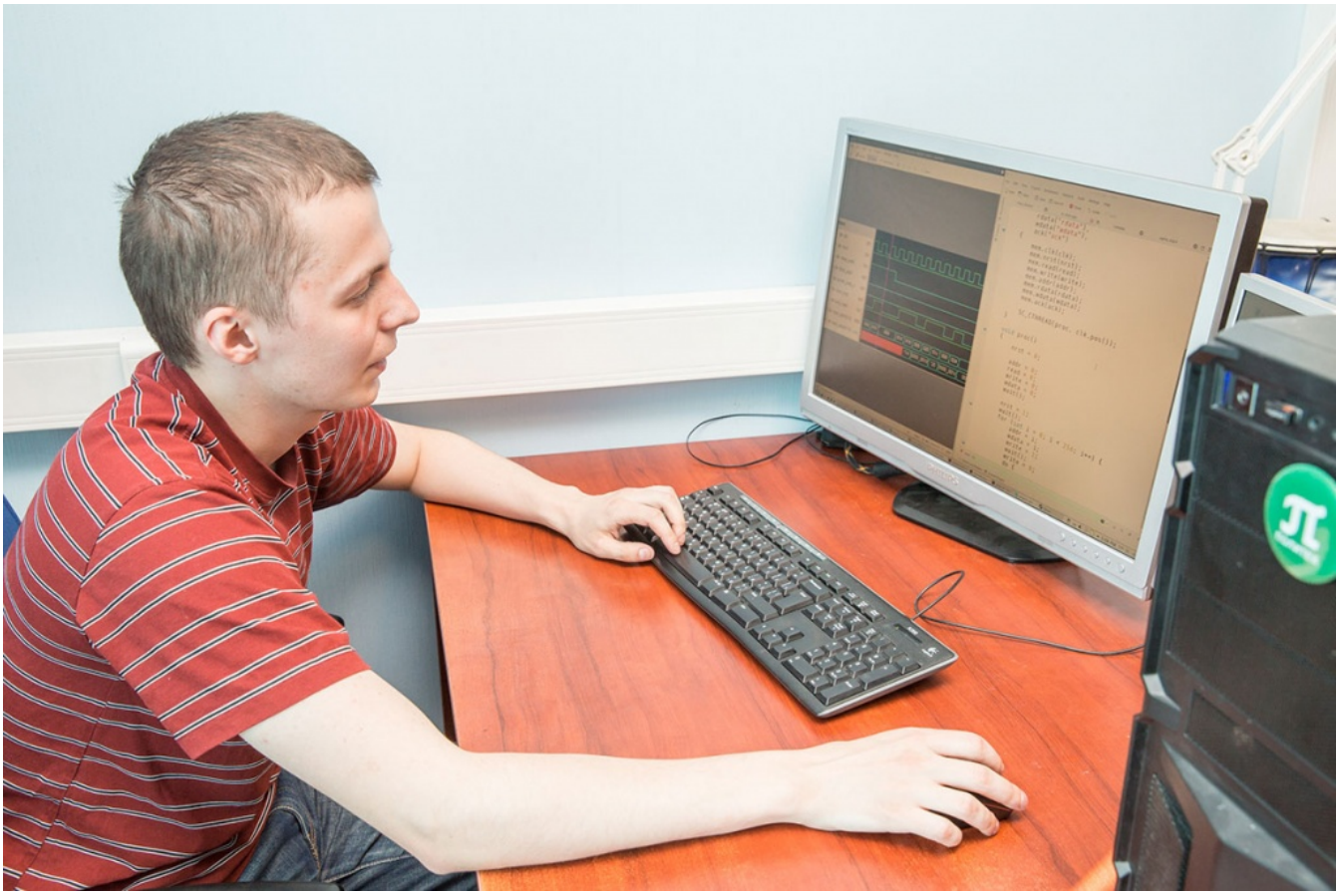
Intel and SPbPU – High-Level Collaboration

Intel Corporation has been cooperating with Russian universities for 15 years, helping to strengthen the skills of graduates in the field of high technologies. The task of such cooperation is to fill the deficiency of specialists, which is very acute in this field. In 2014, Intel Corporation – the leader in IT, and Polytech – the leading technical university in Russia, pooled their resources to create a research and educational platform to solve the most difficult problems in the field of high-level design, analysis, and verification. So, the International Research and Education Center (IREC) "High-Level Design of Digital Systems" was established.



