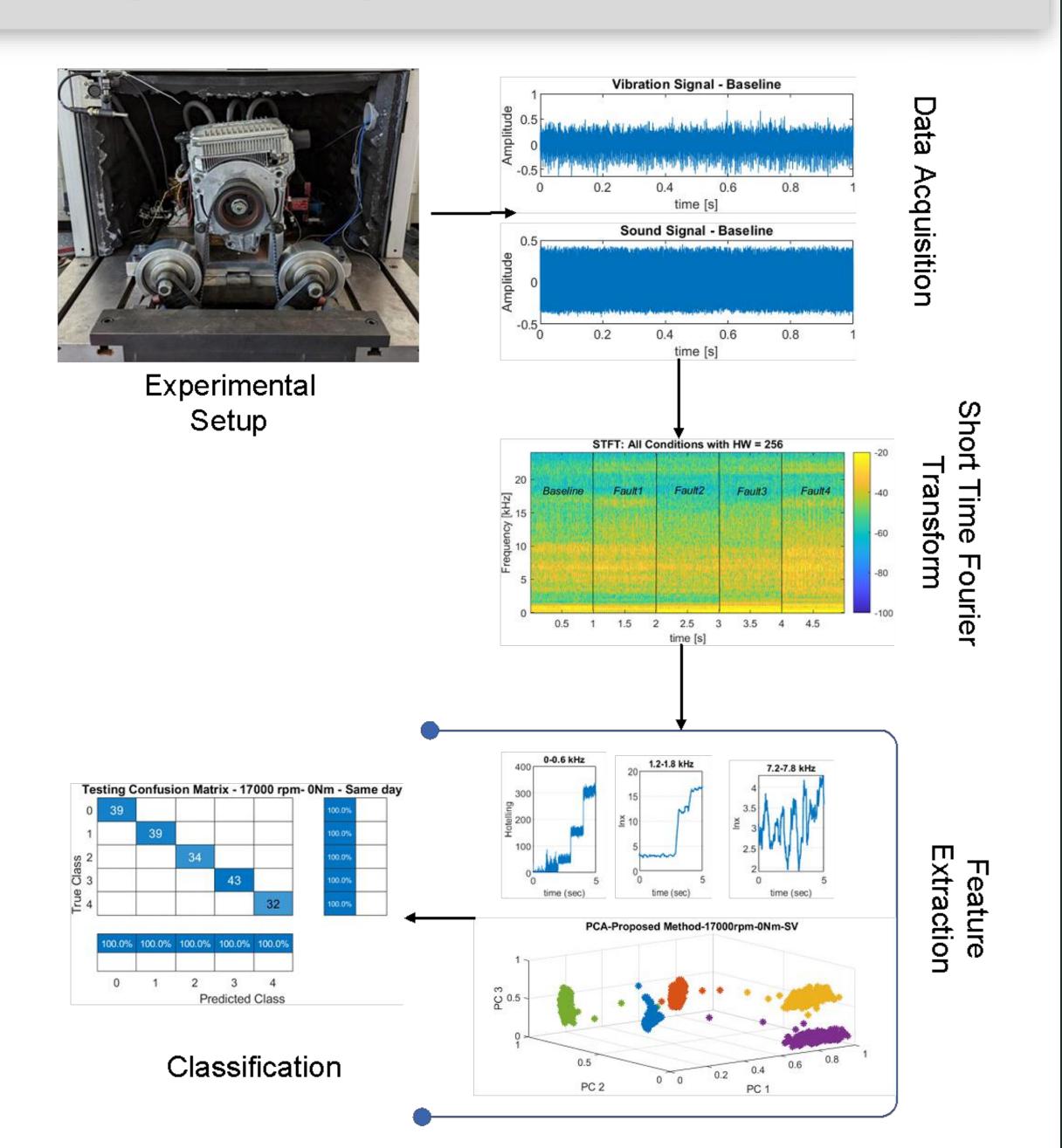
Introduction Reactive Raw Data Preventive engineering Fault Detection FD+Diagnosis Predictive FDD+ Prediction How Does Signal-Based FDD Work in Rotary Machines? Step 1 Step 2 Step 3 Connection and Data Engineering Feature Engineering Data Model and FDD outputs Evaluation Selection ******* Most algorithms do not work correctly on real experimental data with high variability. CMHT's feature extraction

CMHT's Feature Engineering Method

This method consists of three main steps:

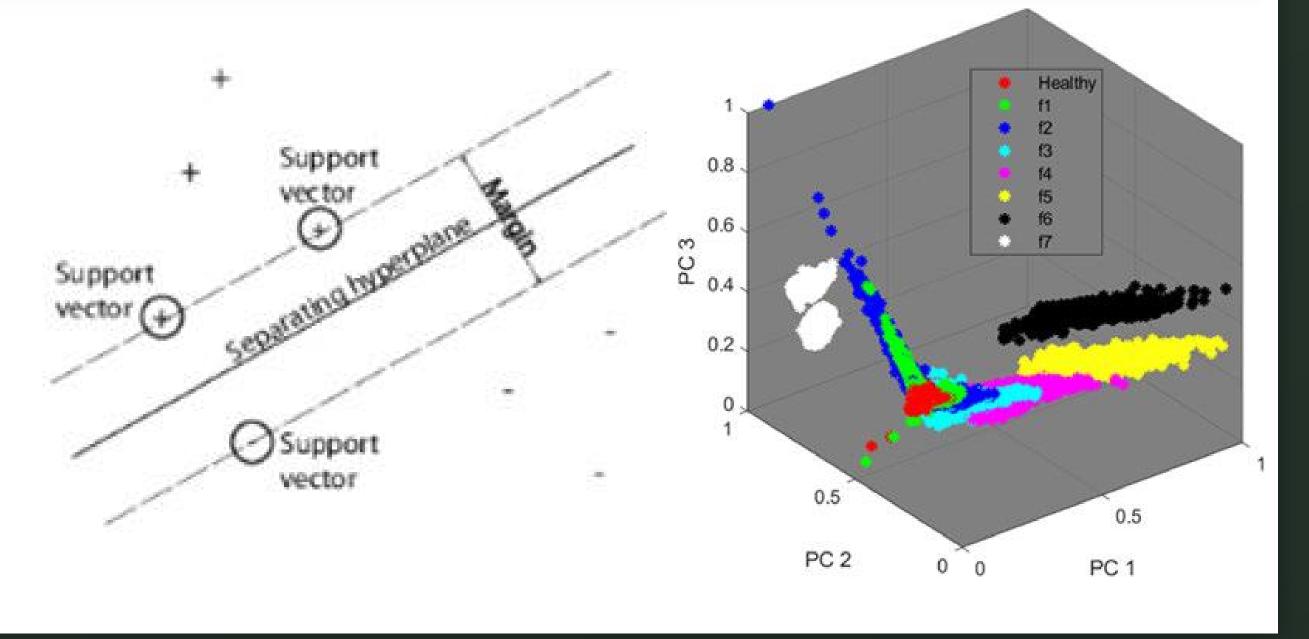
- **Short-Time Fourier Transform** (STFT)
- PCA-based Multivariate **Statistical Process Control** (MSPC) with a sliding window
- Statistical analysis

The PCA-based hoteling represents the estimated squared Mahalanobis distance from the center of the in-control subspace to the projection of new observation onto this subspace.



Classification Using Support Vector Machine

- SVM works by optimizing the margin of a set of data and separating it neatly using a separating hyperplane.
- The support vectors are the data points that are closest to the separating hyperplane.







method



invariant

extract

within noisy datasets.





