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Raspberry Pi based IEEE 1451.1 Network for Distributed Actuation Control.

ABSTRACT - Masterthesis

The DFG funded project FOR 1779 titled "active drag reduction via transversal surface waves", investigates robust methods to reduce the friction drag by influencing the turbulent boundary layer. The Central Institute of Engineering, Electronics and Analytics, ZEA-2: Electronic Systems, Forschungszentrum Jülich GmbH, works on the subproject "development of a real-time actuator and sensor network" for closed loop controlled transversal surface waves. For application on transportation vehicles like airplanes a large scale real-time actuator and sensor network is needed. To investigate the configuration of such a network a model based on Simulink and TrueTime is established. A Raspberry Pi based test bed is then used for parameter verification of the model.

The aim of the thesis is to steer an actuator and to record values from a sensor in a small scale distributed actuator and sensor network with the help of IEEE 1451.1 Smart Transducer Interface Standard Protocol. For this purpose Raspberry Pi network consists of three Raspberry Pi nodes is established in order to send actuation signal, to gather sensor parameters and to provide actuation parameters. The benefit for the model will be to get the propagation time through IEEE1451.1 layer out of this real world test bed.