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Funded by:



Project Partners:



fast robotics

Motivation:

Within modern industrial production facilities and automation systems a multitude of information is communicated between different objects, e.g. between sensors and actors of a machine, between the machines and the human controller and in-between machines. Currently, this communication is mostly wired since state-of-the-art wireless communication technologies cannot cope with the high requirements in reliability, safety and latency. However, wired solutions offer only a small mobility and flexibility, limiting all computation and control to a single location. Hence, the project *fast robotics* aims to perform research towards a communications-control-codesign that is suited to enable a multitude of applications in the field of industrial automation, especially highly flexible mobile robotics.

Objectives:

Goal of the research performed within *fast robotics* is the development of an innovative, distributed system solution in order to enable wireless communication of robotic systems among each other,

Vodafone Chair Contribution:

The Vodafone Chair for Mobile Communications Systems research within this project plans to jointly develop a 5G-based communications system that incorporates integrated tactile radio access and edge cloud technologies in order to enable distributed control. Another central goal is to research and develop a concept for Communication-Control-Codesign for robot applications in order to optimize the performance of a given control application depending on available 5G infrastructure as well as designing RAN technologies towards robot applications.

their components as well as ambient sensors and mobile terminals.

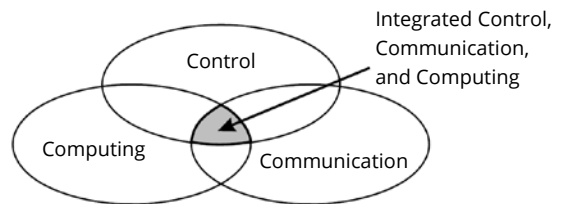
The basis is highly reliable and latency-wise optimized mobile communications in an intelligent, cellular mobile network. On the robotics side, fast robotics will develop a distributed robot control, offloading extensive computation. Exploiting the wireless setup, fast robotics will demonstrate applications like realtime cooperative robotics that remained unfeasible as of now.

Approach:

In order to realize the project's goals, *fast robotics* aims at a communications-control-codesign. It will be investigated how the application (control) can adjust to non-idealities in communications and how the design of communications can be optimized for control. In order to do so, first, the requirements of the application have to be well understood and mapped to QoS metrics of the network. Similarly, instantaneous QoS metrics measured within the network can be translated into to-be-defined classes of QoC (Quality of Control).



Mobile KUKA robot



CCC-Codesign