InnoGuard DN

Call for Applicants

This guide is to provide practical information to potential applicants on how to apply, together with a description of the assessment procedure. For further and up-to-date information, please visit the website: https://www.innoguard.eu/

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1 ABOUT InnoGuard DN

The InnoGuard (Hybrid and Generative Intelligence for Trustworthy Autonomous Cyber-Physical Systems) Doctoral Network (DN) addresses novel challenges posed by quality assurance of **Autonomous Cyber-Physical Systems** (ACPS), which have integrated Artificial Intelligence (AI) components. Their use in our daily lives is increasing, such as in public transport systems, highlighting the need for novel, robust development methodologies to ensure their dependability, whose compromise could have severe consequences, as exemplified by various incidents (e.g., accidents caused by Tesla's autopilot system).

InnoGuard comprises a well-balanced consortium that spans four European countries in addition to Switzerland and incorporates academic to promote international, interdisciplinary and inter-sectoral aspects of DC skill development.

Applications are now invited for 14 Doctoral Candidate (DC) positions on the InnoGuard employed by beneficiaries of the consortium

Successful candidates will undertake 3-year PhD programmes in the area of Autonomous Cyber Physical Systems, co-hosted by academic members of the consortium, with positions preferably starting in February 2025.

The closing date for applications is 23:00 (CET) on 15th October 2025.

Further details about the research programme, applicant eligibility criteria, DC projects and application procedure are provided in this document, with up-to-date information available on the InnoGuard website at https://www.innoguard.eu/

1.1 ABOUT THE RESEARCH PROGRAMME

To ensure ACPS dependability, InnoGuard targets developing novel methods for ACPS quality assurance by creating a tailored training program for Doctoral Candidates (DCs), with scientific objectives including methods to automate ACPS quality assessment and behaviour evolution using AI techniques and enhancing ACPS dependability through real-time security, privacy, and uncertainty handling solutions.

Additionally, InnoGuard seeks to improve the trustworthiness of AI methods, enhance environmental sustainability by increasing the energy efficiency of ACPSs with the usage of AI methods, including Large Language Models (LLMs), and validate such techniques in open-source contexts such as Robot Operating Systems (ROS)-based systems. Ultimately, InnoGuard will deliver novel techniques and methodological principles for ACPS quality assurance, ensuring high trustworthiness, reliability, and legal compliance. The project's holistic approach encompasses technical advancements and training initiatives, with a broad plan to disseminate results to industry stakeholders, associations, and the wider public. Through these efforts, InnoGuard strives to elevate the status of DCs as future experts in ACPS engineering.

InnoGuard will have many impacts on current and future industries. First, InnoGuard technologies will support the development of innovative AI solutions, thereby opening up new

R&D opportunities. Second, we will utilize available AI platforms, such as TensorFlow, Keras, PyTorch, MATLAB Deep Learning Framework, so that InnoGuard will influence the future development of these platforms, resulting in a worldwide industrial impact. Third, we will deliver disruptive contributions to the EU industry's ongoing digitalization toward Industry 5.0 with new, impactful InnoGuard technologies.

The research will be accompanied by a holistic training programme that provides the 14 Doctoral Candidates (DCs) with a multidisciplinary skillset comprising computer science, robotics, law in AI, human aspects and engineering.

1.2 PARTICIPATING HOST ORGANISATIONS

Successful researchers will enrol in one of the 14 DC positions available across the host organisations of the InnoGuard[1]:

1. Mondragon Goi Eskola Politeknikoa (MGEP), Spain
2. Simula Research Laboratory As (SIMULA), Norway,
3. Oslo Metropolitan Universit (OSLOMET), Norway
4. Universita Degli Studi Del Sannio (UNISANNIO), Italy
5. Vrije Universiteit Amsterdam (VUA), Netherlands
6. Universidad De Malaga (UMA), Spain
7. University of Bern (UBern), Switzeland

From the 7 host organisations (Beneficiaries) and 1 Associated Partner (UBern) of the InnoGuard, there are 6 academic institutes (MGEP, OSLOMET, UNISANNIO, VUA, UMA y UBERN), and 1 research centres (SIMULA). Together, they bring expertise in software engineering, robotics, law applied to AI systems, Autonomous CPs, robotics, human factors, business and management to the InnoGuard network.

