CALL FOR GRANT APPLICATIONS

(AE2023-0449)

INESC TEC is now accepting grant applications to award 1 Research Grant (BI) within the scope of the Produtech_R3 funded by IAPMEI with reference 60 Co-financed by Component 5 - Capitalization and Business Innovation, integrated in the Resilience Dimension of the Recovery and Resilience Plan within the scope of the Recovery and Resilience Mechanism (MRR) of the European Union (EU), framed in the Next Generation EU, for the period 2021 - 2026.

1. GRANT DESCRIPTION

Type of grant: Research Grant (BI)

General scientific area: ENGINEERING

Scientific subarea: Electrical engineering

Area of Work: Virtual Reality

Grant duration: 12 months, starting on 2024-01-01, with the possibility of being renewed until the end of the project.

Scientific advisor: Marcelo Petry

Workplace: INESC TEC, Porto, Portugal

Maintenance stipend: € 1199,64, 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:

Research and development of VR/AR applications for the teleoperation of mobile robots used for internal logistics tasks.

3. BRIEF PRESENTATION OF THE WORK PROGRAMME AND TRAINING:

The complete automation of internal logistics operations based on mobile robots is often a very difficult objective to achieve and, in certain cases, susceptible to frequent failures. Mainly, in extremely complex operations, such as loading truck containers with different objects of different geometries, it is a very complex problem and difficult to automate without failures. On the other hand, purely manual operation in cargo transport has several problems associated with it, ranging from the fallibility of operators to the emergence of health problems caused by the constant acceleration/deceleration of forklifts or pallet trucks and very repetitive movements that create injuries to the hands and arms.

Therefore, the objective of this work is to create an application that allows high-level teleoperation of a set of autonomous mobile robots (AMR) of the forklift type where, with the appropriate sensors (cameras mainly), the operator can remotely have a general view of the workspace and another view similar to what you would have if you were sitting on the forklift. Using the global view, the operator can select loads in the image that are in a given location, then select a forklift and then a destination for that load, thus assigning a sequence of tasks to it. The AMR, in a completely autonomous way, will try to execute the tasks, automatically calculating the

trajectories and actions to be taken and allowing the operator to switch to another AMR, to which it will also assign other tasks in a similar way. This way a remote operator can supervise more than a single AMR stacker. When an AMR detects a problem that it cannot resolve on its own, such as the load being in an unexpected position, or it cannot decide where to place/stack the load at the destination, it will raise an alarm to the remote operator. At this point, the application should allow the operator to switch the AMR to a low-level manual teleoperation mode, allowing the human operator to solve the problem as if he were sitting on the forklift.

4. REQUIRED PROFILE:

Admission requirements:

Master's degree in Electrical and Computer Engineering, Computer Engineering, or related areas. The award of the scholarship assumes that the candidate is a student of a study cycle or a non-degree course, taught at a Higher Education Institution.
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 working with the Unity framework is valued.
Participation in extra-curricular activities linked to robotics is valued.
Previous experience of participating in research and development projects is valued.
The publication of scientific articles related to the area of work is valued.

Minimum requirements:

Experience in C/C++ programming.
Previous work experience in the VR field.
Robotics knowledge.

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, 45%), Scientific Publications (PC, 5%), Experience (EX, 45%) and Motivation Letter (CM, 5%).
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: Marcelo Petry
Full member: Manuel Santos Silva
Full member: Luís Freitas Rocha
Substitute member:

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 2024-11-23 to 2023-12-07

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