PhD Position for Digital Twin Research for Cyber-physical Systems

Lero, the Science Foundation Ireland Research Centre for Software at the University of Limerick has an open position for a PhD Student.

Position: 1 X Four-Year Funded PhD Opportunity in the Lero

Location: Lero, University of Limerick

Supervisors
Lionel Briand (Lero)

Qinghua Xu (Lero)

Funding
The PhD scholarship funds stipend of €22,000 per annum and covers the registration fee.

DESCRIPTION

Projects

The successful candidate will be based at the Lero in the University of Limerick. The candidate will work on the **DT4CPS** project, which focuses on advancing digital twin-related research for Cyber-physical Systems.

Cyber-Physical Systems (CPSs) are integral to the industry 4.0 vision, comprising both physical and cyber components to create intelligent, interconnected systems. These systems include autonomous vehicles, autopilot unmanned aerial vehicles (UAVs), smart healthcare, and smart cities. Digital twins (DTs)—virtual replicas of physical assets—are increasingly pivotal in enhancing the security and operational efficiency of CPS through applications like anomaly detection and live monitoring. However, challenges persist in constructing DTs with high realism, effectively leveraging them within CPS environments and accurately assessing the trustworthiness of their predictions.

The **DT4CPS** project addresses these challenges by proposing state-of-the-art digital twin solutions specifically tailored for CPS. This project is closely integrated with our industrial partners, focusing on domains such as healthcare and smart manufacturing. The successful candidate will get the opportunity to work alongside world-leading companies on their industrial cases, driving innovation and advancing both research and industry practices.

This involves:

- **Domain Expertise.** Collaborate with industry experts to acquire in-depth knowledge of the industrial case study and identify their key challenges.
- **Digital Twin Methodology.** Design and implement cutting-edge digital twin construction methodologies that set new benchmarks in the field.
- **Application Development.** Develop and deploy DT-based applications, such as intelligent anomaly detection systems, capable of real-time monitoring and response.
- **Research and Publication**. Author and present high-quality research papers in prestigious conferences and journals, contributing to the broader academic community.

Lero, the Science Foundation Ireland Research Centre for Software
Tierney Building • University of Limerick • Ireland • V94 NYD3
T: +353 61 213028 • F: +353 61 213036 • E: info@lero.ie
lero.ie

Entry Requirements

- **Master's Degree**: A strong academic background with a focus on software engineering or CPS anomaly detection.
- **Methodological Expertise**: Proficiency in data-driven (e.g., machine learning) or model-based methods (e.g., Simulink, MATLAB), with the ability to apply these to complex problems.
- **Programming Proficiency**: Advanced skills in high-level programming languages, such as Python, C++, or Java, demonstrating the ability to develop sophisticated models and applications.
- **Collaborative Communication**: Strong communication and teamwork abilities, essential for thriving in an interdisciplinary research environment.

Desirable Requirements

- **Research Experience**: Previous involvement in digital twin research projects, showcasing a proven ability to innovate and contribute to the advancement of this specialized field.
- **Strong Academic Performance**: Consistently high academic grades throughout your studies, reflecting a strong understanding of core concepts in software engineering, CPS security, or related fields.
- **Publication Record:** A solid track record of contributing to research, as evidenced by publications in top-tier journals or conferences, demonstrating your ability to communicate complex ideas effectively.
- **Knowledge of Cyber-Physical Systems**: A deep understanding of the architecture and operational challenges associated with CPS, particularly in the context of integrating physical and digital components.
- **Familiarity with Simulation Tools**: Proficiency in using simulation tools or software relevant to digital twin development, allowing you to model, test, and optimize CPS systems in a virtual environment.

Closing Date

20th November 2024, 5pm (Irish Standard Time)

Contact & How to Apply

For additional information on the position, please contact: Qinghua.Xu@lero.ie

Application procedure:

To apply, please submit your CV to Qinghua.Xu@lero.ie including the following information:

- A cover letter describing how you meet the criteria, with a description of your previous experience

- Details of at least two referees.
- Full transcript of records of your university-level studies so far.
- Previous publications or previous significant work (thesis, final year project, or similar). Links to an online free access repository are sufficient.

Shortlisted applicants may be invited to interview.
On receiving an offer, the successful applicant will be required to submit supporting documentation (e.g., Copies of degree certificates and English language competency where required).
Application End Date: Applications will be accepted until the closing date.
Interviews will be carried out as soon as a suitable candidate is identified.

Lero, the Science Foundation Ireland Research Centre for Software
Tierney Building • University of Limerick • Ireland • V94 NYD3
T: +353 61 213028 • F: +353 61 213036 • E: info@lero.ie
lero.ie