Our initial project planning involves minimal direct contact with non-academic sectors. We aim to ensure that non-academic contributions are meaningfully integrated when collaboration is most impactful. Although our initial contact is intentionally limited, we adopt a proactive strategy to foster organic and responsive collaborations with non-academic sectors, maximizing the potential for impactful contributions throughout the project. It is noteworthy that partners from InnoGuard have stable collaborations with industry partners, making it easier to foster collaborations with the doctoral candidates.

[1] PhD students are expected to spend one or more periods abroad hosted by project partners during the project.

2 CALL FOR APPLICANTS

2.1 WHY APPLY?

DNs are financially supported by the European Commission under the Marie Skłodowska-Curie Actions (MSCA) because they provide excellent research, training and career aspects. The benefits of being a PhD student in a DN network include:

- You will get the chance to participate in specially developed courses (e.g. on specific techniques, academic soft skills)
- You can start building your personal professional network at a very early stage of your career due to the embedding of our PhD projects in an academic/industrial network
- You will be exposed to industry and the challenges in industry already during the PhD, because we have partners from industry in our network (who also contribute to the training)
- You will get the opportunity to spend some time in the labs of other partners (thereby you will get familiar with other disciplines, techniques, cultures etc.), as the research projects are designed such that they will mostly have interdisciplinary components
- You will be advised by excellent group leaders – they are all outstanding in their research and training

2.2 BENEFITS & SALARY

The DN programme offers a highly competitive and attractive salary and working conditions. The successful candidates will receive a salary in accordance with the MSCA regulations for early stage researchers.

The salary includes a generous living allowance, a mobility allowance and a family allowance (depending on family situation) comprising:

- Living Allowance of €3,400/month (gross) to be paid in the currency of the country where the Host Organisation is based and with a correction factor to be applied per country. The exact (net) salary will be confirmed upon offer and will be based on local tax regulations and on the country correction factor (to allow for the difference in cost of living in different EU Member States)
- Mobility allowance of €600/month to be paid to all DC recruited
- Family allowance of €660/month, depending on family situation

The guaranteed PhD funding is for 36 months (i.e. European Commission funding, additional funding is possible, depending on the host organisation and in accordance with the regular PhD requirements in the country of PhD registration).

In addition to their individual scientific projects, all fellows will benefit from further continuing education, which includes internships and secondments, a variety of training modules as well as transferable skills courses and active participation in workshops and conferences. This training will be payed by the institution that employs the Inidvidual Research Project (IRP), using the *Research, training and Networking costs* part of the budget.

2.3 ELIGIBILITY CRITERIA

Applicants need to fully comply with four eligibility criteria:

- **Academic Qualification:** The applicant has obtained a Degree that formally entitles them to embark on a doctorate in the host country. The degree should be in the area specified by the IRP (or related disciplines).
- **Doctoral Candidate (DC)** are those who are, at the time of recruitment by the host, in the first four years (full-time equivalent) of their research careers. This is measured from the date when they obtained the degree which formally entitles them to embark on a doctorate, either in the country in which the degree was obtained or in the country in which the research training is provided, irrespective of whether or not a doctorate was envisaged. Please note applicants cannot already hold a PhD.
- **Conditions of international mobility of researchers:** Researchers are required to undertake trans-national mobility (i.e. move from one country to another) when taking up the appointment. At the time of appointment by the host organisation, researchers must not have resided or carried out their main activity (work, studies, etc.) in the country of their host organisation for more than 12 months in the 3 years immediately prior to their recruitment. Short stays, such as holidays, are not taken into account. Researcher from any country (not only from European Union) are welcome to apply.
- **English language:** DCs must demonstrate that their ability to understand and express themselves in both written and spoken English is sufficiently high for them to derive the full benefit from the network training. Non-native English speakers are required to provide evidence of English language competency before the appointment is made. An IELTS score of 6.5, or equivalent, is the minimum requirement.

