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GUEST EDITORIAL

Editorial

KRZYSZTOF KULPA

This special issue of the International Journal of Microwave and Wireless Technologies is focused on topics presented during the Signal Processing Symposium, SPSympo-2017, held from 10 to 12 June 2015 in the picturesque Dębe village near Warsaw, Poland. The conference, organized jointly by the Institute of Electronic Systems of the Warsaw University of Technology and the Military Institute of Aviation Medicine, welcomed more than 120 attendees both from Poland and abroad. The conference was chaired by Professor Krzysztof Kulpa, and coordinated by MSc Anna Kurowska. The Technical Programme Committee was chaired by Dr. Sc. Piotr Samczynski. The 3-day event was accompanied by a radar school organized jointly by the Institute of Electronic Systems of the Warsaw University of Technology and the National Instrument company, and two tutorials: "Tutorial on Radar Systems Engineering Analysis and Design" given by Professor Lorenzo Lo Monte and "Tutorial on Biological signal analysis with applications" provided by Dr. Anton Popov.

This special issue of the International Journal of Microwave and Wireless Technologies, published by Cambridge University Press in collaboration with EuMA, covers five topics selected from more than 60 presented papers and is focused on radar sensing technology.

The first paper presents the problem of the estimation of rain parameters using radar reflections. This subject is of great importance for the safety of air transportation. The second paper is focused on the testing of an frequency modulated continuous-wave analogue front end designed for high-resolution imaging radars. The design of small and compact radars are of great interest to society as radars are now being widely used by the automotive industry, and the rapid development of drone technology is opening a completely new market for small, light and low power consumption drone radars devoted to the safety of air operation in uncontrolled air spaces, as well as for imaging during night, fog or bad weather conditions. The remaining three papers are focused on radar imaging techniques, which can be used in ground or small airborne radars. The narrowband radar tomography presented in the third paper is a modern technique used for target imaging using Doppler-only information. Such a technique can be used when a narrow band signal is used and perfectly fits the congested electromagnetic spectrum. The fourth paper presents the problem of autofocusing airborne synthetic aperture radar (SAR) images. The subject is of great importance for high-resolution SAR image creation, as it is necessary to know the whole platform trajectory with an accuracy of a quarter of a wavelength – better than 1 cm for radars working in the X-band and better than 1 mm for radars working in the W band. Modern drones are equipped with cheap, low accuracy navigation systems supported by commercial global positioning system receivers, with accuracy worse than 1 m, and efficient autofocusing is needed.

The last paper is devoted to high-resolution through-the-wall radar imaging, a modern ultra-wideband microwave technology used for security and anti-terrorist actions. The precise microwave imaging tools can save the lives of innocent people in hostage situations.

We hope that this special issue will capture the interest of many readers by reflecting new trends in microwave radar technology and showing applications devoted to a safer world.

Krzysztof Kulpa (M'1991, SM'2010) received his M.Sc., Ph.D. and Dr. Sc. Degrees from the Department of Electronic Engineering, Warsaw University of Technology (WUT) in 1982, 1987 and 2009, respectively. He is now the head of the Radar Technology Research Group at WUT and since 2011 has been the Scientific Director of the Defense and Security Research Center of the Warsaw University of Technology. In 2014 he obtained the title of State Professor. His research interests are in the area of radar signal processing, including imaging, passive and noise radars. He has had more than 260 papers published in journals and conferences. He is an expert of the Committee of Electronics and Telecommunication at the Polish Academy of Science, and is also a member of IEEE, EUMA, AOC and URSI, where he has been chair of the Poland Section Commission F: Wave Propagation and Remote Sensing since 2012.