Resumen de Tesis Doctoral

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BARCELONATECH
Escola de Doctorat

DNI/NIE/Pasaporte	Y3040868Y
Nombre y apellidos	Jesús Adolfo Cariño Corrales
Título de la tesis	Fault detection and identification methodology under an incremental learning framework applied to industrial electromechanical systems
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(Mínimo 1 y màximo 4, podéis verlos en http://doctorat.upc.edu/gestion-academica/carpeta-impresos/tesis-matricula-y-deposito/codigos-unesco)

Resumen de la tesis de 4000 caracteres máximo (si se superan los 4000 se cortará automáticamente)

Condition Based Maintenance is a program that recommends actions based on the information collected and interpreted through condition monitoring and has become accepted since a decade ago by the industry as a key factor to avoiding expensive unplanned machine stoppages and reaching high production ratios. Among the condition based maintenance strategies, data-driven fault diagnosis methodologies have gained increased attention because of the high performance and widen range of applicability due to less restrictive constrains in comparison to other approaches. Therefore, an increased effort is been made to develop reliable methodologies that could diagnose multiple known faults on a machine with initial applications in controlled environments like laboratory test benches.

However, applying those methods to industry applications still represent an ongoing challenge due to the multiple limitations involved and the high reliability and robustness required. One of the most important challenges in the industrial sector refers to the management of unexpected events, in respect of how to detect new faults or anomalies in the machine. In addition, the information initially available of the monitored industrial machine is usually limited to the healthy condition, therefore is not only necessary to detect these new scenarios but also incorporate this information to the initial base knowledge.

In this regard, this thesis present a series of complementary methodologies that leads to the implementation of a fault detection and identification system capable to detect multiple faults and new scenarios of industrial electromechanical machines under an incremental learning framework to include the new scenarios detected to the initial base knowledge while achieving a high performance and generalization capabilities. Initially, a methodology to increase the performance of novelty detection models to detect unexpected events in electromechanical system is proposed. Then, a methodology to implement a sequential fault detection and identification system composed by a novelty detection and a fault diagnosis stages with high accuracy is proposed. Finally, two different methodologies are proposed to provide the sequential fault detection and identification system the capacity to include new scenarios to the base knowledge. The proposed methodologies have been validated by means of experimental data of laboratory test benches and industrial electromechanical systems.

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Firma

R. J. ROMERO TRONCOSO

J.A. ORTEGA

M. DELGADO

Jesús Adolfo Cariño

J.A. CARIÑO