

Paris Session 2022



Application of Machine Learning and Anomaly Detection for On-line Defect - Identification in Wall Bushings in HVDC Systems

A3 - Transmission and Distribution Equipment
PS3 - Asset Management of Electrical Machines
Question 19

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Group Discussion Meeting



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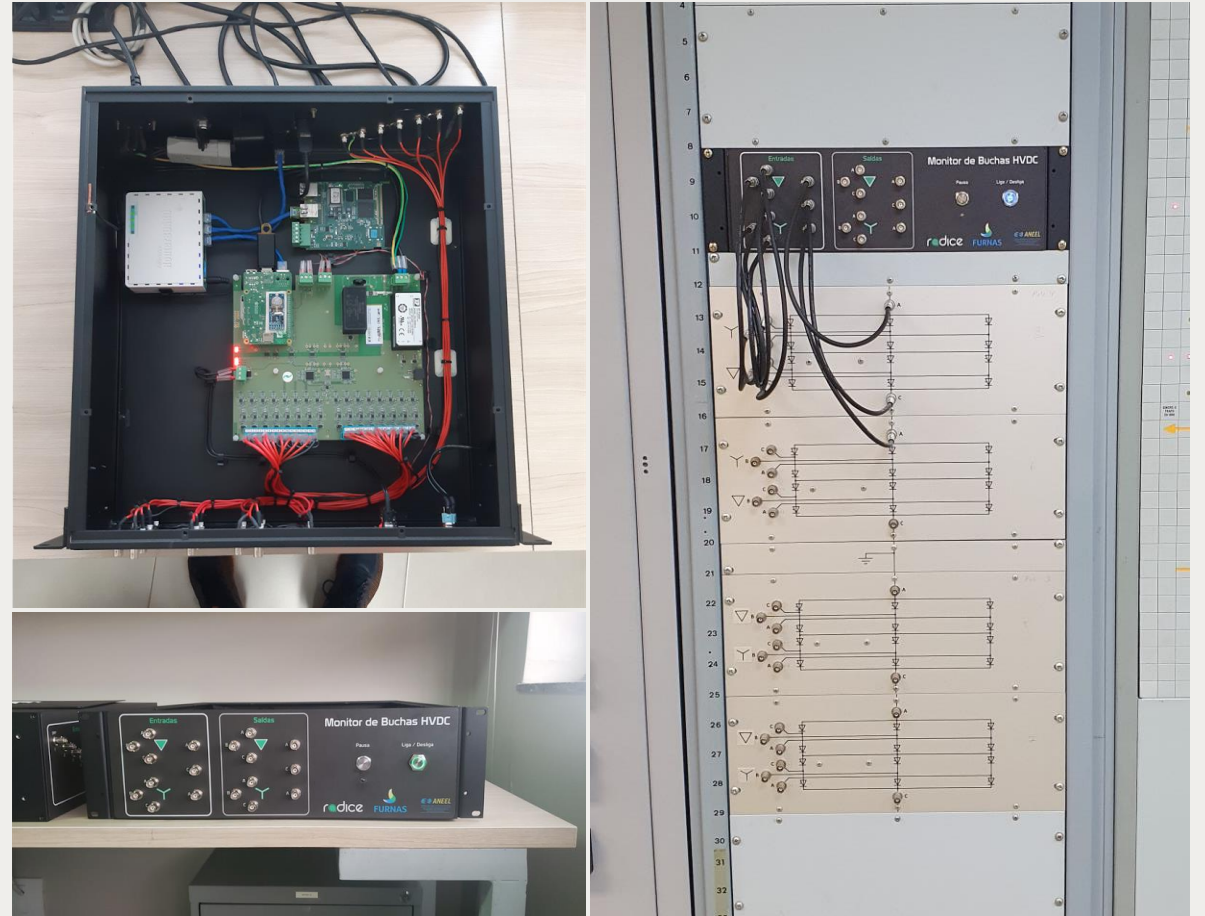
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Machine Learning and Anomaly Detection for On-line Defect - Identification in Wall Bushings in HVDC Systems

- The article presents the results of R&D project Aneel PD-00394-1708/2017, including the development of an On-line Monitor for HVDC Wall Bushings and a diagnostic methodology using two AI techniques
- The prototype was installed at the Ibiúna Substation, part of the HVDC transmission system of Itaipu Hydroelectric plant



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- In the developed sensor, the issue of data validation was highly taken into account. Several data validation routines were created along the process, from acquisition to diagnostic generation steps:
 - The state of the alerts generated by the analog-to-digital converter during data conversion is validated.
 - During the acquisition step, some data characteristics are validated, such as the package acquisition time and the number of samples in the package.
 - Data writing process checks whether the sampled data contains values and whether these values are within limits that are consistent with reality.
 - The percentage of the packet containing errors must be below a previously stipulated value (1%).
 - Finally, the bushing diagnostic generated is cross validate by two different AI techniques, one supervised and one unsupervised learning.

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- Additionally, during development stage the data acquisition hardware and firmware and the diagnostic algorithms are being validated by running the prototype in a real operating environment and future comparison of its results against off-line tests to be performed on the wall bushings.