

Prof. Hermann Rohling visited IICT-BAS, Bulgaria in the period May 18 – 24, 2014. On 21.05.2014 he presented a lecture titled “Automotive Radar Systems”, which caused fruitful discussions and raised interest in further deepening the research contacts.

Biography

Prof. Dr. Hermann Rohling is the Head of the Institute of Telecommunications at Hamburg University of Technology, where he has developed an international reputation for mobile communications and automotive radar systems. Prof. Rohling has started his career at the AEG Research Institute, Ulm, Germany, as a researcher working in the area of digital signal processing for radar and communication applications. Nowadays his research interests include signal theory, digital radar signal processing, detection, estimation, wideband mobile communications based on multicarrier transmission techniques (OFDM) for future broadband systems (4G), differential GPS for high precision navigation, Self-organised synchronisation in a cellular environment, Car-to-car communications, and automotive radar.

Prof. Rohling is the President of the German Institute of Navigation (DGON), a member of Informationstechnische Gesellschaft (ITG), and a Fellow of IEEE. Every year he is the organizer of an International Radar Symposium (IRS) and an International OFDM Workshop. Prof. Rohling was the Vice President of the Hamburg University of Technology, Germany for more than six years.

Abstract

Driving a car means a dangerous task! There are about 5000 fatalities on German streets every year, which are absolutely too many. Drivers have strong limitations in the ability to measure precisely the distance and the speed difference between cars, which is the reason for several accidents. Therefore some assistance is needed. The all-weather-capability as well as the capability of measuring target range and radial velocity simultaneously are some of the essential features, which make radar systems suitable for automotive applications.

Radio Detection and Ranging (RADAR) is a worldwide well-known technique since more than 100 years, which is originally based on the invention of the German engineer Christian Hülsmeyer, who applied his patent at the Kaiserliche Patentamt in Berlin on April the 30th, 1904. He called his invention Telemobiloskop in a good tradition of using Latin and Greek terms for technical subjects.

Collision avoidance between ships was the first application for this new technique. Today we come back to the collision avoidance application however now between cars.

The general requirement on an automotive radar sensor is to measure the target range and radial velocity simultaneously and unambiguously with high accuracy and resolution even in multi target situations, which is a matter of the appropriate waveform design. The received echo signal is then sampled and further processed for target detection and parameter estimation. Based on a single chirp signal target range and radial velocity cannot be measured in an unambiguous way. Therefore a so-called Multiple Frequency Shift Keying (MFSK) transmit signal had been developed, which is applied to measure target range and radial velocity separately and simultaneously, differentiating different targets.