Fault Detection, Diagnosis and Prognosis

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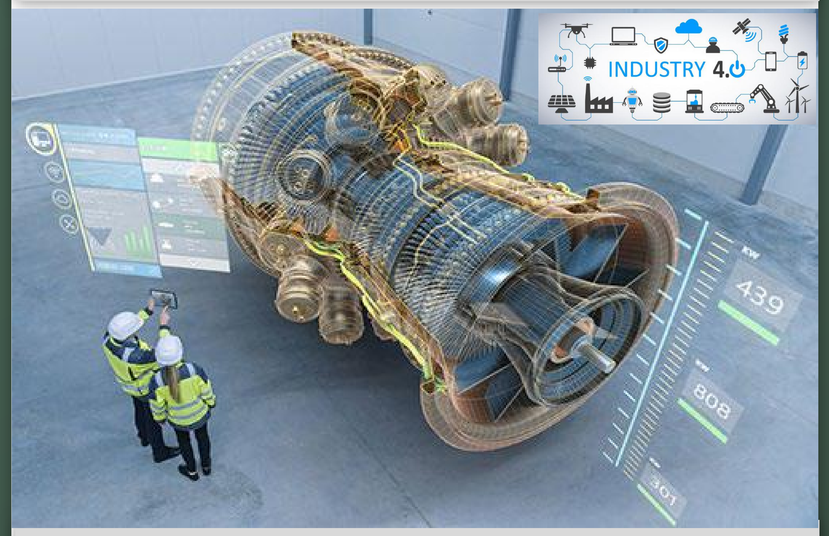
EECOMOBILITY (ORF) & HEVPD&D CREATE

Background



Manufacturing imperatives

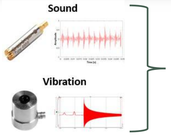
Increased	Decreased
Reliability	Production Cost
Quality	Maintenance

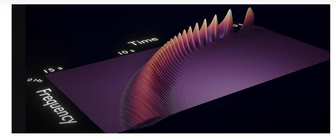
Has a fault occurred? → **Fault Detection**
Where did it occur and how large? → **Fault Diagnosis**
How will it progress in the future? → **Fault Prognosis**

Research Outcome

Engine durability test time reduction is at the corner

Approach





Data Recording: Vibro-Acoustic signals are a good indicator of rotary machineries' operating conditions. A fault in the machinery will generate different vibration and sound signatures

Signal Processing: Vibro-Acoustic decomposition in time and frequency domains via the use of Wavelets

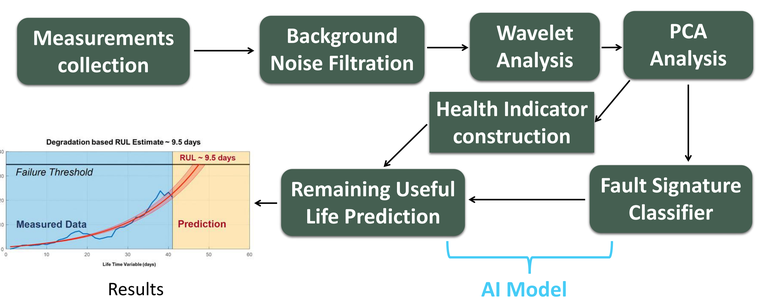
Artificial Neutral Networks : Computing systems consisting of layers of interconnected nodes, or neurons, that process information and make predictions based on patterns in the input data.

Framework

Background noise filtration is an important step to eliminate any confusion in the results.

Wavelet analysis is able to analyze the measurements both in time and frequency domains.

PCA is able to detect any changes in the time and frequency domains produced by wavelet analysis



Health Indicator: measure or metric that is able to track and evaluate the health status

AI Model : Uses Artificial Neural Networks first to determine what type of fault is present in addition to severity, and second to predict how much time is left before failure in that faulty (or degradation) state

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