Special Issue on Embedded Sensors for Fault Diagnosis in Electrical Wiring Interconnection Systems, Power Grids, Structural Cables, Pipelines, and Electrical Machines

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In the era of the Internet of Things (IoT), electrical wiring interconnection systems (EWIS) are massively hosted everywhere in many fields where the transfer of energy and information is a fundamental pillar to guarantee the good performance of a system. In addition, the huge technological and industrial uprising ensured by the emerging fourth Industrial Revolution is forcing electrical machines and instruments toward massive transformations and more complexity than ever before. Accordingly, the health and integrity of any system are essential for the proper operation of any application. Yet, faults and failures are inevitable. They can lead to catastrophic problems on both economical and human levels. Airplane crashes, massive fires, explosions, and so on are examples of such consequences. Accordingly, fault detection, diagnosis, and location have been always substantially important for ensuring safety, security, integrity, and optimal performance for any system. Notably, fault diagnosis of structural cables integrated in dams, bridges, concrete, and so on have also formed a cornerstone in the context of health monitoring of such structures. The same applies for oil and gas pipelines, subsea cables, umbilicals, and so on.

Intelligent sensors and technologies that can take a potentially diverse array of data and create a picture of the system's condition help to determine the early detection of faults. Thus, sensors must have access to or contain intelligent features to detect the problems. It is therefore important to know wide varieties of sensors and technologies for fault diagnosis which can be deployed for the detection and inspection of systems and structures. The reported sensors and technologies should be able to inspect or measure without doing any harm or damage to the system. More importantly, the emergence of sensor networks and connected objects has created the need for embedded and noninvasive fault diagnosis solutions. A good deal of different diagnosis sensing techniques with different characteristics, good performance, and even limitations are available to different application areas. Within this context, Digital Object Identifier 10.1109/JSEN.2020.3035852 there is an increasing demand for designing, developing, and fabricating different types of sensors and sensing technology based on existing or innovative techniques to accurately locate upcoming defects in any structure in an offline and online manner. Significantly, the continuous health monitoring of targeted systems is necessary at almost any stage in the life cycle of a system.

This Special Issue highlights advances in the technologies proposed for the fault diagnosis of EWIS, structural cables, and electrical machines including new nondestructive sensing methods, hardware implementation of existing techniques, and the optimization of different aspects of current fault-inspecting sensors including their reliability, adaptability, validation, and integration.

In this Special Issue, you will find 22 papers from researchers around the world. They cover advances in fault diagnosis solutions for many different types of EWIS, power grids, pipelines, and industrial machines. These sensors include several types of reflectometry, current sensing, acoustic sensors, data analytics, reception of corona discharge, vibration, and more. New algorithms for fault detection, location, and characterization include genetic algorithms, machine learning, optimization, and others. The potential of these methods to significantly improve detection, location, and characterization of both electrical and mechanical faults is apparent.

As this editorial work comes to an end, the Guest Editors would like to thank all the authors who contributed their work and the reviewers for their constructive comments for improving the quality of

all of the papers. They would like to express their sincere appreciation to the Editor-in-Chief, Prof. Sandro Carrara, for supporting this Special Issue.

We hope you, the reader, enjoy this Special Issue.

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