

PETER THE GREAT  
ST. PETERSBURG  
POLYTECHNIC UNIVERSITY



POLYTECH



WINTER, 2021

INTERNATIONAL  
SPbPU  
REVIEW

BEST  
PRACTICES



Rector of Peter the Great  
St. Petersburg Polytechnic  
University, Academician of the  
Russian Academy of Sciences  
**Andrei RUDSKOI**



Peter the Great St. Petersburg University has been developing very actively in terms of education, research as well as in terms of international cooperation and working closely with the global academic community to contribute to the advancement and sustainable development. The year 2020 overall world faced an unprecedented challenge and the necessity to quickly adapt to changing environment and target the most relevant issues of online work and various cooperation modes.

SPbPU has reached a new milestone and opened new horizons of education and research. The year past has given us an opportunity to become more united, to join our efforts and try new modes of communication and joint work.

*May the forthcoming year bring all of us new positive opportunities and happiness, new achievements and breakthroughs. I wish all of you and your families and friends good health, joy and peace in 2021!*



Vice-Rector  
for International Affairs  
**Dmitry ARSENIYEV**

We are approaching the new year of 2021 and we are looking forward to further development of the overall global community as well as the new positive changes. SPbPU is currently working on strengthening and deepening the existing partnership connections as well as developing extensive research projects. And we are extremely pleased to share with you our recent achievements on the pages of this issue of SPbPU International Review.

We hope that you will find some spare time to get to know about the significant results of SPbPU academic and research work. We are pleased to share our news about developing the first in Russia and unique electric smart crossover KAMA-1 based on digital twin technology. We will tell about strategic cooperation with TU Graz as well as a significant event organized already for the second time in collaboration with our Spanish partners – the Second Russian-Spanish Language and Culture Week, and we are glad to share with our partners and friends our outcomes within the research projects and result of participation in the Symposium of Russian-Indian Universities Network, etc.

We wish you good health and happiness in the forthcoming year and look forward to developing cooperation with our partners and welcome new opportunities!

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ALUMNI



## SPbPU NTI CENTER PRESENTED THE FIRST RUSSIAN ELECTRIC SMART CROSSOVER KAMA-1 DEVELOPED ON THE BASIS OF DIGITAL TWINS



At the Vuzpromexpo-2020 exhibition in Moscow in December, a unique Russian serial small-sized city electric car KAMA-1, developed on the basis of digital twins, was presented. It is a development of the Engineering Center of Peter the Great St. Petersburg Polytechnic University together with PAO KAMAZ, the industrial partner of the project. «This is an example where, through the focused efforts of all interested parties, an extremely interesting product can come out» Minister of Science and Higher Education Valery FALKOV.

The «Creation of a smart digital twin and an experimental prototype of a small-sized city electric car with a Level 3-4 ADAS system» project is implemented at the SPbPU Computational Engineering Center (CompMechLab®) - the key structural subdivision of the SPbPU NTI Competence Center of Advanced Manufacturing Technologies with the financial support of the Russian Ministry of Science and Higher Education.

The specialists of the SPbPU NTI Center of Advanced Manufacturing Technologies under the leadership of Alexey BOROVKOV in just two years, the shortest possible time by automotive industry standards, have developed and produced the first Russian electric car. This is the first full-featured prototype as part of the electric vehicle design platform for the development of vehicles varying from a compact city car to urban 18-meter electric buses that meets international certification requirements.

»» *Electric smart crossover KAMA-1, has been created by the SPbPU engineers on the basis of the digital twin technology*



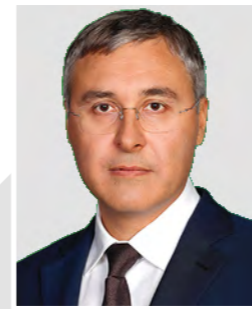
**Alexey BOROVKOV, SPbPU Vice-Rector for Innovative Projects, Head of the SPbPU NTI Center:**

*“This is the first Russian electric car developed entirely on the basis of digital twin technology and specialized digital platforms. The smart crossover is competitive both in terms of technical and consumer*

*characteristics, as well as in terms of design, safety and comfort, and meets international certification requirements.”*

The project was implemented on the basis of unique platform solutions developed at SPbPU: the CML-Bench™ digital twin development and application platform (has been developed at the SPbPU CompMechLab® Engineering Center since 2014; it was awarded the Russian Federation National «Industry» Award in 2017); demonstrator platform for cross-market and cross-industry «end-to-end» digital and advanced CML-CAR™ production technologies (has been developed since 2006 for motor transport and since 2017, for electric transport); the Universal modular platform of electric transport model range development for various consumer demands CML-EV™ (has been developed since 2018).

*“It is not a replica of ready-made solutions: it is a fully domestic development. This is a great result of the work with our industrial partner and the ministry. This vehicle is the prototype, all the design documentation has been created for it. It does not borrow ready-made solutions; it is a fully domestic development in all systems. We developed it as the basis for urban transport. Most people live in big cities, and we would like to have clean cities, clean air, and environmentally friendly transportation”* said **Oleg KLYAVIN**, chief designer of the project and deputy head of the SPbPU NTI Center.



**VALERY FALKOV,**  
Minister of Science and Higher Education of Russian Federation

*Today is a non-trivial event: we are presenting the development of one of the best Russian universities, St. Petersburg Polytechnic University. First of all, I would like to thank the*

*rector Andrei Rudskoi and the team of Alexei Borovkov for this development. But it would be impossible to achieve this result without interaction with the industry, and a special role in the implementation of this project belongs to PAO KAMAZ. The task, solved by St. Petersburg Polytechnic University together with KAMAZ, shows that even in this part the ambitions can be successful. There will certainly be a result, but it is necessary to help, support and trust, because the result is possible through the efforts of large teams.*

*This is a car that was created in record time, using the latest digital twin technology. The technology itself, its carrier and holder is also Polytechnic University, and the ideological inspirer, the man who put the most effort into it, is Alexei BOROVKOV. The electric car we are presenting is an example of when, due to the purposeful efforts of the parties involved, a very interesting product can be fabricated. I would like to emphasize the role of young scientists and engineers in the development of this project. The government has set the goal of making science younger, and there should be synergy between young people and established scientists.*



**SERGEY KOGOGIN,**  
Director General of PAO KAMAZ

*This is not our first joint project with Polytechnic University. We believe that the future of electric transport is not far away but in the near future. After 400 electric buses made by KAMAZ hit the streets of Moscow, after forming a*

*general concept and seeing what is happening in the world, together with Polytechnic University and with the help of the Ministry of Education and Science, which supports us, we decided that it is time to consider developing a basic platform for the development of both passenger and commercial transport. The most important thing for us is the ability of a group of young engineers at SPbPU and our engineers to make a finished product in a short period of time. The near future will show how successful it is.*



**ANDREI RUDSKOI,**  
SPbPU Rector, Academician of the Russian Academy of Sciences

*KAMA1 is a truly unique development that our talented engineers have implemented in two years – from the technical task to the pre-production sample. This*

*project has fully demonstrated the new mission and role that universities should play in the country's economy – not only to carry out training specialists, not only to do local research, but as well to develop complex, sophisticated works. Polytech is one of the leading technical universities in the country, and it is very important that our university also became one of the first in the development of the latest Russian technologies. Electric cars are no longer the future, but a very real present that meets the requirements of being efficient, ecological and environmentally friendly. Only with the help of a high level of digitalization and new approaches to production technologies will we be able to ensure sustainable development for future generations.*



**ALEXANDER SERGEYEV,**  
Academician, President of the RAS

*This is a fusion of youth and experience, university and academic science, a fusion with modern industry. It is symbolic that it was made in St. Petersburg. It was in St. Petersburg that the Russian Academy of Sciences was founded;*

*the city was the cradle of science and continues to be so now, showing powerful examples of innovation. All the breakthrough technologies are developing quite quickly, and young people are looking at where to put their efforts in to break into world technological progress. It is great that KAMAZ is present here. They are the leader of high-tech in our country today; they are at the cutting edge of Russia's advancement towards high technology. I think it is also important that the machine was originally developed in digital form: this is the future of the entire industry. And now that we have entered the digital age, everything should start in silicon (the term for computer modeling, simulation of an experiment - Editor's note). This electric car is an example of how things should be done in the future. It is a fusion of youth and experience, a fusion of university and academic science, a fusion with modern industry. It is a perfect example for the opening of today's exhibition.*





## THE «RECOGNITION AND INFLUENCE» PRIZE: FOR THE SECOND YEAR IN A ROW, POLYTECHNIC UNIVERSITY WAS RECOGNIZED THE BEST UNIVERSITY IN THE CITY!

Ten finalists of the «Fontanka.ru - Recognition and Influence» city prize received their awards last night on the New Stage of the Alexandrinsky Theater. These are the best of the city's best companies and brands, chosen by the audience of the Fontanka.ru city portal by polling. Peter the Great St. Petersburg Polytechnic University for the second year in a row became «The best university.»

According to the organizers, the annual city prize «Fontanka.ru - Recognition and Influence» is a token of gratitude from citizens to the most high-quality businesses in St. Petersburg. In 2020, it is a special mission to select the best and present them with awards. After all, this year has been a real test of fortitude and endurance for many. And for Fontanka it also is the year of its 20th anniversary. The winners were chosen by popular vote at Fontanka.ru. Voting for the best enterprises, companies and projects in the city has been on the site since September. During this time, finalists

were determined in each of the 10 nominations; they have competed for the right to obtain the Golden Griffin and recognition of all St. Petersburg. The winners were awarded by the partners of the event and «Heroes of Fontanka,» real national heroes, whose good deeds and exploits the edition wrote about in 2020.

The ceremony of announcing the results of the popular vote was held in compliance with all safety requirements and in a closed future. The presenters of the ceremony noted that in 2020, because of the pandemic, every educational institution in the city had to try distance learning, which was a challenge for both students and teachers. According to those who voted, the university that provided the best educational process under the current circumstances was SPbPU. The Golden Griffin, Diploma of the Prize Laureate and souvenirs were presented to the Rector of SPbPU, Andrei RUDSKOI, RAS Academician, by **Alexander KONYSHKOV**, Manager

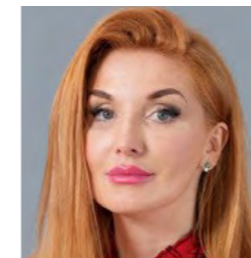


**ANDREI RUDSKOI**,  
SPbPU Rector, Academician of the  
Russian Academy of Sciences

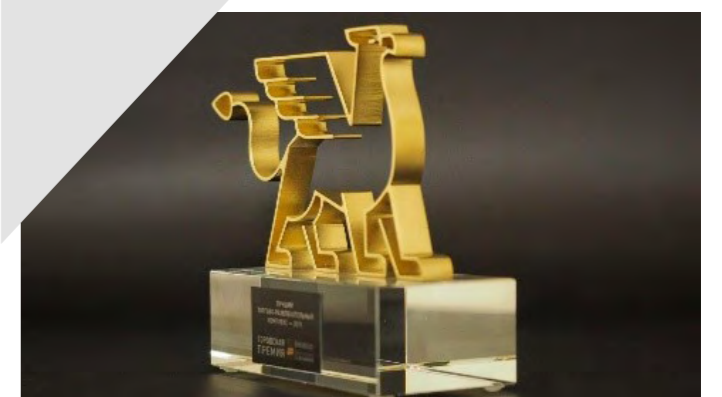
*The first time you receive this nomination, it can be assessed as luck, a happy accident. But this is the second year in a row that we are the best university in the city. Thank you, Fontanka! Victory is not necessarily first place, victory is when you get better.» In what way has Polytechnic University become better this year? The head of the university enumerated a few achievements: «These are five stars of the international QS ranking agency for the quality of online programs for students in Russia and foreign countries. These are tens of thousands of students from Russia, China, Europe and other countries. This is the working group led by Professor Borovkov, who made a mathematical model of the spread of coronavirus, and it was used by the leaders of many regions, including St. Petersburg and Moscow, and the Russian Ministry of Health to make the right decisions and minimize the risks. It is the 37th place in the world in THE ranking based on the UN principles of sustainable development, where we are talking about the environment, working conditions, and taking care of people with disabilities, for whom we provide a normal learning environment. It's the status of a world-class Advanced Digital Science Center, which our university received this year. It's also our TV studio, where we host wonderful programs and invite everyone to collaborate. And most importantly, a few days ago we presented at VUZPROMEXPO the first Russian electric car based on digital twin technology; within two years, we have designed it in our university, from the requirements specification to the pre-production prototype. Using the latest technology, we showed Russia and the world what role higher education can have in the economic space.*

of SMP Bank St. Petersburg Branch, and **Ivan BAKAIDOV**, «Hero of Fontanka».

