

CALL FOR GRANT APPLICATIONS (AE2021-0286)

INESC TEC is now accepting grant applications to award 1 Research Initiation Grant (BII) within the scope of the Plurianual_LA funded by National Funds through FCT - Portuguese Foundation for Science and Technology, I.P., project (reference LA/P/0063/2020)

1. GRANT DESCRIPTION

Type of grant: Research Initiation Grant (BII)

General scientific area: ENGINEERING,COMPUTER SCIENCE,MATHEMATICS

Scientific subarea: Electrical engineering

Grant duration: 6 months, starting on 2022-02-01, with the possibility of being renewed for a maximum term of one year.

Scientific advisor: Louelson Costa

Workplace: INESC TEC, Porto, Portugal

Maintenance stipend: € 446,12, according to the table of monthly maintenance stipend for FCT grants (<http://www.fct.pt/apoios/bolsas/valores>), paid via bank transfer. Grant holders may be awarded potential supplements, according to a quarterly evaluation process (Articles 19, 21 and 22 of the Regulations for Grants of INESC TEC and Annex II), up to a maximum limit of 50% of the monthly maintenance stipend.

Costs attributable to INESC TEC may include registration, enrolment or tuition fee stipend, either directly or through reimbursement, during the grant duration.

The grant holder will benefit from health insurance, supported by INESC TEC.

2. OBJECTIVES:

- Expand knowledge of the state of the art in the area of digital twins (DT) of photovoltaic (PV) inverters and PV systems;
- Study the application of techniques for fault and failure detection and diagnosis in photovoltaic systems based on a DT;
- Develop research capacity through the use of a DT that allows the emulation of a small-scale photovoltaic system (residential level, for instance) that is fed by real-time meteorological readings;
- Develop simulation and modelling skills on MATLAB/Simulink, applying the PLECS block set, for the implementation of the control, PWM, and PLL, and to evaluate the efficiency, THD, power factor, etc., of the inverter;
- Develop a simulation platform, based on the simulation scenario previously developed, to perform the usual testing of a dc-ac converter for grid-connected PV systems.

3. BRIEF PRESENTATION OF THE WORK PROGRAMME AND TRAINING:

- Do a bibliographic review on the subject of general DTs and PV systems DTs;
- To study of the design and modelling of dc-ac converters applied to grid-connected PV systems;
- To perform simulation analysis of the design and modelling for validation of the theoretical approach;
- To develop of fault detection and diagnosis algorithms of the most common problems of dc-ac converters of PV plants;
- To perform experimental validation of the DT and the algorithms under controlled scenarios of fault insertion;
- To develop a methodology for assessing results and quantifying performance;
- Writing of a technical report and a scientific paper for publication in an international conference or journal.

4. REQUIRED PROFILE:

Admission requirements:

Studies in electrical engineering, computer science, applied mathematics, informatics or similar
The awarding of the fellowship is dependent on the applicants' enrolment in study cycle or non-award courses of Higher Education Institutions.

Preference factors:

- Experience in MATLAB/Simulink, Python programming languages - Basic knowledge of power electronics, dc-ac converter - Basic knowledge of photovoltaic systems - Fluency in English (spoken and written)

Minimum requirements:

- Knowledge in one programming language
- Basic knowledge in optimization algorithms
- Knowledge of electrical circuits

5. EVALUATION OF APPLICATIONS AND SELECTION PROCESS:

Selection criteria and corresponding valuation: the first phase comprises the Academic Evaluation (AC), based on the criteria referred to in Article 12 of the Regulations for Grants of INESC TEC, while the second phase comprehends the Individual Interview (EI). All factors are evaluated on a scale of 0 to 100, taking into account the applicants' merit, suitability and conformity with the preference factors.

The weight of the AC factors are as follows: Academic Qualifications (FA, 55%), Scientific Publications (PC, 10%), Experience (EX, 10%) and Motivation Letter (CM, 25%).

Candidates who score less than 50 points in the AC average will be considered excluded on absolute merit. The top five candidates approved on absolute merit will be qualified for the individual interview. The Final Grade (CF) is obtained by the weighted average of AC (80%) and EI (20%).

The Selection Jury is composed of the following members:

President of the Jury: Ricardo Jorge Bessa
Full member: Louelson Costa
Full member: Rui Esteves Araujo
Substitute member: Nayara Brandão de Freitas

Release of results and prior hearing: the results of the selection process, as well as the terms and procedures for prior hearing, will be released to the applicants by email, under the terms referred to in Article 13 of the Regulations for Studentships and Fellowships of INESC TEC.

6. FORMALISATION OF APPLICATIONS:

Application Documents:

1. Motivation letter;
2. Curriculum Vitae (must include the list of previous fellowships, their type, beginning and end dates, funding entities and host institutions);
3. Certificate or diploma degree dully recognised in Portugal;
 - Documents proving the awarding of academic degrees and diplomas, or the according recognition - in cases of academic degrees or diplomas granted by a foreign higher education institution - can be dismissed in the application process, and replaced by the applicant's declaration of honour, with the verification of said condition taking place during the grant's hiring stage. The submission of the certificate is mandatory when signing the contract.
 - Academic degrees or diplomas awarded by a foreign higher education institution require an authentication by a Portuguese higher education institution, and the corresponding registration on the DGES platform, in conformity with Decree-Law no. 66/2018, of August 16, and Ordinance no. 33/2019, of January 25. More information available on the website <https://www.dges.gov.pt/pt/pagina/reconhecimento?plid=374>
4. Proof of enrollment in a degree awarding study cycle or in a non degree awarding Higher Education program.

- The proof of enrollment may be presented just during the grant hiring stage.
5. Signed declaration stating not having benefited from any other research fellowship (Article 5, no. 5)
 6. Documental evidence to support the country of residence, residence permit or other legally equivalent document, in cases where the applicant is a foreigner or non-resident in Portugal - valid until the beginning of the grant.
 7. Other supporting documents relevant to the final assessment.

Failure to deliver the required documents within the 90-day period after the date of the notice of the conditional awarding of the grant implies its cancellation.

Application period: From 2021-12-17 to 2022-01-15

Submission of applications: the application will be formalised by submitting the form available in the *Work With Us* section of INESC TEC website.

7. BINDING LEGISLATION AND REGULATION

The hiring process shall comply with the current legislation regarding the Research Grant Holder Statute, approved by Law no. 40/2004 of August 18, in its current wording, as well as by the Regulations for Grants of INESC TEC and for [FCT Grants Regulation in force](#).

For more information, please check the Regulations for Grants of INESC TEC and relevant annexes at www.inesctec.pt/bolsas



Governo da República Portuguesa

FCT

Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA