

THE CENTER OF COMPUTER SCIENCE CORDIALLY INVITES YOU

– Inaugural Lecture –

Prof. Dr. Thorsten Berger
Professorship for Software Engineering
Faculty of Electrical Engineering and Information Technology



“Perspectives on Automated Software and Systems Engineering”

Abstract

Software engineering is at an inflection point. The traditional and largely manual construction of software is challenged by novel trends and technologies -- including rapidly changing markets, artificial intelligence or continuous delivery (e.g., in-field updates of cars). Developers need to frequently experiment with new ideas and quickly customize software for different markets, environments or hardware platforms, while optimizing for non-functional properties, such as security, performance or energy consumption.

In this talk, I will present my group's contributions towards automating the engineering of software systems. I will discuss how we combine foundational and applied research, often in collaboration with industry, to advance the scientific and engineering principles of software engineering. My focus will be on two application domains: variant-rich systems and robotics control systems.

Variant-rich systems comprise software product lines (e.g., automotive control systems), software ecosystems (e.g., Android apps), and highly configurable systems (e.g., Linux kernel). Engineering such systems is challenging due to variability -- the number of variants grows exponentially with the number of features. We developed analysis, modeling, and program synthesis techniques to tackle the combinatorial explosion and to automatically construct software variants.

Robotics control systems are complex and safety-critical software systems. Their manual construction -- dominated by expert programmers in robotics and control engineering -- is becoming a bottleneck when instilling them with intelligence to ensure robustness and autonomy. We developed software languages that allow both experts and end-users to define and assure the correct behavior of robotic systems -- specifically service robots and autonomous cars.

Time permitting, I will discuss the relation of my research to related areas, including programming languages, formal methods (e.g., model checking), logics (e.g., temporal logics) and reasoning (e.g., SAT solving), artificial intelligence (e.g., machine learning and genetic programming), control engineering, and empirical methods -- hoping to inspire collaborations within and across the discussed application domains.

Short Bio

Thorsten Berger is a Professor in Computer Science at Ruhr University Bochum in Germany. His research focuses on automating software engineering for the next generation of intelligent, autonomous, and variant-rich software systems -- exploring new ways of software creation, analysis, and evolution. Thorsten Berger received the PhD degree in computer science from the University of Leipzig in Germany in 2013, supported by a scholarship from the German National Academic Foundation (Studienstiftung des deutschen Volkes). He worked as a Postdoctoral Fellow at the University of Waterloo in Canada and the IT University of Copenhagen in Denmark. He was a Postdoctoral Fellow at the University of Waterloo in Canada and the IT University of Copenhagen in Denmark, and then an Associate Professor jointly at Chalmers University of Technology and the University of Gothenburg in Sweden. He received grants from the Swedish Research Council (competitive early-career grant), the Wallenberg AI, Autonomous Systems and Software Program (WASP), Vinnova Sweden (EU ITEA project), and the European Union (H2020 project). He received a fellowship from the Royal Swedish Academy of Sciences and the Wallenberg Foundation, one of the highest recognitions for researchers in Sweden. He received best-paper awards at the 2015 ACM SIGPLAN conference on MODULARITY and the 2013 European Conference on Software Maintenance and Reengineering (CSMR, now IEEE SANER), as well as a most influential paper award at the VaMoS'20 conference. His service was recognized with distinguished reviewer awards at the tier-one conferences ASE 2018 and ICSE 2020.

When? 05th of May 2021, 03:00 PM

Where? Via [Zoom](#) (Meeting-ID: 678 2619 6477, Password: 437355)

Anyone interested is warmly welcome to the lecture. No registration is necessary. We are looking forward to your participation!