*«The unpredictability of the situation is the main thing that both teachers and students noted,» **Alexander KONYSHKOV** said. «It is not only the work in the classroom, but also the possibility to set up the learning process remotely, to organize all the work so that students would get what they came for. It requires a high level of professionalism. This is a very important nomination because these people are doing an important thing for you and me - educating our future.»*



**Marianna DYAKOVA**, Head of SPbPU Public Relations, admitted that this year's victory was quite unexpected: *«The first time it was all based on some kind of labor enthusiasm, and the second time it was difficult to earn first place for many reasons: colleagues from other universities also strive to win and it had been a difficult year. But Polytechnic University tried to keep up with the times, to adapt to changes, to seek new methods and approaches, to be even more professional. All the staff understood this, so they developed. This is the second time we have won this award, as they say stability is a sign of excellence, and we have been able to show it. In my opinion, the Fontanka Award is a great initiative, incentive and motivation.»*



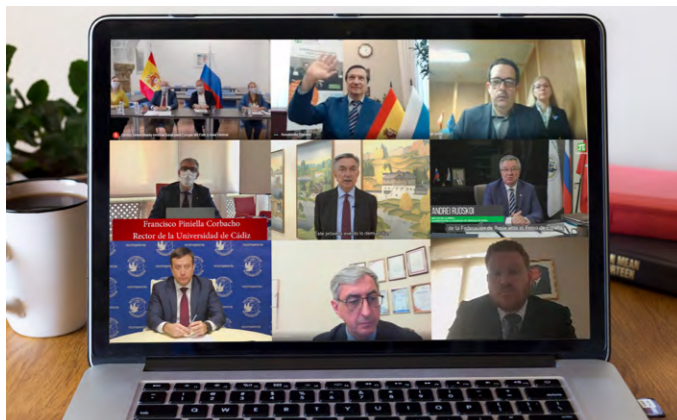


## “II SEMANA HISPANO-RUSA DE LENGUA Y CULTURA”: HOW TO BE MULTICULTURAL AND LEARN LANGUAGES ONLINE

Big international educational event – II Semana Hispano-Rusa de Lengua y Cultura (2nd Spanish-Russian Week of Language and Culture), traditionally organized by Peter the Great St. Petersburg Polytechnic University and University of Cadiz (UCA, Spain) was held online from November 16 to November 20. The virtual format did not prevent it from becoming one of the largest events in Russia and Spain in the field of culture and education: in total, almost 800 people from 33 countries from all over the world signed up for participation in the Week.

Each participant of 2nd Spanish-Russian Week of Language and Culture could find the event to their liking: students, teachers, employees of international offices and just fans of foreign languages listened to lectures, participated in round tables and master classes, enjoyed virtual tours and a flamenco concert, and competed in the «What? Where? When?» intellectual quiz, created by analogy with the popular Russian TV show.

» **2nd Spanish-Russian Week of Language and Culture turned out to become the biggest event between Russia and Spain in 2020 in the field of education and culture**



At the official opening ceremony, which was held online, the heads of participating universities, top officials of embassies and friendly organizations greeted the guests. **Andrei RUDSKOI**, Rector of SPbPU, Academician of the RAS, and **Francisco Piniella CORBACHO**, Rector of the University of Cadiz, addressed the audience on behalf of the organizing universities of the Week.

The Russian-Spanish Language and Culture Week is traditionally supported by the Russian Embassy in Spain and the Embassy of Spain in Russia. The opening ceremony was attended by Ambassador Extraordinary and

Plenipotentiary **Yuri P. KORCHAGIN** and Cultural Advisor of the Embassy of Spain in Russia **Jorge SOLER**. Also with a welcoming speech addressed the participants of the Week **Pavel SHEVTSOV**, Deputy Head of the Federal Agency for the Commonwealth of Independent States, Compatriots Living Abroad and International Humanitarian Cooperation (Rossotrudnichestvo). He emphasized that holding such an international event even in an online format is proof of its demand as a platform for discussing the prospects of humanitarian cooperation between our countries. **Sergey SARYMOV**, Head of the Rossotrudnichestvo office in the Kingdom of Spain, joined Pavel Shevtsov's congratulations and expressed his confidence that Russian-Spanish Language and Culture Week will contribute to the development of partnership between the two countries.

As last year, the organizers paid considerable attention to Russian and Spanish language classes. Over 100 participants joined the lessons, which were held in mini-groups during the week on the Google Meet platform. *“I really like both Spain and Russia. I also enjoy learning different languages and cultures. 2nd Spanish-Russian Week of Language and Culture was a good opportunity to learn more. I have always thought that Russian language is very difficult. But thanks to the effective and interesting lessons that took place in a warm and friendly atmosphere, I now have no fear of studying it,”* – said Nasim MORADI, participant from Iran.

David Riano Martines, college student, Colombia: *“I learned about Russian and Spanish Language and Culture Week through Twitter at the Russian Embassy in Spain and decided to participate because I like Russian culture and was interested in the program. I had never studied Russian before. I really liked the classes and the materials that were sent to us additionally. I would like to continue learning Russian, and I am also considering future admission to a Russian university.”*

Russian participants showed no less interest in Spanish lessons. *“I have been studying Spanish for a long time - it is a hobby and something like psychotherapy. I know about Russian-Spanish week not by hearsay - I participated last year, and I was hoping for this format to become traditional. And, of course, I am glad that in 2020 even the pandemic did not become an obstacle to 2nd Spanish-Russian Week of Language and Culture. In general, the program of the Week impressed me very much - I am already looking forward to next year,”* said Aleksandra SUKHOTINA (St. Petersburg).

Within the framework of the cultural workshop «Tour around the cities of Russia», over 200 spectators made a virtual journey from St. Petersburg to the shores of Lake Baikal. Workshop “Russian folk crafts and folk cui-

sine” introduced the inhabitants of Spain, Portugal, Chile, Ecuador and other countries to the traditions of Russian culture and national dishes. Another workshop was dedicated to the Contemporary Russian Literature and united the readers who showed interest in the Russian literature from the end of the XX century to the present days.

Program of 2nd Spanish-Russian Week of Language and Culture included a series of round tables and seminars, such as «Teaching Spanish during a pandemic», «Actual problems of teaching Russian as a foreign language». Employees of international offices and company representatives joined the seminar «Experience in scientific and technical cooperation between Russia and Spain» and a round table «Spanish language as a strategic tool for internationalization.»

Over 300 participants attended lectures by experts in Hispanics. During the lectures by HSE lecturer **Olga VOLOSUYUK** “Spain and Russia on the Two Shores of Europe: Relations throughout the Centuries” and “Discovery of Spain by Russia: History and Culture”, the participants learned about cultural and historical peculiarities of Russia and Spain and how relations between two countries were built. Lecture “Petersburg of Betancourt” by SPbPU professor **Dmitry KUZNETSOV** revealed the personality of the great architect who made a fundamental contribution to Russian architecture and engineering of the 19th century.

Success of 2nd Spanish-Russian Week of Language and Culture was highly appreciated by the heads of the participating universities, top officials of embassies and friendly organizations. The next Russian-Spanish week is indeed planned to be held at the site of the University of Cadiz. The online format of a number of events will also be preserved - the organizers noted their high demand among Russian and foreign participants.

### Live events: more than 3500 views of the events recordings

Official Inauguration/Closing

Lectures

Cultural workshops

Practical workshops

Round tables

Russian language classes (A1, A2, B1, B2)

Spanish language classes (A2, B1, B2, C1)

Online quiz «What? Where? When?»

Painting exhibition

Poetic meeting

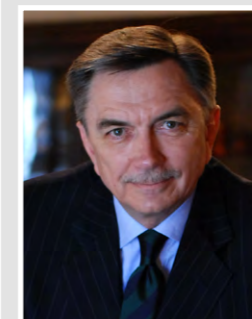
Online excursion to the universities

Concert Flamenco



**FRANCISCO PINIELLA CORBACHO**,  
Rector of the University of Cadiz Spain

*Russia and Spain have a long and rich history of cooperation in both humanitarian and scientific spheres. But the key to success in any partnership will always be the ability to understand each other. That is why mutual communication, learning of mentality, culture, languages of our countries, immersion into the richest musical and literary heritage is so important. This is one of the main goals of our Russian-Spanish week of language and culture, which has already become a tradition and without a doubt the largest Russian-Spanish event of this difficult year 2020.*



**YURI KORCHAGIN**,  
Ambassador Extraordinary and Plenipotentiary of the Russian Federation to Spain

*The Coronavirus Pandemic prevented the Second Russian-Spanish Week from taking place on the hospitable land of Spain. At the same time, I am sure that nothing can prevent the active cultural and educational interaction between the peoples of Russia and Spain, and this event is a confirmation of this.*

**In total, 770 people from 33 countries signed up for participation in 2nd Spanish-Russian Week of Language and Culture**





## FOCUS TO SCIENTIFIC COOPERATION WITH INDIA

### 11th MEETING OF THE RUSSIAN-INDIAN INTERGOVERNMENTAL WORKING GROUP ON SCIENCE AND TECHNOLOGY

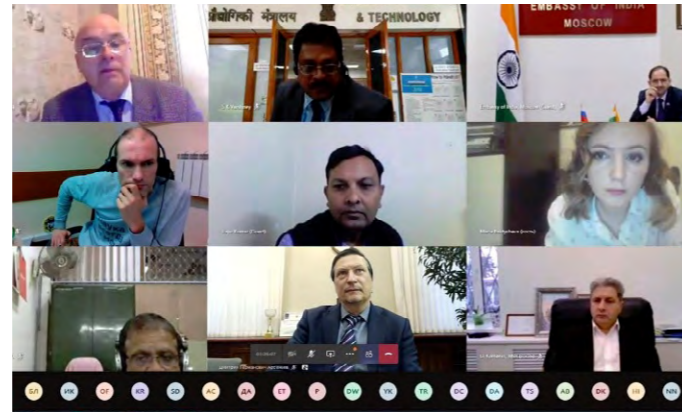
The Russian-Indian Working Group on science and technology is the key intergovernmental structure that brings together representatives of the ministries, the Academy of Sciences and scientific and research foundations of the two countries – Russian Foundation for Basic Research (RFBR), The Department of Science & Technology (DST), Russian Science Foundation (RSF) and others.

Working Group determines the areas of interaction and cooperation, compares states priorities in a number of areas of science and technology, as well as works on developing a roadmap for bilateral cooperation between the Russian Federation and the Republic of India in the selected priority areas. Thanks to close operational interaction at the intergovernmental level, over the past few years, it has been possible to hold a number of bilateral competitions to support joint Russian-Indian research, implement a number of scholarship programs and organize joint scientific events.

In December, the 11th session of the Russian-Indian Intergovernmental Working Group was held, where participants presented information about planned future programs to support research activities, identified priorities and conditions for joint work. The session was attended by specialists from the Russian Academy of Sciences institutes and leading Indian scientific centers. Two leading Russian universities with the strongest and most productive partnerships with the Indian establishments - Peter the Great St. Petersburg Polytechnic University and Tomsk State University - were invited to present their best practices and experience in bilateral projects, as well as proposals for being included in a new roadmap at the meeting of the working group.

Vice-Rector for International Affairs of SPbPU Professor **Dmitry ARSENIYEV**, who was SPbPU representative at the 11th meeting of Indo-Russian Working Group on Science and Technology, noted in his talk that SPbPU partnership with leading universities in India has traditionally been in the focus of SPbPU: for 15 years The Polytechnic University have been enjoying fruitful cooperation of joint research groups. Over the past 5 years, the Polytech has submitted more than 20 joint applications with Indian partners, 6 of which were approved and funded at the intergovernmental

» **Success guarantee: 6 joint scientific projects of SPbPU and leading universities in India are being implemented**



level, which testifies to the thoroughness of scientific research and a high level of collaboration of polytechnics and Indian scientists. Projects have been implemented in such important areas as the Internet of Things, nanomaterials and nanostructures for use in optics, photonics and spectroscopy; intelligent production technologies, robotic systems, new materials and methods of design, machine learning and artificial intelligence, and, in particular, the SmartCity paradigm.

### ONLINE SYMPOSIUMS WITHIN THE RUSSIAN-INDIAN NETWORK OF HIGHER EDUCATION INSTITUTIONS (RIN)



In the autumn of 2020 the Russian-Indian Network of Higher Education Institutions (RIN) hosted two online symposiums on following topics: Data Analytics and Nano Materials.

The events brought together participants from more than 50 universities, including leading engineering universities in India – Indian Institutes of Technology (IIT): IIT Bombay, IIT Madras, IIT Delhi, IIT Hyderabad, IIT Roorkee, IIT Kanpur, IIT Patna, IIT Jodhpur, IIT Indore, IIT Mandi, Institute of Nanoscience and Technology (INST), National Chemical Laboratory of India, etc.

Peter the Great St. Petersburg Polytechnic University (SPbPU) is one of the founders of the RIN Association, and SPbPU representatives were invited to participate not only as speakers, but also as moderators of particular sections.

Within the RIN Data Analytics Symposium, Professor of the Higher school of Hydrotechnical and Power Engineering **Vladimir BADENKO** moderated the section on digital agriculture and made a presentation “Crop models as research tools agricultural systems design: long-term agro-ecosystem dynamic prediction”.

