Overcoming the Digital Synthesis Gap

Yuri Panchul, *Juniper Networks*, *Sunnyvale, CA, USA*

The experience and the future plans to upgrade the Russian education in microelectronics
Yuri Panchul, chip designer and an author of educational materials in microelectronics
Russian microelectronics is suffering from the unfortunate overlap in time of two events: the rise of the modern methods of designing highly integrated chips - and the collapse of the Soviet Union. Both developments occurred during the late 1980s and 1990s. Many key technologies that eventually led to smartphones and self-driving cars went from the labs to the mainstream during this time: logic synthesis of hardware description languages, sophisticated algorithms for physical design on submicron and nanoscale, the techniques for automated verification of giant designs, as well as the prototyping of chip design in FPGA. All this technology was integrated into the courses of Stanford, Berkeley, and MIT that supplied new engineers who created the technological wonders of Silicon Valley: iPhone, high-speed internet chips, 3D graphic processors, and AI chips.
A decade ago a group of people from top Russian universities, electronic companies, and RUSNANO, as well as Russian engineers working in California and in the UK, started cooperating to create textbooks, seminars, and upgrades the university courses in Russia and neighboring countries (Ukraine, Kazakhstan) to address the challenge. We realized that creating the teams capable of designing modern microelectronics has a higher barrier to entry than software and requires the extensive transfer of know-how not only from the foreign universities but also from the foreign industrial partners. At the same time, we learned from China and India that low start in modern microelectronic technologies is not something fatal. This presentation describes the efforts of the past decade and outlines new ideas about creating the centers of competence in the nanoscale system on chip design in Russia and neighboring countries.