PhD Position in Structural Mechanics, ICT and Building, Energy and Environment Groups (VAC-2021-23)

Title of the PhD project: A multidimensional pixel with multiscale modeling for the land management (GCMS-GIS++)

INTRODUCTION:

The International Centre for Numerical Methods in Engineering (CIMNE, www.cimne.com) is a research centre, created in 1987 by consortium between the Catalan Government and the Universitat Politècnica de Catalunya (UPC-BarcelonaTech), devoted to the development and application of numerical methods to a wide range of areas in engineering. CIMNE has been selected as a Severo Ochoa Centre of Excellence for the period 2019-2023, the highest level of recognition of excellence and leadership awarded to a research centre in Spain.

POSITION DETAILS

Number of vacancies: 1
Category: PhD (PHD2)
Location: Castelldefels
Yearly salary (gross): 17.563,14 EUR
Working hours: Full time
Duration: 3 years
Starting date: No later than Sept 2021

FUNCTIONS TO BE DEVELOPED BY THE APPLICANT

CIMNE is looking for a **PhD Researcher** to be part of the Research and Technical Development (RTD) Groups on Structural Mechanics, ITC and Building, Energy and Environment.

The functions assigned to the candidate will be:

- Complete a PhD **in an engineering** program **(ICT/Computer Science)** at Universitat Politècnica de Catalunya – Barcelona Tech. The candidate is expected to complete the PhD thesis in a maximum of three years.
- Collaborate with various research groups within CIMNE and worldwide.
- To publish a minimum of two papers in JCR journals during the PhD period, author and co-author articles in high-impact international journals
- Carry out quality research, training and management.

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- Participate on the dissemination and outreach activities associated with the project
- Participate in international conferences presenting her/his work

DESCRIPTION OF THE PHD PROJECT:

Motivation: development of a marketplace for a Geographical Management System (GCMS).

This PhD is proposed in the framework of the on-going TDA-DTES project "πPLATES. Pilot Platform to support Predictive Land Management and Sustainability", an augmented Geographical Management System (GMS/GIS++) in which all aspects of the human and the natural world may be recorded, and managed according to several computational models that deepen the understanding and prediction capabilities about the human and natural world. Examples of such models include: advanced diagnostics and forecasts on shoreline erosion, land uses and risk assessment, the relationship between traffic restrictions and improvement in air quality, control of the human presence in natural protected areas to defend biodiversity, or how, when and which industrial areas should be promoted to ensure their sustainability or demoted to avoid waste of resources.

The PhD is aimed at the **software design, implementation and validation for the platform** with **GIS components linked to computational modules**, with focus on the study of the **social dimension of the platform**, with two main components: (a) an **Agora** (a common space for sharing knowledge, projects and teaming-up), and a **Marketplace** to provide the computing, organizational framework and business models to manage the Geographical Management System (GMS).

The details of the job are as follows:

- Development and validation of the **new marketplace architecture and paradigm** for the advanced GMS/GIS++ concept combining data, models and business cases management system
- Implementation of workflows for the co-design and co-creation of GIS solutions, combining data and computing engines.
- demo pilots for specific use cases in urban population and infrastructures, coastal, floods, air quality and biodiversity;
- compilation of varied data sources and computational models in a single GMS/GIS++ repository.

References

Maidana A., García-Espinosa J., Oñate E. and Celigueta M.A., GIS/GPU-based simulation model for the shallow water equations and its application to flood/tsunami-risk assessment, 1st Int. Conf. Comput. Eng. & Science for Safety and Environmental Problems (COMPSAFE 2014, Sendai, Japan, 2014

Arnau P., Oñate E., Jiménez J. and Piazzese J., Development and application of decision support systems for environmental monitoring, MAMERN11: 4th Int. Conf. on Approximation Methods and Numerical Modelling in Environment and Natural Resources, Saidia, Morocco, May 23-26, 2011

P. Dadvand, "A framework for developing FEM codes for multi-disciplinary applications", PhD thesis, 2007 UPC; R. Ribó, Desarrollo de un sistema integrado para tratamiento de geometría, generación de malla y datos para el análisis por el método de los elementos finitos, PhD thesis, 2000 UPC

REQUIREMENTS

The position is aimed at students (from any country) who have completed one of the following options:

a) Background studies (BSc and MSc) in **Computer Science** or **Telecommunications Engineering** (preferred) or Civil Engineering, Geotecnics, Geographical, Physics or any other engineering field.

b) The applicants have to be formally enrolled to a doctoral program or meet the conditions to be enrolled to a doctoral program at the moment of the recruiting. Please, check: https://doctorat.upc.edu/en/future-doctoral-candidates/access-and-admission/general-entrance-requirements

2. Excellent academic record.
3. Advanced knowledge of **Programming** and **Software design** (master level).
4. High working knowledge of **English** and **Catalan/Castilian** (Minimum **B2**).
5. Other programming skills: HTML5, Object Oriented, Python, databases (MySQL — Postgre/PostGIS), client/server (Apache, IIS), Javascript, knowledge in GIS formats (shapefile, raster files, etc.)
6. Windows and Linux OS

Other valued skills (not mandatory but highly desirable):

- Previous research, academic or job experience in the field of the position
- Previous experience in frameworks, marketplaces for: ERP (i.e. Odoo) or CMS (i.e. Wordpress), GIS/Galileu /EGNSS /Copernicus.
- Soft skills: high social skills, teamwork oriented, excellent communication skills, oral and written.

EVALUATION OF CANDIDATES

The requirements and merits will be evaluated with a maximum mark of 100 points. Such maximum mark will be obtained by adding up the points obtained in the following items:

- Academic record (30%)
- Previous research, academic or job experience in the field of the position (30%)
- Programming skills (25%)
- Soft skills (15%)

HOW TO APPLY

Candidates must complete the "Application Form" form on our website, indicating the reference of the vacancy and attaching the following documents **in English**:

- Curriculum vitae
- A motivation letter
- Academic transcripts from all Undergraduate and MSc degrees
- Name and institutional contact information of two possible referees

The deadline for registration to the offer ends on 16th April, 2021 at 12 noon.

The shortlisted candidates may be called for an interview. They may also be required to provide further supporting documentation.

CIMNE

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HR EXCELLENCE IN RESEARCH

CIMNE is an equal opportunity employer committed to diversity and inclusion. We are pleased to consider all qualified applicants for employment without regard to race, colour, religion, sex, sexual orientation, gender identity, national origin, age, disability or any other basis protected by applicable state or local law. CIMNE has been awarded the HRS4R label.

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