“The problem of introducing modern digital technologies in

### » Russian-Indian Network brings scientists together despite closed borders

the practice of agriculture is acute all over the world. It is very important to create a system of platform tools that will allow for the transfer of knowledge and technology between all sectors of agriculture, and take into account the needs of all participants in the process – from farmers to end users. Without international cooperation it is almost impossible to do, the expertise of the specialists of the Polytech are an effective tool that allows to work with data aggregation from different sources, the digitalization of professional knowledge and delivery of knowledge and data in the infrastructure information platform of decision support”.

The section on artificial intelligence was moderated by **Vyacheslav CHUKANOV**, senior lecturer at the Higher School of Applied Mathematics and Computational Physics, who also made a presentation on «Deep/Machine Learning for Medical Imaging». «The established global trend towards the creation of intelligent medical diagnostics and preoperative planning systems is manifested by the growing number of studies in the field of MRI, CT or ultrasound image processing. Our research group has many years of experience in developing such algorithms as part of research projects for European companies,» said SPbPU researcher. In his presentation, the scientist also has told about other projects with Siemens, Philips, Huawei, including those on artificial intelligence methods.

As well as data analytics, nanomaterials and nanotechnologies are one of the key research areas of Polytech's activities. The online RIN Symposium on nanomaterials was attended by 12 scientists from the SPbPU Institute of Physics, Nanotechnology and Telecommunications and the SPbPU Institute of Machinery, Materials and Transport. “Our laboratory of Laser Photometry and Spectroscopy took part in the Indian-Russian Symposium with great interest. We talked about our research, and the data presented aroused the interest of our Indian colleagues. In particular, we presented three projects of our laboratory aimed at the practical implementation of optical methods for nanoparticle diagnostics. I hope that the contacts established at the meeting will lead to further fruitful cooperation,” said **Elena VELICHKO**, Director of the Higher school of Applied Physics and Space Technologies.

The section on nanomaterials was moderated by associate Professor of the High School of Materials Physics and Technologies **Ekaterina VASILYEVA**, who made a report on «Nanopowder metallic materials synthesis for various applications». Participants discussed methods for nanomaterials investigation, applications of nanomaterials for the environment, biomedicine, energy, electronics, agriculture, and soil reclamation and other topics of research in this area.

Within the online Symposiums, Russian and Indian scientists shared the interim results of particular researches that the research teams of the institutes are currently implementing and discussed opportunities for cooperation and conducting joint projects. The result was a number of arrangements on expanding contacts between SPbPU scientists and universities in India and identifying further steps for developing cooperation.



**SHISHIR SHROTRIYA**,  
Doctor, Counsellor (Science & Technology) of the Embassy of India, Moscow

Science & Technology has been the epitome of the bilateral India-USSR relationship in the past. Roots of the collaborative programs are deep and now it needs to penetrate further to Universities, Innovative Industries, and laboratories. The joint endeavours in the current decades have the potential to create new knowledge, innovative products, and scientific interventions to drive societal and economic growth. Both India and Russia have lower input costs to R&D and Innovation, thereby making this partnership more attractive for the world markets. Creation of new mechanisms for STI collaboration and exchanges between India and Russia can therefore be a big enabler for both the countries and the emerging world.



**SWATI PATANKAR**,  
Professor, Dean for International Relations, IIT Bombay India

It is difficult to overestimate the work of session moderators and scientists who make presentations. You are the one who is going to push these important topics forward and give them new impulses for rapid growth. I wish great success to all participants of the Symposium. We are always ready to support you in developing your ideas, strengthening cooperation and establishing long-term, stable and productive relations not only between universities, but also between countries.



**DMITRY ARSENIYEV**,  
Professor, Vice-Rector for International Affairs of SPbPU

It should be noted that even taking into account the number of existing contacts and a full understanding of mutually beneficial areas of cooperation, nevertheless, researchers from our countries unfortunately do not have enough resources to implement all ideas on cooperation within the frameworks of the stated development strategies of our countries. Practice-oriented education is becoming the most important aspect in the modern world, especially in engineering and research-oriented and technological subjects. Academic mobility and intra-network interactions are critical for developing such education. Given the current global situation with COVID-19, it is important to use the opportunities of online interaction and online mobility.

## STRATEGIC PARTNERSHIP WITH TU GRAZ



**LANA KALIKINA,**  
Coordinator of strategic partnership with TU Graz  
[kalikinas@spbstu.ru](mailto:kalikinas@spbstu.ru)

Since 2013 Peter the Great St. Petersburg Polytechnic University and the Graz University of Technology (TU Graz) have been strategic partners. Moreover, interaction between the Russian and Austrian universities traces back to 1985 when TU Graz became the first Austrian university to sign a contract with a higher educational institution of the USSR - the Leningrad Polytechnic Institute named after M.I. Kalinin (SPbPU name before 1990). Since then there is an active cooperation between the Polytechnic University and TU Graz: joint projects, joint research and implementation of joint educational programs.

The spread of Covid-19 had a strong impact on the development of international education and cooperation. However, both SPbPU and TU Graz remain optimistic and continue successfully long-standing strategic cooperation, even in the situation of pandemic.

In June 2020 Professor **Harald KAINZ**, Rector of TU Graz, intends to hold regular online meetings with strategic partners at different levels (research groups, educational projects, international grants, Students Project Marathon). To maintain these joint activities the first meeting took place on July 13, 2020. Representatives of International offices discussed several issues: the main news and changes after the COVID-19 pandemic; joint projects and joint supervision of postgraduate students.

On the next meeting in November, 2020, parties summed up results of the year and made new plans of cooperation for the nearest future. **Dmitry ARSENIIEV**, Professor, SPbPU Vice Rector for International Affairs, and **Stefan VORBACH**, Vice Rector for Academic Affairs of TU Graz,

discussed opportunities for new growth points in the development of youth projects, joint programs at the Master's degree, Bachelor's degree, and postgraduate levels, research and publication activities.

**Dmitry ARSENIIEV:** "Regular online meetings with strategic partners give us the opportunity to develop our cooperation without slowing down the «prequarantine» speed. The relationship between Polytechnic University and the Graz University of Technology is at a high level of trust. Our main task is to constantly improve this level. First of all at the account of launching joint projects, conducting joint research and increasing publication activity".

The next strategic meeting, which will take place in winter, will be devoted to the interaction between scientists from SPbPU and TU Graz. And in the fall of 2021, universities are planning to hold a major partnership forum with the participation of university rectors.



### Joint Students Project Marathon SPbPU – TU Graz:

Students Project Marathon is an educational project based on students' research activities. It is a productive experience of joint research and educational project implemented by SPbPU in cooperation with international partners. One of the main advantages of the project is that most of the activities are hold online.

The first Students Project Marathon was successfully held joint with TU Graz in 2019. Teams of Russian and Austrian students under the guidance of supervisors conducted research and carried out experiments; most of the work was done remotely. In total, six international teams took part in the innovative international project. Students, postgraduate students, young scientists and teachers from February till December have been working on serious problems from various research spheres; they presented the results of those at the final forum in the presence of an expert commission.



The projects that international teams worked on impressed with a variety of scientific areas: the participants worked on NoSQL database management systems; created an intelligent system for forecasting real estate prices and an intelligent recommendation system for building an individual educational trajectory of a student. They compared laser and electro-beam welding of aluminum alloys and implemented traditional and modified friction welding with mixing of a specific alloy on different equipment. And finally, the participants worked together on project management using the building information model on the BIM 360 platform.

Students' work was highly appreciated by their Russian and foreign supervisors. TU Graz professor **Matthias MUELLER** emphasized that the marathon was a unique chance for participants to leave the comfort zone, as well as learn how to work together remotely.

The two projects were chosen as the best: «Intelligent Real Estate Assistant» and «Laser and Electron Beam Welding (LEBW)». And a special jury prize was awarded to the team that worked on the «Project Management Collaboration Using Building Information Modeling on the BIM 360 Platform,» which was particularly noted by the President of the St. Petersburg branch of PMI **Maxim GRISHIN**.

TU Graz Professor **Detlef HECK** attested the past student marathon as one of the best examples of joint activities between the Russian and Austrian universities. "The participants actively interacted with each other, and showed excellent results. The range of disciplines in which they worked is very wide. This does impress."

Not only students from the Institute of Computer Science continue their participation in Students Project Marathon. Also remarkable results have participants from the field of Material Science. In 2020 joint publication «Microstructural evolution and mechanical performance of Al-Cu-Li alloy joined by friction stir welding» was published at the Journal of Materials Research and Technology. It presented main results of the research project «Conventional and modified friction stir welding of Al-Mg-Cu-Zn alloy realized on different welding equipment». In March 2021 participants of the project will take part in an international conference and the next article will be published. This academic year one of the supervisors of the project - TU Graz Professor **Sergio AMANCIO**, is a visiting professor at SPbPU and delivering lectures on welding. Professor Amancio invited SPbPU Professors **Anton NAUMOV** and **Oleg PANCHENKO** as editors of the special issue of welding magazine.

The work on the next Joint Student Project Marathon continues and new partners of SPbPU join the Project. In 2020 students and professors from the Universidad Politecnica de Madrid, Universidad de Cadiz and TU Berlin also participate in the Marathon.



**HARALD KAINZ,**  
Professor  
Rector of the Graz University  
of Technology, SPbPU Honorary  
Doctor  
Austria

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*Despite the harm that COVID-19 has done, it helped us understand that online meetings are a promising opportunity to keep in touch with partners abroad. We believe that such events contribute to the improvement of interaction between universities' staff involved in the development of strategic partnerships.*



**STEFAN VORBACH,**  
Professor  
Vice Rector for Academic Affairs  
of the Graz University  
of Technology  
Austria

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*We all are quite impressed with the results of past years. The joint research and educational activities of the two universities have repeatedly received the highest marks from leading world experts. I hope that today's negotiations will become an impulse for the development of new ideas and projects, which will not be hampered by either the pandemic or closed borders.*







## SPBPU AT A ROUND TABLE WITH A STRATEGIC PARTNER - RUSSIAN-ARMENIAN UNIVERSITY

Peter the Great St.Peterburg Polytechnic University has been closely working with the Russian-Armenian University since 2014. The initiative of developing cooperation within establishing and promoting a range of Slavic universities in CIS countries as well as cross-border cooperation was encouraged by the Ministry of Science and Higher Education of the Russian Federation. This initiative allowed contributing to creating partner networks taking into account the expertise of the leading universities to provide expert support, share best practices and establish close links.

In December 2020 the Polytechnic University took part in the round table «Development of the scientific and technical potential of the Russian-Armenian University through the development of cooperation with leading Russian universities and scientific organizations.» The event was held in the format of an online conference and became a continuation of a joint round table with Slavic universities, which was organized by the Ministry of Science and Higher Education of the Russian Federation and Slavic universities of the CIS countries.

A plenary session and panel discussions were held within the framework of the round table. Representatives of the relevant departments of the Ministry of Science and Higher Education of the Russian Federation, the Russian Academy of Sciences, leading Russian universities and institutes of the Russian Academy of Sciences and representatives of the Russian-Armenian (Slavic) University (RAU) took part in the round table. Deputy Director of the Department of State Scientific and Technical Policy of the Ministry of Science and Higher

Education of the Russian Federation, **Viktor ANDRIANOV** addressed the participants with a welcoming speech.

**Dmitry ARSENIYEV**, Professor, SPbPU Vice-Rector for International Affairs, presented a project aimed at supporting the development program of Slavic universities. SPbPU presented specific proposals for expanding collaboration between SPbPU and RAU in the field of modernization and increasing the competitiveness of education, the development of educational programs, research areas and youth scientific and technical initiatives.

On behalf of the RAU authorities, Vice-Rector for Science **Pargev AVETISYAN** welcomed the participants. He underlined that it is necessary to strengthen the integration of Russian and Armenian universities. Specifically, the RAU Vice-Rector noted the great support of SPbPU and the active development of cooperation between the Polytechnic and the Russian-Armenian Universities in recent years.



## PETER THE GREAT ST. PETERSBURG POLYTECHNIC UNIVERSITY AND THE MINISTRY OF THE FEDERAL STATE OF MECKLENBURG-VORPOMMERN DISCUSSED PROSPECTS FOR COOPERATION

Peter the Great St. Petersburg Polytechnic University and the Ministry of Economy, Labor and Health of the Federal State of Mecklenburg-Vorpommern discussed promising areas of cooperation within the frameworks of negotiations that took place on December 9, 2020. The Head of the Department for Technological Cooperation of the Ministry of Economy, Labor and Health of Mecklenburg-Vorpommern **Ralph SVOBODA** emphasized, that the International Forum «Polytech Days in Berlin» in February 2020 had become an

important step for cooperation development. Within the Forum SPbPU Rector **Andrei RUDSKOI** met with the State Secretary of the Ministry of Economy, Labor and Healthcare of the Federal State of Mecklenburg-Vorpommern **Stefan RUDOLF**.

The organizer and moderator of the online meeting was the Director of the St. Petersburg Foreign Economic Bureau in Germany **Dmitry UCHITEL**. He introduced the Russian participants of the meetings: SPbPU Vice-Rector for International Affairs Professor **Dmitry ARSENIYEV**,



Director of the SPbPU Institute of Mechanical Engineering, Materials and Transport Professor **Anatoly POPOVICH** and Director of the SPbPU Institute of Biomedical Systems and Biotechnology Professor **Andrey VASIN**.

