HEART:

HEalth related Activity Recognition system based on IoT – an interdisciplinary training program for young researchers

Fellowship Call for Application

ESR1 - HEALTH BEHAVIOR ANALYTICS ON HETEROGENEOUS DATA

This project has received funding from the European Union’s Horizon 2020 research & innovation programme under the Marie Skłodowska-Curie – ITN Industrial Doctorate, Grant agreement No. 766139
BACKGROUND OF THE HEART RESEARCH PROJECT

Six research fellowships are foreseen within the framework of HEART: HEalth related Activity Recognition system based on IoT, a project funded by the European Union’s Horizon 2020 research & innovation programme under the Marie Skłodowska-Curie – ITN, Industrial Doctorate (GA n. 766139).

HEART is an international, inter-sectoral, interdisciplinary project providing Marie Skłodowska-Curie PhD Fellowships to 6 Early Stage Researchers (ESRs), with the potential to become the leaders of tomorrow in the Internet of Things domain applied to the Health sector.

More specifically, the HEART research program aims for a personalized approach of mobile health coaching programs that involve the user and that are tailored to individual needs (putting the user at the HEART of the system). Programs will leverage on a health integrated activity recognition platform that can detect activities from heterogeneous data, using scalable algorithms, while safeguarding the privacy of the person. When developing such technology, special attention will be devoted to the definition of a penetration strategy for the Chinese market that ensures: i) protection of personal information and acquired sensitive data; and ii) adaption to the needs of the Chinese consumers.

Six PhD students (also indicated as Early Stage Researchers- ESR) will collaborate within the HEART ITN research program: 4 PhD students in Information&Communication Technology (ICT), 1 Phd student in legal studies and 1 Phd student in the international business domain.

All foreseen fellowships have been already assigned with the exception of position ESR 1- HEalth Behavior Analytics on heterogeneous, which is still vacant. The call is re-opened and will stay open until a suitable candidate is found.

The provided information which refer to the other ESR positions (already assigned) is provided only to allow the candidate to better understand the research team he/she will join, in case of recruitment (you can also refer to the old call for application http://heart-itn.eu/fellowship-call-for-application/).

TRAINING AND MOBILITY

The project will offer an ambitious and innovative doctoral program for six new PhD students, combining academic excellence with strong international business attitude, inspired to innovation-oriented mind-set.

PhD students will develop a completely new profile, based on a strong interdisciplinary attitude, integrating technical skills, socio-economic sciences’ perspectives, creativity and entrepreneurial allure. They will also acquire strong teamwork capabilities and ability to cooperate in the EU-China framework for business.

Mobility plays a central role in the programme: PhD students will follow a secondment scheme training them in academic institutions as well as companies, moving from analytics, business, security and privacy as well as between academic research and company based development projects (all PhD students are required to spend at least 50% of their time at non academic institution, mainly at Philips’ premises). Mobility periods are foreseen both in European countries and in China (eg. Fudan University, Graduate University of Chinese Academy of Sciences, Philips Research China). Indicative planned secondments for each PhD position are illustrated in the attachment.

The rotation of PhD students among the partners will bring PhD students to learn complementary techniques and methods, which will broaden their perspectives and capabilities, and enhance their career development.
POST DESCRIPTION

Number of available position: ESR1, as described in the attachment

Title: Marie-Sklodowska-Curie Doctoral Fellow

Hiring institutions and PhD Enrolment

ESR1 will be hired by Philips Electronics Nederland B.V. (the Netherlands). He/she will be enrolled at the Doctoral School of KU Leuven. Tuition fees –where foreseen- will be charged to HEART’s budget.

Duration of the employment: expected start date: as soon as possible, duration 48 months.

Income: 3.243,73€ Gross per month (38.924,76€ / year).

Benefits
600€ Mobility Allowance per month (7200€ / year)
500€ Family Allowance per month (6000€ / year) - When applicable according to the Marie Skłodowska-Curie.

