



BAYESIAN GREY-BOX IDENTIFICATION OF CONVECTION SOURCES IN A THERMOMECHANICAL SYSTEM

Assignment

Convection systems, for instance cooling fans, can have a complex effect on the dynamics of heat in a machine. Modelling this effect often requires incorporating flow terms in large state-space models which makes system identification a computational challenge. In this project, a data-driven component (black-box) is added to a thermodynamical model (white-box) to form a hybrid model (grey-box); the normal thermal dynamics may be captured by the white-box while the black-box looks for structure in the noise. Recent research has shown that such models are able to identify the overall effects of unmodelled factors. Here, we aim to recover a convection source on a demonstrator system of increasing complexity. The performance of the model must be evaluated on those devices. The model may need to be optimized automatically and/or manually to be able to run as a digital twin on less capable devices.

Activities

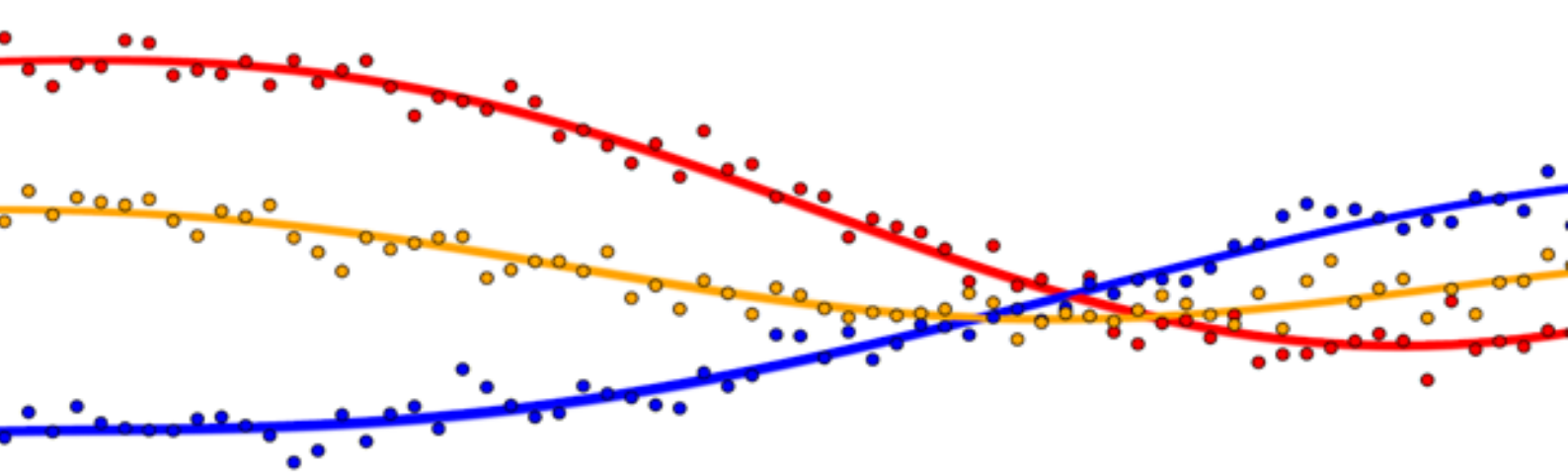
The student will apply a specific probabilistic model and statistical inference technique to a proprietary thermomechanical system. She/he is expected to develop software, design experiments, collect data, analyze results and visualize their findings

Internship overview

- Master Student
- Graduation assignment
- Mathware
- Location: Eindhoven

Technologies

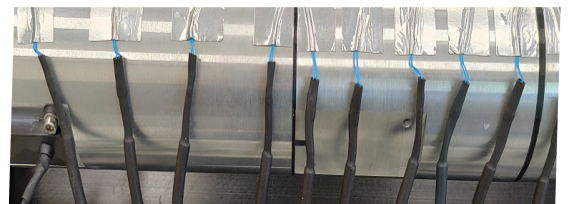
- Bayesian inference.
- System identification.
- Heat transfer
- Gaussian processes.
- Digital Twinning



Context

This project is part of an exploration into new statistical inference techniques and probabilistic programming tools. The model will incorporate Gaussian processes and Markov Chain Monte Carlo sampling algorithms. The student is not expected to understand these techniques in complete detail but will get a chance to familiarize themselves through project work and with the aid of dedicated software. An important part of this project is to assess how rapid these techniques may produce approximate results, which would allow for optimizing the location of cooling systems in high-precision mechatronic systems.

We are looking for a student interested in probability and statistics, and their application to engineering. The prospective intern should have some experience with software development, preferably in MATLAB, Python or Julia. In return, we offer a collaborative, inspiring and fun working environment with highly trained and supportive professionals. We hope the project will be an exciting experience to the young engineer.



Why choose Sioux?

- Working on innovative technology
- Challenging, dynamic and varied work
- A comfortable and personal work environment
- Plenty of opportunities for personal development
- Great career opportunities
- Contributing to a safe, healthy and sustainable society

Get in touch!

Would you like to know more about this student assignment?

Contact:
Caspar Gruithuijsen
jobs@sioux.eu