ANNOUNCEMENT FOR THE AWARD OF A RESEARCH FELLOWSHIP

Title: Research Fellowship for a Master's degree holder – SoftWear; 1 vacancy

Reference: SoftWear - 2024.14813.PEX_BI-03/2026-CMEMS (1)

A call for applications is now open for the attribution of (one) 1 grant of Research Fellowship for a Master's degree holder within the scope of the I&D project Center for Microelectromechanical Systems (CMEMS-UMinho**), "SoftWear - Soft Wearable Robot with Muscle-Like Actuation and Control"**, reference **2024.14813.PEX**, financed by national funds through Fundação para a Ciência e Tecnologia (FCT), under the following conditions:

Scientific Area: Electrical Engineering, Electronics, and Computer Science.

Recipient category: Master's in Biomedical Engineering, with specialisation in Biomechanics, or related fields enrolled in a PhD or masters enrolled in non- academic degree courses.

Requirement for granting the fellowship:

- The applicants may apply without prior registration in the course for which the fellowship is open. The requirement to enroll in a degree course or non-academic degree course will be verified on the date of contracting the fellowship;
- Only fellowships whose selected applicants present a valid proof of enrollment in a degree course or non-academic degree course will be contracted, according to the type of the fellowship, issued by a Higher Education Institution, indicating, respectively, the academic year or its duration (start and end).

Applicants' eligibility: Candidates who meet the conditions set out in Article 9 of the Research Grant Regulations, No. 950/2019, of 16-12-2019, of FCT I.P. are eligible.

Nationals or citizens of other European Union member states, third-country nationals, stateless persons, and citizens with political refugee status are eligible to apply for this competition.

Candidate eligibility requirements:

- Applicants must hold, at the time of application, a Master's degree in Biomedical Engineering, with specialisation in Biomechanics, or related fields. It is required for contractualization, proof of academic qualifications completed at the deadline for applications, including those resulting from academic degree recognition processes;
- Candidates enrolled in non-conferring degree courses: cannot benefit from this scholarship candidates who, with the conclusion of the scholarship contract in question, including renewals, exceed a cumulative period of two years followed or interpolated, in this type of scholarship;
- Requirements: clear demonstration of competencies in biomechanics and in modelling of physical systems; experience in numerical modelling and/or constitutive models of materials (preferably shape memory alloys) and heat transfer; experience in developing and training neural networks and other machine learning models; programming skills (e.g., Python or MATLAB) and experience with simulation tools; knowledge of control systems, namely feedforward and feedback control, applied to exoskeletons or robotic systems.

Workplan and objectives to be achieved:

This work plan aims to develop a feedforward model for the low-level control of an active soft exoskeleton based on Shape Memory Alloy (SMA) actuators, through the simplification of the SMA actuator model and its conversion into a neural network. In an initial phase, the fellow will analyse the computational model of the SMA actuator developed within the project, which integrates the constitutive equations, phase transformation kinetics, stress-strain and strain-temperature relationships and heat transfer models, identifying the dominant variables and parameters in the relationship between the thermal input (Joule heating and cooling), the deformation and the force produced by the actuator. Based on this analysis, the fellow will develop

a simplified (reduced-order) model of the SMA actuator suitable for real-time execution, and will validate its performance against the full model and experimental data from benchtop tests.

Additionally, the fellow will generate representative datasets from numerical simulations of the simplified model and from experimental tests, covering different operating conditions (e.g., heating and cooling rates, loads and deformation trajectories), and use them to train a neural network that approximates the inverse model of the actuator, i.e., that establishes the relationship between the desired assistive trajectory/torque and the required heating and cooling temperatures/power, accounting for the material's non-linearity and hysteresis.

Finally, the fellow will integrate the neural network as the feedforward model in the exoskeleton's low-level controller, and will support its evaluation in benchtop tests, analysing trajectory tracking accuracy, response time and latency. The fellow will also contribute to the preparation of technical reports and documentation associated with the project activities.

These objectives are part of Activities 3 and 4 of the project.

Applicable legislation and regulations: Research Fellow Statute (EBI), approved by Law nº. 40/2004 of August 18, in its current wording and FCT Research Fellowship Regulation, approved by Regulation nº 950/2019, published in the Diário da República, 2nd series, of December 16, 2019, in its current wording, and Scientific Research Fellowship Regulation (RBIC) of the University of Minho, approved by order nº 4998/2025, published in the Diário da República, 2nd series, nº 81, of April 28, 2025 Amended and republished through amendment statement no. 634/2025/2, published in the Official Gazette, 2nd series, no. 132, of July 11.

