

# VibSim vibration analyzer for wind turbines

Unique combination of :

Vibrations - Telecommunication techniques - Artificial Intelligence

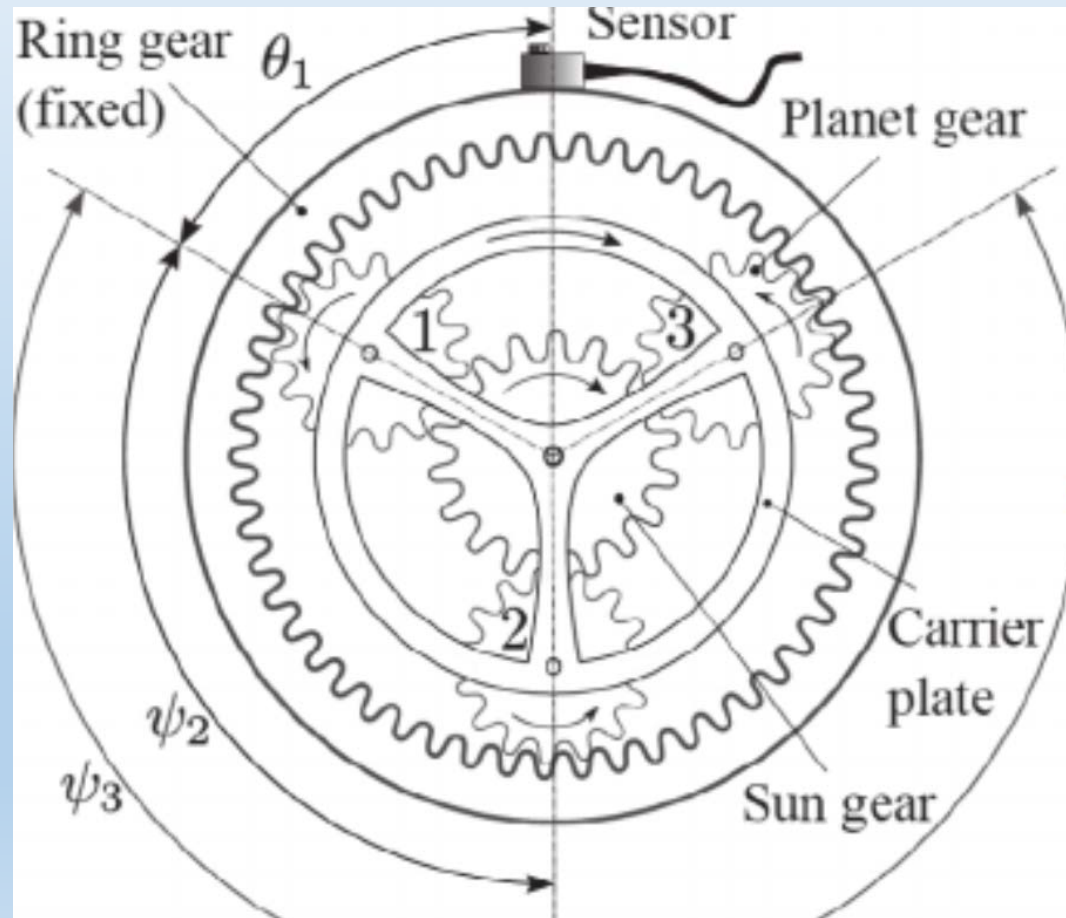
100 times earlier detection of damage

Calculates remaining lifetime

