LARIS
Laboratoire angevin de recherche en ingénierie des systèmes
EA7315

Internship position

Title:

Tools to take uncertainties into account in building life cycle assessment

Hosting laboratory:

The Laboratory of Angers in Research of System Engineering (LARIS) is a multi-disciplinary research unit at the University of Angers, combining skills in the fields of Information Sciences and Technologies and Engineering Sciences. The unit is structured into three teams within which high quality theoretical research is developed, with a strong emphasis on collaborative research with industry and business. For many years, LARIS has been developing skills in assessing and guaranteeing the performance of complex systems such as built systems.

https://laris.univ-angers.fr/en/homepage.html

Internship subject:

Context: The environmental impact of buildings can be reduced by applying eco-design tools to new-build projects and for the renovation of existing buildings. Life Cycle Assessment (LCA) is a holistic method for assessing the environmental impact of a product throughout its life cycle, and is particularly well suited to this purpose. However, there are many sources of uncertainty in the environmental modelling of buildings, which could affect the choice of design alternatives. Statistical methods exist for dealing with these uncertainties and quantifying their impact (uncertainty and sensitivity analyses). Applying these methods can increase the confidence in LCA and improve the decision-making support provided by eco-design tools. However, they are still very little used, and the effect of uncertainties is almost never taken into account in construction projects. In this context, the aim of the STUBE (towards Systematic Treatment of Uncertainties in Building Ecodesign) project is to facilitate and make operational the treatment of uncertainties in LCA of buildings.

Tasks: In order to make uncertainty assessment operational, it is necessary to help building LCA users in companies to choose the uncertain factors to include in their studies and to provide them with tools to visualise LCA results with uncertainties. Depending on your profile and skills, you will work on at least two of the following three main tasks:

- You will study the current use of LCA in companies in France and LCA users' perceptions of uncertainties. To do this, you will conduct a literature review and work on developing a questionnaire aimed at, among others, professionals in design offices.
- You will also work on a database gathering uncertainties already observed in building LCA studies. This database, which is currently being compiled, will help to select uncertain parameters to include in studies. You will be required to enrich it by collecting data from scientific and technical literature. In addition, you will analyse this database in order to easily identify, for example, how often each source of uncertainty has been studied, or in what context (early-design, renovation, certification, commissioning, etc.) it has been studied. Dashboards (generated using Excel, PowerBI, Grafana, etc.) may be proposed to facilitate the extraction of data from this database.
- Finally, you will propose different ways of displaying LCA results for buildings in a clear and concise manner, in both deterministic (without uncertainty) and stochastic (with uncertainty) cases. Several types of graphs can be produced using Python scripts.

In addition to these main tasks, you may be involved in the assessment the environmental impacts of

the buildings used as case studies in the project (detached houses, small apartment buildings, offices, schools). To do this, LCAs will be carried out using Pléiades dynamic thermal simulation and LCA software. In addition, you may occasionally participate in running and interpreting sensitivity and uncertainty analyses, which will require the use of a Python-coded simulation platform coupled with Pléiades.

You will be supervised by a team consisting of a LARIS lecturer-researcher who works in LCA and uncertainty treatment, as well as a PhD student involved in the STUBE project.

Profile:

Student preparing for a 5-year degree in engineering or a Master, with knowledge of building energy, life cycle assessment, or data treatment. Programming skills (in Python if possible) would be a plus.

You are curious, rigorous and take initiative. You are at ease with the English language (reading scientific articles in English).

Internship conditions:

- Duration: about 6 months
- Starting date: 1er quarter 2026
- Location: LARIS laboratory offices, 62 avenue Notre Dame du Lac, 49 000 ANGERS, France
- Gratification: legal amount for internship (hourly rate: 4.35 €/h)

Application:

Please send your CV and cover letter to Marie-Lise Pannier marie-lise.pannier@univ-angers.fr