Overview of the III International Conference on Applied Physics, Information Technologies and Engineering – APITECH-III 2021

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Abstract. The overview describes the main directions and results of the III International Conference APITECH-III 2021 held in Krasnoyarsk from September 24 to October 3, 2021. It gives the details about the participants and the proceedings. The purpose of the Conference is to share the experience of leading experts in the application of modern methods of applied physics and information technology in high-tech production, in the fields of aerospace, energy, chemical and oil and gas engineering, as well as in modern areas of neuroinformatics and modeling of nonequilibrium systems. The JSC “ISS-Reshetnev Company” and Siberian Scientific Centre DNIT sponsored the Conference.

The Volume contains Proceedings of the III International Conference on Applied Physics, Information Technologies and Engineering (APITECH-III 2021) which was held at the Krasnoyarsk Science and Technology City Hall in Krasnoyarsk, Russian Federation from September 24 to October 3, 2021. Additionally, the volume includes the best reports accepted and presented at the XXIX All-Russian workshop "Neuroinformatics, its applications and data analysis" (September 24-26, 2021) and the XXIV All-Russian workshop "Modeling of nonequilibrium systems-2020" (October 1-3, 2021), which took place in the Federal Research Centre «Krasnoyarsk Scientific Centre of the Siberian Branch of the Russian Academy of Sciences» at the Institute of Computational Modeling of the Siberian Branch of the Russian Academy of Sciences (ICM SB RAS). The volume also includes the best reports accepted and presented at the III International Scientific and Practical Conference “Borisov’s Readings”, which took place at the Polytechnical Institute of the Siberian Federal University on 23-24 September 2021.

The purpose of these scientific events is to share the experience of leading experts in the application of modern methods of applied physics and information technology in high-tech production, in the fields of aerospace, energy, chemical and oil and gas engineering, economics and organization of engineering production, as well as in modern areas of neuroinformatics, complex systems research, modeling nonlinear, non-stationary and spatially heterogeneous processes.

The International Conference on Applied Physics, Information Technologies and Engineering (APITECH-III 2021) was jointly organised by the International and Russian Union of Scientific and Engineering Associations (Moscow, Russia), Federal Research Centre "Krasnoyarsk Science Centre of
the Siberian Branch of the Russian Academy of Sciences" and Krasnoyarsk Science and Technology City Hall.

The main partner organisations in preparing and organising the Conference in Krasnoyarsk as well as of the previous scientific events [1-14] were: JSC “ISS-Reshetnev Company” and Institute of Space and Information Technologies of Siberian Federal University.

The JSC “ISS-Reshetnev Company” and Siberian Scientific Centre DNIT sponsored the Conference.

The Program Committee and Editorial Board included prominent professors and scientists from the Russian Academy of Sciences, Siberian Federal University (Russia), University of Leicester (United Kingdom), Bukhara Engineering Technological Institute (Uzbekistan), Republican center for space communications and electromagnetic compatibility of radio-electronic devices (Kazakhstan), Tashkent Institute of Irrigation and Agricultural Mechanization Engineers (Uzbekistan), Institute Curie (France), Amity University Uttar Pradesh (India), Reshetnev Siberian State University of Science and Technology (Russia), Voronezh State Technical University (Russia) as well as specialists from Russian and foreign leading industrial enterprises (see Appendix 1).

The international scope of the Conference was confirmed by the participation of representatives from 14 countries besides Russia (Azerbaijan, Ukraine, United Kingdom, Finland, Kazakhstan, Belarus, China, France, Uzbekistan, Iran, Kyrgyzstan, Qatar, Vietnam, Honduras).

The participants from Russia represented more than 200 universities, scientific institutes and organisations, industrial enterprises from more than 40 regions of the Russian Federation (Figure 1).

The event has offered a platform for bringing together students, postdocs, innovative academics and industrial experts to exchange their ideas and contribute new applied physics and engineering approaches to research mechanical and automation processes in various technological and information systems. Great interest was aroused by the section about applied physics, oil and gas engineering, cybernetics and information technologies, ecological engineering and mechanical science. These directions stimulated lively discussions among researchers as well as industrialists.