Robotization and Fully Automatic

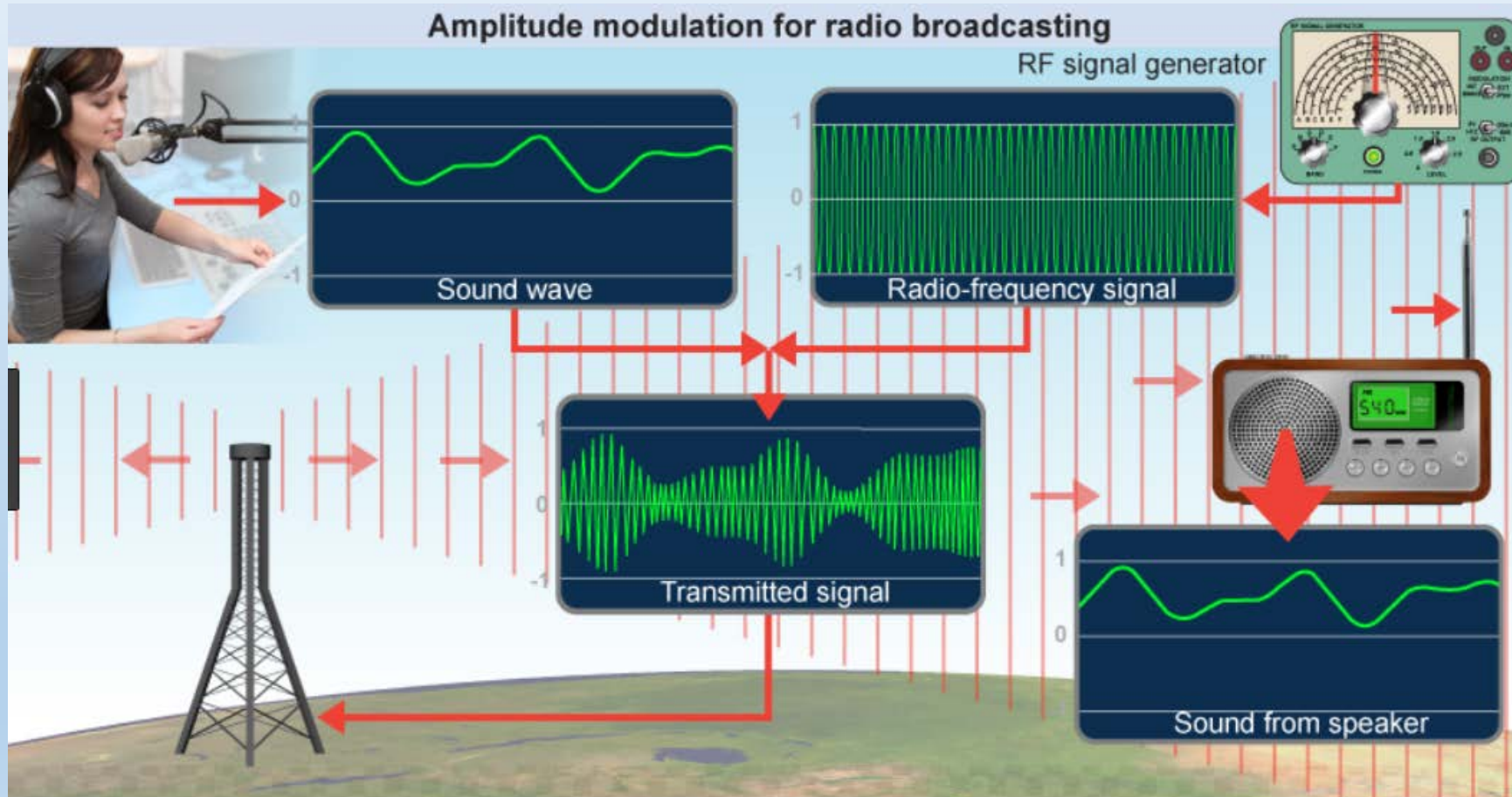
Recently patented in India, USA and EU

# Gearbox vibrations are the sensor data

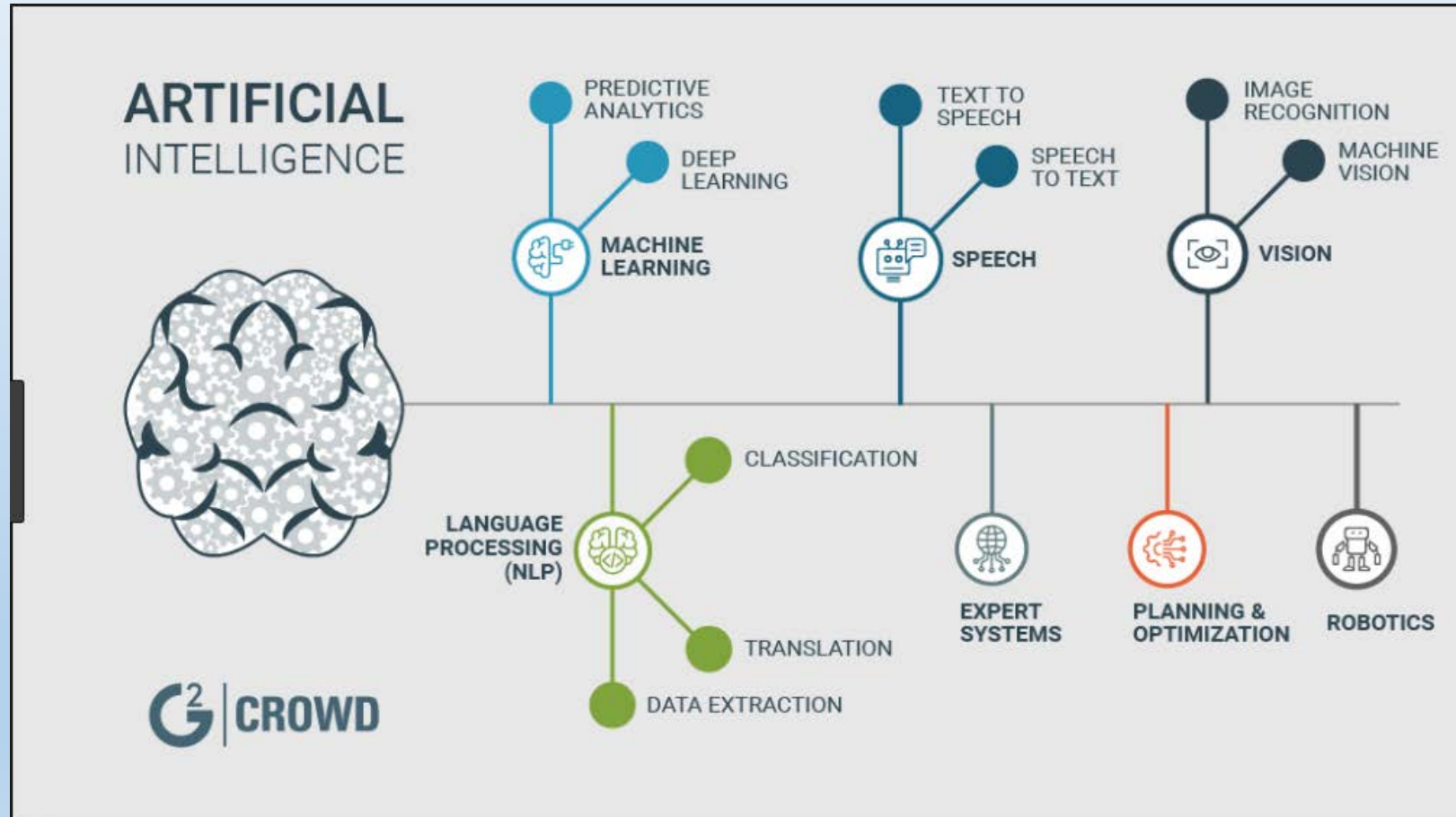


Accelerometer  
or  
Acoustic microphone

# Analysed by Telecommunication technics



# Remaining lifetime calculated by use of Artificial Intelligence



# Cost saving by new technology

VibSim vibration analyzer is a software package that saves operation cost.

