Developing a diagnostic framework for identifying causes for differences in actual and predicted energy-performance

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Introduction

Modern buildings have sophisticated systems to automatically manage activities such as heating, ventilation and air conditioning, in order to optimize energy usage. However, due to misconfiguration, wearing and environment changes, buildings fail to achieve long term efficiency. Such faults are usually detected and fixed during recommissioning activities, which only occur after long time, and therefore go unnoticed and can cause energy waste even for several months.

Techniques for Automatic Fault Detection and Diagnosis can be applied to buildings in order to recognize issues as soon as they happen, and to notify maintenance teams so that they can fix them before recommissioning.

Project period

15. August 2015 - 16. August 2018

State of art

The existing techniques can be grouped in: model-based techniques, where a physical model of the equipment exists and can be used to compare measured quantity with predicted one; rule-based techniques, where a set of rules is used to detect anomalous behavior; data-driven techniques, where the model is obtained as a black box from historical data; and a combination of these.

Fault detection techniques have to deal with low-frequency data, faulty and missing sensors, old equipment not designed for fault detection.

Objectives

The objectives for this project are: designing **techniques, methods and algorithms** for fault detection and diagnosis, using them to develop **software and tools** and deploy and evaluating such tools on real buildings.

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