

CALL FOR GRANT APPLICATIONS

(AE2026-0316)

INESC TEC is now accepting grant applications to award 1 Research Grant (BI) project DFence, with reference 18408 (NORTE2030-FEDER-01474400) Co-funded by ERDF - European Regional Development Fund through the NORTE 2030 Regional Program under the scope of Portugal 2030.

1. GRANT DESCRIPTION

Type of grant: Research Grant (BI)

General scientific area: ENGINEERING

Scientific subarea: Systems engineering

Area of Work: Optimisation and Simulation for Decision Support

Grant duration: 12 months, starting on 2026-12-01, with the possibility of being renewed until the end of the project.

Scientific advisor: Catarina Moreira Marques

Workplace: INESC TEC, Porto, Portugal

Maintenance stipend: € 1090.98, [according to the table of monthly maintenance stipend for FCT grants](#), 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.

INESC TEC supports costs with registration, enrolment or tuition fees, during the grant duration, under the terms established in the internal document: [Payment of Tuition fees to grant holders](#).

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

2. OBJECTIVES:

- Broaden knowledge of the state of the art in optimisation, simulation and data engineering applied to decision support in pasture management;
- Identify and select the optimisation and simulation methods appropriate to grazing planning under uncertainty;
- Develop research skills through the design, implementation and validation of a planning module integrated into an operational data pipeline;
- Exercise critical thinking in the evaluation of the research process and the results obtained.

3. BRIEF PRESENTATION OF THE WORK PROGRAMME AND TRAINING:

The fellowship is part of the DFence – Dynamic Virtual Fences project, which aims at the autonomous definition of virtual fence boundaries for extensive grazing, based on computer vision, forecasting models and planning. The work aims to investigate, develop and validate the pasture-use planning, simulation and optimisation module of the project's Integrated Decision Support System. This module should generate actionable grazing plans that i) prevent over- and under-utilisation of pastures, ii) ensure that animals graze in the most suitable areas and iii) ensure sustainable management practices, serving as the basis for the dynamic definition of virtual fences.



Optimisation models based on exact methods (e.g. mixed-integer linear programming) and approximate methods (e.g. metaheuristics, evolutionary algorithms, multi-objective optimisation) will be studied and developed, as well as agent-based and discrete-event simulation models. Simulation will make it possible to analyse the uncertainty (weather, external factors, animal behaviour) and variability (biomass availability and regrowth, per-animal intake) of the system, and to assess the performance of plans and forecasts in a stochastic environment as close to reality as possible. The module will take as inputs historical sensor and telemetry data, terrain and vegetation attributes extracted from imagery, and pasture-state forecasts produced in other project tasks.

The work will build on existing project results: an agent-based simulation model of the study area and a data pipeline organised in layers (Bronze, Silver and Gold), with data products and data contracts, orchestrated workflows and quality reports. In addition to developing the planning module, the fellowship holder will be responsible for integrating it with the pipeline and for the continued maintenance and evolution of the pipeline, closing the data–forecast–simulation–optimisation–decision loop.

Specifically, the main activities to be carried out by the fellowship holder are:

- Study the state of the art in grazing planning and optimisation, agent-based and discrete-event simulation applied to livestock systems, optimisation under uncertainty, simulation-optimisation approaches, and virtual fencing.
- Formalise the pasture-use planning problem (decision variables; spatial, water, topographic and animal-welfare constraints; productivity, ecological sustainability and welfare objectives), in coordination with the consortium partners.
- Develop and compare exact and approximate optimisation models, including multi-objective formulations, to generate grazing plans and virtual fence configurations.
- Extend the agent-based and discrete-event simulation models, incorporating uncertainty and variability, and use them to assess the robustness of the plans and the accuracy of the forecasting and optimisation methods in a stochastic environment.
- Integrate the planning module with the data pipeline, automating the generation of scenarios and simulation configurations from the data products and the consumption of forecasts and image-derived attributes.
- Maintain and evolve the data pipeline: incorporate new data sources and versions (e.g. GPS collar telemetry), update workflows, data products and data contracts in an additive and versioned way, monitor data quality and improve processing performance.
- Calibrate and validate the models with real telemetry and field data, as they become available, and with the expert knowledge of the project partners.
- Systematise the results of the work, producing technical documentation, reports and, where applicable, scientific contributions in the form of papers, datasets or reusable software.

The training component will include the integration of the fellowship holder into a multidisciplinary research team, training in optimisation, simulation and data engineering tools, and participation in consortium technical meetings and science dissemination activities.

4. REQUIRED PROFILE:

Admission requirements:

Bachelor's degree in Computer Engineering, Industrial Engineering and Management, Information Systems or a related field.

The awarding of the fellowship is dependent on the applicants' enrolment in study cycle or non-award courses of Higher Education Institutions.

Preference factors:

- Proficiency in Portuguese and English (written and spoken).
- Experience in developing and maintaining data pipelines (e.g. Python, SQL, workflow orchestration, analytical data formats).
- Experience in optimisation modelling (mathematical programming and/or metaheuristics) and/or in agent-based or discrete-event simulation.
- Experience in processing geospatial data (vector and raster).
- Enrolment in a master's programme in a relevant field.

Minimum requirements:

Bachelor's degree final grade above 13.

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, 50%), Scientific Publications (PC, 0%), Experience (EX, 30%) and Motivation Letter (CM, 20%).

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%).

DISABILITY INCENTIVE

Candidates who present a degree of disability equal to or greater than 90% will benefit from an incentive (20) in the score of the CV Assessment.

Candidates who present a degree of disability equal to or greater than 60% and less than 90% will also benefit from an incentive (10) in the score of the CV Assessment.

Said score may, in these cases, exceed 100 points.

Candidates must demonstrate the degree of disability during the application, namely through the submission of the Multi-Purpose Medical Certificate of Disability, issued in accordance with Decree-Law no. 202/96, of October 23 currently in effect.

Candidates must declare, in the application form, the type of disability used throughout the selection process, in order to proceed with the required adaptations.

The Selection Jury is composed of the following members:

President of the Jury: Catarina Moreira Marques

Full member: Davide Rua Carneiro

Full member: Hugo Miguel Ferreira

Substitute member: Carla Pereira

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;
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 the infringement of the grant holder's duties (article 14, no. 4)
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 2026-10-22 to 2026-11-04

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



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