

Date: December 26, 2022

Speaker: Dr. Igal Bilik, Department of Electrical and Computer Engineering

Title: Sensing for Autonomous Driving

Abstract:

Autonomous driving is one of the megatrends in the automotive industry, and a majority of car manufacturers are already introducing various levels of autonomy into commercially available vehicles. The main task of the sensing suite in autonomous vehicles is to provide the most reliable and dense information on the vehicular surroundings. Specifically, it is necessary to acquire information on drivable areas on the road and to port all objects above the road level as obstacles to be avoided. Thus, the sensors need to detect, localize, and classify a variety of typical objects, such as vehicles, pedestrians, poles, and guardrails. Comprehensive and accurate information on vehicle surroundings cannot be achieved by any single practical sensor. Therefore, all autonomous vehicles are typically equipped with multiple sensors of multiple modalities: radars, cameras, and lidars. Lidars are expensive and cameras are sensitive to illumination and weather conditions, have to be mounted behind an optically transparent surface, and do not provide direct range and velocity measurements. Radars are robust to adverse weather conditions, are insensitive to lighting variations, provide long and accurate range measurements, and can be packaged behind optically nontransparent fascia. This talk will discuss active safety and autonomous driving features and associated sensing challenges. Next it will overview technology trends and state advantages of available sensing modalities and describe sensing performance requirements.

Bio:

Dr. Igal Bilik received B.Sc., M.Sc., and Ph.D. degrees in electrical and computer engineering from the Ben-Gurion University of the Negev, Beer Sheva, Israel, in 1997, 2003, and 2006, respectively. During 2006–2008, he was a postdoctoral research associate in the Department of Electrical and Computer Engineering at Duke University, Durham, NC. During 2008-2011, he has been an Assistant Professor in the Department of Electrical and Computer Engineering at the University of Massachusetts, Dartmouth. During 2011-2019, he was a Staff Researcher at GM Advanced Technical Center, Israel, leading automotive radar technology development. Between 2019-2020 he led Smart Sensing and Vision Group at GM R&D, where he was responsible for developing state-of-art automotive radar, lidar, and computer vision technologies. Since Oct. 2020, Dr. Bilik is an Assistant Professor in the School of Electrical and Computer Engineering at the Ben-Gurion University of the Negev. Since 2020, he is a member of the IEEE AESS Radar Systems Panel and Chair of the Civilian Radar Committee. Dr. Bilik is an Acting Officer of the IEEE Vehicular Technology Chapter, Israel, and Chair of the Autonomous and Connected Transportation Committee, Israeli Center for Smart Mobility Research. Dr. Bilik has more than 180 patent inventions, authored more than 60 peer-reviewed academic publications, received the Best Student Paper Awards at IEEE RADAR 2005 and IEEE RADAR 2006 Conferences, Student Paper Award in the 2006 IEEE 24th Convention

of Electrical and Electronics Engineers in Israel, and the GM Product Excellence Recognition in 2017. Dr. Bilik is an Associate Editor of IEEE TAESS and IEEE Transactions of Radar Systems and a Guest Associate Editor in IEEE J. of Selected Topics in Signal Processing, "Automotive Radar Processing," 2020, co-organizing IEEE Transactions on Aerospace and Electronic Systems Special Section on "Deep Learning for Radar Applications," 08/2022 and Special Section on "Automotive Imaging and Super-Resolution Radar Systems", 10/2022. Dr. Bilik's research interests are radar signal processing, target estimation, and detection, automotive radar, sensing for autonomous platforms, bio-inspired radar, NN-based radar processing, radar target classification, and THz radar processing.