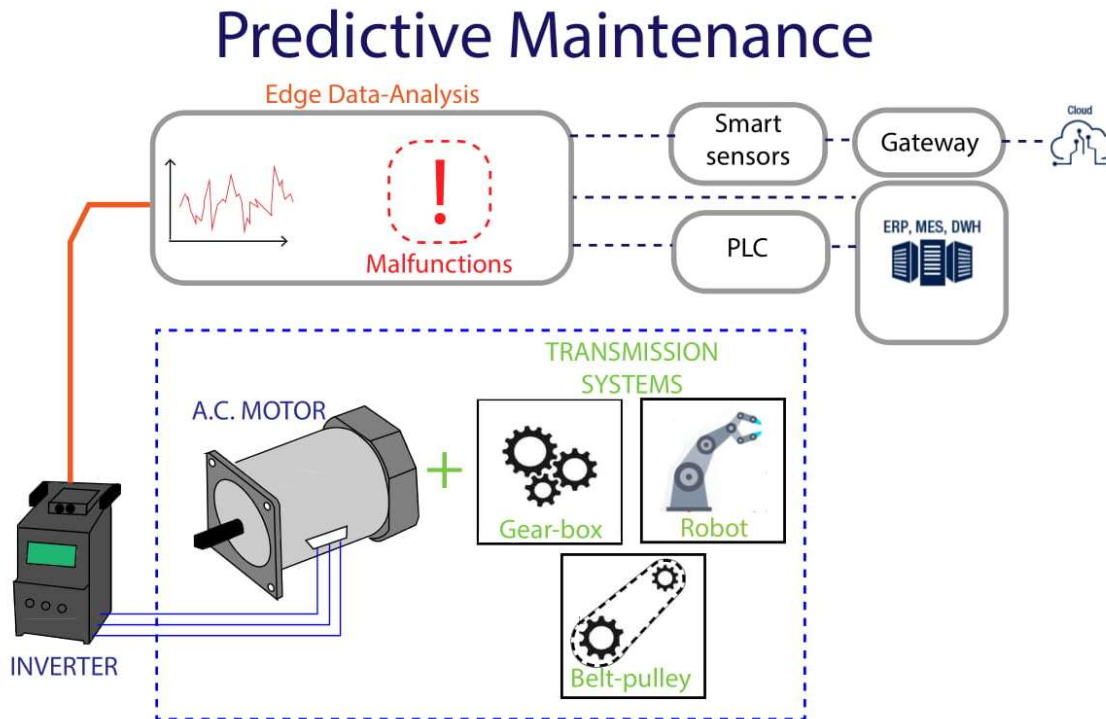


FAULT PREDICTIVE DIAGNOSIS SYSTEM FOR INDUSTRIAL MACHINES



PRIORITY NUMBER:

102020000007249

KEYWORDS:

Predictive maintenance

Fault diagnosis

Multi Resolution Analysis

One-phase current signal



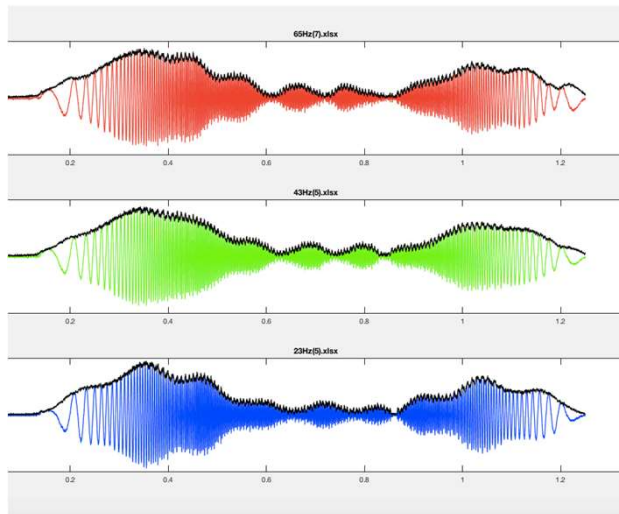
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This method is a part of condition monitoring branch, and can be classified as a predictive maintenance technique. It is a non-invasive and low-cost methodology for diagnose and predict failures in electric motor-operated devices, using Multi Resolution analysis techniques to overcome the limits related to classical MCSA (Motor Current Signature Analysis). It can be used in every working condition, rather than in steady state, differently from MCSA.



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DESCRIPTION:

The electrical signal is passed through a pre-processing phase for signal envelope extraction to perform a Multi Resolution Analysis (MRA). Following this process, it is possible to deal with non-stationary signals acquired during the transient state and to compare them, by means of MRA, in order to evaluate the influence of the fault in terms of widths and frequencies. The potentiality of this technique and its actual validity for different cases was demonstrated. The invented method has been tested on a real Cartesian Robot (CR) widely used in Industrial field. More precisely, the robot was composed of a three-axes system with permanent magnet synchronous motors (PMSM), connected to a belt-pulley transmission system, which allows the movement. It's also possible to perform an Algorithm with proper Indexes to evaluate the faulty conditions and their behaviours.



ADVANTAGES:

- Works in steady and not steady conditions,
- Different malfunction kinds can be detected.
- The method can be applied to any machinery driven by electric motors.

APPLICATIONS:

- **Predictive maintenance of industrial machines and robots**
- **Industry 4.0**
- **IoT**
- **Robotics**