NB: this is a gross EU contribution to the salary cost of the researcher. The net salary will result from deducting all compulsory (employer/employee) national social security contributions as well as direct taxes

INFORMATION ON ALREADY SELECTED ESRS:

ESR4 has been hired by Philips Electronics Nederland B.V. (the Netherlands);
ESR2 and ESR3 have been hired by KU Leuven (Belgium);
ESR5 and ESR6 have been hired by the University of Macerata (Italy).

DESCRIPTION OF HIRING INSTITUTIONS

Philips Research is the source of many advanced developments in Healthcare, Lifestyle and Technology. Building on 100 years of experience in industrial research and our world-leading patent position, we are dedicated to bringing meaningful innovations that improve people's lives.
We provide technology options for innovations in the area of health and well-being, targeted at both developed and emerging markets. Positioned at the front-end of the innovation process, we work on everything from spotting trends and ideation to proof of concept and first-of-a-kind product development.
Philips has a long history of successfully introducing innovative products to the market (lamps, CD players, medical imaging equipment, patient monitors, etc). Today, Philips is connecting its products to the digital world, introducing new services and integrated solutions based on digital technologies. Therefore, Philips Research and Philips product divisions rely more and more on digital security technologies, which are playing a crucial role in new Philips products, services, software and solutions. We are looking for a candidate to join the Data Science department of Philips Research to work on which will be used / integrated into Philips products and services. For more insights you can visit: www.research.philips.com

KU Leuven
Founded in 1425, KU Leuven is the largest Belgian university (http://www.kuleuven.be/english/) with over 41,000 students and 8,084 researchers (2015). KU Leuven is a breeding ground and attractive destination for the world's best researchers, including Starting and Consolidator ERC Grantees and hundreds of Marie Curie fellows. About 40% of our researchers come from abroad. KU Leuven conducts fundamental and applied research in all academic disciplines with a strong international orientation. KU Leuven is one of the founding members of LERU (League of European Research Universities). KU Leuven is ranked 1st in Reuters’
"Europe's Most Innovative Universities" Ranking. The success in the FP7 and Horizon 2020 Marie Skłodowska Curie Actions is a manifestation of the three pillars of KU Leuven: research, education and service to society. In our 199 Actions, hundreds of young researchers have been trained through research and have acquired the necessary skills to transfer their knowledge into the world outside academia. To strengthen international collaboration, KU Leuven has its own international research fellowship programme and supports international scholars in international funding applications. KU Leuven Research & Development (LRD) is the technology transfer office (TTO) of KU Leuven. Since 1972, LRD acts a multidisciplinary team of experts that guides researchers in their interaction with industry and society and the valorisation of their research results to industry and society (e.g. via the >100 established spin off companies).

University of Macerata

The University of Macerata (UNIMC), founded in 1290, is the only university in Italy that focuses exclusively on Socio-economic Sciences and Humanities (SSH). University's motto "Humanism that innovates" illustrates its mission: to contribute to the development of people and society through the added value that social and human sciences bring to the understanding of complex socioeconomic and political issues, according to an interdisciplinary perspective.

UNIMC is member of international and national research networks including: European Consortium for Humanities Institutes and Centres, European Connected Health Alliance, Economic Policy Forum, Chinese Globalization Association, E-living regional cluster on Ambient Intelligence and Ambient Assisted Living. In 2014, UNIMC was awarded by the European Commission with the ‘Excellence in Research Logo’. UNIMC has a good reputation for entrepreneurship programs for young researchers, especially through LUCI and Eureka initiatives. The Humanities Laboratory for Creativity and Innovation (LUCI) is a laboratory opened to SSH post graduate students, PhD and young researchers promoting innovative and entrepreneurial attitude among young people to support the creation of innovative business initiatives SSH-driven. Eureka is a PhD industrial scholarship program co-financed by the University, the local Regional government and companies. Students are trained for half of their time in local firms and half of their time in the academia, both in Italy and abroad. Started in 2012, the program allowed enrolling about 60 PhD candidates.