Host/Contracting institution and scientific supervision: The workplan will be carried out in the Center for Microelectromechanical Systems (CMEMS-UMinho) of University of Minho), located in the Azurém Campus, Guimarães, under the scientific supervision of the Doctor Joana Sofia Campos Figueiredo, Junior Researcher, and coordination Professor Luís Miguel Valente Gonçalves, Director of Center for Microelectromechanical Systems.

Fellowship duration: The grant will take place for a period of 6 months, with a provisional starting date of 4 January 2027. The fellowship grant may, eventually, be renewed up to the maximum limit allowed by the project and/or applicable legislation.

Amount of the research grant: The amount of the grant corresponds to 1 309,64 €/month, according to the table of values of the Research scholarship of the University of Minho, updated annually, as decided by the Management Board.

Payment is made on the 23rd of each month, through bank transfer to the Bank Identification Number of the fellow identified in the contratualization process.

Other components of the research grant: Define other components of the scholarships, as provided for in Article 18º of the FCT Research Scholarship Regulations (RBI).

Other benefits: Reimbursement of Voluntary Social Insurance, if the candidate chooses to receive it, corresponding to the 1st level of discounts (for research grants with a total duration 6 months or higher) and personal accident insurance.

Exclusivity regime: The grantee will perform the activities under exclusivity, as foreseen in article 5º of the Research Fellow Statutes and applicable regulations.

Selection panel: The selection panel is composed by:

President: Doctor Cristina Manuela Peixoto Santos, Assistant Professor with Habilitation, Industrial Electronics Department of School of Engineering of University of Minho;

Effective Member: Doctor Alexandre Manuel Teixeira Barros Ferreira da Silva, Assistant Professor, Industrial Electronics Department of School of Engineering of University of Minho;

Effective Member: Doctor Susana Oliveira Catarino, Assistant Professor, Industrial Electronics Department of School of Engineering of University of Minho;

Substitute member: Doctor Graça Maria Henriques Minas, Associate Professor with Habilitation, Industrial Electronics Department of School of Engineering of University of Minho;

Substitute member: Doctor Luís Miguel Valente Gonçalves, Associate Professor, Industrial Electronics Department of School of Engineering of University of Minho.

The first effective member will substitute the President of the selection panel in case of impediment, being nominate the first substitute member in the place of the first effective member.

Criteria and procedures for applications assessment and selection: The applications assessment will focus on the candidate's Merit, following evaluation criteria, valued on a scale of 0 to 5 values (or another scale)[1]:

Applicant Merit - AM (100%):

a) Academic path (considering the classifications of academic degrees), with a weighting of 40%;

b) Proven experience in the areas listed in the requirements, with a weighting of 60%:

I. Experience in modelling physical and biomechanical systems, 40%;
II. Experience in developing neural networks and machine learning models, 25%;
III. Experience in biomechanical systems and human-robot interaction, 35%.

The final classification of the applicant's merit with the achieved through the following formula:

MC=(a1*0.4) +(a2*0.6)

Application deadline and submission: The call for applications is open for a period of 10 working days from the date of publication on the Euraxess portal.

Applications must be submitted by email to joana.figueiredo@dei.uminho.pt, indicating the reference number of the competition in the subject line. Only applications submitted within the established deadline and accompanied by the following documents will be accepted

a) Candidate's updated curriculum vitae;
b) Certificates of the academic degrees obtained or, if applicable, the candidate's declaration of honor that he/she has completed the degrees required in the notice by the application deadline (not applicable to research initiation grants).
For degrees obtained abroad, the record of recognition of the academic degrees and record of the conversion of the respective final classification to the Portuguese classification scale must be presented, or, alternatively, a declaration of honor from the candidate.
This declaration must attest to facts that occurred prior to the application. In the event of a discrepancy between the information contained in the declaration and the documentation submitted for the purposes of contracting the scholarship, only the information contained in the latter will be considered. If it is found that the documents proving the academic degree and diploma, or their recognition under the terms of Decree-Law n. º 66/2018, of August 16, do not correspond to the classifications awarded in the assessment of the academic career and may consequently alter the candidate's ranking, the scholarship will not be contracted;

c) Statement proving that you meet the conditions for the type of scholarship, in accordance with the application requirements;
d) Other documents that the candidate considers relevant to the evaluation process.

