

Ph.D. Position together with Pro2Future
**Factory of the Future: Engineering Adaptable
Cyber-Physical Production Systems**
[Institute of Software Systems Engineering](#)
[Johannes Kepler University, Linz, Austria](#)

The big picture:

Manufacturing enterprises of the future are networked and together with Pro2Future we are developing a middleware-based approach to support communication of modular and autonomous, intelligent cyber physical machines for products and production. The overall goal of our work is to better understand machine to machine communication and factory processes – both closely tied to the engineering of the machines, factories, and their products they are producing. Modularity and loose coupling are required to support adaptation of these systems. Composable models are key artifacts for reasoning on behavior and thus ensure that new or updated machines, processes, and configurations don't negatively affect their shop floor environment. Composable constraint specifications complement these models to guide the adaptation process as well as to monitor the cyber-physical production systems at runtime. From an engineering aspect, designing and running highly flexible and adaptive cyber-physical production systems requires the appropriate, dynamic team structures that facilitate collaboration and coordination across engineering disciplines.

The goal:

The goal of this thesis is to build methods for engineering and monitoring cyber-physical systems. The candidate will work with/at the Pro2Future competence center – which is an interdisciplinary center at the Johannes Kepler University (JKU) Linz for research on smart production and the factory of the future. Possible Ph.D. topics are:

- Studying model modularity for generating system-level digital twins from machine-level models
- Understanding run-time adaptation capabilities of cyber-physical production systems (how to handle changes, leaving, joining machines, robots, and human workers?)
- Supporting engineering processes for adaptive cyber-physical production systems (how do engineers manage the dependencies across engineering disciplines?)
- Investigating Engineering Processes for Shop Floor DevOps

Required expertise:

- A Master's degree in computer science or a closely related discipline
- Strong programming skills (for example in Java, C++, or C#)
- Ability to work on own initiative and also as a part of a team
- English language proficiency, written and spoken

Application Instructions:

Applications should include a cover letter, CV, preferably also letters of reference, and a brief statement describing the applicant's research motivation in relationship to this topic. Electronic submissions are required. Review of applications will begin immediately and continue until suitable candidates are appointed.

Contact:

- Prof. Dr. Alexander Egyed (alexander.egyed@jku.at)
- Dr. Christoph Mayr-Dorn (christoph.mayr-dorn@pro2future.at)



About Pro2Future:

Pro²Future is a K1 Competence Center for Products and Production of the Future collocated (in part) at the Johannes Kepler University (JKU) Linz. This PhD position will be linked to Area 2 which addresses the challenges of cognitive robotics and shop floors. The position involves work in close collaboration with industry partners of the competence center for defining use cases and evaluating results.

About the Institution:

The JKU Institute for Software Systems Engineering is a 30+ people strong research institute that is ranked among the best in the world (e.g., recently Microsoft ranked JKU 16th in the world in software engineering). Research at the institute covers a wide area of software engineering from requirements to capture software, systems architecture, design and testing, to maintenance. Engineering is an inherently creative process that requires rigorous attention to details. However, engineering is also a collaborative, human centric process with adhoc activities. Engineering automations are few and rare – not just during programming but also during modeling, testing or maintenance.

About the Advisor:

Prof. Dr. Egyed received his Doctorate from the University of Southern California, USA and previously worked at Teknowledge Corporation, USA and the University College London, UK. He is most recognized for his work on software and systems design – particularly on variability, consistency, and traceability. Dr. Egyed has published over 200 refereed scientific books, journals, and conferences with over 6000 citations to date. He was recognized a Top 1% scholar in software engineering in Communications of the ACM, Springer Scientometrics, and Microsoft Academic Search. He was also named an IBM Research Faculty Fellow in recognition to his contributions to consistency checking.

Location: Linz, Austria

Website: <http://isse.jku.at/>