Prof. Dmitry Arseniev noted that the Polytechnic University has been closely cooperating with universities and industrial companies in Germany in many areas and has a number of joint structures, including the ones with universities and research centers of the Federal State of Mecklenburg-Vorpommern: Stralsund University of Applied Sciences, Wismar University of Applied Sciences, scientific and technological company BaltiCo GMBH. In cooperation with the last mentioned company a specialized research and education centre has been established at SPbPU.

Summing up the results of the meeting, Ralph SVOBODA noted that he was impressed by the SPbPU research potential and expressed hope for the productive development of cooperation. Already in February-March 2021, the parties plan to involve high-tech enterprises of Mecklenburg-Vorpommern in negotiations and hold the next two sessions at the beginning of 2021, focused on the possibilities of technology transfer, uniting the efforts of universities and industrial companies and creating project micro-consortia, including universities and industrial partners from Russia and Germany.



Andrey VASIN: "I believe that developing cooperation in the field of biotechnologies and modern agricultural technologies with Mecklenburg-Vorpommern is extremely promising."



**RALPH SVOBODA**, Head of the Department for Technological Cooperation of the Ministry of Economy, Labor and Health of Mecklenburg-Vorpommern Germany

In connection with the launch of new support programs for 2021-2027, the key directions for the Federal State of Mecklenburg-Vorpommern were identified. They were expressed in the Innovation Strategy for the Development of the Region 2021-2027. These are renewable energy, mechanical engineering, medical technology and biotechnology. Russia and, in particular, St. Petersburg are indicated as one of the priority partners in the strategy. We have carefully studied the directions of research and educational activities of the Peter the Great St. Petersburg Polytechnic University and already now we see that we have a vast field for joint activities. Supporting research and projects is an important focus of the Department of Technology, and one of our global goals is to develop products that can compete globally and create high-quality jobs. The Ministry of Economy aims to concentrate financial support in three main areas: mechanical engineering, medical technology and biotechnology.



**ANATOLY POPOVICH**, Director of the SPbPU Institute of Mechanical Engineering, Materials and Transport

Modern production is impossible without the use of digital technologies within the framework of the Industry 4.0 concept. In 2020, SPbPU received the status of a world-class center in the field of digital manufacturing technologies based on the results of the competition. This area of Industry 4.0 is multifunctional and covers all types of activities - from designing a product and implementation, to disposal. SPbPU cooperates with many German companies, mainly in terms of scientific and technological facilities for 3D printing. We would like to develop cooperation with the Federal State of Mecklenburg-Vorpommern in the various fields of additive manufacturing.





## SPBPU BECAME THE MEMBER OF TWO NEW INTERNATIONAL ASSOCIATIONS



In 2020 Peter the Great St. Petersburg University became a member of two new international associations – European Distance and E-learning Network (EDEN) and the Institute of International Education (IIE), the USA.

SPbPU is constantly developing links with international associations that provide a range of benefits for their members – they create a platform for networking, finding new partners with similar interests, sharing experience, developing joint projects and contributing together to global sustainable development. And in the current situation of the pandemic the issues of e-learning and online education have become extremely vital. SPbPU had been prepared and managed to quickly adapt all its systems to the «new reality».

SPbPU having received the '5 stars' category in the nomination QS Stars Online Learning as well as its practice and experience in developing e-learning, open and distance education made it advantageous to become a member of the European Distance and E Learning Network. This association that includes 180 institutional members and over 1100 members in the Network of Academics and Professionals sees its main goal in sharing knowledge and improving understanding amongst professionals in terms of distance education and e-learning process. The EDEN network was established in 1991 and is operating to promote improved standards and practice across Europe and beyond.

Within the frameworks of EDEN the following important network activities are organized: from specialized conferences and webinars that SPbPU as well took part in, to information assistance and support for different education levels.

» Peter the Great St. Petersburg University has become a member of European Distance and E-learning Network (EDEN) and the Institute of International Education (IIE), the USA



One of the important directions in SPbPU development is cooperation with the educational establishments and research institutions of the USA. In 2020 SPbPU became a member of the Institute of International Education (IIE).

The history of this international association dates back to 1919 when the founders started the process of its creation with the understanding that international education could be able to make the world more stable, balanced and open. Nowadays the association is closely working with people in 180 countries. One of the key missions if IIE is contributing to carrying out the new generation of students, young researchers and scholars with leadership abilities and determination to develop and improve our world.

To join IIE is an important step for SPbPU as our university already is developing close links and stable partner relationships with partners from the USA. Becoming a member of the association that works closely with public and private higher education institutions in order to develop and strengthen institutional partnerships with their colleagues around the world SPbPU meets the opportunity to extend its links in the USA and globally.



## UNIVERSITY ALLIANCE OF THE SILK ROAD EXECUTIVE COUNCIL MEETING

Despite closed borders, SPbPU remains in touch and develops international cooperation with the Asian region. On November 27, Polytechnic University took part in the meeting of the Executive Council of the University Alliance of the Silk Road (UASR). The event was the part of the UASR Events 2020, organized by Xi'an Jiaotong University (P.R.China) in collaboration with Politecnico di Milano (Italy).

The UASR is a non-governmental and non-profit organization dedicated to openness and international cooperation in higher education. The UASR was initiated by Xi'an Jiaotong University in 2015 against the backdrop of the Chinese Central Government's «One Belt, One Way» strategy. Today the network unites over 150 universities in Europe and Asia.

In the course of the UASR Executive Council meeting, Mr. **HE Changzhong**, Secretary-General of the UASR, Director of Department of International Cooperation and Exchanges, XJTU, presented a report on the Alliance's activities in 2020 and also introduced 4 new universities that have applied for the UASR membership. The central part of the meeting was the consideration of the proposals of Peter the Great St. Petersburg Polytechnic University and Politecnico di Milano on the development of cooperation between universities within the UASR.

**Professor Dmitry ARSENIIEV**, Vice-Rector for International Affairs: *“Since the first days of the Alliance (initially SPbPU was an observer, then - a member of the Executive Committee), we have been developing diverse formats of interaction with our foreign colleagues, as well as active in other network partnerships. The COVID-19 pandemic presented us all with global challenges that needed to be addressed immediately. We have formulated the most relevant proposals, and have presented them to Alliance members for further work”.* On behalf of SPbPU proposed to develop a network partnership in the field of distance education - to conduct joint courses and internships, webinars on the implementation of distance technologies. Another initiative of SPbPU was the implementation of the Students Project Marathon network project between member universities of the UASR, relying on the infrastructure of the Alliance. The university also proposed to create a common UASR online portal with the possibility of posting information on priority scientific areas, leading scientific groups and

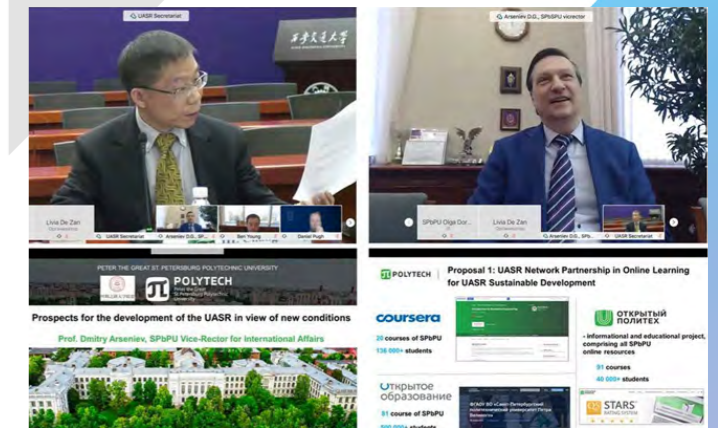


丝绸之路大学联盟



**GUANG XI**,  
Professor, Vice-president of Xi'an Jiaotong University  
China

*Four aspects are on the topic of higher education in the post-pandemic era: first, post-pandemic higher education will center itself around the concept of a community with a shared future of mankind and universities should boost cooperation in order to prevent and defend against global challenges; second, the encounter of the pandemic and the fourth industrial revolution will lead to an accelerating revolution in both educational ideals and educational methods; third, the pandemic has provided lively samples and models for the all-round development and growth and for higher education and students; fourth, XJTU has initiated the iharbour project to explore a new development mode for the intergratin of universities and the society in the 21st century.*



promising joint projects and expressed the idea to use the capabilities of SPbPU World-Class Research Center for Advanced Digital Technologies to enhance cooperation among Alliance members in the field of digitalization, intelligent manufacturing technologies, robotics, big data, machine learning and artificial intelligence, as well as on the entire spectrum of development and application of Arctic technologies.

Prof. **Giuliano NOCI** (Vice-Rector for China, Politecnico di Milano) supported SPbPU initiatives: in his speech he also emphasized the exchange of online education courses, the development of scientific cooperation, strengthening ties with the industrial sector.

All proposals formulated have been documented in a general presentation of UASR, which the Secretariat has sent to Alliance members for further discussion.



## XLVIII INTERNATIONAL SCHOOL-CONFERENCE «ADVANCED PROBLEMS OF MECHANICS» TOOK PLACE IN SPBPU



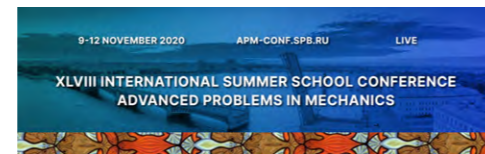
**PROF. ANTON KRIVTSOV**,  
Director of the SPbPU Higher School of Theoretical Mechanics, Corresponding Member of the RAS.

On November 9-12, 2020, the 48th International School-Conference "Advanced Problems in Mechanics" (APM) was held in Peter the Great St. Petersburg Polytechnic University in a new online/on-site format. A limited number of Russian scientists came to Polytech to participate in the conference in person. The others attended APM through video conference.

Over the decades since its establishment, the conference has become a powerful tool for industry development and international cooperation of mechanicians. That is why, despite the complicated epidemiological situation in the world, the organizers, namely, the Institute of Applied Mathematics and Mechanics of SPbPU and the Institute for Problems in Mechanical Engineering of the Russian Academy of Sciences, decided to hold the conference following all the safety precautions, and not deprive the scientists of the opportunity to discuss the most critical issues of the industry with the peers and present the results of their scientific research.

The conference lasted three days, and more than 200 leading scientists in the field of mechanics and related disciplines took part in it. For instance, lectures and presentations were given by Professor **Chen GANG** from Massachusetts Institute of Technology, USA (h-index 103),

» **More than 200 prominent mechanicians from all over the world took part in the event both online and on-site.**



**Michel BARSOUM** from Drexel University, USA (h-index 96), Professor **Herbert HUPPERT** from the University of Cambridge, UK (h-index 62), **Andrei SLAVIN** from the University of Auckland, New Zealand (h-index 54) and many others.

There was no conventional division into thematic and highly specialized sections and mini-symposia in the conference program. The experts prepared talks on more general topics to help students and young scientists who begin to immerse themselves in the world of mechanics, to make a more thorough picture of mechanics as a science, its importance and place in industry and life. For example, **Alexander FREIDIN**, professor of SPbPU, gave a lecture on the coupled problems of mechanochemistry; **Kenneth GOLDEN**, a professor from the University of Utah, spoke about modeling the geometry of submarine currents in the Arctic seas; scientific advisor of IPME RAS, professor **Dmitry INDEITSEV** made a speech on the dynamic behavior of the thermal expansion coefficient and its impact on the acoustic wave, and **Vitaly KUZKIN**, a scientist of the Higher School of Theoretical Mechanics of SPbPU, told about his recent discovery of a new physical phenomenon called «ballistic resonance». In Politech, the conference was held in the Semyonov conference hall with all the security measures followed: the scientists used personal protective equipment, and they were seated at the appropriate distance from each other.

In spite of the remote format, the conference participants could also observe scientific experiments. Professor



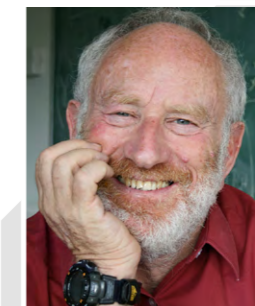
**Herbert HUPPERT** from the University of Cambridge, beloved by the students and employees of Politech for his fascinating experimentation, experimented by video conference and made a clear demonstration of granular collapse.

The conference finished with a youth day. A case championship «Student case-championship APM 2020» was organized for students of the Higher School of Theoretical Mechanics of the Institute of Applied Mathematics and Mechanics with the help of FabLab Polytech. The contest consisted of three tracks: «Pro-Inventions», «Pro-Gas&Pro-Oil» and «Pro-Intellect». Within each track the students had to come up with and offer their own technological project for solving problems of oil and gas industry and artificial intelligence sphere. And in order to popularize the fundamental science and to show that it is interesting and exciting to do research, an unconventional task was prepared for the participants of the track «Pro-Inventions»: the guys had to offer such study or invention, which could qualify for the Ig Nobel prize.

The students were given three hours to work on their projects, during which they had to think over the implementation process, prescribe the results of the product launch and prepare a presentation, and the participants of the scientific track even had time to conduct small studies. A maximum of four people was allowed to team up, and all students were placed in several rooms to ensure the necessary social distance.