Intel equipped a computer room for 12 workspaces, provided servers for research and educational activity, and the required licensed software, took part in developing educational courses. It should be noted that the joint initiative of Intel and SPbPU is implemented within the 5-100 Project – an academic excellence program for Russian universities. (The Project includes a number of activities, particularly implementing joint educational programs with foreign universities, attracting international professors to teach Russian students, developing international academic mobility of students and professors, increasing publication activity, and others.)

Today, at IREC "High-Level Design of Digital Systems" they do joint research (scientists, post-graduates, and students of SPbPU on one side and specialists from Intel on the other) in the field of modern methods of designing digital devices and systems, train highly-qualified specialists in the field of the newest methods of high-level design of digital systems, systems on a chip, and firmware. The expected result of such cooperation is to enhance proficiency of students and post-graduates in the most relevant areas of the computer industry; publications in the international press; opportunities for further cooperation with different departments of Intel, which are interested in the research subjects of IREC.

More information about the work of IREC "High-Level Design of Digital Systems" was provided by its director – head of the department "Computer Hardware and Software Systems" at SPbPU Institute of Computer Science and Technology (ICST) Vladimir M. ITSYKSON.

- Vladimir Mikhailovich, what importance for Polytech does the collaboration with Intel Corporation give?

- First of all, I would like to note that Intel is the world's leader in developing microprocessors – the majority of personal computers and servers are supplied with Intel's processors and parts. However, the areas of the company's work are a lot broader. Intel is a large software developer and the competencies of the research center Intel labs – one of the largest among the centers, organized by

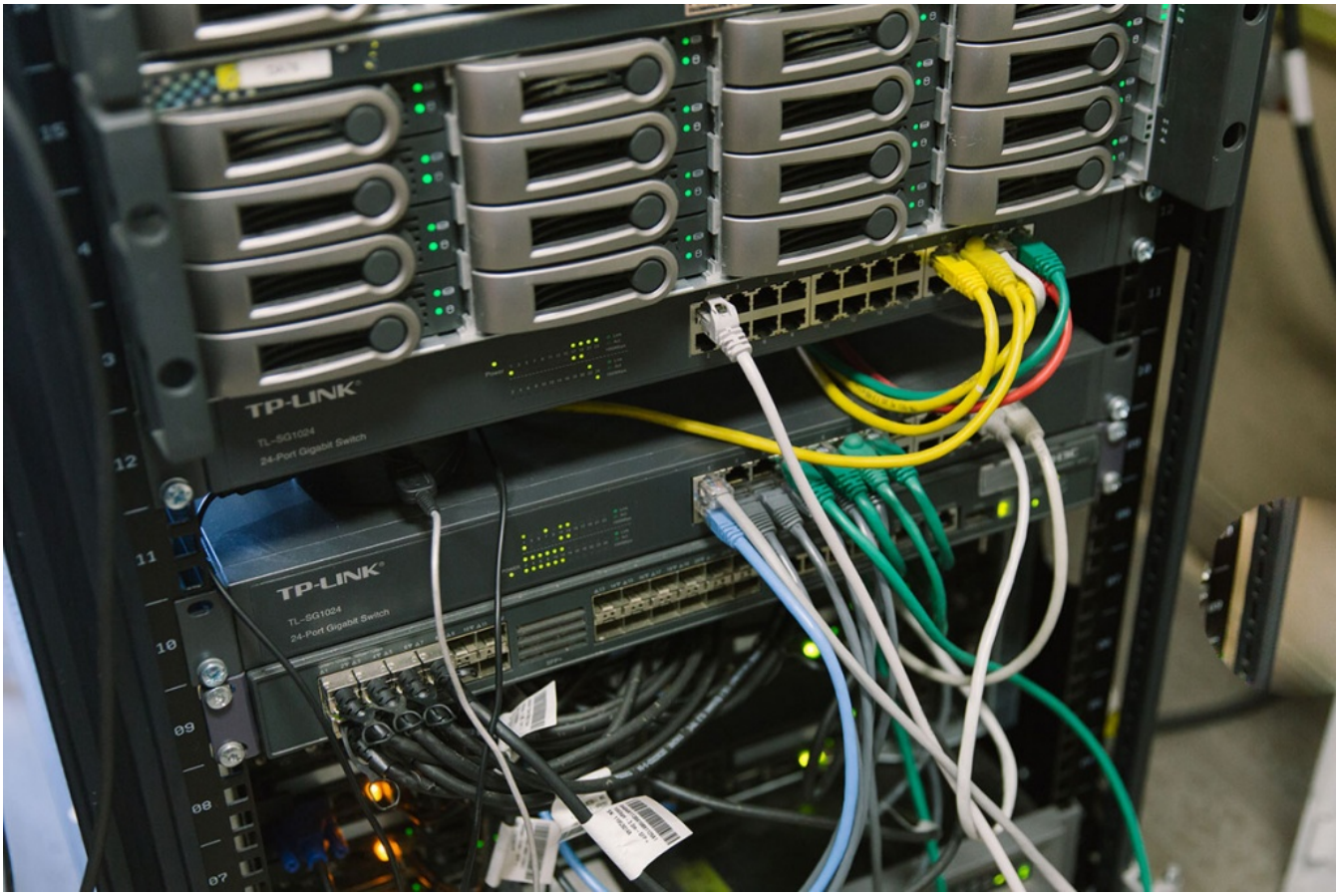
high-tech companies – are not limited to the design of high-throughput processors. The spectrum of their activity is very wide: microprocessors, telecommunications, supercomputers, mobile devices, optimization of power consumption, processing video streams, and many other things.