Figure 1. Scientific sections.

The Conference provided the premier interdisciplinary and multidisciplinary forum for researchers, practitioners and educators to present and discuss the most recent innovations, trends, concerns, practical challenges encountered and the solutions adopted in the fields of industrial physics, materials
sciences, mechanical and aerospace engineering, information and transport technologies, robotics and cybernetics, data protection in automation systems, chemical, ecological and power engineering, etc.

Although the schedule of the Conference was very tight, there were very vivid discussions among the participants. The program of the Conference consisted of keynote and plenary talks and numerous presentations. A wide range of engineering and industrial physics problems in various production and technological systems has undergone consideration during the meeting. The programme of the Conference included the following scientific directions:

- Condensed Matter Physics;
- Nanoscience and Nanotechnology;
- Optical Physics, Quantum Electronics and Photonics;
- Engineering and Industrial Physics;
- Instrumentation Metrology and Standards;
- Software Engineering;
- Information Systems;
- Software Reliability and Data Protection;
- Cybernetics, Economics and Organization of Mechanical Engineering Production;
- Mechanical Engineering and Industry 4.0;
- Automation Engineering and Cyber-Physical Systems;
- Materials Science, Aerospace Technology and Engineering;
- Power, Chemical and Ecological Engineering;
- Oil and Gas Engineering;
- Neuroinformatics, its applications and data analysis (the XXIX All-Russian workshop);
- Modeling of nonequilibrium systems (the XXIV All-Russian workshop);
- Industrial physics and transportation engineering (the III “Borisov’s Readings”, section in IrGUPS).

The participants who could not come to the Conference due to different reasons including the problem of restrictions connected with COVID-19 and high transportation costs presented on-site presentations which are available on the web-site of the Conference and took part in the online session with reports which had been prepared and sent to the Organizing Committee beforehand. The online section was held on the Zoom platform (zoom.us) which let all the participants to watch the reports and ask questions online as well as to write them in the chat format. The speakers answered the questions online (Figure 2).
The overall technical quality of the conference was good, the platform let to add up to 500 participants simultaneously. The participants could watch the reports, write questions and communicate. The moderator could change the roles so that the speaker could answer questions and make comments.

All participants were invited to present their papers in this Volume and all submitted manuscripts went through the independent peer review process. We are very grateful to all reviewers from Russia, China, USA, Slovenia, France, Uzbekistan, Germany, Belarus and Republic of Kazakhstan for their time and highly professional comments. We deeply believe that their reviews gave opportunity to improve the scientific quality of the presented papers which may be useful for academic, scientific and industrial partners.

More than 600 reports were submitted to the Organizing Committee of the Conferences APITECH-III-2021, the XXIX All-Russian workshop "Neuroinformatics, its applications and data analysis", the XXIV All-Russian workshop "Modeling of nonequilibrium systems-2020" and the III International Scientific and Practical Conference “Borisov’s Readings”. 368 reports were selected for inclusion into this Volume after the review process. All the papers were subjected to rigorous peer-review by conference committee members and international reviewers. The papers were selected based on their quality and relevance to the Conference directions. The proceedings present to the readers the recent advances in the field of applied physics (section 1), cybernetics and IT (section 2), engineering and material science (section 3), instrumentation technology and environmental engineering (section 4), industrial physics and transportation engineering (section 5). These papers reflect modern applied and industrial physics and engineering approaches in all Conference directions, broaden the researches of the previous Conferences [1-14]. We hope that the papers included into the Volume will be useful for scientists and engineers all over the world.

We chose the IOP Journal of Physics: Conference Series to provide all contributors with the opportunity to publish their papers in an international, peer-reviewed journal. This is understood and appreciated by all the participants of our Conference, and therefore this Volume provides an excellent overview of the main topics of our Conference.

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On behalf of the conference committee and organizers, we would like to thank all the authors who contributed to this Volume as well as to the reviewers, speakers and all the conference participants for their support to APITECH-III 2021.

**Figure 2.** Presentations and speeches of the participants of the online session.
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