2.4 DC ROLES & RESPONSIBILITIES

All DCs recruited will be expected to carry out the following roles:

- To manage and carry out their research project within 36 months
- To write a PhD dissertation
- To participate in research and training activities within the InnoGuard network
- To participate in meetings of the InnoGuard projects
- To disseminate their research to the non-scientific community, by outreach and public engagement
- To liaise with the other research staff and students working in broad areas of relevance to the research project and partner institutions
- To write progress reports and prepare results and writhe articles for publication and dissemination via journals, presentations, videos and the web
- To attend progress and management meetings as required and network with the other research groups

3 IRP PROJECTS

3.1 INTERNATIONAL & INTERSECTORAL SECONDMENTS

The InnoGuard is a Doctoral Network (DN) programme where a group of 14 Doctoral Candidates (DCs) will be trained within world-leading groups and will be introduced to Autonomous Cyber Physical Systems to exploit advances in fundamental research towards innovative applications. To “enable” this vision, each trainee will have access to closely integrated complementarities and world-class expertise in the field of Autonomous Cyber Physical Systems (MGEP, SIMULA, OSLOMET, UNISANNIO, UBern), law applied to AI (UMA), human factors (MGEP), testing ….

Additional cross-disciplinary training (intellectual property, Responsible Research and Innovaiton, patenting, entrepreneurship, communication, open science, gender balance awareness, etc.) and a strong involvement on the part of the research centres and universities will provide the students with transferable skills and complementary competencies which will improve their research training and enhance their future employability

3.2 PROJECT DETAILS

The projects associated with the 14 IRP positions available in the InnoGuard are as follows:

DC 1 – Regulation-compliant test case and oracle generation for AI-enabled CPSs.

Project Description: The goal of this DC is to develop an automated testing framework for AI-enabled CPSs that should comply with the EU-AI Act as well as other CPS related regulations. This DC will focus on test input and test oracle generation, that is, it will generate cost-effective test cases that aim at testing AI-enabled CPSs. To this end, the DC, together with DC7, will first study relevant regulations for AI-enabled CPSs. It will complement this with other sector-specific regulations (e.g., Regulation (EU) 2018/858), to see the commonalities and variabilities of the law in relation to different types of CPSs. Based on this first investigation, the DC will select those specific aspects from the regulations relevant to AI-enabled CPSs to integrate them into the framework. The DC will implement a tool that uses, among others, Large Language Models (LLMs) to generate test inputs and oracles for the CPS and checks its compliance with relevant laws and regulations automatically. Test cases will be both for off-line testing (i.e., only the AI component) as well as on-line testing (the AI components with the physical part of the CPS).

Host Institution: MGEP, Spain
Planned Secondments: UMA, SIMULA

Lead Supervisors: MGEP – Dr Aitor Arrieta ; SIMULA Dr Shaukat Ali

For further details or queries about this project, please contact innoguard@mondragon.edu
To apply for this position please visit: https://www.innoguard.eu/apply.html

Mondragon Unibertsitatea
Faculty of Engineering

DC 2 – Automated Program Repair of ACPSs

Project Description: The goal of this DC is to develop an automated program repair (APR) framework for ACPSs. While APR has been a widely investigated area in the context of software systems, its application to CPSs face several scalability issues due to two core challenges: (1) the use of simulation-based testing, and as a direct consequence, the test execution time; and (2) the use of a low number of test cases to check whether a patch is valid or not. This DC will have as a goal to solve these challenges by means of three sub-goals. The first sub-goal will be to develop a method to localize the bug, which can either be at the AI component (i.e., neural network) or at the code level. The second sub-goal will be to develop a novel method to repair code-level bugs, which will combine search-based techniques with LLMs to propose patches. The last sub-goal will be to develop a novel method to repair neural-network level bugs, which can be solved by taking actions like re-training by amplifying the training dataset, changing the network architecture or changing training hyperparameters. To validate the changes, it will use test cases and oracles from the methods developed by DC1 as well as the tools generated by DC6.

