

### 1. Interested institution:

- Research group: Advanced Control of Energy Systems (ACES)
- Address: (1) Institute of Industrial and Control Engineering, Universitat Politècnica de Catalunya, Av. Diagonal 647, 08028 Barcelona, Spain; (2) Institut de Robòtica i Informàtica Industrial, Universitat Politècnica de Catalunya-Consejo Superior de Investigaciones Científicas, C/Llorenç i Artigas, 4-6, 08028 Barcelona, Spain
- Website: <https://recerca.upc.edu/aces>, <http://futur.upc.edu/aces>

### 2. Brief Description of the Institution

The **Universitat Politècnica de Catalunya** is a public institution dedicated to higher education and research, specialised in the fields of **engineering, architecture and science**.

In a highly creative context, the UPC's research, teaching and management projects are based on the principles of **freedom, justice, democracy, solidarity, cooperation, sustainability, efficiency, transparency and social responsibility**. They also reflect the **University's commitment to the environment and to change**.

With a focus on intellectual rigour, critical thinking, a cross-disciplinary approach to knowledge, educational innovation and entrepreneurship, the UPC produces competent professionals with the skills they need to tackle present and future challenges.

The activity that goes on at UPC campuses and schools has made the University a benchmark institution. The University harnesses the potential of basic and applied research, and transfers technology and knowledge to society. These actions make the UPC—in partnership with industry—an **agent and driver of economic and social change**.

The UPC puts its scientific and technological infrastructure at the service of research groups and centres, researchers and students, professionals, companies and institutions.

As a leading member of international networks of excellence, the UPC has a privileged relationship with global scientific and educational organisations. As a result, the University is at an advantage when it comes to **attracting international talent**.

### 3. Please tick the areas of research (as established in Marie Skłodowska Curie Actions)

- |   |   |
|---|---|
| <input type="checkbox"/> Chemistry (CHE)                                      | <input type="checkbox"/> Environmental Sciences and Geology (ENV) |
| <input type="checkbox"/> Social Sciences and Humanities (SOC)                 | <input type="checkbox"/> Life Sciences (LIF)                      |
| <input type="checkbox"/> Economic Sciences (ECO)                              | <input type="checkbox"/> Mathematics (MAT)                        |
| <input checked="" type="checkbox"/> Information Science and Engineering (ENG) | <input type="checkbox"/> Physics (PHY)                            |

#### 4. Research / Project Description

The research interests of ACES are mainly focused on the modeling and control of complex systems, as well as on its application to problems related to the generation, conditioning, storing, and managing of electrical energy. On one side, the theoretical working lines encompass: internal model principle-based linear control; nonlinear control, including adaptive, sliding, energy-based, and complex networks control; order reduction in large-scale models; nonsmooth systems, and differentially flat systems. On the other side, the applied works on the energy field deal with fuel cells, power electronics converters, electrical machines, and power networks.

The leaders of ACES are Profs. Enric Fossas and Jordi Riera. However, the reduced size of the group, with a core of twelve senior researchers, is the reason why the organigramme is almost flat. As regards the research activity, this is organized around the above mentioned research lines. However, and due again to the small size of ACES, the versatility of the staff, and the intersections of most of the lines, it is usual for the researchers to be in more than one of them.

The group has an interuniversity character and, as such, keeps to headquarters: one of them is located in the Institut de Robòtica i Informàtica Industrial (IRI) –a joint UPC-CSIC research center– and essentially devoted to the control of fuel cell-based systems; the other one is in the Institute of Industrial and Control Systems (IOC) of the UPC, and it is focused on control theory and its applications to power electronics, electrical machines, and electrical power networks (such as smart grids, AC and multi-terminal DC grids).

ACES has a laboratory facility in each headquarter. The fuel cells laboratory has as its main goal the experimental validation of the researches of the group in this field. This entails tasks such as characterization of the dynamic behavior and the health conditions of the fuel cells, validation of its mathematical modeling, and implementation of the designed control strategies. The lab has five completely autonomous test stations, where one can experiment from monocells of a few watts till twelve hundred watt stacks' generation systems. The power electronics and electrical machines laboratory is devoted to the experimental works related with basic and applied investigation –validation of models and control techniques– and technology transfer –development of products for companies–. The ancillary of the lab allows not only building prototypes, but also carrying out tests with active filters, rectifiers, inverters or uninterruptible power systems.

The group shows a high quality scientific production, with numerous articles and presentations in well-known journals (*Automatica*, *IEEE Trans. Automatic Control*, *IEEE Trans. Industrial Electronics*, *IEEE Trans. Power Electronics*, *Int. J. Hydrogen Energy*, *Int. J. Robust Nonlinear Control*, *J. Power Sources*, *Proceedings of the IEEE...*) and international conferences (*CDC*, *ECC*, *FDFC*, *ICRA*, *IFAC*, *ISCAS*, *ISIE...*). It also has a wide experience in the

leadership of competitive projects and R&I contracts, which represent the main funding sources of its research activities. In turn, ACES has a high capacity of training of specialized scientific and technical personnel at both master and PhD levels, and participates in the Industrial Doctorate Programme of the Generalitat de Catalunya.

### *5. Who can apply?*

At the deadline for the submission of proposals (10/09/2015), researchers (\*):

- shall be in possession of a doctoral degree or have at least four years of full-time equivalent research experience.
- must not have resided or carried out their main activities in the country of Spain for more than 12 months in the 3 years immediately prior to the abovementioned deadline.

### *6. Contact person*

Dr. Josep M. Olm: [josep.olm@iri.upc.edu](mailto:josep.olm@iri.upc.edu)

Dr. Jordi Riera: [riera@iri.upc.edu](mailto:riera@iri.upc.edu)

### *7. Applications: documents to be submitted and deadlines*

Interested applicants should submit a CV and a letter of motivation no later than one week before the deadline of the call.

Please note that:

- Deadline of the next call for proposals for Marie Skłodowska – Curie Individual Fellowships is **September, 10<sup>th</sup> 2015**.
- Oficina Europea is only responsible for the display of the expressions of interests received by the institutions; further contact and information requests will take place directly between the host institutions and the interested researchers.

(\*). Further details on the Call and additional eligibility criteria can be found at the [Participants' Portal](#)