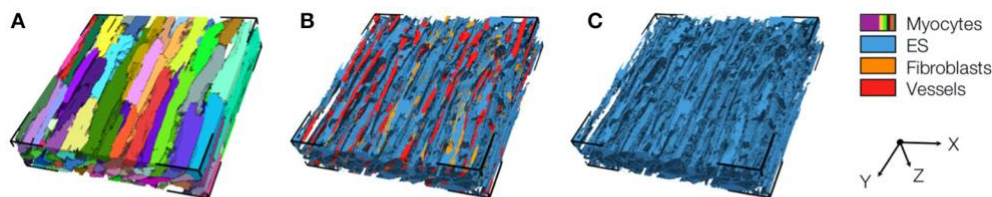


Mesh generation of cardiac meshes at cellular scale

Engineer fixed-term contract, 12 months (renewable)

Context

The engineer will work in the context of the Work Package “mesh generation” of the [MICROCARD](#) European project. He or she will develop powerful tools for parallel mesh generation in order to generate the very large and detailed meshes ($\sim 10^{12}$ elements) of cardiac tissue that partners will need to simulate cardiac electrophysiology on models with micrometer resolution. These tools will be part of the simulation platform able to exploit future exascale computers that will be developed by all the European partners.



3D reconstruction of segmented confocal images of healthy cardiac tissue:

(A) cardiomyocytes, (B) complementary tissue constituents, (C) extracellular space (Figure from [1])

Missions

The engineer will be in charge of the development of the open source toolchain for the generation of 3D tetrahedral meshes for the project test cases. Starting from the data segmented by one of the project partner (voxels labeled as vessels, myocyte, fibroblast...), this person will develop robust tools for:

1. Building tetrahedral meshes from 3D image voxels;
2. Data filtering and cleaning;
3. Explicit discretization of cellular domains by isovalue discretization and mesh improvement and adaptation (implementation within the parallel open source remesher [ParMmg](#) and the sequential remesher [Mmg](#)).

Desired profile

Master degree level, you enjoy designing algorithms, imagining, developing and combining codes to find robust and reusable solutions to complex problems. You like working in a team and in contact with many partners.

A first experience in software development as well as some knowledge in mesh generation and adaptation techniques would be appreciated.

Competences

- Scientific computing: basic knowledge in computational mechanics and/or computational geometry (finite elements method, unstructured meshes, associated data structure...).
- Programming: C language and MPI standard are required, knowledge of Python will be appreciated.
- Classical programming tools: Git, CMake/CTest, Jenkin, gdb...
- Linux environment.
- Other: fluency in English, ability to draft reports and to work independently.

Location : Inria Bordeaux – Sud-Ouest, 200, avenue de la Vieille Tour 33405 Talence CEDEX

Starting date: April 2021

Application: recrutement@ihu-liryc.fr, algiane.froehly@inria.fr and luca.cirrottola@inria.fr

[1] Greiner J, Sankarankutty AC, Seemann G, Seidel T, Sachse FB. Confocal microscopy-based estimation of parameters for computational modeling of electrical conduction in the normal and infarcted heart. *Front. Physiol.*, 2018;9:239. doi:10.3389/fphys.2018.00239.