

GAËTAN DESRUES *Ph.D.*

Data Engineer, Software Engineer

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Ph.D. in Computer Engineering with expertise in mathematical modeling and AI for biomedical applications. Experienced in cloud computing, high-performance computing, and large-scale system design. Proficient in Python, C++, and data management, with a strong background in real-time simulations and optimization. Seeking a role focused on cloud infrastructure, data architecture, and machine learning.

Skills

- Python | C++ | Cloud Storage/Computing: AWS, GCP, Azure | Git | CI/CD | DevOps | Docker | Kubernetes | AWS S3,EC2,ECS,Batch
- Javascript | React | Web Development | Flask | APIs | MongoDB | Automation | Machine Learning | Scikit-Learn | PyTorch
- Mathematical Modeling | Simulation | Optimisation | HPC | Spark | Infrastructure as Code | Serverless | French, English

Experience

Doctorate in Computer Engineering **INRIA - Microport CRM** *Sophia-Antipolis - Paris* **2020 - 2023**

- My research focused on using digital twin technology to predict responses to Cardiac Resynchronization Therapy (CRT). This thesis demonstrates the feasibility of implementing AI-based methods to create and personalize a biophysical heart model from clinical data
- Participated in **conferences**, poster sessions, presentations and **talks**. Involved in the **SimCardioTest** European Research Project
- Designed and implemented a **Python/C++** framework for cardiac simulation, deployed the computations in the INRIA and **Azure** clouds

Research Internship **INRIA** *Sophia-Antipolis* **2019 - 2020**

- Building a reduced cardiac **finite element** model based on poly-affine deformation. The model is developed using SOFA in C++

Education

- **Master in Mathematical Modeling**: major in Fluid Mechanics and **High Performance Computing** at ENSEIRB-MATMECA high school. Studying differential calculus, Lagrange's method and variational calculation (**Bordeaux, 2016 - 2019**)
- 2-year intensive math and physics course (**PCSI - PSI**) in Lycée Bellevue (**Toulouse, 2014 - 2016**)
- **Teaching assistant**: conducted tutorial sessions on linear equations for Master's level students, (**Nice University, 2020**)

Projects

- IoT applications on microcontrollers, implementing **real-time** systems with publish-subscribe messaging via MQTT, (**2024**)
- Creation of a **web application** for itinerary booking, integrating Google and OpenAI **APIs**, using **Kubernetes, React** and FastAPI, (**2023**)
- Using deep learning (convolutional neural network) to recognize cancerous tumors (soft tissue sarcoma) over MRI images. Working with Inria team Monc, (**INRIA, Bordeaux University, 2019**)
- Incorporating experimental data into an automobile simulator. OBDII embedded data is extracted from a car and integrated into the simulator via UDP (and a Qt interface). The mechanical part is used to manage a 6DOFs simulator platform while GNSS data helps in retrieving maps location and VR visualization, (**ETS Montreal, Canada, 2017**)
- Modeling the propagation of a tidal bore wave propagating upstream a river (mascaret) using C++, Gmsh, Paraview and Fluent. Modelisation with unstructured mesh in 3D with the shallow water equations, (**Bordeaux University, 2017**)
- Modeling a pressurized cylinder with Fortran 90, Paraview and Abaqus using constitutive equations in the material. Calculation of deformations as a function of the pressure in the cylinder, (**Bordeaux University, 2017**)

Publications

- Gaëtan Desrues. *Personalised 3D electromechanical models of the heart for cardiac resynchronisation therapy planning in heart failure patients*. Theses, Université Côte d'Azur, (**03/2023**)
- Jairo Rodriguez, Gaëtan Desrues, Delphine Feuerstein, Thierry Legay, Serge Cazeau, and Maxime Sermesant. *Electromechanical output as function of APD: a cardiac personalized simulation study*. In World Congress of Biomechanics, Taipei, Taiwan, (**06/2022**)
- Gaëtan Desrues, Delphine Feuerstein, Thierry Legay, Serge Cazeau, and Maxime Sermesant. *Personal-by-design: a 3D Electromechanical Model of the Heart Tailored for Personalisation*. In Functional Imaging and Modeling of the Heart, Stanford, CA, United States, (**06/2021**)
- Gaëtan Desrues, Hervé Delingette, and Maxime Sermesant. *Towards Hyper-Reduction of Cardiac Models using Poly-Affine Deformation*. In Statistical Atlases and Computational Models of the Heart. STACOM 2019: Statistical Atlases and Computational Models of the Heart, Shenzhen, China, (**10/2019**)