



UNIVERSIDADE DE ÉVORA

DEPARTMENT OF MECHATRONICS ENGINEERING

Doctoral scholarship - 1 vacancy

20th of October of 2023

A call for tenders is open for one scholarship for a PhD programme within the scope of the Research project called Mobilising Agenda: New Space Portugal (Ref. C644936537-00000046, Notice ACC02/CO5-i01/2022, funded by the "Mobilising Agendas for Business Innovation" through the "Recovery and Resilience Programme (PRR)" and by Portugal 2020 through the Competitiveness and Internationalisation Operational Programme and the Lisbon Regional Operational Programme and co-financed by "FEDER".

Scientific area: Mechatronic Engineering, Aeronautical Engineering or Aerospace Engineering, Space Missions (monitoring of orbital vehicles (rocket) and propulsion systems).

Admission requirements:

1) Be enrolled in the PhD program in Aeronautical Engineering; 2) Knowledge of systems for suborbital and orbital vehicles; 3) Advanced training in intelligent systems for suborbital vehicles; 4) Knowledge of sensors and cameras, i.e., electronic control instrumentation; 5) Knowledge in designing electronic systems for signal acquisition, using Altium; 6) Knowledge of mechanical simulation using finite elements (ESATAN, Siemens NX, Ansys); 7) Experience in implementing instrumentation and combined sensors, signal acquisition and fusion of sensors and cameras for flight's visual monitoring of the vehicle's; 8) Knowledge and programming of controllers, processors and cameras; 9) Know how to prepare technical reports on systems for suborbital vehicles or orbital vehicles.

As set forth FCT Research Scholarship Regulation No. 950/2019 of December 16, 2019, article 3 and 6, candidates for "BI" must comply as a rule condition for the award of the scholarship, the effective inclusion in study cycles leading to the attribution of academic degrees or in courses not leading to an academic degree. Courses that do not confer an academic degree correspond to the courses provided for in subparagraph e) of paragraph 3 of article 4 of Decree-Law No. 74/2006 of 24 March and must be developed in a higher education institution in association with at least one R&D unit, including a course plan in one or several research areas of the unit.

Work plan:

1. The award of a Doctoral Scholarship, to deal with work for missions to space (using new space materials), in the area of monitoring space vehicles and propulsion systems (behavior of the oxidizer and propellant mixing in the rocket's thrust chamber), and the stage separation zone. The work will focus more specifically on the development of instrumentation solutions, namely sensors and cameras for flight's visual monitoring of the orbital vehicle's, its characterization and implementation of a data acquisition and



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- transmission system and sensor fusion in cryogenic operating conditions (on-board computers).
2. Review of the state of the art within the scope of: defining mission requirements regarding the reusing or not the vehicle; Types of launchers: single-stage-to-orbit or two-stage-to-orbit; Positioning of sensors and cameras: mid or bottom part of the vehicle or rocket; Analysis of thermal loads (high and low temperature); Type of propellant used in the vehicle: liquid, solid or hybrid.
 3. Multi-channel sensor system solutions and new space cameras for monitoring orbital vehicles in cryogenic operating conditions;
 4. Survey of sensor and camera requirements for the vehicle: within the scope of cryogenic operating conditions (operating temperatures, vibrations, stress loads); within the scope of technical needs (interfaces, parameters to monitor, acquisition times, storage needs); within the scope of data transmission protocols (processing needs, final data format);
 5. Project of sensor and camera systems for flight's visual monitoring of the orbital vehicle's status during flight (on-board computer);
 6. Simulation and implementation of the monitoring system;
 7. Definition of test plans;
 8. Carrying out functional tests;
 9. Qualification of the sensor and camera system for flight's visual monitoring of the orbital vehicle's condition during flight;
 10. Carrying out tests in the operational environment of the orbital vehicle.
 11. Writing the thesis and publications

Applicable legislation and regulations: The granting of the Research Scholarship will be carried out upon the signing of a contract between the University of Évora and the scholarship holder, as set in the template [former.fct.pt/apoios/Minuta_Contrato_Bolsa.docx](https://www.fct.pt/apoios/Minuta_Contrato_Bolsa.docx), pursuant to the Research Scholarship Statute (Law No. 40/2004 of August 18 and Decree-Law No. 123/2019 of August 28) and in accordance with the legislation and Regulation of Research Grants of the Foundation for Science and Technology, IP in force, regulation nº950/2019 of December 16, 2019: <https://files.dre.pt/2s/2019/12/241000000/0009100105.pdf> and other applicable rules.

