SHAKE THE FUTURE.

CENTRALE NANTES

2ND AND 3RD YEAR SPECIALISATION

SCIENTIFIC CHALLENGE 2024

HIGH FIDELITY MODELLING OF THE COMPLETE BOAT-OAR-ROWER SYSTEM

With the upcoming 2024 Olympic and Paralympic Games in Paris and the relationship forged between Centrale Nantes, CREPS des Pays de la Loire and the French Rowing Federation through various research projects linked to performance support over the past twenty years, there is a willingness to expand the links between scientific research and the sports community.

The opportunity is therefore offered to students to take part in these scientific challenges in order to develop innovative tools based on a high-fidelity simulator of the boat-oar-rower(s) system, and to acquire scientific skills and knowledge through a large-scale engineering and research project that requires continuity over time to be successful.

COURSE CONTENT

After the first two years of the project, which laid the foundations, demonstrated the tool's feasibility and then improved its functionality, the main objective, at the dawn of the Olympiad leading up to the Paris Games in 2024, is twofold:

To pursue development and the validation phase, and demonstrate the tool's capacity

> Improve reliability and facilitate simulator implementation to ensure professional quality
> Undertake the essential validation phase using existing field measurements, but also by developing measurement methods for missing data
> Deploy an operational high-fidelity simulation tool for rowing

To provide answers to sports experts, by carrying out studies in the field

> Conduct parametric studies of the determinants of sports performance in rowing from simulations
> Make the research results accessible for sports experts
> Use the simulation results to propose training tools for coaches

Ingénieur grande école

graduate programme

2019/2020 project team

FIELDS OF ACTIVITY

> Research and development
> Instrumentation
> Modelling
> Scientific computing
> Sports performance analysis
> Company organisation
> Communication

SKILLS

> Project engineering
> Numerical simulation
> Software development
> Experimental Methods
> Managing complexity
> Teamwork
> Knowledge transfer

TEACHING STAFF

HEAD OF SPECIALISATION:
Alban Leroyer

SPORTS RESEARCH CONTACT:
Sophie Barré (CREPS des Pays de la Loire)

SPORTS PARTNER:
Fédération Française d'Aviron
(French Rowing Federation)

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PROJECT-BASED TEACHING

The objective is to train engineers capable of undertaking large-scale projects, providing relevant solutions to issues in the field, within efficiently organized project teams. This innovative project-based teaching method will allow students to acquire competences in a different way thanks to:

> A customised training programme
> Agile and autonomous organisation
> Tailored support
> Scientific challenges linked to industrial issues (naval hydrodynamics, MRE, simulations, etc.)
> A database of experimental measures carried out within the French teams
> An opportunity to take concrete action on an ambitious performance support project in preparation for the 2024 Paris Olympics

PROJECT DELIVERABLES

> A comprehensive analysis of the complete boat-oar-rower system, in order to audit the resolved system and to address the concept of performance
> An extension of the rower's kinematic model
> Automated post-processing of simulations including different indicators of performance with realistic rendering
> A tool for automatic processing of measurements made in the field that can be used in production
> A blade flexibility test bench that can be used in an environmentally friendly way.
> A specific study of the accuracy of the current means of measurement for the boat's kinematics
> A first step towards simulator validation based on currently available measurements
> A first parametric study based on field measurements
> Regular project monitoring deliverables (minutes, reports and progress indicators, monitoring tools etc.)

EXAMPLES OF PREVIOUS INTERNSHIPS

Project-based learning is highly valued by companies. Student internships are quite varied, and reflect the diversity of backgrounds.

> Development of hydrodynamic meta-models and CFD validation, Artemis Technologies, UK
> Graphic reconstruction of an electronic horizon, Renault Software Labs, Sophia-Antipolis
> Executive Assistant: Project Management and Financial Reporting, Haemers Techologies, Brussels
> Thermo-hydrodynamic modelling on a heat exchanger, Naval group, Nantes
> Numerical simulation of ship maneuvers, Numeca Int., Brussels,
> CAD and subsystem design of the 'Heron Tree', Les Machines de l'île, Nantes

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Centrale Nantes is a French engineering school and member of the Ecoles Centrale Group. Its graduate, master and PhD programmes are based on the latest scientific and technological developments and the best management practices. Founded in 1919, Centrale Nantes' 40-acre campus welcomes 2320 students, including 1550 graduate students, 150 Executive Education and degree apprenticeship students, 240 PhD students and 380 Master and Advanced Master students.