

Accepted Manuscript

Title: Temperature Sensor Signal Reconstruction for Failure Detection of Vapor Compression System

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PII: S1568-4946(17)30397-6
DOI: <http://dx.doi.org/doi:10.1016/j.asoc.2017.06.054>
Reference: ASOC 4323

To appear in: *Applied Soft Computing*

Received date: 2-2-2016
Revised date: 14-6-2017
Accepted date: 28-6-2017



Please cite this article as: Emilia Visek, Livio Mazzarella, Mario Motta, Temperature Sensor Signal Reconstruction for Failure Detection of Vapor Compression System, Applied Soft Computing Journal <http://dx.doi.org/10.1016/j.asoc.2017.06.054>

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Temperature Sensor Signal Reconstruction for Failure Detection of Vapor Compression System

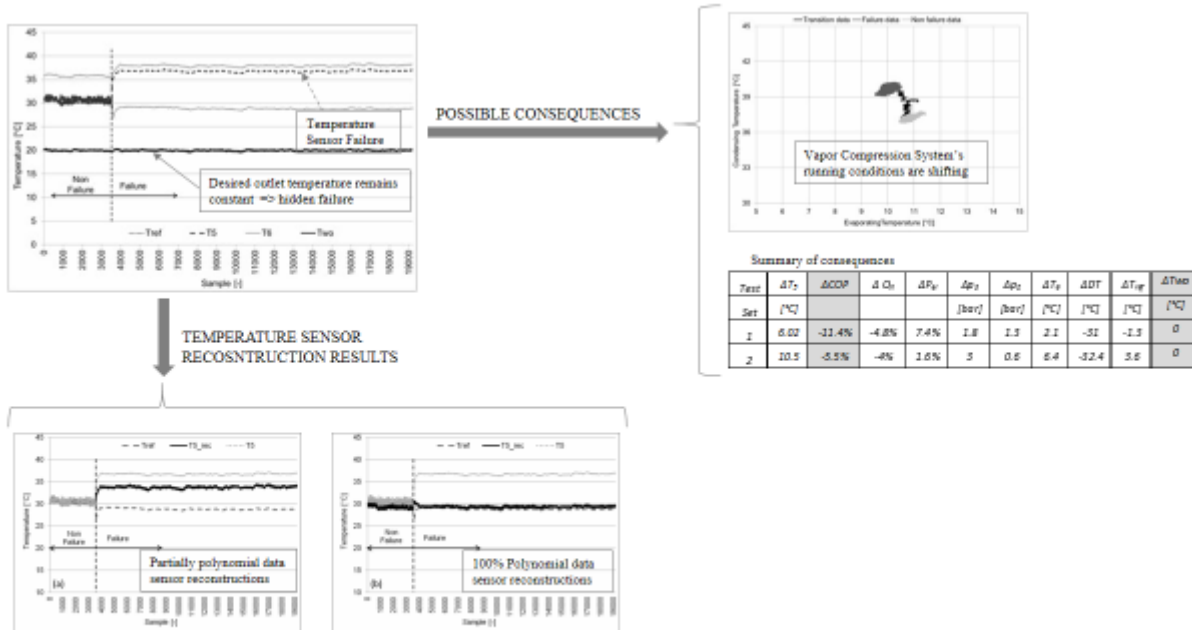
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Graphical abstract



Highlights

- Identified three techniques as suitable for temperature sensor reconstruction: PCA, FPCA and CFPCA;
- Adapted the techniques to fit a VCS application;
- Defined covariance matrix extraction methods;
- Analysed applicability of polynomial instead of measured data as training for sensor reconstruction methods;
- Assessed the effects of the temperature sensor failure on the performances of VCS system

Abstract.

Large effort has been made to fill up databases of failures and diagnosis for all types of technologies and they will remain open lists as systems are dynamically improving. This paper's purpose is to provide support in decision making, quantification and diagnosis of failures in temperature sensor signal for a vapor compression system. The main challenge regarding this topic has been to distinguish and adapt methods to suit vapor compression systems. The temperature sensor signal failure was experimentally induced to a vapor compression system set-up, failure consequences were analyzed and three detection methods were evaluated: Principle Component Analysis, Fuzzy- Principle Component Analysis and Complex Fuzzy- Principle Component Analysis. All these methods are sensor reconstruction models, trained by the non-

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