In each of the tracks, the jury chose the best projects, and the winners received monetary prizes: for the first place, the students were awarded certificates worth 50 thousand rubles, for the second place they got 30 thousand rubles, and teams that took the third place received certificates worth 20 thousand rubles.

«Many guys offered really interesting and viable projects, which deserve further attention and support. But first of all, we evaluated their initiative, activity, fresh eyes and non-standard approach to solving problems,» – said Anton KRIVTSOV, Chairman of the Case Championship Jury. – «We will talk to each team, and the best students will be invited to join the existing projects of our research and educational center.»



**HERBERT HUPPERT**, professor at the University of Cambridge and Bristol, the University of New South Wales (Australia); member of the Royal Society, the American Geophysical Union and the American Physical Society

*I see that many young people are interested in science. They observe climate change and wonder why it's sunny today and cloudy tomorrow. Why it gets hotter every year, what that indicates, and why earthquakes happen. They want to understand how things work, how we live, and how we age. And they are eager to find the answers to these questions. What helps them become successful scientists is a broad outlook and a good imagination. It's crucial to be a person with an imagination, to be able to see from the other side. I think that's the most important thing in a scientist's job.*



**Read more about participation in the conference «Advanced problems in mechanics»:**





## RISE IN INTERNATIONAL RANKINGS TO EVIDENCE THE PROMINENCE OF POLYTECH



**MARIA VRUBLEVSKAYA**  
Head, Strategic Planning and Development programmes Office  
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Physics being the key-note for the research and science showcased one more achievement – entering TOP-125 in Physical Sciences in THE 2021. The leap was driven by positive dynamics in all factors evaluated by THE with due regard to such indicators as ‘industrial income’, ‘international interaction: overseas students and visiting professors’, and ‘research impact’. As an outcome the University is among the TOP-5 of the 42 universities representing Russia in this subject ranking.



We are proud to see Polytech in TOP-150 in Engineering Sciences THE 2021 articulating the University positioning on the global arena and claiming the status of the national leader among Russian universities. High performance in ‘industrial income’, ‘research impact’ and ‘international interaction’ distinctly showcase strong evidences and positive paces regarding the University science and research policy on a global scale.



Fair enough to highlight favourable dynamics in TOP-250 Education THE 2021 which is backed by an increase in the number of publications disseminating best practices of our teaching staff regarding new educational methods, approaches to assess the quality of education provided, and newly coming initiatives to streamline learning processes (distance technologies, project activities, blended learning, problem-oriented learning, etc.).

Capping the year 2020 Polytech can boast of high performance in international rankings which vividly highlight strong points about the University and give the straightforward clues to the positioning.



**For the first time, Peter the Great St. Petersburg Polytechnic University entered the top 100 in physics in the subject ranking of U.S. News Best Global Universities ranked 95.** Such a breakthrough can be underpinned by high positions in both global and regional research reputation in line with the total number of publications included in 1% of the most cited ones in the world. All in all, Polytech is presented in four subject rankings - physics, engineering sciences, material science, and chemistry – standing out for high research outcomes and positive international collaboration results. This year turned out to be very successful for St. Petersburg Polytech in Times Higher Education World University Rankings 2021 with 5 subjects positively evaluated.

» *Facing new challenges to achieve sustainable development is only possible in close cooperation with true partners from all over the globe!*



It's highly important to underline the multidisciplinary approach in research and significant input of the University research groups working in the areas of economics, business and management, which is proven by a solid position TOP-300 in Business and Economics THE 2021. With the proactive on-going research work in these areas the University foresees greater contribution to the sustainable future of the society.

And, of course, it is a pleasure to see anticipating results of our research teams working in the field of biomedical technologies dealing with such challenges as cancer and Alzheimer's diseases. This year it's for the first time when Polytechnic University has emerged in TOP-500 in Life Science THE 2021.



Last but not least we are more than happy to claim the ‘5 Stars Online Learning» status assigned by the international ranking agency QS Quacquarelli Symonds which is a profound evidence of the University's team to promptly react to such a challenge as the worldwide pandemic. With 93 scores out of 100 experts have highly evaluated capacity, resources and facilities of online education and readiness of the University for distance learning. Over the past five years, Peter the Great Polytechnic University has done a great job in developing online education: more than one hundred mass open online courses have been created, advanced training courses for teachers in the field of online have been held. And the QS experts' assessment carried out for the first time showed a worthy result.

Today we can say for sure - going forward and facing new challenges to achieve sustainable development – is only possible in close cooperation with true partners from all over the globe!



**ANDREI RUDSKOI,**  
SPbPU Rector, Academician of the Russian Academy of Sciences

*SPbPU has boosted its position up to 301-350 in THE Times Higher Education World University Rankings 2021 among 1,527 of the world's universities. Such impressive growth confirms the status of Polytech being a driver of Russian engineering education. Active position of our polytechnics, youth inclusion into scientific and CDIO activities of the university as well as the synergetic effect of increased interaction with the academic community and industrial partners at the national and global scale contribute to our international positioning and to global competitiveness of the Russian Federation Higher Education System as a whole.*





## INSTITUTE OF MECHANICAL ENGINEERING, MATERIALS AND TRANSPORT (IMEMT) – LEADER OF ADDITIVE MANUFACTURING



Prof. ANATOLIY POPOVICH

Director of IMEMT, Scientific Advisor of Structure materials and Additive technologies laboratory

[director@immet.spbstu.ru](mailto:director@immet.spbstu.ru)

### Goal setting and ambitions for the development of the Institute

Training of engineering personnel who are experts in world-class industrial technologies and are able to solve new complex problems of the industry. Development of the Institute as one of the key Russian research and educational centers, a recognized center of competence in the field of additive technologies, machine building and robotics, new materials and welding. Development of new technologies and equipment allowing to enter the newly formed world markets (aircraft engine building, additive equipment and additive technologies in medicine).

### IMEMT History

The IMEMT was created as the successor to the Physics and Metallurgical Faculty, one of the first faculties, established in 1902 simultaneously with the establishment of the St. Petersburg Polytechnic Institute. Outstanding scientists D.I. Mendeleev and D.K. Chernov were its founders. So far, departments of this Institute have been involved in developments of promising materials and research of their physical and chemical profile.

### KEY SCIENTIFIC TOPICS

#### New materials:

Modeling the processes of forming the properties of new materials; Electronic engineering materials; Composites; Ceramics; Carbon materials; Powder materials; Functional materials.

### Development of advanced manufacturing technologies

Additive technologies; Welding technologies; Plasma technologies; Laser technologies.

### Machine building and robotics

Industrial robotics; Mechanical Engineering Technology; Technical measurements; Prototyping technology; Sensorics.



According to the data of authorized web-based analytics platform SPbPU has become the most productive University in Europe in publication activity in the field of Additive Manufacturing (Data Source: Scopus, up to 30 Sep 2020). SciVal is based on the publication database Scopus and provides comprehensive access to the research performance of over 14,000 research institutions and their associated researchers from 230 nations worldwide.

**SPbPU has become the most productive University in Europe in publication activity in the field of Additive Manufacturing**

### A dynamically developing Institute that demonstrates strong ties with industry

Today IMEMT includes four Graduated Schools, two departments of general engineering education and three affiliated departments on the basis of «Prometey» (Structural Materials Research Institute), «Klimov» Corporation (engine building) and «Baltic Industrial Company».

IMEMT is involved in large international research projects, cooperates with leading industrial companies: Korolev Rocket and Space Corporation ENERGIA, Automotive Company KAMAZ, RosAtom Corporation and metallurgical company SEVERSTAL, as well as ARVEDI Group.

In 2016 SPbPU and IMEMT, together with Chinese partners became a founders of the CHN&RUS NEMTRI - joint China-Russia Research Institute, a technology-intensive enterprise that integrates production, learning, research, science, industry and trade. The NEMTRI is located in Huaxi Industrial Functional Area, a new energy town of Changxing County, Huzhou City, Zhejiang Province.

The leading experienced and young ambitious scientists, BSc and MSc students have the opportunity to work under complex scientific and applied projects using the facilities of specialized R&D labs and scientific and educational center (SEC).

### R&D laboratories and centers of IMEMT:

- Russian-Chinese R&D Lab of functional materials;
- International SEC «BaltTribo-Polytechnic»;
- R&D Lab of metallic materials microstructure and properties research and simulation;
- R&D Lab of lightweight materials and structures;
- Russian-German center of laser technologies.

### The joint centers in cooperation with industry:

- SEC «Structural and functional materials» with ENV New Energy (China);
- SEC «Mechanical engineering and materials» with «Baltic Industrial Company»;
- SEC «Research and simulation of materials» with «Severstal»;



Pedro Vilaça, AALTO University, HI-23, SPbPU (IMEMT) visiting professor



Sergio de Traglia Amancio FILHO, TU Graz, HI-24, SPbPU (IMEMT) visiting professor

Researchers of IMEMT are actively working under educational and scientific projects (Mega-grant of Government Corporation «Rossatom», grants of Russian Scientific Fond). This fact leads to the significant increase in the number of publications.



WANG QINGSHENG, Director of CHN&RUS NEMTRI, SPbPU Visiting Professor

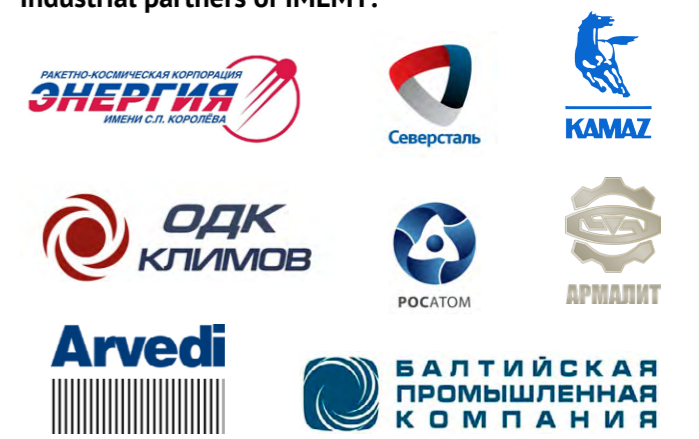
In 2020, in a difficult year for the entire world community, we managed to move from the field of fundamental scientific research projects to the field of applied R&D projects, namely, to

start implementing our products into the field of electric transport. This became possible thanks to our fruitful partnership with SPbPU, since the Polytechnic University is one of the leading universities in the Russian Federation for the development and implementation of innovative products in the industry.

### Academic partners of IMEMT - leading world Universities:



### Industrial partners of IMEMT:





## THE REPRESENTATIVE OFFICE OF PETER THE GREAT ST. PETERSBURG POLYTECHNIC UNIVERSITY IN SHANGHAI: NEW STATUS AND NEW PARTNERS

In September 2020, the Representative Office of Peter the Great St. Petersburg Polytechnic University in Shanghai received a certificate of state registration from the Science and Technology Committee of Shanghai Municipality. Thus, Peter the Great St. Petersburg Polytechnic University became the first Russian university whose representation abroad was recognized at the state level.

The ceremony of awarding the certificate was held online as part of the round table «Russian-Chinese cooperation in science and technology.» Mr. **Zhang JUN**, Chairman of the Shanghai Science and Technology Committee, addressed the audience with a welcoming speech, stressing that cooperation between Russia and China in the scientific and technological sphere is developing intensively and dynamically, and universities and research centers play an important role in this issue. The Shanghai Science and Technology Committee has become the supervising government institution for the SPbPU Representative Office, which opens up wider opportunities for SPbPU cooperation with universities, scientific organizations, high-tech companies of the region in the fields of joint research and technology transfer.

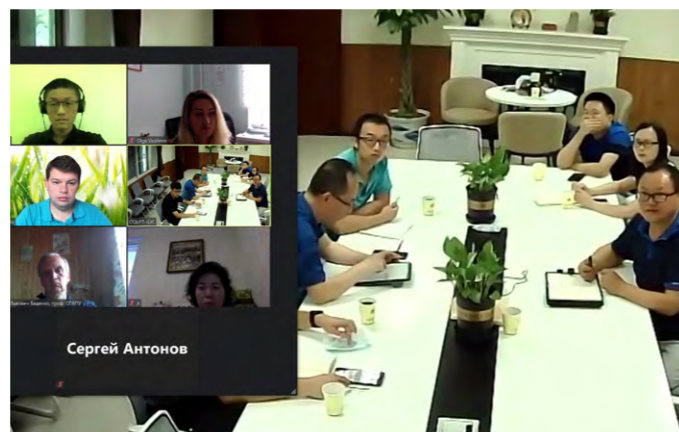
It is important to note that the Shanghai Science and Technology Committee has been providing information and organizational support to The Representative Office of SPbPU in Shanghai since the first days of its foundation, including by providing an opportunity to demonstrate university projects to partners and investors in the framework of various business events. One of the recent events was the International Forum on the Development of Free Trade Zones, which took place in Shanghai. The key goal of the forum is to help

outstanding foreign projects enter the Chinese market. On behalf of the Polytechnic University, the head of the Shanghai office of SPbPU Lu ZHIYUI took part in the forum. He presented the scientific projects of SPbPU in digital transformation and intelligent control systems. The presentation attracted great interest of Chinese investors.

