

Building Energy Management Dashboard and Data Analysis of the NEST SolAce unit

Description

The NEST SolAce unit is a mixed living and working space designed by EPFL researchers, characterized by a positive annual energy balance and a quasi-neutral CO₂ balance. The goal of the unit, set-up in October 2018 at the EMPA in Duebendorf (ZH), was to meet the highest standards of luminous, thermal, acoustic and air quality comfort, with a unitary and appealing aesthetic appearance. A large use of renewable energy conversion technologies and building automation is made to reach these goals, together with the most advanced envelope technologies and energy systems.

A large number of sensors is operating in the unit offering a wide palette of monitored data. The building management staff needs an interactive online interface to monitor indoor comfort variables, as well as the energy production vs consumption in real time / across several time series aggregations. The observation of real time data and monthly / daily trends allows the facility management to act promptly and optimize the overall energy performance of the unit. The task consists of designing a management platform composed by an online GUI and a set of written reports. If times allows, the analysis of variable correlations and the production of forecasts may be included in the platform.



Objectives

- Perform a descriptive statistical analysis of the environmental / energy / comfort-related variables monitored during the past year inside the unit.
- Design an interactive online dashboard showing real-time data and automatically reporting aggregated trends on indoor comfort, energy production vs consumption in the unit.
- Analyze possible correlations among variables, and infer predictions (possibility to apply some basic Machine Learning algorithms)
- Optional: look at the interface with other units and simulate a “block chain” energy exchange platform.
- Write an article in a scientific journal, based on the obtained results.

Suggested profile

- Knowledge of Python language is mandatory
- A sound command of the Python library “Pandas” and of time series analysis in Python is strongly recommended
- A minimum knowledge of SQL querying language is envisaged
- Knowledge / previous experience with the Python library “Bokeh” would be an asset
- Knowledge / previous experience with JavaScript language would be an asset
- Experience with Energy Management Systems and Building Automation would be an asset
- Interest / Experience in Machine Learning regression techniques would be an asset

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