Host Institution: MGEP, Spain
Planned Secondments: SIMULA

Lead Supervisors: MGEP – Dr Aitor Arrieta, Dr Miren Illarramendi

For further details or queries about this project, please contact innoguard@mondragon.edu
To apply for this position please visit: https://www.innoguard.eu/apply.html

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Faculty of Engineering

DC 3 – HMI-based run-time monitoring for AI-enabled CPSs.

Project Description: Under the EU-AI Act proposal, high-risk AI systems shall be designed and developed in such a way, including with appropriate human-machine interface (HMI) tools, that they can be effectively overseen by natural persons during the period in which the AI system is in use. To this end, effective and efficient run-time monitoring approaches are necessary. AI-enabled CPSs should be safe even under unforeseen and uncertain situations. The goal of this DC will be, on the one hand, to research effective and efficient run-time monitoring approaches for AI-enabled CPSs, in collaboration with DCs 4, 13 and 14. And, on the other hand, to research effective ways for communicating this to the human. For instance, in an autonomous vehicle, when an unforeseen situation is given and the system is in an unsafe situation, this should be effectively indicated to the human driver, so as to take the appropriate action. With this, a framework to design HMI for ACPSs will be developed and validated in an open-source case study and the ITDP.

Host Institution: Mondragon Goi Eskola Politeknikoa (MGEP), Spain
Planned Secondments: OSLOMET, UBERN

Lead Supervisors: MGEP- Dr Maitane Mazmela & Dr Aitor Arrieta

For further details or queries about this project, please contact innoguard@mondragon.edu
To apply for this position please visit: https://www.innoguard.eu/apply.html

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Faculty of Engineering

DC 4 – Developing and evolving digital twins with model-based and data-driven learning approaches for uncertainty handling in operation

Project Description: This project has 4 main objectives:
1) Develop a digital twin engineering methodology including hardware, physical environment, software, and network modeling with model-based systems engineering (MBSE) approaches for co-simulation, and evolve these models by continuously learning digital twin models from data (historical and real-time data) with relevant machine learning techniques;
2) Develop novel holistic uncertainty quantification methods for deep learning models embedded in ACPS, and ACPSs as a whole;
3) Develop uncertainty analyses and handling methods (i.e., anomaly detection, robustness assessment, probabilistic uncertainty forecasting) relying on machine learning techniques, search algorithms, and relevant theories (e.g., probability and uncertainty) to enable uncertainty handling of operational ACPSs via their digital twins;
4) Devising novel methods to autonomously handling unsafe situations when those are detected.

Host Institution: OSLOMET, Norway
Planned Secondments: UBERN, MGEP

Lead Supervisors: SIMULA - Dr Shaukat Ali & MGEP-Dr Aitor Arrieta

For further details or queries about this project, please contact innoguard@mondragon.edu
To apply for this position please visit: https://www.innoguard.eu/apply.html

OSLOMET

OSLO METROPOLITAN UNIVERSITY
STORBYUNIVERSITETET

DC 5 – Uncertainty quantification and handling of large language models for ACPS quality engineering tasks

Project Description: This project has four main objectives:
1) Investigating existing metrics to quantify and estimate uncertainty in LLMs such as single-inference and multi-inference and assessing their strengths and weakness in our context;
2) Devising novel metrics for uncertainty quantification and estimated based on identified weaknesses in the first objective;
3) Devising novel methods to use quantified uncertainty for risk assessment of the use of LLMs for ACPS quality engineering tasks to assess their trustworthiness,
4) Studying relationships of uncertainty with correctness and other non-functional characteristics (e.g., performance) of quantum engineering artifacts produced by LLMs such as test cases