Another major Shanghai event, guided the Shanghai Science and Technology Committee, was the International Symposium of Belt & Road Science & Innovation Network (BRSIN). SPbPU has been a member of the BRSIN executive committee since 2017. The topic of this year's symposium is «Sustainable Development». Altogether 3 forums were held, including sustainable energy, sustainable development of BRSIN and sustainable development of smart city.

Peter the Great St. Petersburg Polytechnic University was presented by Vice-Rector for Research **Vitaliy SERGEEV**, who made a report «Circular Economy for Sustainable Development» and Associate Professor of the Higher School of Industrial, Civil and Road Construction **Anton RADAEV** with a presentation of SPbPU projects in the field of transport communications construction.

In addition to Shanghai, the Representative Office is actively developing partnerships with other regions and provinces of China. Among them is the Shaanxi province with the capital Xi'an. One of the key partners in this region is Xi'an University of Technology (STU). SPbPU and STU are already actively cooperating in the educational sphere within the framework of the joint Internship Center «TU Xi'an - Polytech» and exchange programs for masters. The partners recently agreed to launch a new project to support innovation. An agreement on the creation of a new acceleration program for



» The SPbPU Representative Office received a new status in China and was recognized at the state level.



innovative projects was signed in September by SPbPU, Fengdong New District Office of Xi'an City, Shaanxi Province, Xi'an Polytechnic University and PuE Business Incubator. The ceremony was held online as part of the Russian-Chinese Scientific and Educational Innovation Forum and Conference on International Exchange of Professionals (CIEP-2020). According to the initial plans, the accelerator of the Peter the Great Polytechnic University will be located in the Sino-Russian Silk Road Park in the new Fengdong district of Shaanxi province.

At the invitation of a Beijing partner - State Grid Corporation of China, Vice-Rector for Research **Vitaliy SERGEEV**, Director of the SPbPU Representative Office in Shanghai **Lu ZHIYU** and Professor of the Institute of Energy **Maxim POPOV** took part in the International Forum for Energy Transition 2020: Sustainable Development in the Post-COVID-19 Era, which is held in partnership with the World Economic Forum. As part of the business agenda, top managers of the world's largest energy corporations discussed how to accelerate a clean energy transition through sustainable development, benefitting the economy, society and the global energy system.

SPbPU also has partnerships with the provinces of Jiangsu and Hebei. The team of the Polytechnic University took part in online negotiations with representatives of the Hebei University of Technology and the Research Institute of Industrial Technologies of Jiangsu Province (JITRI) to jointly promote the projects of the Polytech. The meeting was attended by a researcher of the Institute of Energy, Materials and Equipment of Hebei University of Technology Ji Puguang and a leading manager of the International Cooperation Department of the Institute of Industrial Technology of Jiangsu Province **Li LIANYI**. The Russian side was represented by Oleg Tolochko, Professor of the Higher School of Physics and Materials Technology, **Sergey ANTONOV**, Head of the Department of International Scientific and Foreign Economic Relations, and **Lu ZHIYU**, Head of the SPbPU Representative Office in Shanghai. The participants discussed opportunities regarding new foundation that Jiangsu Department of Science and Technology had established at the Industrial



**ZHANG QUAN**,  
Head of Science and Technology  
Commission of Shanghai  
China

Peter the Great St. Petersburg Polytechnic University is a world-renowned university, research center and talent training base. It has long-term friendly cooperation with Shanghai and other cities in China. The establishment of a Representative office in Shanghai by SPbPU (Science and Technology Center) will help carry out more pragmatic scientific research cooperation, transfer and transformation of scientific and technological achievements, deepen China-Russia scientific and technological exchanges and partnership, contribute wisdom and strengthen the bright future of China, Russia and the world.



Research Institute to modernize the province's industrial structure. The Jiangsu provincial administration has a significant interest in the development of innovative projects. Hebei University of Technology and the SPbPU have a great chance cooperate in the field of materials supported by province. During the videoconference, the parties negotiated the conditions for filing a joint application for participation in the grant competition and agreed that Russian-Chinese cooperation in this area has good prospects for all parties.





## ACCT! – ACTING ON CLIMATE CHANGE TOGETHER!



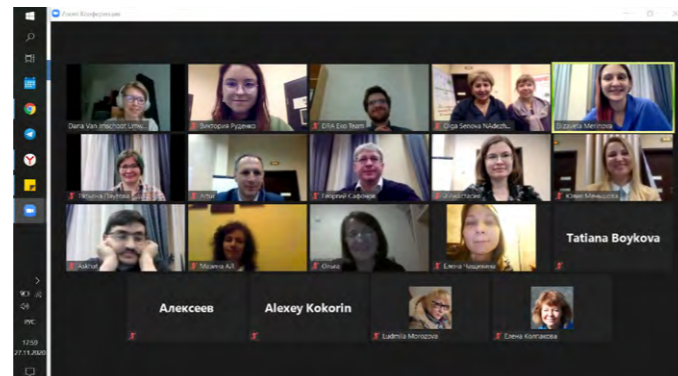
ALLA MAZINA  
ACCT Project Coordinator  
mazina\_al@spbstu.ru



» *The actions we take now against climate changes will determine what the world we live in will look like in 10, 20 or 50 years' time.*

**International project ACCT was funded by the European Union within the framework of Europe Aid. ACCT project aim is to provide young people in the northwest of Russia with knowledge about climate change and its impacts.**

is climate change? What causes it? What does it cause on our planet and especially in Russia? What needs to be done to stop it? Local NGOs will also be strengthened to address climate change with young people and raise their awareness for it.



November 27, Intersectoral Dialogue «Education of Youth on the Topic of Climate» was organized as a part of the Russian Climate Conference in St. Petersburg. Dialogue became a part of international project «ACCT! - Acting on Climate Change Together!». The Dialogue participants were representatives of organizations involved in different levels of education: school, additional education, retraining centers, universities, NGOs, youth associations. The main topic of discussion was the development of interactive educational formats for introducing the topic of climate change in state educational programs and environmental educational activities of various organizations.

In the project «ACCT-Acting on Climate Change Together!», which was funded by the European Union within the framework of Europe Aid, Russian environmental organizations, universities and German NGO «DRA» have joined forces to develop innovative interactive climate educational programmes (formats) for different educational establishments.

The aim is to provide young people in the northwest of Russia with knowledge about climate change and its impacts. With the help of a Council of climate education experts, five interactive educational formats were developed, tested and will be implemented by the end of 2021.

Young people in St. Petersburg, the Leningrad, Arkhangelsk and Murmansk regions and Republic of Karelia will become more aware of climate change and its impacts. Teachers will be provided with tools and methodologies to work with young people in schools, universities and extracurricular activities on climate change issues: What



On September 25, 2015, 193 member states of the United Nations adopted 17 global sustainable development goals (SDGs). The new goals and objectives are complex and indivisible and balance the three components of sustainable development: economic, social and environmental.

### ACCT aims:

- Concepts and tool kits for five innovative, participative and action-oriented climate education programmes will be developed that combine climate change knowledge and climate protection;
- Teachers and education experts are trained in climate education programmes, which they then implement;
- Young people take part in climate education programmes, and acquire knowledge about climate change and opportunities for climate protection. They are encouraged to pass on their knowledge to their social environment;
- Russian NGOs and teachers improve their knowledge and methodological approaches in climate education;
- an Advisory Council of Climate Education Experts is formed in Northwest Russia;
- Russian and international climate education experts form networks at expert talks and conferences.

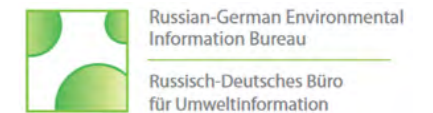
### Project activities

- 2019 - Workshops on the development of climate education interactive formats (April, June, September, November);
- 2020 - Networking conference of the Russian Social Ecological Union
- 2021 – Development of methodological materials and training of trainers in the implementation of educational formats
- 2021 - Implementation of climate educational formats in North-West regions of Russia

### PROJECT PARTNERS:



This project is funded by the European Union





## FOREIGN STUDENTS ADMISSION DURING A PANDEMIC: IMPOSSIBLE IS NOTHING



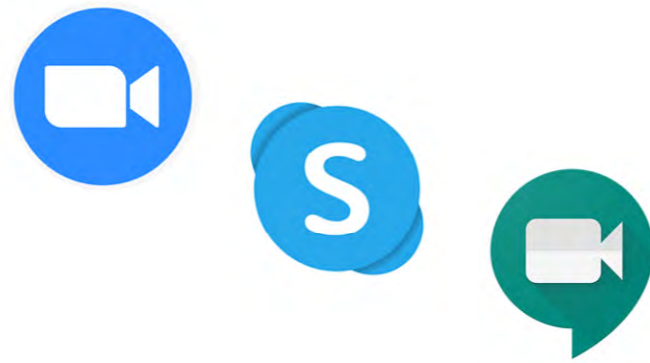
EUGENIA SATALKINA

Head of International Education Office  
*satalkina@spbstu.ru*

Peter the Great St.Petersburg Polytechnic University is traditionally in the top three among Russian universities in terms of the number of foreign students. Due to the coronavirus pandemic and closed borders the admission campaign for foreign students was carried out completely in an online mode. Despite this fact, the Polytechnic University not only maintained a stable position in the number of foreign students, but was even able to improve the positions, and as well launched several new international educational programs.

### New tools

The 2020 International Student Admission Campaign took place online for the first time. The employees of the International Office working with foreign students switched to a new format. Foreign applicants submitted their documents only remotely. Consultations on admission and training were held via the electronic platforms Zoom, Skype or Google Meet, as well as by



means of SPbPU English social networks. In terms of social networks, the activity of foreign applicants during the pandemic has increased significantly. In total, during the admissions campaign 2020, managers processed more than 6,000 applications from potential candidates.

### Online exams

This year, the Ministry of Science and Higher Education of the Russian Federation made an unprecedented decision to conduct admissions tests online due to the coronavirus pandemic. In a short time, both examiners and foreign applicants had to adjust to the new work mode. A real challenge for both students and SPbPU staff was the difference in time zones. Teachers and applicants had to find a way to adapt and demonstrate all their responsibility. The examiners spent much more of their time and effort in comparison with traditional offline exams, because, as noted above, the number of applicants interested in entering the Polytechnic University was very impressive, and the exams themselves in the distance form were organized for the first time.

In order to ensure successful process of online exams detailed instructions were developed at the Polytechnic



University in 9 languages, and a special forum for applicants was created, where students could contact on technical issues. The system itself for passing the exams was flexible and mobile - technical support representatives and teachers were constantly in touch with applicants. Those students who, due to technical reasons, could not join the exams, had the opportunity to pass the examinations on specially designated additional days. The developers had paid great attention to making the exam taking process as transparent as possible. So, the examiners could check whether the applicant left the process themselves, or connection was cut off for technical reasons. Candidates also found out about the results of the exams online - using the login and password, one could immediately find out whether the exam was successfully passed or not. The entire document circulation was as well in electronic form - students who successfully passed the entrance exams were sent a study contract in advance, and they could get acquainted with the details and conditions at home, and ask clarifying questions. Since due to the coronavirus pandemic in 2020, there were often delays in bank payments, foreign students were given some more time for paying their tuition fees.

### Demand has increased

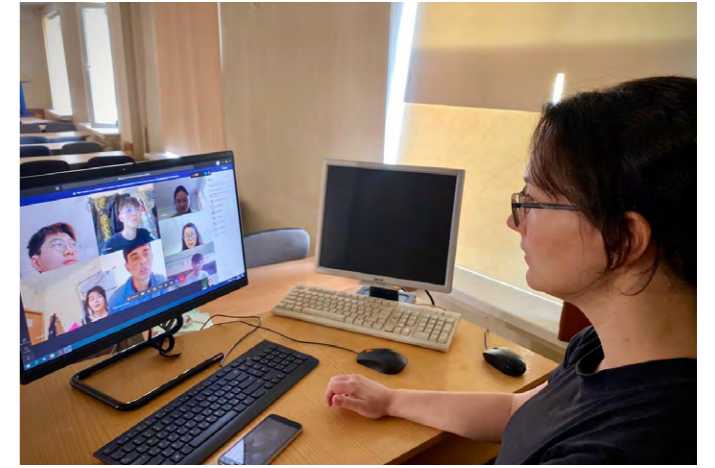
During the 2020 admissions campaign, SPbPU International Office staff working with international students noted increased demand in some countries. China, Iran, India and Kazakhstan keep leadership positions in terms of the number of applications. The number of applications from citizens of Egypt, Turkey and Syria has increased significantly. It is noteworthy that, even despite the pandemic, applicants from Great Britain, Germany, Haiti, South Korea, Mali, Nicaragua, Switzerland and Eritrea submitted their documents to study at SPbPU. These are the countries where students rarely come to study in St. Petersburg. In addition, a record number of foreign SPbPU Bachelor's Degree graduates decided to continue their studies at SPbPU and have chosen various Master's Degree programs, and students who graduated from the pre-university programs applied for Bachelor's Degree programs.