UNIMC has a strong international reputation for Chinese studies, which are developed through the China Center and the Confucius Institute. Every year, Winter and Summer Schools, as well as international conferences and EU-China Workshops are organized, involving scholars, the business community, PhDs, and local high schools.

CAREER DEVELOPMENT PROSPECTS

All ESRs will gain highly valuable research skills, linked to the booming market of the products/services connected to the increased life expectancy and attention to well being, and to the Internet of Things sector. Fellows will be also provided with transversal skills (IPRs, grant application, etc.) and with the capacity to conduct their specific research according to an interdisciplinary approach and to create innovation. This combination of skills will increase their attractiveness for both academic and business sector. Moreover, exposure to the Chinese context and enhanced capacity to create business/research relationships (thanks to basic knowledge of the Chinese language and culture) will make all ESRs attractive to organizations interested in this crucial Asian country and to international Business settings.

NON-DISCRIMINATION

Philips has adopted family friendly policies as part of its equal opportunities policies for male and female employees. The ESRs will be located at the Philips premises at the High Tech Campus in Eindhoven, with the following facilities at hand:
• Dedicated breast feeding rooms in every building
• On-site day care facilities for young children
• An international school, within 5 kilometres of the High Tech Campus

ELIGIBILITY CRITERIA

Degree: Master degree or equivalent providing access to PhD programmes. See attachment for required degree for the position. Applicants must not have a doctoral degree.

Language: English proficiency must be attested either through a previous English language diploma, or an internationally recognised proficiency test (at least C1 level of the Common European Framework of Reference for Languages i.e. IELTS, IBT, TOEFL or Cambridge).

Career: When starting their contract selected researchers should be within the first four years of their research careers. This means being both within a four year window following their most recent graduation and not having been awarded a prior doctoral degree so far.

Mobility: At the date of recruitment, the researcher must not have resided, or carried out his/her main activity (work, studies, etc.) in the Netherlands for more than 12 months in the 3 years immediately before the recruitment date.

Application: Complete submission exclusively via the HEART on-line application system. Documents submitted must be in English. If supporting documents (eg. letters of academic references and scan of degree qualification) are not in English, they must be submitted together with a certified or official translation in English.

Please note that, in addition to the above mentioned eligibility criteria further essential or desirable requirements are detailed in the attached detailed description of the PhD position.

HOW TO APPLY

Applications must be sent exclusively in English and through the HEART online Application System open and accessible through the HEART website (http://heart-itn.eu/category/news-channel). Applications sent through other means or in other languages (other than English) will not be evaluated.

Candidates must apply through the HEART online application system, which will request the following information:

1. a complete CV in Europass Format in English that must highlight activities and place where the activities have been carried out in order to give evidence of fulfilling the mobility eligibility criterion (see above). Use the template available at https://europass.cedefop.europa.eu/it/documents/curriculum-vitae/templates-instructions
2. a complete academic CV in English with references to past research and training experiences;
3. a motivation letter, in English, highlighting the consistency between the candidate’s profile and the chosen ESR position for which you are applying (ESR position 1);
4. at least 2 letters of Academic reference, in English or in certified translation (these letters can be also sent by e-mail directly to dietwig.lowet@philips.com).
5. scan of the degree qualification, with certified translation in English (if the degree qualification is not in English).
6. proof of language proficiency. The English proficiency can be attested through the possession of an internationally recognised proficiency test (at least C1) OR through the possession of an English language diploma (bachelor or master degree). In this latter case, evidence that the course has been held in English must be submitted.
7. scanned copy of valid identification document (identity card or passport)
8. Declaration of Honour according to the template available in the website.
9. (OPTIONAL) any further and relevant supporting documents (eg. research publications).
TIMING OF SELECTION PHASE