Host Institution: SIMULA, Norway
Planned Secondments: UNISANNIO

Lead Supervisors: SIMULA – Dr Shaukat Ali & Dr Are Magnus Bruaset

For further details or queries about this project, please contact innoguard@mondragon.edu
To apply for this position please visit: https://www.innoguard.eu/apply.html

DC 6 – Testing ACPSs with hybrid methods

Project Description: These are the 3 main objectives of the project:
1) Develop novel methods to test ACPS with a combination of AI methods such as reinforcement learning and evolutionary algorithms in software in the loop simulation, including generating multi-modal environmental scenarios and uncertain situations;
2) Combining previous AI-based methods with LLMs to iteratively improve the realism of scenarios and uncertain situations including efficient prompt engineering, and incorporating risk assessment and uncertainty quantification methods from DC5 to improve the quality and realism of scenario generation further, while at the same time reducing the uncertainty in LLMs,
3) Releasing the integrated testing framework as open source and extensively assessing its cost and effectiveness with various ACPSs and publicly available LLMs

Host Institution: SIMULA, Norway
Planned Secondments: MGEP

Lead Supervisors: SIMULA – Dr Shaukat Ali & MGEP – Dr. Aitor Arrieta

For further details or queries about this project, please contact innoguard@mondragon.edu
To apply for this position please visit: https://www.innoguard.eu/apply.html

DC 7 – A check-list generation framework for AI-enabled CPS developers to support compliance of the system with regulations

Project Description: The goal is to develop a tool that will support CPS developers to comply with different legislative regulations by the EU and associated countries when developing their systems. To this end, the DC will first study the EU-AI Act regulation to see which aspects are relevant to AI-enabled CPSs, with the help of DC1. It will also complement this with other sectors specific to different CPSs. From there, it will extract commonalities and variabilities of the law based on the systems they are targeting to develop, which will be the base for developing the tool. Afterwards, the DC will develop a software tool for CPS developers. The tool will include an interface where the user will introduce the different characteristics of the system. The back-end of the tool will process all the data and will provide as an output a document that will provide a set of checklist for the user to help them build a system compliant with the EU regulation

Host Institution: UMA, Spain

Planned Secondments: MGEP, SIMULA

Lead Supervisors: UMA - Dr Pablo Sanchez Molina & Dr. María del Mar Navas Sánchez

For further details or queries about this project, please contact innoguard@mondragon.edu
To apply for this position please visit: https://www.innoguard.eu/apply.html

DC 8 – Analyzing and Improving the legal protection of AI

Project Description: The objective is to analyze the regulations on AI in the EU and in those Member States with more advanced regulation in order to ascertain the current state of affairs. A preliminary analysis allows us to affirm the incipient state of these regulations and the need to implement improvements. As AI makes autonomous decisions, the question arises as to who is liable in case of harm or damage caused by an AI system. New rights related to legal responsibility and accountability of AI developers and systems may need to be established. Therefore, this DC aims to develop novel regulatory frameworks that can be applied in the context of dependable AI-intensive systems (including ACPS). The proposed framework will be generic enough to be applicable in different countries (especially within the EU), and able to fulfill the current EU regulations. Also, upon developing the framework, the DC will also develop technical requirements that impact development activities (e.g., analysis and testing) and artifacts (e.g., Software and AI Bills of Materials).

Host Institution: UMA, Spain

Planned Secondments: UNISANNIO

Lead Supervisors: UMA - Dr Pablo Sanchez Molina & Dr. Ángel Rodríguez-Vergara Díaz

For further details or queries about this project, please contact innoguard@mondragon.edu
To apply for this position please visit: https://www.innoguard.eu/apply.html

DC 9 – Studying, identifying, and fixing technical debt in LLM-intensive systems

Project Description: The overall goal of this DC is to study technical debt for LLM-intensive systems, as well as deriving from the usage of artifacts generated by LLMs, and to develop approaches and tools to identify and repair it. 1) Providing a definition and taxonomy of technical debt for LLM-intensive systems, including systems leveraging LLM-generated software artifacts. The taxonomy will be empirically elicited by analyzing existing systems, combining quantitative and qualitative methods; 2) Developing an approach aiding to automatically identifying technical debt in LLM-intensive systems and LLM-generated artifacts. The approach will itself leverage state-of-the-art machine learning techniques, including LLMs, and mine different kinds of artifacts, including source code, models' metadata, and information originating from MLOps pipelines; 3) Developing approaches repairing technical debt in LLM-intensive systems.

