

Project abstract

Title: Self-predicting and inter-communicating electric drives for industrial process optimization

Objective

Proof of concept of a new way of achieving industrial process reliability, flexibility and optimization through smart electric drives forming an edge cloud. In this cloud, local self-monitoring and health prediction of electric machines and drives is implemented, through improved hardware, artificial intelligence and direct inter-drive communication.

Abstract

This proposal aims to tackle the Industry 4.0 vision of modular, flexible, self-optimising future factories by focusing on increased intelligence, inter-communication capabilities and autonomous operation of electric drives in an industrial process. In this vision, electric drives perform a local condition monitoring and health prediction by means of improved hardware and artificial intelligence. Through inter-drive communication links, this information (together with some real-time operative information) is shared to form an “edge cloud” where process optimisation tasks are performed at the lower level of the devices. A “higher cloud” connects to the fleet of drives for historical analysis and monitoring. Condition monitoring and fine grain process optimization leads to increased energy efficiency and more efficient and sustainable use of the available infrastructure.

The edge cloud implementation is obtained by means of: 1) an improved hardware incorporated in the electric drives, allowing a better monitoring of electric machines and drives, 2) artificial intelligence algorithms for fault prediction, 3) inter-drive communication for health-and-operation information sharing. The proposal aims to realise a simple proof of concept of the edge cloud by testing a maximum of three drives working in a collaborative manner, and by demonstrating the capabilities of the new approach of self-monitoring, self-predicting and inter-communication, leading to improved energy efficiency, decreased equipment down-time.

The proposal is a continuation of the Vinnova-financed feasibility study “Smart current sensor for a network of electric drives”. An increased number of industrial partners (ABB AB, Ericsson AB, Imagimob AB and LumenRadio AB) with competences in electric power and communication systems work together with KTH, building a value chain that completes each other’s core competence and business.

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