

Ph.D. Position
CROSS-CHANGE

[Institute of Software Systems Engineering](#)
[Johannes Kepler University, Linz, Austria](#)

The big picture:

Designing a software-intensive mechatronic system brings together design knowledge from different engineering disciplines – with each discipline contributing its own modeling languages and mechatronic design artifacts (source code, 3D hardware models, electrical layout, etc.). A key challenge is to keep all these artifacts consistent to obtain a correct system.

While existing research started to address the issue of consistency among engineering artifacts, studying how engineers interact with mechatronic design artifacts has received little attention. Investigations into how engineers create and refine an artifact, coordinate those changes with other engineers, in what order, to achieve what task is important to understand in order to improve design tools, especially for supporting change management. Ultimately this will lead to a reduction in friction losses among disciplines, shorter development cycles, fewer inconsistencies across artifacts, and more adaptable system designs.

The goal and research question:

The main goal is to obtain a better understanding how engineers coordinate and execute cross-disciplinary changes in software-intensive mechatronical systems. This can be achieved through investigations on 1) how engineers create and change mechatronical artifacts and their dependencies; and 2) how engineers coordinate their work around these artifacts: two sides of the same coin. To this end, the research approach focuses on applying methods, techniques, and theory from software engineering in the mechatronics field.

Job Duties:

- Assisting in the execution of interviews with and observations of engineers how they conduct and coordinate changes
- Applying data mining and AI techniques to detect coordination patterns and change patterns
- Implement software connectors to access various mechatronic artifacts and changes thereof
- Development of research software prototypes to assist in change coordination
- Integration with existing research prototypes
- Writing scientific papers
- Participate in coordinating the research project CROSS-CHANGE (<https://tinyurl.com/yyr24su8>)

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:

- Dr. Christoph Mayr-Dorn (christoph.mayr-dorn@jku.at)

Starting date: Spring/Summer 2021



About the Institution:

The JKU Institute for Software Systems Engineering is a 20+ 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.

Advisor:

The research work is supervised by Dr Christoph Mayr-Dorn and Prof. Alexander Egyed.

Dr. Mayr-Dorn is a senior researcher at the Institute for Software Systems Engineering at the Johannes Kepler University Linz, Austria. He holds a Ph.D. in Computer Science from the Technical University Vienna. His current research interests include software process monitoring and mining, change impact assessment, and software engineering of cyber-physical production systems.

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



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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/>