Host Institution: UNISANNIO, Italy
Planned Secondments: VUA, SIMULA

Lead Supervisors: UNISANNIO – Dr Massimiliano Di Penta && Dr Fiorella Zampetti

For further details or queries about this project, please contact innoguard@mondragon.edu
To apply for this position please visit: https://www.innoguard.eu/apply.html

DC 10 – Laws and regulations in LLM-based development

Project Description: The overall goal of this DC is to study legal problems related to the use of AI-generated code in software systems, and to propose techniques to cope with these problems. The specific sub-objectives are: 1) Identify Intellectual property-related problems related to the use of LLMs in software development. This will be done by conducting surveys, interviews, and by analyzing data from software repositories. 2) Develop an approach for provenance analysis of LLM-recommended source code. The proposed approach would on the one hand leverage existing origin-analysis approaches and large repositories (such as World of Code); 3) Development of an approach for the automated generation of Software Bills of Material for software systems leveraging automatically-generated code. The approach will encompass analysis of hardware configurations for CPSs (to generate HBOMs) and model descriptions or model cards for the generation of AIBOMs.

Host Institution: UNISANNIO, Italy
Planned Secondments: UMA, MGEP

Lead Supervisors: UNISANNIO – Dr Massimiliano Di Penta && Dr Fiorella Zampetti

For further details or queries about this project, please contact innoguard@mondragon.edu
To apply for this position please visit: https://www.innoguard.eu/apply.html

DC 11 – ACPS Sustainability- Quality Modelling and Planning

Project Description: The project aims to define the sustainability priorities of ACPSs as quality properties, and to synthesise Decision Maps[2] (i.e., diagrams modelling architecture elements and related quality properties) and related Sustainability-Quality model (i.e., quality properties and associated metrics) for both direct and indirect sustainability impact that should be fed to LLMs or vice versa, be generated by LLMs. To this end, the objectives of the project include:
(1) to review existing works addressing quality properties of ACPSs;
(2a) to propose an operational (i.e., measurable) definition of the extracted suite of quality properties and metrics to quantify, e.g., uncertainty or energy efficiency, based on internal/external sustainability, the well-known sustainability dimensions (technical, social, environmental, economic) and the impact over time; (2b) to specialise/extend it for the ACPS domains tackled by other partners; and (3) to propose a method for representing measures collected at operation time and link them to the ACPS artefacts (e.g., architecture components or architectural tactics) that are responsible for the measured quality so that (4) good software practices (or anti-patterns) can be extracted and made reusable at design time.
Examples of scientific studies related to the topic:

- P. Lago (2019). *Architecture Design Decision Maps for Software Sustainability*, in 41st International Conference on Software Engineering: Software Engineering in Society (ICSE-SEIS), IEEE/ACM, pp. 61–64. (pdf).
- Toczé, K., Madon, M., Garcia, M., & Lago, P. (2022). *The dark side of cloud and edge computing: An exploratory study*. Eighth Workshop on Computing within Limits. (pdf).

Iffat Fatima, Markus Funke, Patricia Lago (2024). *Providing Guidance to Software Practitioners: A Framework for Creating KPIs*. TechRxiv. February 13, 2024. (pdf).

