

Industrial Workshop IW05

Virtual road testing: advanced electromagnetic simulation of radar systems for autonomous vehicle (by Ansys)



Abstract:

Radar is the primary sensor technology for safety in autonomous vehicles. Physically building and testing radar systems to demonstrate reliability in all possible scenarios is a tedious process. Simulation is the most practical solution for developing radar systems. In this workshop methods will be demonstrated which enable engineers to conduct high-fidelity, physics-based simulations of full-scale realistic traffic scenarios. These techniques empower radar manufacturers to rapidly validate their products and calculate range, doppler effects, direction-of-arrival (DoA) and micro-Doppler on a system level. Topics covered are:

- Challenges of advanced automotive radar design and their solution by using hybrid EM solvers
- Methods for efficient analysis of antenna interaction with vehicle bumper and fascia
- Assessing the full system radar performance based on waveform parameters in traffic scenarios
- MIMO channel analysis to optimize the DoA estimation
- Target classification using micro-doppler

Workshop Program (Wednesday 24 March 2021, 12.10-13.40h)

The technical contents will be presented to convey the challenges of automotive radar system development. Different high-fidelity and ray tracing simulation techniques will be presented along with a brief theoretical background. A hybrid approach which enables full scale system simulation will be presented.

- A post-processing technique for simulation of long-, medium- and short-range pulse-Doppler and chirp-sequence FMCW radars will be presented which speeds up the simulation by more than 100x.
- During the workshop multiple demonstrations of the presented capabilities will be given by using Ansys HFSS. These radar scenarios will show proof the value of simulation for validating the radar system for complex edge cases