

### **1) Title of the tutorial**

High-Resolution Automotive Radar Perception Systems

### **2) Instructors name and affiliation**

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### **3) A 300 word abstract describing the proposed topic and including an outline of the contents**

Autonomous driving poses unique challenges for vehicle environment perception due to complicated driving scenarios. Precise knowledge of dynamic and feature information about surrounding objects is one of the key tasks. Automotive Radar has already reached a market penetration that leads to several tens of million units used. This is mainly due to its physical principle that offers unique performance features at reasonable costs. Nowadays highly automated vehicle intelligence requires automotive radar systems could provide imaging like capabilities and interact in radar networks for highly comprehensive perception tasks. There are two major technical lessons we have learned in recently years from our work on Autonomous Driving systems: 1) Current radar data analysis has to be extended to machine learning, image understanding and pattern recognition concepts to keep radar in the leading edge of remote sensing. This requires a high-resolution automotive Radar system and related low-level data processing; 2) Most Radar-based ADAS modules are single sensor perception; for higher degree in automation, multi sensor networks composed of four or more short-, mid-, and far range radars are being applied, nowadays.

The tutorial will discuss the state of the art of automotive radar usage on mainly the basis of the DAIMLER/Mercedes-Benz car platforms, will give an outline on future requirements for highly automated/driver-less driving, and will present recent approaches in Radar-based environmental perception for scene understanding purpose. Advanced Radar topics, such as extended object tracking and Radar-based fusion systems, will be introduced. Additionally, we will discuss about data legal/ethnic/sensitivity issue around the world.

### **4) Target audience and assumed knowledge**

The tutorial is addressed to industry engineer, laboratory researcher, faculty, PhD/MS student having interests in the area of automotive sensor systems (radar systems in particular). Beginner/intermediate knowledge on vehicle intelligence, estimation theory and/or automotive sensor system would be sufficient.