

# Internship on fault detection in district heating substations

07/01/2019 Veolia Research and Innovation (VERI)

**Company:** Veolia Research and Innovation

**Location:** Maisons-Laffitte, France

**Duration:** 6 months

**Starting date:** March 2019

**Supervisor:** Phillippe R. Sampaio

**Contact:** send your application (CV and cover letter) to [phillipe.rodriques-sampaio@veolia.com](mailto:phillipe.rodriques-sampaio@veolia.com)

**Do you have fun solving difficult problems?**

**Are you passionate about data?**

**Do you like machine learning and time series?**

If you answered yes to these questions, join us at Veolia Research and Innovation to solve challenging problems in innovative ways with great environment impact in real-life applications!

## Who we are

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Present on five continents with nearly 180,000 employees, Veolia is the world leader in environmental services. Veolia provides customized solutions to industries and communities in three complementary activities: water management, waste management and energy management.

Veolia Research and Innovation (VERI) has two research centers in France: Limay and Maisons-Laffitte. The main missions of our research are: the management and preservation of natural resources, the limitation of impacts on natural environments, the preservation of health and living conditions and the development of alternative energy sources.

## Internship description

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You will work within a team of researchers on machine learning and optimization and you will become familiar with district heating networks. District heating is a system that allows to efficiently distribute the heat produced in centralized production zones to several end users (e.g., residential buildings, offices, commercial buildings). It is composed of many types of production units, storage systems and networks. With the rapid growth in heat demand due to the increasing urbanization, environmental problems that come along with heat load production have become an important matter. In order to reduce the use of primary energy sources and the environmental impact at production zones, it is of great importance to be able to detect anomalies (e.g. leakage of actuators and sensors, drifts of

## Fault detection in district heating substations

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energy consumption), in the heat distribution in substations as soon as possible.

The internship focuses on developing and applying a new fault detection approach for district heating substations. You will be working with machine learning and time series models that will help to improve the work developed by your future team.

### Main missions

- Literature review on clustering methods for time series and existing fault detection methods
- Data analysis and interpretation
- Implementation of a fault detection method
- Tests, solution analysis, validation of the results
- Comparison with state-of-the-art methods

## Minimum qualifications

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- Pursuing a master's degree (or equivalent) in an analytical field (Engineering, Applied Mathematics, Statistics, Computer Science)
- Hands-on experience with object-oriented programming and Python scientific libraries (Numpy, SciPy, Panda, etc)
- Good knowledge of machine learning and time series
- Strong collaboration skills, autonomy and curiosity
- Able to analyze and interpret data, drawing conclusions and recommending actions
- Able to communicate results and write reports in a concise way
- Excellent organizational and time management skills

## Preferred qualifications

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- Experience with fault detection methods

### Raison sociale

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