1 Preface

11th International Conference on High-Performance Computing Systems and Technologies in Scientific Research, Automation of Control and Production (HPCST-2021).
May 21-22, 2021, Barnaul, Russia

The 11th International Conference on High-Performance Computing Systems and Technologies in Scientific Research, Automation of Control and Production (HPCST-2021) took place at the Altai State University on May 21 - 22, 2021. Altai State University (AltSU) is located in the center of Barnaul city - the capital of Altai region of the south-west of Siberia.

Figure 1. Main Complex of Two Joint Buildings of Altai State University: left - Learning Campus; right - University Administration Building.

HPCST is a regular scientific meeting that is held annually since 2011. It attracts specialists in the various fields of modern computer and information science, and their applications in automation of control and production, in mathematical modelling and computer simulation of processes and phenomena in natural sciences by means of high-performance computing.

The goal of the conference is to present state-of-art approaches and methods for solving contemporary scientific problems and to exchange the latest research results obtained by scientists from both universities and research institutions. All the reported results are valuable contributions to the field of applied information and computer science.

Due to the global COVID 2019 pandemic, travel restrictions were still in place in Russia, so the committee decided to hold the conference in a semi-virtual format. Specifically for the purpose, several rooms in AltSU main building were supplied with the equipment for videoconferencing. HPCST-2021 virtual meetings took place in the conference room (figures 2 and 3) of the university administration building using the Zoom remote videoconferencing system.
At the opening of the conference, Vladimir I. Jordan as the Organizing Committee Chairman addressed the conference participants with a welcoming speech. In addition, the Vice-Rector for Scientific and Innovative Work Svetlana G. Maksimova and the Director of the Institute of Digital Technologies, Electronics and Physics Sergey V. Makarov addressed the conference participants with welcoming speeches (figure 3).
The conference began with plenary reports by the chairmen of the main three sessions, who informed the audience about current problems, the latest achievements and promising developments in the fields of modern computer and information science.

Moderator Alexander V. Kalachev (AltSU, Barnaul) made the plenary report at the first conference session "Multi-processor computing systems, multi-core processors and programmable logic structures, digital signal processing". Dr. Ilya E. Tarasov (Russian Technological University, Moscow) as chairman of the first conference session "Multi-processor computing systems, multi-core processors and programmable logic structures, digital signal processing" made another plenary report using remote videoconferencing system. Moderator Vladimir I. Jordan (AltSU, Barnaul) made the plenary report at the second conference session "Parallel programming and computer simulation of processes and phenomena in natural sciences with using of parallel computing". Dr. Victor N. Sedalishchev (AltSU, Barnaul) as chairman of the third conference session "Robotics, control automation, production automation and automation of scientific experiment" made one more plenary report.

The local audience from Barnaul, its suburbs and surrounding cities participated in presentia (figure 4).

Figure 4. Ilya Ilyashenko, a postgraduate student of the Information Security Department, makes a presentation of his report.

At the same time, not local audience participated remotely via Zoom (figure 5). This year, the geography of countries, cities and research organizations expanded, from which new researchers who had not previously participated in the conference participated. For example, foreign participants were added to the conference from Brazil (from far abroad), as well as from neighboring countries - Kazakhstan and Uzbekistan. New participants from Russia were representatives of state universities from such cities as Moscow, St. Petersburg, Sevastopol, Chelyabinsk, Tomsk, Novosibirsk.

Following the plenary sessions in the course of the two-day event, communication was established between seasoned scholars and PhD students in various fields of computer and information science.
Sessions of the conference are devoted to the relevant scientific topics: architecture and design features of the multi-processor computing systems, architecture and design features of the hardware on the basis of FPGA, signal (DSP) and multi-core processors, IP-cores for FPGA, processing and synthesis of signals, technologies of distributed processing and distributed computing using multiprocessor computer systems, GRID-technologies and cloud computing and services, neuronal network technologies, high-performance and multi-scale predictive computer simulation in natural sciences, robotics and artificial intelligence systems, control automation and mechatronics, production control automation, scientific experiment automation.

Figure 5. Conference Chairman Vladimir Jordan (left) and Chairman of the third conference session Victor Sedalishchev (right) participate in the discussion with the speaker remotely via Zoom.

Distinguished reports by young researchers were awarded with the honorary certificates.

The conference was attended by 142 scholars with more than sixty qualified reports. Best reports were selected for these proceedings by the programme committee and the moderators of the sessions. The main criterion for selection of articles was scientific novelty and relevance of the results achieved in the fields of modern computer and information science. Besides the selection, all 25 accepted manuscripts were reviewed by two referees. A few papers were retracted further due to various reasons.

The organizing committee would like to express our sincere appreciation for the organizational support to the administration of Altai State University and to the staff of Institute of Digital Technologies, Electronics and Physics of Altai State University.

The editors’ deep appreciation for the opportunity of international publication of the volume is offered to IOP Publishing.

With best regards on behalf of the conference board,

Vladimir I. Jordan
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