### New international educational programs

In 2020, the Polytechnic University launched three new international educational Master's Degree programs in English. They are «Molecular and Cellular Biomedical Technologies», «International Trade Relations» and «Quantitative Finance». Despite the pandemic, high demand for both new and previously launched SPbPU international educational programs remains among international applicants.

### Plans for 2021

A new admissions campaign for foreign applicants in 2021 is almost about to start, and preparations for it are already underway. To ensure its success it is important to take into account the experience of the previous year and optimize processes in such a way that they are flexible and as transparent as possible. Already, applicants can get to know the examples of entrance exams on the SPbPU website. The organizers plan to develop trial



tests and make them available on the website in all subjects necessary for admission so that future students can check not only their knowledge, but also their technical facilities. As well, within the framework of the admissions campaign in 2021, it is planned to increase the number of periods for taking entrance examinations in order to separate the flows of students simultaneously taking exams in the system. Thus, foreign applicants will have more options when it will be possible to take exams, and the system will be even more reliable and stable. Admission consultations for foreign citizens since 2020 have moved to the online format and are now becoming regular. They will be held every month in the form of a webinar during the admissions campaign in 2021. In addition, an updated Personal Online Area of a foreign applicant will be developed and launched in the near future in two languages. It will allow everyone to easily and quickly apply for studying at the Polytechnic University and track changes and their application process during the entire period of admission.

The above measures translate the entire process starting with documents submission and up to the official enrollment completely into an electronic format. In the current epidemiological conditions, it is the most comfortable and attractive for foreign applicants.





## ACADEMIC MOBILITY – CHALLENGES AND PROSPECTS



**ELIZAVETA SUKHOVA**

Deputy Head of International educational programs and academic mobility department  
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**ANNA KOLOTAEVA**

SPbPU Erasmus coordinator  
a.kolotaeva@spbstu.ru

The unprecedented world situation connected to the COVID-19 outbreak is not over yet. But it doesn't mean that our students should stop making plans for the future. Despite the fact that academic mobility suffers a lot from the COVID-19 outbreak and had to be transformed and is taking other shapes this year, we remain positive that together we will overcome the whole situation and the usual international interaction will be back soon. The 2020/2021 academic year brings a lot of challenges and we have learned to handle them. To maintain a dialogue, the SPbPU Erasmus team is actively participating and organizing events together with the partner universities as virtual student fairs, round tables and virtual meetings.

One of the very successful events organized by the SPbPU Erasmus team was the **ERAMUS+ TEATIME WITH SPBPU**. The event was held within the framework of the #ErasmusDays 2020 (<https://www.erasmusdays.eu/>) and with the support of the National Erasmus+ Agencies and the European Commission. Over a cup of tea, in a quite casual online format, we suggested our partner universities to discuss the trickiest challenges for this academic year connected to the realization of the Erasmus+ program:

- Prospects for interaction for the 2020/2021 academic year within the Erasmus+ program
- Ongoing or planned activities under the Erasmus+ program
- Budgetary reallocations due to not used mobility scholarships
- Best practice cases in the solution of nonstandard

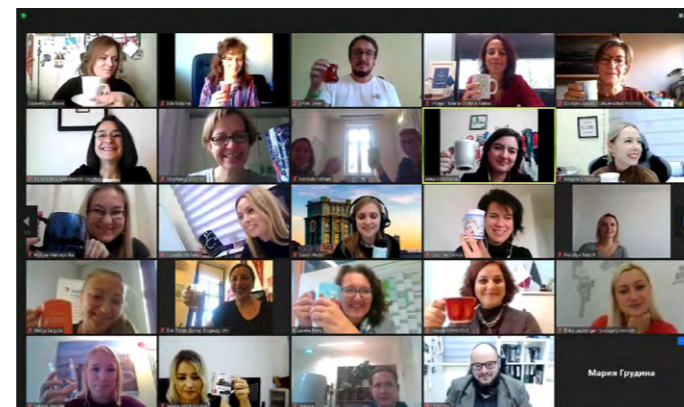
situation connected to the exchange in the period of the pandemics

- The successful completion of the mobility program in terms of the pandemics
- Support of exchange students during the lockdown period
- How to ensure safety conditions to the exchange students in a foreign country
- Prospects for the new Erasmus+ Program

More information about the event:

<https://www.erasmusdays.eu/event/erasmus-teatime-with-spbpu%e2%98%95/>

Within Erasmus+ TeaTime, SPbPU, Republican Sivas University (Turkey), Liepaja University (Latvia) Beja Polytechnic University (Portugal), Polytechnic University of Madrid (Spain) shared their experience. In total, over



Erasmus TeaTime 16.10.2020

» The current situation is still very difficult all over the world but we wish that our students start making plans for the future again.

20 universities from Germany, Spain, France, Turkey, Austria and other countries took part in the discussion. All the panelists without exception spoke about the need for following the security measures. The coronavirus pandemic has significantly affected the number of participants in academic mobility programs. In order to go back to the previous figures and study or work safely at a foreign university, it is important to remain conscious and adapt to necessary precaution measures. Besides, there are still reasons for joy as 15 new applications within the Erasmus + KA 107 Credit mobility project 2020 has been successful. The implementation period of the new projects will be 2020-2023. That means new scholarship opportunities for students and professors from SPbPU. We are pleased that this year our applications have been supported as with our long-standing partners universities (TU München, Politecnico di Torino, BTU), as with new partner-universities (University of Southern Denmark, Instituto Polytechnico di Beja, Liepaja University).

Also, SPbPU has 21 ongoing Erasmus Credit mobility project from the project year 2019 where none of the scholarships for incoming and outgoing professors and students could be used yet because of the pandemic outbreak. So, we are sure that there are a lot of great opportunities waiting for students and professors.

The SPbPU International educational programs and academic mobility department on daily basis receive questions from students and staff about when new competitions under the Erasmus+ scholarship programs will start again. Given the current epidemiological situation in the country and in the world, it is very difficult to answer it for sure: according to preliminary data, the next competition for the Erasmus+ scholarship program will be held in February 2021, as we hope that the autumn semester 2021 will give us the opportunity to return back to our familiar international collaboration and we will be happy to welcome students and staff from our partner universities at SPbPU and safely send our students for an semester exchange.

Thus, we can introduce some examples of safety and support measures provided to the students.

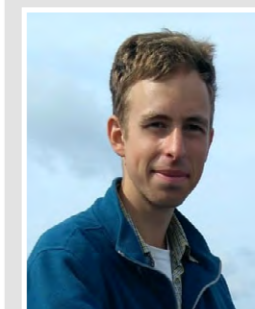
**Information help by Erasmus+ team:** connection to Consulates, Embassies, Crisis Management Centre of The Ministry of Foreign Affairs of the Russian Federation, campus condition status update upon arrival medical measures instruction handling with dormitory administration always in touch via Email, WhatsApp, Phone etc.

**University's help:** tutor help, financial support, volunteers for students who are quarantined observation facilities for students who are quarantined masks and sanitizers in each study building etc.



**EMRE SEVEN,**  
SCU Erasmus Vice Coordinator,  
Sivas Cumhuriyet University,  
Turkey

During the pandemic, we faced several problems. Uncertainty, social isolation, parental anxiety, distance learning, returning home, medicine - this is by no means a complete list of what students were worried about. We tried to solve every problem - we held regular orientation meetings online, volunteers communicated with parents and students, and the university provided assistance in technical support so that foreigners would have constant contact with home. To ease social isolation, we organized an online Turkish language club. And of course, we have been and continue to be in close contact with hospitals, consulates and embassies on various issues.



**DAVID GUTDEUTSCH,**  
SPbPU Exchange Student from  
TU München  
Germany

When lessons in spring became online, to me they didn't lose quality. Teacher even likely gave extra lessons more flexible. Since at the beginning of pandemic I didn't went out often, there was nothing to do than better prepare the lessons. But during this time I almost lost contact to Russian students, also because student activities like the universities orchestra has been cancelled, so I was glad to live in dormitory, having there some friends among the exchange students. Right now my second semester at Polytech is in class room and I enjoy weekly rehearsals of the orchestra, chamber music and concerts and theater in the city. Empty trains made trips around the city more comfortable as well as a very long travel by train through whole Russia during summer vacations.



Full interview



15, 16, 17  
of October  
2020

# JOINT AND DOUBLE DEGREE PROGRAMS



A DOUBLE DEGREE PROGRAM  
IS THE BEST OPTION TO EXPERIENCE  
HIGHER EDUCATION ABROAD IN FULL



**DARINA KLIMOVA**

Alumni of the Double Degree program  
«International Business Development»  
Chief coordinator of short-term international  
programs

[dklimova@spbstu.ru](mailto:dklimova@spbstu.ru)

I graduated with two Master's degrees from Peter the Great St.Petersburg Polytechnic University (SPbPU) and Leibniz University Hannover (LUH, Germany) in October 2020. My double degree program combines the first year at SPbPU MSc course «International Business Development» and the second year at LUH MSc course «Economics and Business Administration.» Both programs are delivered completely in the English language.

Since I have been working at SPbPU International Office for 5 years it was reasonable for my career growth to experience studies abroad myself. Certainly, two universities' degrees in one Master's program was a unique chance to use two years as efficiently as possible and that gave me plenty of insights into how the educational system works in another country in the regulation and social terms. I was determined to do a double degree program with the German university for self-improving, growing professionally, increasing my competencies, getting hands-on international education experience, and deeply broadening my cultural horizon. Eventually, I reached all these goals.

» **SPBPU & Leibniz University of Hannover DD Program: 2 years + motivation = 2 MSc degrees**



I have to highlight that a very important element of any academic mobility is a full immersion into the local or intercultural experience and I had one into German youth culture. But everyone should distinguish the difference between an exchange semester and a double degree program mobility. In the second case, the pressure and responsibility are higher but, at the same time, the outcome is way much more valuable and fruitful.

If comparing Master's programs at two universities, I would say that courses at SPbPU are mainly focused on improving public speaking and presentation skills, while lecturers at LUH pay more attention to academic and research knowledge in social sciences. As for the team project skills, I was gaining them at both universities. If you ask me to compare studies at SPbPU and at LUH in general, in the first place I would point to the German culture of studying at libraries what is commonly not typical for Russian universities' culture. Another meaningful difference is the exam regulations: an LUH student can skip any semester exam and, since this «try» is not counted, he/she can pass it the next semester or the next year as the first try. That usually gives students more flexibility to focus on particular courses each semester and to stretch their studies for a couple of more semesters or even years, while exams in Russia are held strictly within one exam session in the three only tries during the two months.

The most impressive course at LUH was «Strategic Management» with weeks of reading academic papers and a three-day intensive out-of-campus training with a real case of the Lufthansa Group. I also had similar classes at my undergraduate program at SPbPU and now I am even more convinced that these kinds of training-like courses are the best approach to deliver

a deep understanding of management and interaction in an organization or a team through tools and means of education. The most memorable and effective course at Polytech Master's program was «Investment Management» where we went through similar to the real-world circumstances of projects preparation and presentations to venture funds investors.

Within my MSc thesis, I mastered a so-called «good academic practice» by doing the study that had to meet high-standard international requirements generally applicable to research papers in indexed social sciences journals. Now I am planning to publish an academic paper based on my MSc thesis research about the perception of leadership patterns among SPbPU staff. Its findings can be also applied in leadership development and training programs in the context of Russian universities.

It is also noteworthy that by the end of my studies at LUH I was nominated for the DAAD- and College Awards organized by their International Office.

To sum up, I consider my overall MSc studies and the successful finishing of the programs at both universities as a big win, a truly valuable achievement, and one of the most enriching experiences I ever had. Certainly, I recommend everyone, who is striving for studies abroad and is full of motivation and determination, to catch this unique chance and go for a double degree program.



**NIKITA LUKASHEVICH,**  
Deputy Head for International  
Affairs, Institute of Industrial  
Management, Economics and  
Trade, SPbPU

Double degree programs are one of the most valuable results of strategic partnerships, which provide many opportunities not only in education, but also in cooperation with foreign professors and research. Double degree programs give SPbPU additional competitive advantages, make it possible for the talented Russian and international students at SPbPU to acquire the valuable competences and intercultural experience at partner universities



**FRANCESCA CRISTALDI,**  
Scientific assistant to the Vice  
President for Studies and  
Academic Affairs  
Leibniz University Hannover,  
Germany

I nominated Ms. Klimova for the «DAAD and University Awards 2020» organized by the LUH by the International Office due to her great academic achievements, social commitment and exceptional enthusiasm to studies.



# JOINT AND DOUBLE DEGREE PROGRAMS



## NEW INTERNATIONAL MSC PROGRAM «QUANTITATIVE FINANCE»



**EKATERINA KOROLEVA**

Associate Professor, Supervisor of master program «Quantitative Finance»

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**IRINA RUDSKAYA**

Professor, DSc, Supervisor of summer school «Quantitative Finance»

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For the first time, the Graduate School of Industrial Economics launched an international master program «Quantitative Finance». The program has attracted students from different countries who are interested in deepening their knowledge in the financial area. The program focuses on 4 main modules: financial accounting and analysis, risk assessment, financial markets, and financial technologies.