Host Institution: VUA, Netherlands
Planned Secondments: MGEP

Lead Supervisors: VUA Dr. Patricia Lago – Dr. Ivano Malavolta

For further details or queries about this project, please contact innoguard@mondragon.edu
To apply for this position please visit: https://www.innoguard.eu/apply.html

[2] Decision Map and Sustainability-Quality Model are instruments part of the open-source Sustainability Assessment Framework (SAF) Toolkit (online https://github.com/S2-group/SAF-Toolkit)

DC 12 – Conversations with the Architect – Large Language Models for Designing Energy-Efficient ACPSs

Project Description: The project aims to exploit LLMs to better support ACPS developers in developing energy-efficient software for ACPSs. At the core of the project lies the concept of architectural tactic, i.e., design decisions that influence the achievement of system qualities and can be reused across projects. For example, a tactic for energy efficiency is to offload computationally-expensive algorithms from a battery-powered robot to the Cloud. Tactics have been studied and successfully used in areas like big-data cybersecurity and Cloud-based systems, but they have never been used in conjunction with LLMs. LLMs will be used for recommending architectural tactics for ACPSs either conversationally to developers at development time or programmatically to the ACPS itself at runtime. Architectural tactics in ACPSs are highly domain- and context-dependent, they can have side effects, and can come with non-trivial complex trade-offs. The ability to process large amounts of data and internalise implicit cross-domain knowledge of LLMs makes them excellent candidates for managing architectural tactics. The objectives of the project include: (1) to build a knowledge base of concrete, repeatable, and quantifiable architectural tactics for energy-efficient ACPSs, (2) to integrate such knowledge base into different LLMs for providing timely recommendations about applicable tactics at development time, (3) to develop an approach for automatically applying and composing architectural tactics in the context of ACPSs, and (4) to develop a self-adaptive approach where ACPSs autonomously apply tactics to their software architecture in response to changes in their measured quality of service (e.g., energy degradation).

Examples of scientific studies related to the topic:

- Ivano Malavolta, Katerina Chinnappan, Stan Swanborn, Grace Lewis, Patricia Lago (2021). *Mining the ROS ecosystem for Green Architectural Tactics in Robotics and an Empirical Evaluation*. In Proceedings of the 18th International Conference on Mining Software Repositories, MSR, pp. 300–311, New York, NY. (pdf)
- Milica Dordevic, Michel Albonico, Grace Lewis, Ivano Malavolta, Patricia Lago (2023). *Computation Offloading for Ground Robotic Systems Communicating over WiFi - An Empirical Exploration on Performance and Energy Trade-offs*. Empirical Software Engineering, 28(140), pp. 1573–7616. (pdf)
- Ye Yuan, Jingzhi Zhang, Zongyao Zhang, Kaiwei Chen, Jiacheng Shi, Vincenzo Stoico, Ivano Malavolta (2024). *The Impact of Knowledge Distillation on the Energy Consumption and Runtime Efficiency of NLP Models*. In 3rd IEEE/ACM International Conference on AI Engineering - Software Engineering for AI, CAIN 2024, Lisbon, Portugal, April 14-15, 2024. (pdf)

Host Institution: VUA, Netherlands
Planned Secondments: UBERN, MGEP
Lead Supervisors: VUA – Dr. Ivano Malavolta & Dr. Patricia Lago

For further details or queries about this project, please contact innoguard@mondragon.edu
To apply for this position please visit: https://www.innoguard.eu/apply.html

DC 13 – Monitoring and self-adaptability to ACPS states

Project Description: A main goal targeted by the project is to enable ACPS to self-adapt to unprecedented scenarios, to fulfill the required level of trustworthiness. To this aim we target to (1) develop facilities leveraging AI methods, meta-heuristics, and LLMs that are able to adaptively learn/detect misbehaviors and unsafe states in ACPS at runtime; and (2) extend the facilities above with the ability to support CPS self-adaptability, e.g., to new scenarios in X-in-the-loop activities (HiL, simulation, etc.) activities

