



BUENAVENTURA EDCAS, COMSOC, and AESS CHAPTERS

MIMO Radar: Fundamentals, Sparse Sensing and its Application in Autonomous Driving (Part I)

Speaker: Shunqiao Sun, Delphi Electronics & Safety

September 26, 2017 at 6:30 PM

Location: Skyworks Solutions, Newbury Park, CA

Radar not only has found widespread application in advanced driver assistance systems (ADAS) but also is one of the key technologies to enable environmental perception in autonomous driving. Compared with LiDAR and camera, radar technology provides reliable measurements of range, velocity and angle information of obstacles surrounding vehicle in all kinds of weather conditions. Unlike the traditional phased-array radar system which transmits via its antenna array a single waveform with different phase shift, multiple-input multiple-output (MIMO) radar can transmit multiple waveforms that may be chosen freely. As compared to traditional radar system with the same number of transmit and receive antennas, MIMO radar achieves significantly improved spatial resolution by exploiting waveform diversity. Due to its advantages, MIMO radar technology has been widely used in designing millimeter-wave radar sensors for ADAS and self-driving cars.

The Part I talk will focus on the fundamentals of MIMO radar as well as novel MIMO radar approaches with the emerging sparse sensing techniques. This talk will cover the radar basics, MIMO radar architecture and waveform design, sparse sensing methods in MIMO radar including compressive sensing (CS) based MIMO radar as well as novel MIMO radar approach using matrix completion (MC).

The Part II talk (October) will focus on the role of radar in autonomous driving and various aspects of automotive radar signal processing techniques. This talk will cover the radar system requirements and architecture for autonomous driving, principles of frequency-modulated continuous-wave (FMCW) radar, high resolution angle finding methods, “smart” radar sensors with machine learning, as well as unique problems associated with automotive radars for autonomous driving such as pedestrian detection.



Dr. Shunqiao Sun received his Ph.D. degree in Electrical and Computer Engineering from Rutgers, The State University of New Jersey in Jan. 2016. He is currently with the radar core team of Delphi Electronics & Safety, Agoura Hills, CA, where he is working on advanced radar signal processing and machine learning algorithms for self-driving cars. In the past, he held internships at Cisco Systems and Mitsubishi Electric Research Labs (MERL). His research interests lie at the interface of statistical and sparse signal processing with mathematical optimizations, MIMO radar, machine learning, and smart sensing in complex environments. Dr. Sun is winner of the 2016 IEEE Aerospace and Electronic Systems Society Robert T. Hill Best Dissertation Award for his thesis “MIMO Radars with Sparse Sensing”.

Location

Skyworks Solutions

649 Lawrence Drive, Newbury Park, CA 91320

Intersection of West Hillcrest Drive and Lawrence Drive

(**NOT** the main building, please use link below to arrow that pinpoints building)

<http://maps.google.com/maps?q=34.187542,-118.930994&num=1&t=h&vpsrc=0&ie=UTF8&z=18&iwloc=A>

Directions

From Los Angeles

Highway 101 North

Take exit 47A for Rancho Conejo Blvd

Use the left lane to turn right onto Rancho Conejo Blvd

Turn left onto W Hillcrest Dr.

Destination will be on the right

From Ventura

Highway 101 South

Take exit 47B for Wendy Dr. toward Newbury Park

Turn right onto N Wendy Drive

Continue onto Camino Dos Rios

Turn right onto W Hillcrest Drive

Destination will be on the left.

