

Accurate and reliable system state estimation for automated vehicles using Galileo

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The development of automatic driving capabilities aiming autonomous transportation systems is currently one of the most important research topics and innovation drivers worldwide. Especially concerning coordinated navigation, the topics accurate localization, environmental sensing, and networked communication are basic functionalities. Here, satellite-based navigation contributes very well to the localization topic, e.g., using the approved GPS and GLONASS system. Nevertheless, the new European satellite system Galileo also provides advantages to be considered for accurate, robust, and integer position determination. This talk introduces the research activities of the RWTH Aachen University in the field of satellite-based navigation especially taking into account the upcoming Galileo system. Subsequent, the talk gives an overview of our works concerning the development of different methods to couple inertial measurements with satellite-based absolute position estimations, such as loosely and tightly-coupled methods. Finally, the presented filter types are compared with each other in several real world applications, such as automotive, railway, and vessels systems. For each application extensive measurement campaigns were carried out and each system possesses particular challenges and requirements with respect to position estimation. An evaluation of the suitability pairing filter approach and application will be done.