- Since the call will remain open until the identification of a suitable candidate, each week the Selection panel will evaluate applications received within the framework of the previous week.
- Selection will take place according to the criteria below mentioned (par. “Selection criteria”).
- Should the selection panel identifies a suitable candidate among assessed applications in the previous week(s), the selection panel has the right to interrupt or not proceed with the evaluation of applications received after the selected one.
- Recruitment will start as soon as possible. Procedures for recruiting at Philips and enrolment at KU Leuven Doctoral school will start immediately after the acceptance of the position by the applicant.
- Therefore candidates must be available to start the employment contract as soon as the above mentioned procedures are concluded.

SELECTION CRITERIA

Since the call will remain open until the identification of a suitable candidate, each eligible application will be assessed on the basis of the following criterion “Qualification and previous experience”.

<table>
<thead>
<tr>
<th>Selection criteria for the admission to the interview</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualifications and previous experience:</td>
<td>0-50,0</td>
</tr>
<tr>
<td>A. Master degree in the scientific field relevant to the project</td>
<td></td>
</tr>
<tr>
<td>B. Other qualifications relevant to project/area, incl. letter of references</td>
<td></td>
</tr>
<tr>
<td>C. Authorship of research outputs</td>
<td></td>
</tr>
<tr>
<td>D. Previous experience of research in specific project area</td>
<td></td>
</tr>
<tr>
<td>Total maximum score to be assigned</td>
<td>50,0</td>
</tr>
</tbody>
</table>

Candidates will be ranked on the basis of the assigned score. If candidates have been awarded with the same score, priority will be based on scores for the sub criterion B “Other qualifications relevant to project/area, incl. letter of references”. Up to 5 candidates awarded with the highest scores, above the threshold of 35 points in the weekly ranking list, will be admitted to the interview.

During the interview the candidates will be evaluated according to the following criterion “Research abilities and personal skills”. The interview may be conducted also using a videoconference system.
<table>
<thead>
<tr>
<th>Selection criteria of interviewed candidates</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research abilities and Personal skills:</td>
<td>0-50,0</td>
</tr>
<tr>
<td>1. Abilities to design, conduct and project manage original research in the subject area;</td>
<td></td>
</tr>
<tr>
<td>2. Ability in relevant research methods</td>
<td></td>
</tr>
<tr>
<td>3. Other relevant skills specific to project, including industry experience</td>
<td></td>
</tr>
<tr>
<td>4. Excellent oral communication in English, including the ability to communicate complex subject orally</td>
<td></td>
</tr>
<tr>
<td>5. Good communication and interpersonal skills</td>
<td></td>
</tr>
<tr>
<td>6. Attitude of a natural team player and capability to work in an international research group</td>
<td></td>
</tr>
<tr>
<td>7. Enthusiasm, proactivity, creativity and commitment</td>
<td></td>
</tr>
<tr>
<td><strong>Total maximum score to be assigned</strong></td>
<td><strong>50,0</strong></td>
</tr>
</tbody>
</table>

The final ranking list will be obtained by adding the score obtained by the candidate according to the criterion “Qualifications and previous experience” with the score obtained after the interview assessment according to the criterion B “Research abilities and personal skills”. When scores are equal, priority will be based on scores for the sub criterion 3 “Other relevant skills specific to project, including industry experience”.

In case a candidate will not reach a minimum score of 35 points out of 50 points on the criterion “Research abilities and personal skills”, the selection panel has the right to not proceed with recruitment.

**CONTACT:** Enquiries can be sent to the relevant project supervisor(s) via email.
ATTACHMENT - DESCRIPTION OF ESR 1 POSITION
ESR1 - Health Behaviour Analytics on Heterogeneous Data

HIRING INSTITUTION: Philips Electronics Nederland B.V. (the Netherlands)

YOUR TEAM

You will work in the Personal Health department of Philips Research Europe. The department develops solutions that empower people to manage their health and support professionals in providing better care. A strong focus of the research is on measuring and monitoring people’s health status and habits in their own home and to provide motivating feedback to come to a healthier lifestyle. Application domains that the department is focusing on are cardiovascular, sleep, and elderly care, where the group is closely collaborating with the business units of Personal Health Solutions, Sleep and Respiratory Care and Population Health Management. The department has various clinical collaborations across Europe.

