Interdisciplinary Project
Predictive Control for Multi-Vehicle Systems

Task

With the enhancements in sensing and communication technologies, networked multi-vehicle systems have received considerable attention over the last years. In agriculture, multiple vehicles have been used for different field operations, such as seeding, harvesting, and soil sampling. Each single vehicle in such fleets can work semi-autonomously or fully autonomously by just predefining the objectives and the operation area. Besides path planning and optimizing the collective behavior of multiple vehicles, it is of interest to develop reliable approaches considering environmental constraints, e.g., boundaries of workspace and other restrictions.

The focus of this thesis is investigation and implementation of a predictive control scheme for multiple vehicles for specific scenarios.

Work packages

- Literature review on control of multi-vehicle systems (Optimal control, MPC for UGV, UAV fleets).
- Selecting an appropriate method considering the use case defined with the thesis instructor.
- Implementation and application of the method to a nonholonomic vehicle fleet.
- Theoretical and simulative discussion of the reliability and robustness of the approaches.
- Documentation (preferably English) - conversations can be either German or English.

Prerequisites

- Being a good team player
- Experience with python
- Basic knowledge in control theory (Being familiar with optimal control is beneficial)
- Motivation to learn and implement new methods
- Structured and independent way of working

Remote work and meetings at Campus Garching are possible.

Start: April-May
For more information, please send your application by email to ertug.olcay@tum.de including

- A short email elaborating your background and motivation
- Curriculum vitae (CV) and your current transcript of records

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https://www.amx.wzw.tum.de/