EDITORIAL

This special issue of Applied Radioelectronics Journal is devoted to the Third International Conference on Noise Radar Technology, NRT-2012, being held in Yalta, Crimea, Ukraine on September 27-29, 2012. It has been organized by Laboratory for Nonlinear Dynamics of Electronic Systems (LNDES), IRE NASU with technical support by the Academy of Applied Radioelectronics, IEEE Kharkov Joint Chapter and National Antenna Association of Ukraine.

The first papers on range-measuring radar based upon noise signals have been published by R. Bourret in 1957 and B. Horton in1959. Employing noise signals can be traced back to 1904. At that time, noise pulses were used by C. Huelsmeyer in the "telemobiloscope", the radar precursor, which used a monostatic configuration and by A. Popov in the experiments on ships detection in bistatic configuration. In both cases, a discharge device played the role of a pulse-noise transmitter and a coherer was used as a detector to receive the noise pulses. Today's Noise Radar Technology (NRT) uses Noise (Random or Chaotic) Waveforms (NW) as a radar signal and *coherent* signal processing for noise radar returns reception.

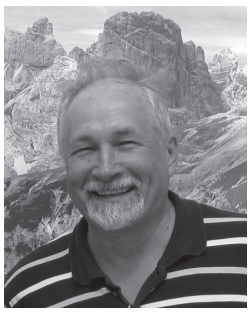
In spite of rather long history, the concept of Noise Radar did not attract the radar engineers, mainly because of the lack of appropriate noise signals sources and essential difficulties in the correlation signal processing implementation using analogue circuits. Nevertheless, this concept has been rediscovered in the last decades as it follows from the recent conferences on NRT: Novel Radar session at "Advances in Radar" PIERS Conference, April 1998, Baveno, Italy; "The First International Workshop on NRT" (NRTW'2002), Yalta, Crimea, Ukraine; NRT-2003, Kharkov, October 21-23, 2003; and dedicated sessions on NRT at IRS-2006, Cracow, and IRS-2008, Wroclaw, Poland; IRS-2010, Vilnius, Lithuania. Besides, Noise Radar Workshop was held in November 2008 in Arlington, and dedicated NRT session at SPIE-2010 Conference in Orlando, USA. Dedicated session on "Applications of Random Signals for SAR" was organized at APSAR-2011, September 2011 Seoul, South Korea. All of them have drawn speakers and observers from many countries of America, Europe, Asia and Australia.

Actually Noise Radar has been under intensive development during the last 20 years in Ukraine, USA, Australia, Brazil, Canada, China, France, Italy, Poland, Russia, South Korea, Sweden, UK, and other countries. Noise Radar provides excellent potential capabilities for unambiguous and simultaneous range and Doppler measurements with high resolution and accuracy. Noise Radar Systems have the best Low Probability of Intercept (LPI) and Electromagnetic Compatibility (EMC) performance. They are suitable for implementing of covert operational mode of radar sensors and their high resistance against jamming, etc. All these and other properties enable design of cost-effective and affordable radar systems for various civil and military applications.

Ten year after the First NRT Conference, the NRTW-2002, we decided to gather noise radar engineers again in Yalta for the NRT-2012 Conference. NRT-2012 attendees from 13 countries had an excellent opportunity to present and discuss their recent R&D results in Noise Radar and related topics, exchange information and new ideas in the rapidly emerging Noise Radar Technology. Unlike previous NRT conferences we decided to extend the scope of the conference topics, including applications not pure random signals, but also pseudo random and even chirps and short pulses. Moreover, not only papers dealing with electromagnetic signals, but also papers devoted to applications of random signals in acoustic and seismic systems have been presented as well. All papers published in the present issue have been structured according to the following topics: **Random Waveform Design; Random Noise Signal Generation; Signal Processing in Noise Radar; Noise Radar Design; Noise Radar Performance; Noise Waveform SAR; Noise Radar Technique in Optics and Seismology.**

I hope that the papers presented in this issue will help radar engineers to understand better the advantages of Noise Radar for design of various radar systems. Application of noise waveforms and correlation processing of radar returns provides unique performance of noise radar systems which are not affordable when using other waveforms. We may recall some of them here: indoor measurements and imaging with Noise Radar, since reflections do not affect radar sensitivity that much; desirable limited working range of stepped-frequency noise radar due to disappearing of coherent reception beyond the correlation length of the transmitted random signal; partial reception/integration of long noise waveform pulses; Doppler frequency Noise Radar for range (!) estimation, etc.

I would like to emphasize that recently several Noise Radars have been designed, manufactured and delivered to customers in different countries for research and trials in both CW and pulse-coherent modes. However the first operational surveillance noise radar has been designed and manufactured by the ORBISAT Company in Brazil based on the noise radar concept suggested by LNDES IRE NASU, where the partial integration of the radar returns has been used to provide both a long working range and a short blind zone simultaneously. I am sure that Noise Radar will expand the area of realistic applications of radar systems due to the mentioned above and other unique properties of Noise Radar Technology.



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