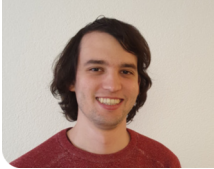


Fully automatic close synchronous movement with low cost drones

Development and test of a precise control system for synchronized movements using low-cost technology

Graduate



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Introduction: The present work focuses on developing a system that allows an autonomous drone to precisely follow a remotely controlled drone. The focus is on maintaining a constant distance between the drones. Systems of this type find application in aerial refueling scenarios for drones or in formation flights at air shows.

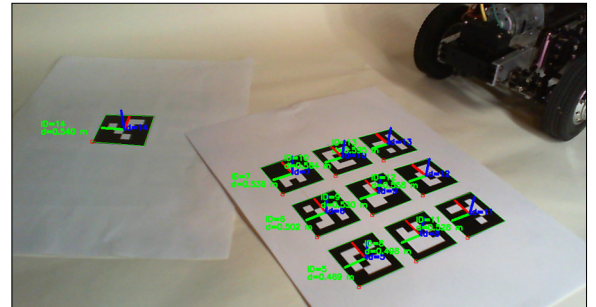
Approach / Technology: A Simulink model was built to test the control mechanisms in advance. This also verified that the information from the camera system and the transmission of the tractor's speed were sufficient to control the trailer. Subsequently, the demonstrator was built and the control algorithms were tested. The demonstrator consists of a model of a truck and a truck trailer.

The control system is composed of two main parts. One is responsible for ensuring that the trailer's drawbar is always aligned with the tractor's hitch. While the other aims to keep the distance between the drones constant.

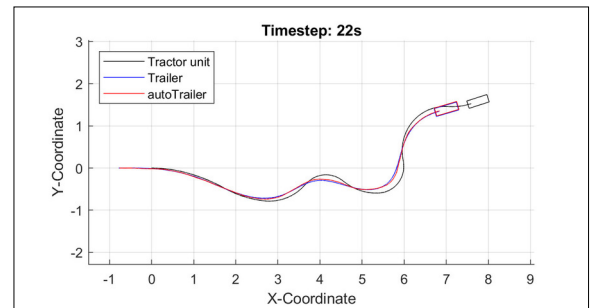
Result: With the execution of the tests, it has become clear that high-resolution feedback is indispensable for precise control. This allows for the backlash in the mechanics to be compensated and enables a fast and accurate response to deviations between the target and actual state.

The demonstrator illustrates the basics of synchronous motion and offers valuable insights for future improvements and further developments of such a system.

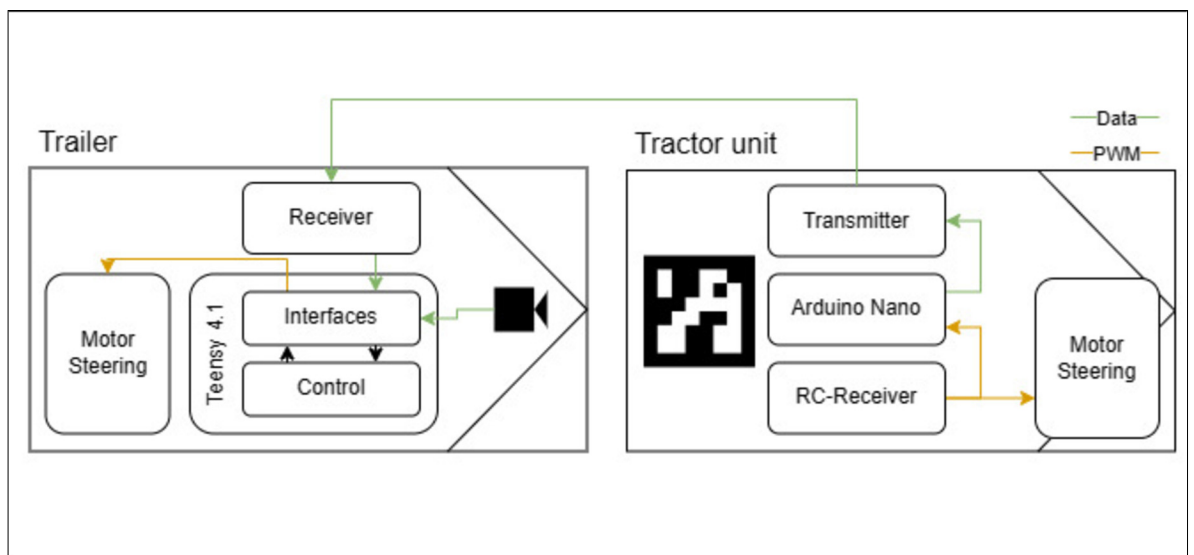
Example of the ArUco marker detection used
Own presentation



Results of the Simulink simulation
Own presentation



Hardware structure
Own presentation



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Subject Area
Computational Engineering, Electronics and Control Engineering, Computer Science