Form of publication/notification of results: The results of the evaluation are published in a single list in alphabetical order, posted in a visible and public place in the host unit, as well as by email to all candidates, attaching, for this purpose, the minutes of the jury's deliberations, within a maximum period of 90 working days from the deadline for submission of applications.

Candidates are informed, at a preliminary hearing, in accordance with Articles 121 and 122 of the Administrative Procedure Code, of the likely outcome of the final decision, and may comment within 10 working days of this notification.

An appeal may be lodged against the final decision within 15 working days, or an appeal may be lodged with the highest executive body of the funding entity within 30 days, both after the respective notification (Article 12(n°6) of the FCT Research Grant Regulations).

Within 10 working days of notification of the grant award, the applicant must declare their acceptance in writing. In case of non-acceptance, the next highest ranked applicant will be notified immediately.

Constitution of a selection reserve list: The applicants ranked in the next positions on the ordered list will be included in a selection reserve list, which can be used until 31/03/2027.

Fellowship contractualization: The scholarship is awarded through the signing of a contract between the University of Minho and the scholarship recipient, in accordance with point 2.4 of the Rules for the Award and Management of Scholarships https://www.fct.pt/wpcontent/uploads/2022/03/Normas_de_Atribuicao_de_Bolsas_2021.pdf and the draft contract in Annex II of the University of Minho's Scientific Research Scholarship Regulations.

The contract can only be signed after receipt of all the documentation required for the type of scholarship, which must occur within a maximum period of 6 months, including proof of academic degrees or diplomas, as well as enrollment in non-degree study cycles or courses, as applicable.

Once all the documentation has been received, the contracting entity has 60 working days to sign the scholarship contract. Once received by the scholarship holder, the contract must be returned, duly signed, within 15 working days.

Term and cancellation of fellowship contracts: Without prejudice to the other grounds laid down in the University of Minho's Scientific Research Scholarship Regulation and in the Research Fellow Statute, the scholarship will cease on completion of the contracted work plan, as well as on expiry of the period for which it was granted or renewed.

The **final report** must be submitted to the scientific advisor, in accordance with the defined objectives and evaluation criteria, no later than 60 working days after the end of the scholarship and must be drawn up in accordance with Annex I of the Regulations of the University of Minho.

Non-discrimination and equal access policy: Universidade do Minho actively promotes a policy of non-discrimination and equal access, so that no candidate may be privileged, benefited, harmed or deprived of any right or exempt from any duty due, namely, to ancestry, age, sex, sexual orientation, marital status, family status, economic situation, education, social origin or condition, genetic heritage, reduced working capacity, disability, chronic illness, nationality, ethnic origin or race, territory of origin, language, religion, political or ideological convictions and trade union membership.

Declaration of Honor

Academic qualifications

I, (full name), candidate for the vacancy for the award of a (type of scholarship), within the scope of the project (name or reference of the project), published on the Euraxess portal, with the reference (ref. notice), declare on my honor that I have completed the academic degree of (academic degree), qualifying for the type of scholarship in the competition, namely the course (designation), by the (University conferring the degree), on the date XX/XX/XXXX, with a final average of XXXXX values on the YY scale.

As it is not possible for me to present proof of qualifications until the end of the competition, I declare that I undertake to present the aforementioned certificate at the conclusion of the scholarship contract, in the event that I am selected for the vacancy in the competition.

As this is true, I hereby date and sign this declaration.

(Place), (date).

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(full name)

NOTE: The declaration may only attest to facts that occurred prior to the application.

In the event of a discrepancy between the information contained in the declaration and the documentation submitted for the purpose of contracting the scholarship, only the information contained in the latter will be taken into account.

Declaration of Honor

I, (full name), bearer of identification document number (XXXX), candidate for a research grant (type of grant), within the scope of the project (name or reference of the project), published on the Euraxess portal, with the reference (ref. call for proposals), declare on my honor that (I have not received any research grants to date / I have received the following research grants) under the Research Grant Holder Statute.

University	Financing Entity	Project	Type of Grant	Duration	Start	Term

As this is true, I hereby date and sign this declaration.

(Place), (date).

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(full name)