

Position Description

1. General Information

Name of the position	Resilient modern renewable-energy-based power networks
Foreseen enrolment date	September 2025
Position is funded by	<ul style="list-style-type: none"> • COFUND, Marie Skłodowska-Curie Actions (MSCA), Horizon Europe, European Union • Universitat Politècnica de Catalunya (UPC) • RMIT University
Research Host	Universitat Politècnica de Catalunya (UPC)
PhD awarding institutions	Universitat Politècnica de Catalunya (UPC) & RMIT University
Locations	Primary: Barcelona, Spain Secondary: Melbourne, Australia
Salary	26,626.09 EUR annual gross salary (2,218.84 EUR monthly gross salary)
Supervisors	<ul style="list-style-type: none"> • Eduardo Prieto-Araujo, Associate Professor, UPC • Oriol Gomis-Bellmunt, Professor, UPC • Lasantha Meegahapola, Associate Professor, RMIT University • Carlos Teixeira, Senior Lecturer, RMIT University • Industry Partner: eRoots Analytics (Josep Fanals)
Group of discipline	Electrical and Electronic Engineering

2. Research topics (only one of these projects will be funded)

Project 1: *Deconstructing renewable energy based modern power systems*

Today, there is a quest across academia and industry to define the future key control structures for operating modern power systems. The programmable capacity of power-electronics-based assets opens a new paradigm, as their dynamics can be completely defined by the code embedded in their control systems. This fact is extremely powerful, but it has opened a discussion across a wide variety of control implementations (e.g., grid-forming structures), making it difficult to reach a consensus. This thesis aims to simplify the control definition approach by deconstructing the fundamental features of power systems to define a structured, feature-oriented framework that can be sustained across different implementations. The framework aims to be capable of defining, locating, and tuning the key features and controllers operating in modern PE-based assets to maximize network performance and resilience.

Supervisors: Eduardo Prieto-Araujo (UPC), Oriol Gomis-Bellmunt (UPC), Lasantha Meegahapola (RMIT), Carlos Teixeira (RMIT)



Research Fields: Renewable Energy, Power Systems

Project 2: *Innovative controls in modern power networks*

Grid-following has been the workhorse of power-electronics industry during the last decades. This approach secured an adequate network synchronization and reliable performance across a wide variety of network conditions. However, such structure has been demonstrated to not be valid for modern power-electronics-dominated power systems, when the penetration of PE assets dominates over synchronous generators. Currently, grid-forming appears as a new promising breed of controllers that could replace grid-following as the industry main implementation. However, given the programmable capacity of power electronics assets, defining a single control implementation seems quite a restrictive approach. This thesis aims to explore novel control structures for modern power networks, that can be deployed across any possible asset in the network that is interfaced by power electronics assets (generation, storage and loads).

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Research Fields: Renewable Energy, Power Systems

Project 3: *Interaction analysis tools in modern power networks*

The energy transition is transforming the power system into a power-electronics-dominated network, driven by the large penetration of renewable energy systems, storage, and electric vehicles. This shift is altering the nature of network dynamics, transitioning from a physics-based (synchronous generator) to a programmable-dominated network (power electronics). Alongside this transition, the controllers coded within power converters are typically black boxes due to intellectual property (IP) restrictions. Therefore, the future power system dynamics will be dominated by the performance and interaction of black-boxed controllers operating across the network. This radical change poses a challenge for interaction analysis tools, which have traditionally been designed to assess synchronous-generator-driven interactions with simpler and more transparent control structures. This thesis aims to develop new tools to analyze interactions in modern power networks to ensure their resilience and functionality under this new scenario.

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Research Fields: Renewable Energy, Power Systems

3. Employment Benefits and Conditions

Universitat Politècnica de Catalunya (UPC) offers a 48-month full time work contract. The total working hours per week is 37.5.

The remuneration, in line with the European Commission rules for Marie Skłodowska-Curie grant holders, will consist of a **gross annual salary** of yearly 26,626.09 EUR (which is of monthly 2,218.84 EUR). Of this amount, the estimated net salary to be perceived by the Researcher is 1,819.00 EUR per month. However, the definite amount to be received by the Researcher is subject to national tax legislation and the personal situation.



Benefits include

- Becoming a Marie Skłodowska-Curie fellow and be invited to join the Marie Curie Alumni Association
- Access to all the necessary facilities at UPC and RMIT University
- Tuition fees exemption at both PhD awarding institutions
- Travel allowance to cover flights and accommodation for participating in DREAM+PLAN events
- Up to 12 months in Australia
- 22 days paid holiday leave
- Social security coverage
- Sick leave
- Parental leave

4. PhD enrolment

Successful candidates for this position will be enrolled by the following institutions and must comply with their specific entry requirements, in addition to DREAM+PLAN's conditions.

Universitat Politècnica de Catalunya (UPC)

To enrol in a Doctorate program you must meet the general conditions, namely:

As a rule, applicants seeking admission to an official doctoral programme must hold a Spanish bachelor's degree or equivalent and a Spanish master's degree or equivalent, provided they have passed at least 300 ECTS credits on the two degrees. Any of the following applicants may also gain admission:

- Holders of official Spanish degrees or equivalent Spanish qualifications, provided they have passed 300 ECTS credits in total and they can prove they have reached Level 3 in the [Spanish Qualifications Framework for Higher Education](#).
- Holders of degrees awarded in foreign education systems in the European Higher Education Area (EHEA), which do not require homologation, who can prove that they have reached Level 7 in the Spanish Qualifications Framework for Higher Education, provided the degree makes the holder eligible for admission to doctoral studies in the country in which it was awarded. Admission on this basis does not imply homologation of the foreign degree or its recognition for any purpose other than admission to doctoral studies.
- Holders of degrees awarded in a country that does not belong to the European Higher Education Area, which do not require homologation, on the condition that the University is able to verify that the degree is of a level equivalent to that of official university master's degrees in Spain and that it makes the graduate eligible for admission to doctoral studies in the country in which it was awarded. Admission on this basis does not imply homologation of the foreign degree or its recognition for any purpose other than admission to doctoral studies.
- Holders of another doctoral degree.



- University graduates who, having previously been awarded a training post in the entrance examination for specialised health training posts, have passed and obtained a positive assessment in at least two years of training on a programme leading to an official qualification in a Health Sciences specialisation.

Specific requirements and admission procedure:

Each doctoral programme may have specific requirements for admission in addition to the general requirements. The additional specific requirements that must be met for admission are listed on the web pages for each programme.

More information: https://doctorat.upc.edu/en/future-doctoral-candidates/access-and-admission/general-entrance-requirements?set_language=en

RMIT University

Visit the website: <https://www.rmit.edu.au/research/research-degrees/how-to-apply>

