Andrey **Sheleg**

Radio engineer, developer of DSP algorithms, electronic and radar equipment. Ph.D.

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Work experience:

Military R&D enterprise "Almaz", St. Petersburg, Russia (03.2019 – 11.2022)

Lead Specialist, Chief Designer frequency-modulated continuous-wave (FMCW) radar.
Development of a millimeter-wave FMCW radar for differentiation of small UAVs from birds:
- Design of embedded systems based on the Xilinx Zynq UltraScale+ MPSoC (ARM+FPGA) platform;
- Analysis of methods for detection and recognition of small-sized UAVs, reviewing existing and perspective solutions, development of requirements for effective radar architecture, choosing Analog Devices and Xilinx products as the element base;
- Development and analysis of an active phased array millimeter wave antenna on a multilayer printed circuit board (PCB) from a stack of Rogers laminates using Ansys HFSS;
- Conducting bench measurements of antennas, flaw detection of manufactured antenna modules, making adjustments to the antenna model with Ansys HFSS;
- Development, modeling in Python of algorithms for multi-channel spatial and spectral digital signal processing (DSP) of the active electronically scanned array (AESA) and digital antenna array (DAA) of the FMCW radar and acoustic array of sensors, including the latest tensor implementations of the direction of arrival (DOA) methods of the MUSIC and ESPRIT types. Their verification on existing radar mock-ups.

www.linkedin.com/posts/andrey-sheleg_fmcw-radar-for-recognition-of-small-uavs-activity-7015801445618712577-JKPJ
www.linkedin.com/posts/andrey-sheleg_modeling-microstrip-components-in-hfss-for-activity-7015806622711042048-GkDa

Experimental Design Bureau "Karat", St. Petersburg, Russia (2012 - 2019)

Chief designer.
1. Development of the technical control system for the equipment of the modernized multifunctional anti-missile / anti-space defense radar station "Don-2M", 5N20PM. The developed software and hardware have successfully passed state tests as part of the "Don-2M" radar.
2. Development of the channel for detecting ballistic targets of the air defense radar "Nebo-T 55G6T".
3. Development of a complete set of functional and technological software for the early warning radar complex (ballistic targets) 60K6 from the air defense / missile defense system S-500 "Prometheus", 55R6M "Triumphator-M". The developed software has successfully passed preliminary (factory) tests as part of a prototype 60K6 with a fragment of an active phased array antenna.
4. Development of software and hardware systems for automated testing of analog and digital electronic modules. The results of the work were used by contract electronics manufacturers for the purpose of functional and peripheral testing (JTAG) of their products. For various types of products, we produced cradles (docking stations), in which serially produced electronic boards and modules were installed, which were tested in various operating modes, including in climatic chambers and on vibration platforms.

Scientific and Technical Center "RIF", St. Petersburg, Russia (2010 - 2012)
Deputy general manager - Chief designer.
- Development of a special computer for a passive side-scan radar (ROC "Zerkalo", based on the analysis of GLONASS signals reflected from the earth's surface, software and hardware implementation based on the Xilinx Virtex 4 FPGA and the DSP TMS320C55 signal processor.
- Draft and technical design of a device for coherent processing of echo signals for navigational radars.

Transas Marine Ltd - the world's largest supplier of electronic charts, nautical software and hardware for the maritime industry, St. Petersburg, Russia (2004 - 2009)

Head of Control Systems and Data Processing Department, Chief Designer.
Leading the following projects:
1) integration and refinement of serial radar and echolocation systems for navigation and tactical systems (the MR-6PV navigation radar (based on the Nayada-5MP radar) and MR-2PVM (based on the Baltika radar) were developed for coastal ships protection of projects 6457C, 14310, TRIMS 22460, etc.);
2) development of an on-board radar environment simulator for the 3Ts-25E "Harpoon-B" radar (based on the analysis of a digital map of the area in the selected region, it provides the formation of all IF and LF radar signals and displays the situation on a standard indicator for training operators);
3) development of a training complex of technical means for protecting the perimeter "Tutor" (radar, electron-optical, electrocapacitive, electroinductive, vibrational and other technical means of protection);
4) development of interactive manuals for the operation of radar stations with built-in simulators.

Education:

Military University of Air Defense, St. Petersburg, Russia (1994 – 1997)
Ph.D. Radar systems, digital signal processing, image processing, radar target class recognition (including neural circuits, supervised machine learning, unsupervised machine learning, etc.).
The results of scientific work have been implemented in the Pantsir S-1 96K6 self-propelled anti-aircraft missile system and others. Received patent № 2109306 (Russia) for the invention of a pulse-Doppler radar station with a device for recognizing target classes by a multi-frequency polarization-spectral portrait:
https://findpatent.ru/patent/210/2109306.html
At the same time, he taught cadets the subject "Fundamentals of Radar and Electronic Warfare".

Higher Radio Engineering School of Air Defense, Kiev, Ukraine (1987 – 1992)
Specialist, Radio engineer.
The study of the theory of construction and practical implementation of air defense radar stations, the study of antennas, RF and microwave technology, analog circuitry, digital signal and image processing algorithms, the development and practical implementation of a monopulse device for selecting moving targets.

Skills: Python, Matlab, Mathcad, Ansys HFSS, CST, Altium Designer, Vivado HLS / Vitis.
I can independently master a new scientific and technical direction, find the necessary literature, agree on technical requirements with the customer, develop tasks for performers and contractors, simulate the external environment and algorithms for the functioning of the components of the device being developed, and issue test benches to performers.
I know how to use measuring instruments, including oscilloscopes, spectrum analyzers, vector network analyzers, stands for measuring antenna parameters.

Languages: Russian – native, English – technical reading, German – basic, Hebrew – "א".

About me: Born and raised in the Soviet Union, received higher education in Ukraine, later studied and worked in Russia. Since 11.2022 I have been permanently living in Israel. From 01.2023 - citizen of Israel.