Host Institution: UBERN, Switzerland
Planned Secondments: OSLOMET

Lead Supervisors: UBERN - Dr. Sebastiano Panichella & UZH - Dr. Harald Gall

For further details or queries about this project, please contact innoguard@mondragon.edu
To apply for this position please visit: https://www.innoguard.eu/apply.html

DC 14 – Monitoring and self-healing of ACPS quality aspects based on hybrid and generative methods

Project Description: Our objective is to develop a component for assessing the quality aspects of ACPS. We focus on addressing mitigation strategies using hybrid methods (AI, meta-heuristic, LLMs) for: 1) predicting and fixing Flaky Scenarios with X-in-the-loop Facilities, 2) enhancing ACPS quality under security attacks, and 3) minimizing resource usage in X-in-the-loop based on Historical Analysis

Host Institution: UBERN, Switzerland
Planned Secondments: MGEP, VUA

Lead Supervisors: UBERN - Dr. Sebastiano Panichella & UZH - Dr. Harald Gall

For further details or queries about this project, please contact innoguard@mondragon.edu
To apply for this position please visit: https://www.innoguard.eu/apply.html

4 APPLICATION PROCEDURE

4.1 CONTENT & SUBMISSION OF YOUR APPLICATION

All applications must be submitted through the on-line recruitment portal on the InnoGuard website https://www.innoguard.eu/apply.html and candidates may apply for up to three DC positions by indicating their preferences on the application form.

Your application consists of two parts:

1. **An online application form**: On the online form, you are requested to fill in information that is aimed to facilitate the eligibility check of your application and to identify the DC position(s) you are applying for.

2. **PDF application file**: You must include a Curriculum Vitae (Europass format) and motivation letter in a single PDF file when submitting this application file.

Closing date for receipt of applications is 23:00 (CET) on 15th October 2024

All positions are recruited in line with Open, Transparent, Merit (OTM) and Competency based recruitment.

4.2 KEY DATES

- 09/09/2024: Launch and advertise 14 DC positions
- 15/10/2024: Deadline for on-line application.
- 30/10/2024: Circulation list “preselected candidates”
- 01/11/2024 – 15/1/2024: InnoGuard Recruitment Event (Date TBC)
- 22/11/2024: Circulation list “recruited InnoGuard DCs”. The week after the Recruitment Event
- 10/12/2024-15/02/2025: Time period for confirming the eligibility of the candidates, managing the enrollment in the doctoral program and preparing the contract, as well as the visa application process if necessary.
- 20/02/2025: Target start date for DC contracts

5 SELECTION & EVALUATION CRITERIA

5.1 ELIGIBILITY CHECK

All applications will be checked according to the eligibility criteria. Only eligible applications will be processed to the next evaluation stage.

- The applicant is an Early Stage Researcher / Doctoral Candidate
- The applicant complies with the mobility rule for the project(s) applied for
- The application is complete, in English and submitted through the online form before the deadline

5.2 PRESELECTION PROCEDURE

Eligible candidates will be ranked by the recruitment committee (formed by principal supervisors of the DCs according to the following assessment criteria:

- Scientific/Academic background and merits to date
- Professional experience
- Motivation

Candidates who are ranked sufficiently high for an DC position will be invited to attend the Recruitment Event.

5.3 RECRUITMENT EVENT

Preselected candidates will be invited to:

- On Day 1, InnoGuard will be presented to candidates through a series of educational workshops and seminars (online, 05/11/2024 (TBC))
- On Day 2, selection panel will arrange a meeting with the candidate for the recruitment interview (online). In these interviews each candidate will give an open presentation on their view regarding current and emerging opportunities for Autonomous Cyber-Physical Systems with a focus on Europe

The selection panels will make the final decision about the successful candidates after this event. The selection panels will include DC Supervisors.

The final decision on who to recruit will be communicated the week after the Recruitment Event. The selected DCs will start their research as quickly as possible (target: 20 February 2025).

6 FURTHER INFORMATION

For further and up-to-date information, please visit the website https://www.innoguard.eu/ , or contact us at innoguard@mondragon.edu

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