INSIDE-HEART:

multI-discipliNary, multi-Sectoral and multi-national trainIng network on Digital biomarkErs for supraventricular arrHythmia charactErizAtion and Risk assessment

2 PhD positions available at the University of Milan

The Doctoral Network

INSIDE-HEART is a Doctoral Network programme (H2020-MSCA-DN-2023 – Grant 101119941) for highly motivated young scientists with no or minimal experience, where state-of-the-art research is combined with a comprehensive training programme. The network is funded by the European Community through the Horizon Europe Actions.

INSIDE-HEART brings together **universities**, **companies** and **hospitals** from Italy, Finland, France, Israel, Netherlands, Spain, and Sweden to establish a multi-disciplinary network to tackle the **design** and early-phase **validation** of **digital biomarkers** targeting the diagnosis of **supraventricular arrhythmias** (SVAs) and their associated potential for adverse risk assessment. The composite nature of the INSIDE-HEART network ensures a **highly qualified training** and **research infrastructure** for the specific goal, which aims to generate a new researcher profile with multi-sectoral expertise able to fill the existing gap, i.e., the absence of **digital biomarkers** for SVAs reliably estimated with **non-clinical devices** via the combination of **signal processing** and **artificial intelligence**, taking into account basic research, clinical needs and business interests.

The programme will hire 10 PhD students (Doctoral Candidates or DCs), whose 2 positions are available at the University of Milan.

The research projects

Project 1 (DC10): Department of Computer Science, University of Milan, Italy
The project focuses on the development of AI-based predictors of SVA in patients with comorbidities and suspected SVAs. The objectives are: i) to use deep learning on ECG data (long term Holter) to investigate the mechanisms behind SVA development in patients with comorbidities using data from available previous studies ii) to identify digital biomarkers which play a central role in arrhythmia progression; and iii) to propose ECG-based biomarkers characterizing progression, and to compare them to non-ECG clinical biomarkers. The candidate will be enrolled in the PhD programme in Computer Science at the University of Milan where he/she will perform most of the activities. He/she is also expected to do secondments at institutions part of the INSIDE-HEART consortium.

Project 2 (DC6): Smart Solutions Technologies SL (NUUBO), Madrid, Spain
The project focus on the assessment of ventricular repolarization during AF and on risk prediction from clinical and wearable ECG recordings. The objectives are: i) to investigate changes in ventricular repolarization during AF via computational model; ii) to propose an advanced signal processing algorithm for digital biomarkers related to repolarization and AF; iii) to propose AI-based digital biomarkers related to repolarization and AF, using data from previous studies. The selected candidate will be employed for three years by Smart Solutions Technologies SL (NUUBO, Madrid, Spain; www.nuubo.com/), where he/she will perform most of the research activity. He/she is also expected to do secondments at institutions part of the

INSIDE-HEART consortium and to register in the PhD programme in Computer Science at the University of Milan.

Research group and general conditions

The recruited Doctoral Candidates will be enrolled in the PhD programme in "Computer Science" at the University of Milan. They will receive a Monthly Living Allowance, a Mobility Allowance and Family allowance (where applicable) compliant with the EU Marie Skłodowska-Curie Actions-DN general conditions. They will be covered under the social security scheme of the country of enrollment (for Project 1 - DC10: Italy and for Project 2 – DC6: Spain) and will pay taxes according to the specific fiscal rules of that country. The recruited PhD students will participate in the network's training activities and work placements at the laboratories of the participating academic and industrial partners. In addition, the training programme of the recruited DC will be supplemented by regular meetings and workshops within the INSIDE-HEART consortium.

Admission criteria for doctoral education at the University of Milan

Specific requirements and information:

- The Candidates must hold a M.Sc. Degree by the starting date of the fellowship, in one of the following areas: **Computer Science, Engineering, Physics or Applied Mathematics**. The suitability of the foreign academic qualifications in terms of content is appraised by the Examining Board constituted for admission to each PhD programme, in compliance with the regulations in force in Italy and in the country in which the academic qualification was issued, and the international treaties or agreements pertaining to the conferment of qualifications for the continuation of studies.
- Eligible DC candidates may be of any nationality but must not, at the time of recruitment have resided or carried out their main activity (work, studies, etc.) in the country of their host organization (for Project 1 - DC10: Italy and for Project 2 – DC6: Spain) for more than 12 months in the last 3 years immediately prior to the reference date.
- English language skills at B2 level (minimum) of the CEFR (Common European Framework of Reference for Languages) is required for the position. Possession of the requirement must be demonstrated by the end of the first year of the doctoral course by acquiring linguistic certification from a recognized certification body.
- The contract will last 36 months.
- The gross salary for Doctoral Candidates positions is composed by a living allowance that depends on the country where the DC will be hired (39,739.20€/year for Project 1 – DC 10, and 37,250.40€/year for Project 2 – DC6), a mobility allowance (7,200€/year) and a family allowance (7,920€/year where applicable).
- The DC will pay taxes according to the country rules where he/she will be hired (the tax percentage depends on the country too).
- The DC must be employed full-time, unless the European Research Executive Agency has approved a part-time employment for personal or family reasons.
- The DC must be working exclusively for the action.
- Each DC will have to complete at least two secondments (temporary transfer to another INSIDE-HEART academic, industrial or clinical partner) for a total period of minimum 6 months during the term of his/her employment.
- Each DC must actively participate in the events organized by INSIDE-HEART network, such as training/network events as well as in regular yearly Outreach Activities targeting different audiences.

- Recruitment, selection and appointment of the DC follow the European Charter & Code of Conduct. All INSIDE-HEART partners commit themselves to provide equal opportunities for male, female and disabled DCs.

Application procedure

Candidates may apply for more than one fellowship (maximum 10), but only with a single application, in which the candidate has to provide the list of fellowships for which he/she is applying in order of preference.

List of Documents to be provided:
- Application Form;
- Letter of motivation;
- Copies of degree and academic transcripts with grades and rankings;
- Short CV using the attached template;
- Two reference letters from academics or professionals[1]. Candidates must indicate the academics detail when applying;
- Proof of English language skills (if required by the host institution);
- Passport copy.

All the above-mentioned documents must be collected in a single pdf file. The pdf file has to be sent to the INSIDE-HEART Coordination Office at the following email address: insideheart@polimi.it. This being a compulsory procedure, any other means/format for submitting the application will not be accepted.

Call opening: December 4th, 2023
Application deadline: **January 1st, 2024**
Start date (planned): June 1st, 2024
Contact details: Prof. Roberto Sassi, Computer Science Department, University of Milan - Milano (Italy)
E mail: roberto.sassi@unimi.it

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[1] The letters must be compiled using only the given template. The academics or professionals need to send the letters directly to the Coordination Office from their official e-mail address, **no later than 31/1/2023**. It is the Applicant's responsibility to contact the academics or professionals and provide them with the Recommendation Template.