Place of work: The work will be carried out at the CENTRA Laboratories, Faculty of Sciences, University of Lisbon; AEROG, Universidade da Beira Interior, IDMEC, Instituto Superior Técnico, and Instituto Superior de Engenharia de Lisboa, under the scientific guidance of Prof. Rui Melício, Prof. Paulo Gordo, Prof. André Silva, Prof. Leandro Barbosa Magalhães.

Duration of the scholarship(s): The scholarship will have a duration of 6 six months, starting on December of 2023. The scholarship contract may be renewed up to (ex.) a maximum of 31 months or until the end of the funding project's budget allocation (...).

Amount of monthly maintenance allowance: The amount of the scholarship corresponds to €1199,64, according to the table of scholarships awarded directly by FCT, I.P. in Portugal (https://www.fct.pt/wp-content/uploads/2023/02/Tabela-de-Valores-SMM_2023.pdf), payments being made monthly, by check or bank transfer.



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Selection methods: The selection methods to be used will be the following:

Curriculum evaluation – 100%

The selection interview will be held in the event of a tie between the first 2 candidates, with the respective valuation:

Curriculum evaluation - 85% and the selection interview - 15%.

Composition of the Selection Jury:

President: Prof. Rui Melício (IDMEC, Centro de Ciências e Tecnologias Aeronáuticas e Espaciais, Instituto Superior Técnico e Universidade de Évora)

1st Member: Prof. Paulo Gordo (CENTRA, Center for Astrophysics and Gravitation, University of Lisbon)

2nd Member: Prof. Leandro Barbosa Magalhães (AEROG, Astronautics Research Center, University of Beira Interior and ISEC Lisbon, Instituto Superior de Educação e Ciências)

1st Alternate: Prof. Luís Santos (AEROG, Astronautics Research Center, University of Beira Interior and ISEC Lisbon, Instituto Superior de Educação e Ciências)

2nd Alternate: Prof. André Silva (AEROG Astronautics Research Center, Universidade da Beira Interior)

Advertising/notification of results: The final results of the evaluation will be publicized, through an ordered list by final grade obtained posted in a visible and public place at the University of Évora, Colégio Luis António Verney, Rua Romão Ramalho, nº59, Évora 7000-671), being the candidate (a) approved notified through email.

To ensure the right of prior hearing of interested parties, the Final Classification project will be announced by any written means to all interested parties.

After communicating the provisional list of the results of the evaluation, candidates have a period of 10 working days to express their opinion in a preliminary hearing of interested parties.

Application deadline and submission of applications: The tender is open from 25th of October of 2023 to 9th of November of 2023 and the results of the selection will be published by 17th of November of 2023.

Applications must be formalized, obligatorily, by sending an application letter with the following documents: Curriculum Vitae, certificate of qualifications and other supporting documents considered relevant.

For the purposes of application, the evidence may be replaced by a declaration of honor signed by the candidate, but the failure to demonstrate that evidence, in the contracting phase, possession of the required degree on the deadline for application or the non-presentation of proof of enrollment in the study cycle or non-degree course, for scholarships with this component, imply the cancellation of the candidate's application.



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Academic degrees obtained in foreign countries require registration by a Portuguese Institution in accordance with Decree-Law no. 66/2018, of August 16 and Ordinance No. 33/2019, of January 25th.

The presentation of the certificate is mandatory for the signing of the contract. More information can be obtained at: <https://www.dges.gov.pt/pt/pagina/recognition?plid=374>

Applications must be sent by email to:

Subject: "New Space Portugal Project PhD Scholarship Application".

Prof. Rui Melício;

Departamento de Engenharia Mecatrónica

email: ruimelicio@uevora.pt