It is a unique combination of:

- Vibration measurements - Telecommunication methods- Artificial Intelligence
- It detects early symptoms of failures 100 times earlier.
- It is fully automatic by robotization.
- Remaining lifetime is calculated.
- Integration in a control system with presentation in a control-room.
- VibSim Analyser also suitable for running on a stand alone PC.
- Or it can run as a part of a server based system.

# Cost saving by no more need for Visual borescope inspections



# Cost saving by no more fatal damage to windturbines

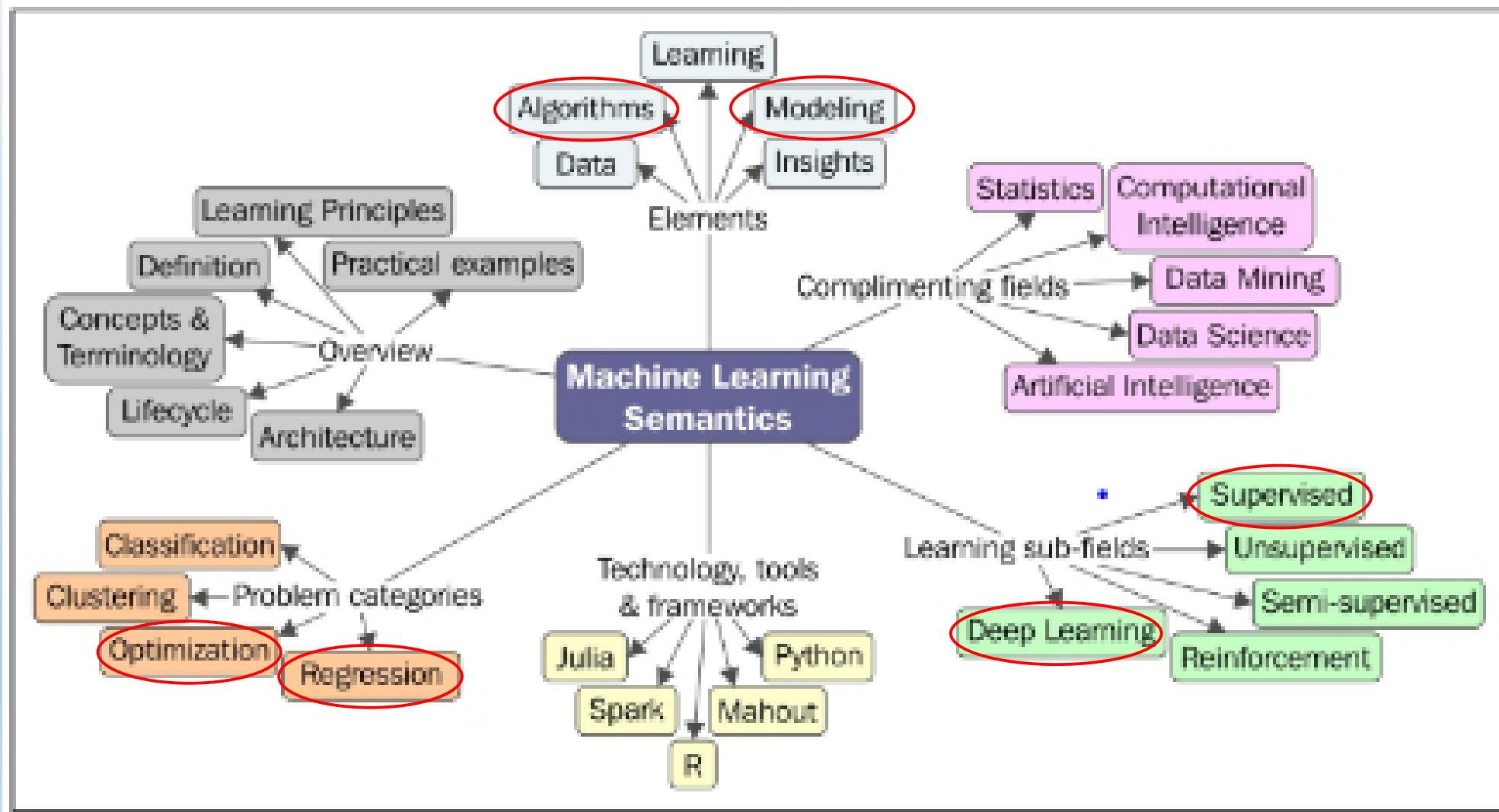


# Cost saving by overhaul only when absolutely required, at the best possible point of time

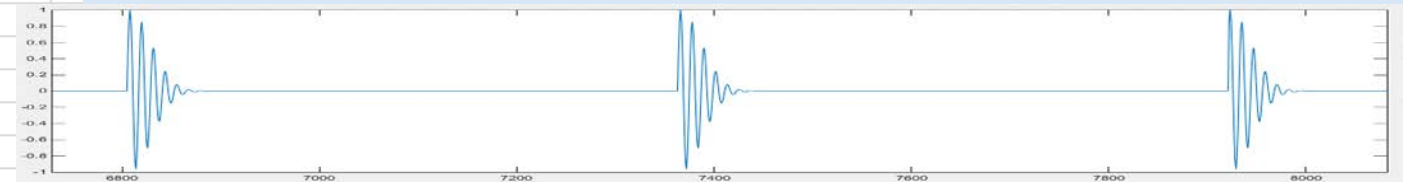
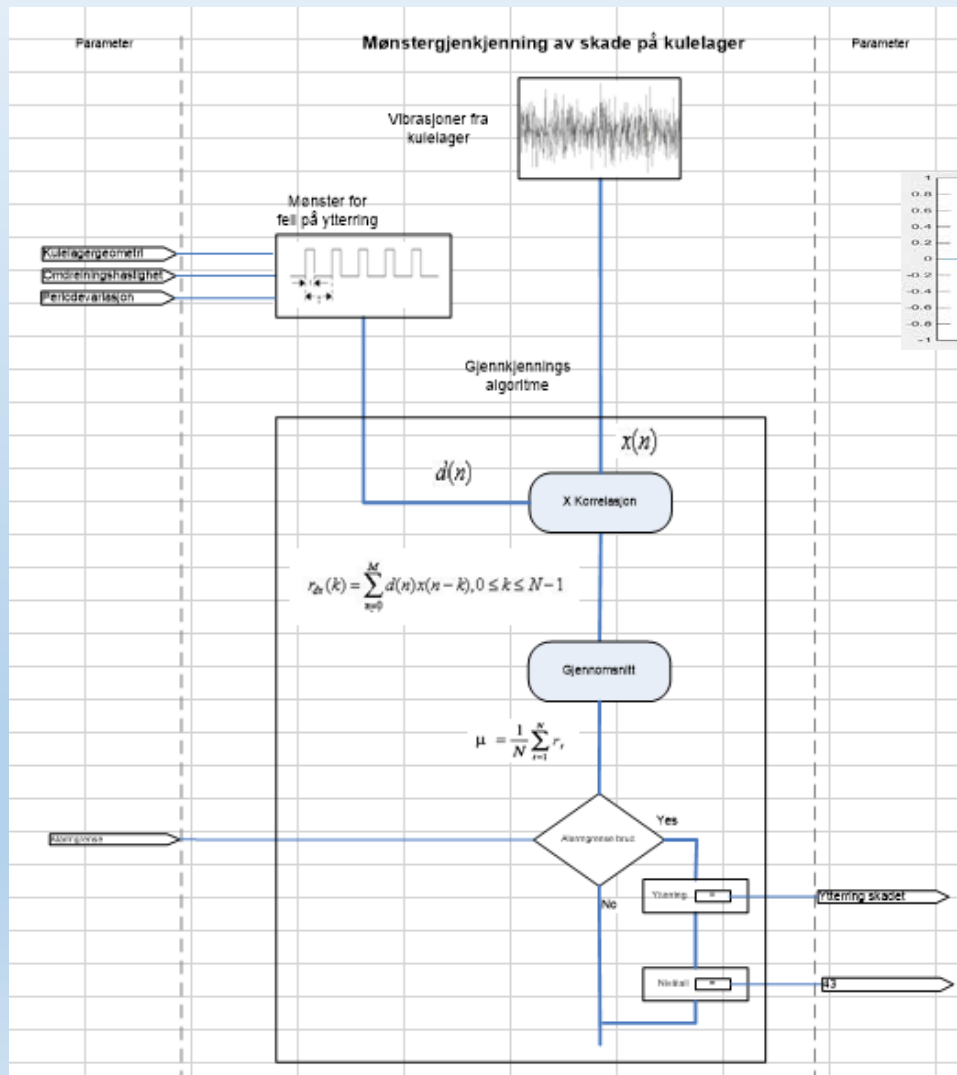




# Machine Learning is our toolbox



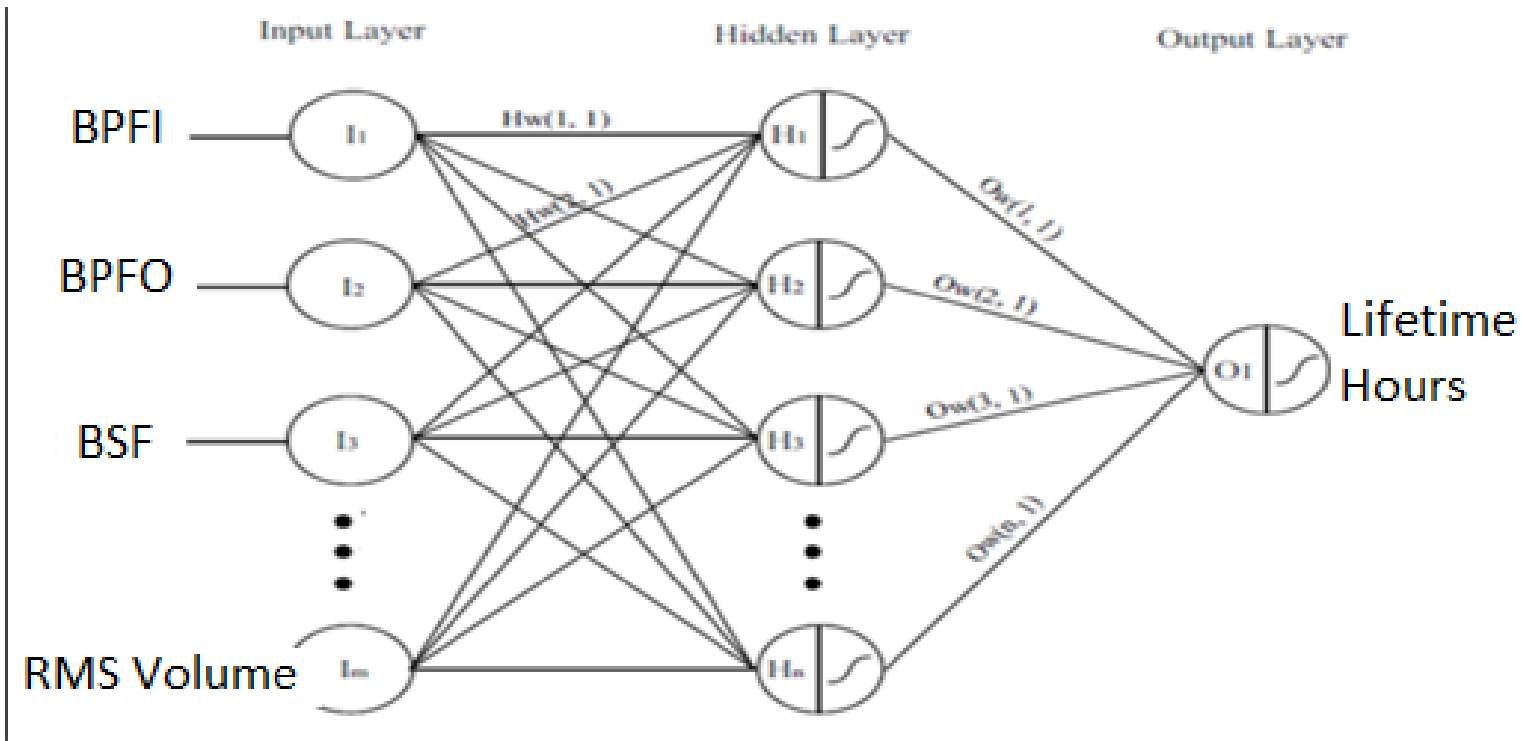
# Pattern Recognition discover symptoms



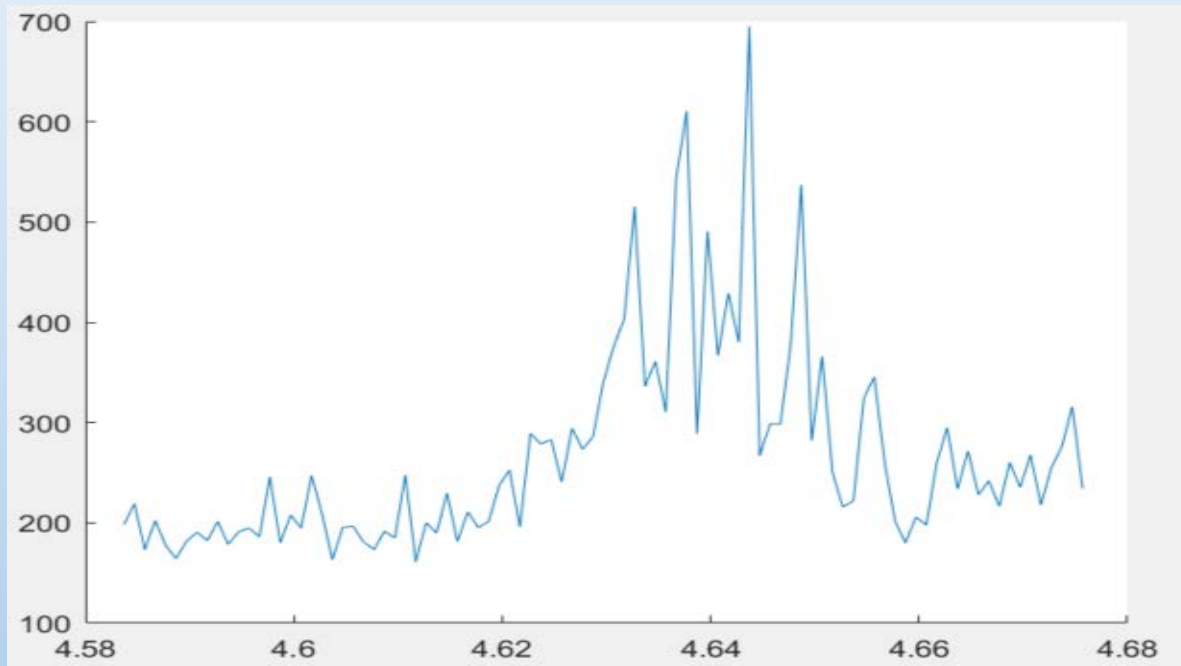
# Neural Networks, Deep Learning calculates remaining lifetime.

Full control with Weights and Bias, by use of nntool from MATLAB.

- Remaining Lifetime is calculated by Neural Networks



# Crack on bearing inner-ring, LSS generator side found with Pattern Recognition in time domain.



BPF1, LSS GS. Indication from pattern recognition is 4,63

# Borescope inspection confirm vibration analyse



*Low speed shaft bearing generator side*  
normal signs of wear, surface crack on ring visible without further impact. Crack must be observed regularly.

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