OBJECTIVES

Human activity recognition and vital sign monitoring play a significant role in tailoring personal health and behaviour change coaching solutions to each individual. With the advent of wearable sensors and devices, a unique opportunity for healthcare is emerging where it becomes possible to monitor the health parameters and health related parameters for continuously for long periods, outside the lab or doctor’s office setting, and for large numbers of people. This represents a unique opportunity to gain insight into how behaviour and lifestyle influences the health of people and in how changing of lifestyle can improve the health of people.

The following objectives are proposed:

1) Activity recognition and detection of critical situations: Recent wearable devices measure multimodal data streams. Different physiological properties are measured such as physical activity, galvanic skin response and heart-rate. Other data include in-home Internet-of-Thing (IoT) sensors and device data, smart phone sensor data and interaction data. The objective is to combine these heterogeneous data streams from wearable and IoT sensors to recognize health-related activities of the user and physiological parameters to extract actionable insights for example detection of critical situations as e.g. epilepsy seizures, unusual heart rhythms or unusual behavior and activities.

2) Relation between activities and health parameters: Aggregating parameters as activity levels, vital signs and context will allow to create a person specific health profile. This health profile consists of different levels: a) health parameters (heart rate, blood pressure, weight, mental wellbeing); b) behaviour and activity related parameter, such as the amount of sleep, physical activity, amount of stress full activities or relaxing activities, amount of work-related activities, food intake, social activities, etc. The objective is to use data analytics and machine learning to find person-dependent patterns in the link between behaviours and health parameter.

3) Data-acquisition: ESR1 will support the data-acquisition of a multimodal database consisting of motion, & vital sign modalities. An efficient approach to come to a high-quality labelled set is investigated.

These objectives will likely involve analysis of time series data with new advanced methods, such as, deep learning. A key challenge is to combine common knowledge with pattern recognition methods.
EXPECTED RESULTS

- Algorithms for the recognition of complex activities based on multimodal and heterogeneous data.
- A multimodal data-driven health-profile classifier based on vital sign and accelerometer data.
- Quality runtime code for the use of these such models, calibrated on preliminary and historical data.

INDICATIVE PLANNED SECONDMENTS - Institution, place and timing expressed in contract month (M)

- KU Leuven (Leuven, Belgium) - M7-8 ; 9-11
- Fudan University (Shanghai, China) - M15-19
- University of Macerata (Macerata, Italy) - M25
- KU Leuven (Leuven, Belgium) - M34-36

Further analysis might be required, based on the development of the research project.

SUPERVISORS: Dietwig Lowet (dietwig.lowet@philips.com), Bart Vanrumste (bart.vanrumste@kuleuven.be), Stijn Luca (stijn.luca@kuleuven.be – www.kuleuven.be/advise)

ADDITIONAL ESSENTIAL REQUIREMENTS: Master degree with distinction (cum laude) in computer science (or equivalent).

Please note that also candidates who did not obtain the degree cum laude can apply, provided that they have distinguished themselves with high-quality scientific publications or design-oriented achievements. This element will be assessed by the selection panel members who will evaluate the candidate's suitability for the position on the basis of, for example, exam results, experience, professional qualifications, etc. This assessment will be conducted during the elaboration of the shortlist of candidates to be interviewed.

DESIRABLE REQUIREMENTS: a clear interest in and knowledge of machine learning, e.g. deep learning. Expertise in data analytics/classification and affinity for computational modelling. Good programming skills are desired. Knowledge of either Matlab/Pyhton/R is required.