

euHeartDB

A Web-enabled Database for Geometrical Models of the Heart

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Overview

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- What is *euHeartDB*?
- Motivation
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What is euHeart?

euHeart is an European consortium of 17 partners (including teams from: OXU, ABI, Philips, INRIA)

euHeart is part a European research initiative targeting the personalized diagnosis and treatment of cardiovascular disease

Goal: *the development of individualised, computer-based, human heart models in order to provide insight into the origin and progression of specific disease patterns*

www.euheart.eu

What is euHeartDB?

euHeartDB is:

A Web-enabled database that provides the functionalities to upload, to download, to search, and to integrate geometrical models of the heart

Motivation

A necessary condition to achieve *Patient Specific Treatments* is that software and data are reused and shared to reduce the costs and to improve the accuracy in the investigation of cardiovascular diseases

Motivation

In the *Modelling and Simulation of the Heart*, this can be achieved by **(1)** introducing an interoperable model data exchange format (*FieldML*) and by **(2)** designing a model repository (*euHeartDB*)

For functional models, this has been achieved with **(1)** *CellML* and **(2)** the *CellML repository*

For **geometrical models**, this is being addressed using **(1)** *FieldML*. A **tool** is therefore needed to satisfy **(2)** for euHeart and the entire cardiac community

Goal

- Contribute to the implementation of the *Patient Specific Treatments* view
- More specifically, automate the *sharing* and the *reuse* of geometrical models, and to facilitate their use for simulations of functions, e.g.:
 - Mechanical
 - Electrical
 - Fluid
 - Or coupling of them

Scope

euHeartDB will:

- 1) support *coupling of geometrical models*
- 2) enable the *solution of simulations within different geometries*
- 3) allow *benchmarking of simulation results*
- 4) support *anatomical surveys on models of the heart*
- 5) store *documentation of different diseases on the heart geometry*

Requirements

Identified from:

- *general domain knowledge* within the Oxford research group
- *specific practices* in use within the euHeart Consortium

Requirements

Functional:

- Upload, download, and search of models

Non functional:

- Decentralised management of DB content, web accessibility, secure control access, semantic-based search, graphical methods, interoperable format for model data exporting
- Integration with other standard tools

Requirements

From circulated questionnaires:

1. Support for VTK format
2. Support for functional and geometrical-based investigations
3. Incorporation of metrics and algorithms for mesh quality and error estimation

However, only 1 is of primary importance at this stage

Live Demo

Further Details

- Still work in progress
- Joint tasks with the Bioengineering Institute
- To be released to euHeart partners in June
- To be released publicly soon afterwards
- Currently stores four models from:
 - Bioengineering Institute (NZ)
 - INRIA (F)
 - UPF (S)
 - Philips Research (D)

Future Plans

- Integrate with Virtual Physiological Human tools and technologies:
 - Integrate with FieldML
 - Link geometries to the CellML models simulated in user applications
- Raise new requirements and collect feedback from the community