LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY (LIST) IS HIRING A IM-2212 - INTERNSHIP IN GRAPHICAL INTERFACE FOR A COMPOSITE MATERIAL SOFTWARE FOR INTERNSHIP 4 MONTHS.

Date: 01/04/2022

Job reference: IM-2212-37355715

Type of contract: Internship
Localisation: Esch-Sur-Alzette 4362, LU
Contract duration: 4 months
Level of studies: Master's Degree
Years of experience: < 6 months

Company description:
www.list.lu

Job description:
Are you passionate about research? So are we! Come and join us

The Luxembourg Institute of Science and Technology (LIST) is a Research and Technology Organization (RTO) active in the fields of materials, environment and IT. By transforming scientific knowledge into technologies, smart data and tools, LIST empowers citizens in their choices, public authorities in their decisions and businesses in their strategies.
https://www.list.lu/

You ‘d like to contribute as an Intern? Join our Materials Research and Technology department
Through its research into advanced materials and processes, the “Materials Research and Technology” (MRT) department, with its 200 researchers and engineers, contributes to the emergence of enabling technologies that underpin the innovation processes of local and international industry. MRT’s activities hinge on four thematic pillars: nanomaterials and nanotechnology, scientific instrumentation and process technology, structural composites, and functional polymers.

The department also includes four high-tech platforms, focusing on composites, prototyping, characterization and testing. These platforms serve both LIST research staff, and other stakeholders in Luxembourg.

Microstructure-property relationship of materials is the foundation of the in-service performance of devices and components. Design methodology and algorithms based on statistical continuum theory is developed to customize three-dimensional (3D) porous materials for desired physical properties and a high pore connectivity. To correlate the effective physical property of a porous material to its complex pore architecture, we use probability functions in conjunction with the strong-contrast formulation, which has been proved accurate in predicting effective physical properties of heterogeneous materials, especially when the intrinsic properties of the two phases exhibit large differences. Using this approach, the 3D microstructure of a nearly isotropic porous material with spherical pores is constructed and used as the initial configuration to design either isotropic or anisotropic porous materials that exhibit desired effective properties and a high pore connectivity. This construction process is implemented progressively by re-shaping, re-orienting, and merging the pores (cells) in the porous material. Simulations show that after tailoring of the material microstructure, a high connectivity of pores can be reached even at a relatively low porosity, which provides more freedom to design porous materials with a large range of physical properties. As an application, the developed tool is used to design a porous material that has a high pore connectivity and a desired thermal conductivity.

The objective of this internship is to build a graphical interface of the existing homemade software and to propose alternatives methods for the construction process to reduce the running time.
This interim project will focus on tailoring material with specific effective physical properties such as porous material for energy applications that find contribution in the MRT Hydrogen Technologies Core Technology.
The proposed research project will be carried out by the “Composite Modelling” group of the MRT department.
**How will you contribute?**

Heterogeneous composite material consists of a matrix filled with one or several heterogeneities to enhance its intrinsic properties (mechanical, electrical, thermal ...). Composite with desired properties can be achieved simply by controlling the distribution, shape and orientation of the heterogeneities within the matrix. LIST researchers have created a toolbox combining imaging tools and techniques with numerical mechanics methods to virtually create composite materials with tailored physical and mechanical properties. The programming was done in Python and a rudimentary graphical interface was realized with the module Tkinter. The Mahotas and Mayavi libraries are used for image analysis and visualization. The student will develop a user-friendly graphical interface. Visualization of 3D objects will therefore be an important aspect of the work.

**Project plan :**

Task1: Understand the existing structural scheme of the python code towards possible reorganization of the code structure (0.5 month)  
Task2: Develop a user-friendly graphical interface (3.25 month)  
Task3: Final report (0.25 month)

**Expected outcomes:**

Student will get familiar with advanced methods for software graphical interfaces development and visualization tools.  
User-friendly graphical interface.

**Required profile :**

Is Your profile described below? Are you our future colleague? Apply now!  
You are a Master student or equivalent degree in Computer Science or Engineering with knowledge of graphic libraries and proficiency in Python programming.  
On top of that you have a good knowledge of French or English.

**To apply:** [https://apply.multiposting.fr/jobs/4939/37355715](https://apply.multiposting.fr/jobs/4939/37355715)