PhD Marie Curie DN postion available

WHERE:

Jožef Stefan Institute (JSI) is the leading research institution for natural sciences in **Slovenia** with over 900 researchers within 25 departments working in the areas of computer science, physics, and chemistry and biology. **The Department for Artificial Intelligence**, with approximately 40 researchers, is one of the largest European research groups working in the areas of machine learning, data mining, language technologies, semantic technologies and sensor networks. Its key research direction is combining modern statistical data analytic techniques with more semantic/logic based knowledge representations and reasoning techniques with the purpose to make progress in solving complex problems such as text understanding, large scale probabilistic reasoning, building broad coverage knowledge bases, and dealing with scale. The team is a dynamic, young and international with the Institute located close to the city centre of Ljubljana. We are looking for bright, motivated and driven individuals and look forward to welcoming you to our team!

FUNDING AND OVERVIEW:

HORIZON TMA MSCA Doctoral Network: APRIORI, a Marie Sklodowska-Curie Doctoral Network "Active PRoduct-to-Process LearnIng fOR Improving Critical Components Performance"

The manufacture sector is and will continue experiencing an evolving trend, marked by the exponential growth of additive manufacturing, the ongoing 4th industrial revolution (Industry 4.0) and an increasing demand of customization of the manufactured products. However, the production and economical growth of the manufacturing sector needs to meet unpostponable sustainability guidelines and criteria. In 2010, the International Energy Agency identified the critical areas that should lead to the undelayable reduction of C02 emissions by 2050. The area which will experience the largest impact is the so-called End-Use Energy Efficiency sector, directly linked to the manufacture sector, where the aim is "doing more with less", minimizing energy losses as much as possible.

To be ready for the upcoming challenge, there is a need to create a critical mass of highly skilled young engineers and innovators who will enhance Europe's position in the engineering sciences. Specifically, these future engineers and innovators need to become familiar with two key technical challenges within the manufacturing sector: the uncertainty induced by the production process (e.g. human errors, geometrical and material variabilities caused by the manufacturing process and/or by the machine setup) and the increasing complexity of the manufactured goods characterized by the critical parts or components.

The ambition of the **Active PRoduct-to-Process LearnIng fOR Improving Critical Components Performance (APRIORI) training network** is to train the next generation of Doctoral Candidates (DCs) to fully sustain the ongoing transition of the EU manufacturing sector. This will be achieved by developing the skills and new technologies that will enable the development of a unique integrated product design strategy that will drastically improve the performance of critical parts or components under uncertainties.

Beneficiaries

1. Katholieke Universiteit Leuven (Coordinator), Belgium: www.mech.kuleuven.be/mod
2. Technische Universiteit Delft, Netherlands: www.tudelft.nl
3. Aalborg Universitet, Denmark: www.aau.dk
4. Grundfos Holding AS, Denmark:
5. Temporary Works Design 9 B.V., Netherlands: www.twd.nl
6. **Jožef Stefan Institute, Slovenia:** http://www.ijs.si/ijsw/JSI
7. Materialise NV, Belgium: www.materialise.com/en
8. QLECTOR, Slovenia: www.qlector.com

Partner organisations

1. Leuven.Inc Stichting
2. The Jožef Stefan International Postgraduate School (IPS)

PhD Topic Descriptions

PhD Position: Active Learning for ExplainabilityManufactured Products

Duration: 36 months

Job description: Position 1 (DC9)

Objectives: DC9 will develop active learning approaches and strategies to enhance explainability of learned models and provide insights on the classification models' prediction to reduce the manual labelling effort. The effectiveness of such approaches and strategies will be evaluated on real-world use cases from the manufacturing industry. The use of active learning for automated visual inspection of manufactured products will advance current defect detection, by eliminating the manual inspection for most of the produced pieces, while requiring a labelling effort only on those that are most informative to the model. In addition, the use of explainable artificial intelligence will provide means towards understanding the rationale behind the models' decisions, which can be used in two ways: (a) by the machine learning engineers to enhance future models, and (b) by the operators, to obtain hints regarding why a piece could be considered defective. We envision that the implementation of such an approach will speed up detection, reduce manual labour, and enrich the operators experience with additional insights that are currently not available to them.

Expected Results:

- Design methodologies and approaches combining active learning, explainable artificial intelligence, and machine learning models for visual inspection in manufacturing;
- Quantify expected gains in terms of reduced manual inspection work, and labelling effort (actual labeled instances vs. stream of all data, and time-to-label).
- Quantify how the use of active learning improves the quality of the model and associated explanations over time.

Planned secondments:

- KU Leuven , M15- M18, 3 months, collaboration on explainable digital twins
- TWD, M 28-M31, 2 months collaboration on using explainable models in industrial applications

Requirements

We are looking for talented, creative and highly motivated researchers. A suitable background for this open position includes Data Engineering, Knowledge Engineering, Statistics, Signal Processing, Artificial Intelligence, Machine Learning and other related areas. Fluent written and spoken English and solid programming (C/C++/Python/R/Matlab) and sufficient data engineering skills (e.g. SQL, Hadoop or Spark) are required. Excellent skills in statistics, applied mathematics and data science are essential. Skills in the manufacturing sector are acknowledged.

If separately asked from a candidate, a suitable English language proficiency test may be required.

• Candidates applying for the doctoral student position must hold Master’s degree or equivalent in a relevant field and the recruited candidate is expected to enroll as a PhD student at the Jožef Stefan International Postgraduate School.

• Applicants shall, at the time of recruitment by the host organization, be in the first four years (full-time equivalent research experience) of their research careers and not yet have been awarded a doctoral degree. Full-Time Equivalent Research Experience is measured from the date when a researcher obtained the degree that would formally entitle him/her to embark on a doctorate.

HE MSCA Mobility Rule: the recruited researcher has not resided or carried out their main activity (work, studies, etc.) in the country of the recruiting beneficiary (Slovenia) for more than 12 months in the 36 months immediately before the recruitment date — unless as part of a compulsory national service or a procedure for obtaining refugee status under the Geneva Convention.

Salary:	The salary will be set in accordance with MSCA Doctoral Network rates. The monthly salary is subject to country coefficient rate.
Trial period:	Trial period of 4 months applies.
For more information, please contact:	Dr. Polona Škraba Stanič Artificial Intelligence Laboratory, Jožef Stefan Institute polona.skraba@ijs.si ++386-1-477-3778
How to apply:	Applications can be submitted via electronic application system and email by the **June 15th 2023**. In case no suitable candidates are found in the first application round, the call will be re-opened. The application should include the following annexes: - Letter of motivation - CV (including names and contact details of at least two references) - Copy of MSc degree certificate - List of publications
Open until:	**June 15th, 2023**