The establishment of IREC in Polytech has become a logical result of cooperation with Intel – the department "Computer Hardware and Software Systems" has a long history of interaction with this company. Our co-workers and post-graduates participate in research projects, connected with methods of increasing the quality of digital systems; in 2014, a summer school, devoted to tools of program modeling a hardware platform, was held jointly with Intel. And at the end 2014, our request for establishing the Center within the framework of competitive selection of the Program "5-100-2020", was one of the winning requests.

Answering your question – the collaboration with Intel allows Polytech to participate in solving the most urgent problems of developing tools and systems of IT and computer science, to reflect new methods and means of developing computer appliances in educational programs.

- What focus areas does the Center work in?

- The name of the Center – "High-Level Design of Digital Systems" – characterizes the main area of activity. The thing is that in recent 20 years the nature of the hardware engineer profession has changed. Now you can see a person with a soldering iron, who is soldering capacitors and transistors onto a printed-circuit board in a laboratory, only in old movies. Nowadays, not only the technologies for making hardware have dramatically evolved but the approach to their design. The main tool of a hardware engineer is a program EDA (EDA – electronic design automation), which allows designing a device, modeling its work, testing it in different modes, and "put" the created device into a programmable logic device. Generally speaking, the differences between programmers and hardware engineers get erased and developing hardware becomes more like programming in specialized languages: VHDL, Verilog, SystemC.



In addition, it is possible to see the change in modern trends – from making software and hardware separately to creating systems when, with the help of high-level means of design, modeling and the design of all the hardware and software system are done. And the specific decision about what parts will be made with hardware and what parts with software is made at later stages. Developing such approaches is what our Center does.

- The abbreviation itself – IREC – implies three areas of activity: international, research, and educational. Could you tell more about each?

- We try to develop all three parts equally. Within the framework of educational activity, a new subject called "Basic system design in SystemC" emerged, which we included into the master's program "Design of hardware and software means of computing systems". Also, our employees developed the summer school program on software modeling of hardware platforms.

Within the framework of the research activity, the Polytechnic University signed a contract with Intel in the field of studying methods of power consumption control for high-level designs. We prepared a number of scientific articles and registered the result of the intellectual activity.

As for international activity, we actively participate in international conferences and introduce an international component into the education process. For

example, Intel specialists have already given several lectures to our students via the Internet. Besides, within the framework of academic mobility, we are planning to organize internships for Polytech's students and post-graduates in research centers abroad.

- What are your plans for the Center's development?

- Development plans are very serious. They are also connected with the Supercomputer Center (SCC) of the Polytechnic University. Since the greater part of the SCC capacities is based on Intel's technologies and components, it was absolutely logical that representatives of Intel Corporation took part in the recent open day of the Supercomputer Center. SCC is an important competitive advantage of Polytech and, naturally, it influences the plans of our Center's work, because the technologies of parallel computing and designing systems with ultra-high level of parallelism require proper instrumental support. Besides, the importance of energy efficient technologies is growing; the relevance of power consumption optimization of the created systems is increasing. We are actively developing this area and planning to sign new agreements with Intel and other high-tech companies.

We hope that such state-of-the-art facilities as the Supercomputer Center and advancing competencies in the field of high-level synthesis will attract students and professors from all over the world to Polytech.

Media Center, SPbPU

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