Universität Stuttgart
Institut für Systemtheorie und Regelungstechnik
Prof. Dr.–Ing. Frank Allgöwer

Open Thesis (SA,MA)

Distributed MPC for cooperation - with non-idealised communication

Description:

In a recent work, we developed a distributed model predictive control (DMPC) scheme for cooperation of multi-agent systems. An agent is a system that can act individually in an environment. A multi-agent system consists of a number of agents that are connected in some other way, e.g. collision avoidance or a common objective. Many control goals are characterised by cooperation of the agents, for example, converging to a certain formation or agreeing on some value, i.e. consensus. Our developed DMPC scheme solves this control goal by first defining an appropriate cost for cooperation. Each agent is equipped with a local MPC for tracking formulation which is augmented by a local part of the cost for cooperation. In addition, each agent computes an (artificial) reference that is tracked in each time step and moved towards the cooperative goal by the cost for cooperation, resulting in asymptotic achievement of the cooperative goal. An open question is, however, what effect package losses or time-delays on the communicated artificial references have. A Lyapunov-based analysis should give guarantees on retaining stability, and simulations should illustrate the impact in practice.

cf. Köhler et al. (2022), *Distributed MPC for Self-Organized Cooperation of Multi-Agent Systems*, 10.48550/arxiv.2210.10128

Prerequisites:

- *Model Predictive Control*
- interest in distributed systems

Supervisor:

Matthias Köhler
Room 3.240

Area:

Model predictive control
Networked Systems

Properties:

Type: SA,MA

20% literature
50% theory
30% simulation

Beginning:

anytime

Further information on www.ist.uni-stuttgart.de/lehre/bama

Aushang vom November 8, 2022