

The Field Robotics Center

Seminar Series

Friday, 14th April

NSH 1507 1:00 – 2:00pm

Lunch will be served



Matthias Althoff

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Ensuring Safe Human-Robot Co-Existence by Reachability Analysis

Abstract: Modern manufacturing companies are expected to quickly and efficiently adapt to production changes, and robotics has long been known as the candidate solution for the required flexibility. To improve such flexibility, future working environments will be populated by both humans and robot manipulators, sharing the same workspace. This scenario entails a series of issues and open topics, such as safety and flexibility. I will mainly talk about the safety issue and later show how to improve flexibility by modular robots.

To address the safety challenge, I will present a new method where robots verify themselves during operation. Based on a set-based prediction of surrounding humans, the robot constantly checks whether a collision is possible. If a collision is possible, the robot automatically adapt its future path. The method uses techniques from formal verification and thus is certifiable. Our approach also takes into account the uncertainty in the measurement of the pose of surrounding humans.

Towards the end of my talk, I will present new techniques for assembling and controlling modular robots. Our methods in this area make it possible to automatically find the optimal assembly of a robot from given modules for a given task. Once the robot is assembled, it recognizes the assembled modules and automatically writes its own control code based on the gathered information of each module.

Speaker Bio: Matthias Althoff received the diploma in Mechatronics and Information Technology from the department of mechanical engineering at the Technische Universität München, Germany, in 2005. He received his PhD degree (summa cum laude) in electrical engineering from the same university under the supervision of Univ.-Prof. Dr.-Ing./Univ. Tokio Martin Buss in 2010. From 2010 - 2012 he was a postdoctoral researcher at Carnegie Mellon University, USA, with a joint appointment in electrical engineering and the Robotics Institute. He joined the computer science department at Ilmenau University of Technology, Germany, in 2012 as assistant professor for automation systems. Since 2013 Matthias Althoff is assistant professor in computer science at the Technische Universität München.

His research interests include the design and analysis of cyber-physical systems, formal verification of continuous and hybrid systems, reachability analysis, planning algorithms, robust and fault-tolerant control. Main applications of his research are automated vehicles, robotics, power systems, and analog and mixed-signal circuits.



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