The program «Quantitative Finance» is implemented in cooperation with Business School Cass, City University of London, and Tallinn University of Technology. In the first term, students had unique opportunities to visit online lessons of TOP-ranked professors. During the course «Finance», professor Dirk Nitzsche (Business School Cass, City University of London) introduced students to the basics of financial theory, including the consideration of financial instruments and the application of basic financial concepts. In the framework of the course «Digital resources in scientific research» professor Peeter Muursepp (Tallinn University of Technology) gave the main tools for conducting scientific research and acquainted with the key rules for making scientific surveys.

The students also have a great experience to coordinate with experts from the industry. In the first term, the students of program met with Fyodor Murachkovsky, the founder of a crowdfunding company Planeta.ru. Students asked a lot of different questions and were interested in the results of the platform's activities during the COVID, aspects of the company's interaction with advertisers in the framework of special projects, and much more. Moreover, the students take an active part in project

activities and participate in the international symposium WC2. Within the framework of the symposium, students have the opportunity to interact with students from all over the world and present a joint projects of vision for business development after COVID world.

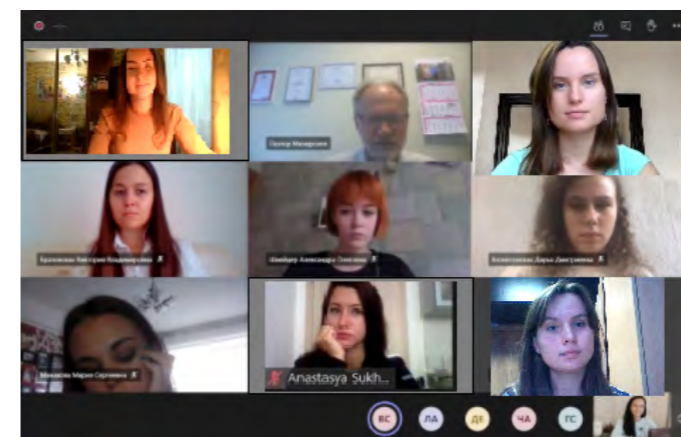
The international program is designed to aware students of the latest trends in the financial sector; gain knowledge of risk decrease and create appropriate control or preventative measures; receive the experience of econometric modelling in Stata as well as programming in Matlab and Python. Graduates of the master program will be able to receive employment in large investment banks, hedge funds, audit organizations, and other specialist companies.

In the framework of the international master program, it is planned to organize an adaptive credit-bearing module in Summer School 2021 «Quantitative Finance» in cooperation with Business School Cass, City University of London. As a student of the Summer School course, you'll be able to expand your experience, enhance your qualifications, and get the necessary skills in the framework of portfolio theory and asset management. Our intensive modules are appropriate for current undergraduate students, prospective MSc students, and those already working in the industry.

» You can lose by risking, but you cannot win without risking (c).



The program has attracted students from all over the world.



The online and face-to-face lessons of international professors.



professor Dirk Nitzsche

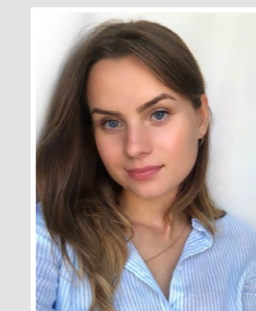


professor Peeter Muursepp



**SHAUYA JIGEER,**  
Student of master program  
«Quantitative Finance»  
China

SPbPU is located in St. Petersburg, which is a historic city with breathtaking architecture and rich culture, also is a modern city called the most European city in Russia. I chose SPbPU because it provides a range of programs for international students, including both Russian-taught and English-taught programs. Studying at program «Quantitative Finance» is allowed me to gain knowledge from professors, who are come from leading universities of Russia and abroad. The strong learning atmosphere inspires me to focus on my interest and to make continuous progress in financial area.



**KSENIIA LAKOVICH,**  
Student of master program  
«Quantitative Finance»  
Russia

The program «Quantitative Finance» is the perfect option for me! As part of the program, we get acquainted with the latest trends in the digitalization of the financial sector, as well as study econometric programming. I really like that the studying is conducted in English, thanks to which I see a significant improvement in my English language skills. A great advantage for me is to attend lectures by foreign teachers. In the future, I plan to continue developing in the financial field and spend a semester on exchange!



If you want to feel the atmosphere of our program, visit our page on Facebook:



## TURKISH SPECIALISTS OF AKKUYU NUCLEAR POWER PLANT ARE TRAINED AT THE SPbPU INSTITUTE OF ENERGY



**ALENA ALESHINA**

Coordinator of International Educational Programs, SPbPU Institute of Energy  
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SPbPU, being reference university of ROSATOM, trains personnel for the company's needs both in Russia and internationally. We moved to a new level of cooperation in 2018, when Peter the Great St. Petersburg Polytechnic University was chosen as a training site for the personnel of Akkuyu nuclear power plant in Turkey. Rosatom assigned us the task of training non-nuclear energy specialties that are in high demand at the plant. We modified international educational programs of the Institute of Energy to meet the needs of the industry. New curricula of «Power Plant Engineering» and «Electrical Engineering» master programs have additional design tasks, laboratory and practical classes, excursions to industrial enterprises, an intensive course of Russian and extended research work during the whole period of training.

However, history of cooperation with Turkey in the field of professional training in energy field started five years ago. 24 Turkish students were selected to study at «Nuclear power plants: design, operation and engineering» specialist program. Students have successfully overcome challenges of studying nuclear power engineering in Russian with labs, course works, internship at the Leningrad Nuclear Power Plant and company visits to Izhorskiye Zavody and Petrozavodsk Branch of JSC «AEM-technology» to see the manufacturing of equipment for the Akkuyu Power Plant. They have been ac-

» **New student enrollment for SPbPU – RosAtom – Akkuyu Nuclear Power Plant joint educational program in energy field**

tively participating in the cultural and social life of the university and took part in the Russian language Olympiads, sport competitions, as volunteers of Polytechnic winter and summers schools, speakers at the Week of Science and even organized a festival of Turkish culture.

486 Turkish candidates applied for the master programs in 2019. After three rounds of selection 11 applicants joined Electrical Engineering master program and 14 started studying Power Plant Engineering. Both groups took additional intensive course of Russian. In October students chose their master thesis themes and started research work ranging from smart grid to turbines, turbocompressors and renewable energy solutions.

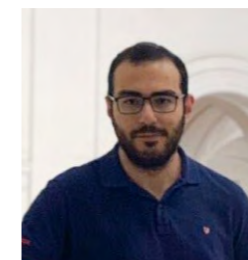
This year we received even more applications, selection process was even more competitive and requirements for the applicants even more demanding. As a result 25 bachelor graduates from leading Turkish universities - Hacettepe, Gazi, Çukurova, and Istanbul technical university came to St. Petersburg to study energy at Polytech.

2020/2021 academic year started for the second year students on campus, first year students started studying online. Epidemiological situation forced us to transfer all of the classes online in November. Distant education has been a challenge for engineering specialties. Practical skills essential for future career have to be acquired in laboratory classes and during company visits and internships. Instructors had to master new skills of filming and editing laboratory experiments, teaching the classes in the new format and motivating students to study effectively in a distant mode. We are doing our best to ensure that online learning does not affect the quality of students' training or the competencies and knowledge they acquire.



Online format have made ties with partner universities more close knit. Professors from Brandenburg University of Technology, Germany (**Prof. Harald SCHWARZ**), University of Genoa, Italy (**Prof. Pietro ZUNINO**), Brno University of Technology, Czech Republic (**Prof. Petr TOMAN**), Aalborg University, Denmark (**Ass. Prof. Behnam ZAKERI**) taught full length courses for international master students.

At the moment, we are working with the Turkish side and Rosatom on organizing pre-degree internships and master's thesis research work of students right on the site of the nuclear power plant under construction in relevant departments. We believe that this will allow our graduates to get additional practice-oriented competences and become more familiar with the future workplace and future profession while they are still students.



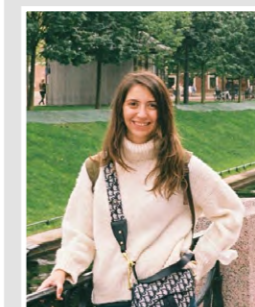
Ismail Egemen KOCAK, Power Plant Engineering Master's program 1st year student, Turkey: "I started to study in September 2020 and so far it is a great experience for me! Being National Research University Polytech is located in the cultural capital St. Petersburg

and has exchange agreements with several partner universities, which are one of the leading universities in their corresponding countries. I study a broad range of curriculum, comprised of both technical and social science classes. I have learnt a lot from them but among the classes I can easily name the Numerical Methods for Heat and Mass Transfer and Energy Economics as classes I like the most. Like classes, the lecturers have their expertise and experience on various topics, and it really broadens horizons. I hope that the worldwide struggle against Coronavirus is won, so that we can switch from distance learning mode to in person classes and have the opportunity to explore the university, its campus and the city more!"



**KHUSEIN CHECHENOV**,  
 Director for Educational and Cooperation Programs  
 AKKUYU NÜKLEAR A.Ş.,  
 Turkey

Training of Turkish specialists for Akkuyu nuclear power plant (NPP) is currently being carried out in two Russian universities of the corresponding profile - National Research Nuclear University MEPhI and Peter the Great St. Petersburg Polytechnic University according to the agreement between Russian Federation and the Republic of Turkey. Ministry of Energy and Natural Resources of Turkey visited SPbPU and gave positive assessment of the quality of education and students' training conditions. Akkuyu Nükleer A.Ş. is planning to continue training Turkish citizens in SPbPU. In order to equip Akkuyu NPP with operating personnel for the life cycle of the plant, our company has been working on the system of joint specialists training by Russian and Turkish partner universities on the basis of joint educational programs (JEP, Double Degree Programs) in the field of nuclear power and related specialties.



**SERAY KUPCUOGLU**,  
 Electrical Engineering Master's program 2nd year student  
 Turkey

I came here from Turkey where I grew up in a very different education and university system. However, the education that I am taking here, gives me a new point of view. It changed my line of sight to engineering and the way I think. SPbPU gave me professionalism in the field of scientific work. Besides, it is one of the international universities in Russia and this made me work with people from many different countries. I am pleased that I have the opportunity to develop myself here with a different educational culture. I feel lucky to be a part of it!





## MATHEMATICAL MODELING AGAINST COVID-19



**ALEXEY BOROVKOV**

Vice-Rector for Innovative Projects of Peter the Great St. Petersburg Polytechnic University, Head of the SPbPU National Technology Initiative Excellence Center for Advanced Manufacturing Technologies

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A working group systematically carrying out works on predictions of the spread of coronavirus infection has been operating in St. Petersburg since February 2020. Experts of the National Technological Initiative (NTI) Competence Center of Peter the Great St. Petersburg Polytechnic University (SPbPU) in cooperation with experts from SPbPU Institute of Biomedical Systems and Biotechnologies of and the Smorodintsev Research Institute of Influenza developed a mathematical SEIR-model of the Kermack-McKendrick type and a computer program for simulating the epidemic process, based on a mathematical model, taking into account the variable intensity of effective contacts. The work was carried out with the involvement of specialists in mathematical and simulation modeling, programmers, virologists and epidemiologists, economists of organizations included in the consortium of the SPbPU NTI Center.

The model is based on a system of differential equations describing the spread of dangerous epidemics. To calibrate the models, the situation of the spread of coronavirus infection in the Wuhan metropolitan area in China, on the Diamond Princess cruise ship, in the Italian province of Lombardy and others were analyzed and described with a high degree of accuracy.

Despite the fact that the origins of modeling are mathematical models, first created during the time of the Spanish flu (more than 100 years ago), the current models have been radically revised and take into account a large number of various factors: the number of in-

fect, the incubation period, the intensity of contacts, measures for the introduction and removal of restrictions (socio-economic indicators), seasonal diseases and many others.

The modified model has long gone beyond the epidemiological framework. Despite the fact that the data for modeling cannot be considered completely representative and relevant, dynamically reconstructed and calibrated predictive mathematical models of the working group provide significant assistance to the city government (other regions and the entire country) to make certain organizational, controlling decisions, to assess the resource of the health care system (in particular - on the «bed fund»). The principles of modeling, its results and the corresponding recommendations of the working group were covered in detail and continue to be covered in regional and federal media.

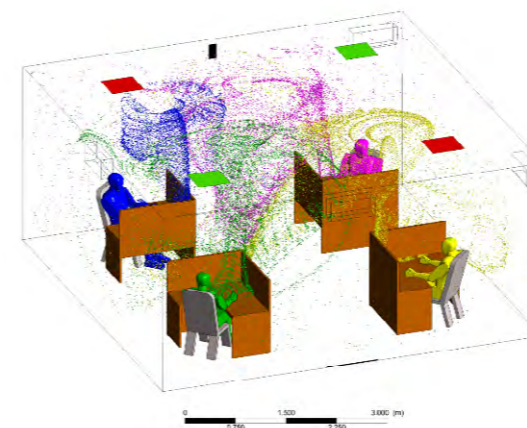
So far, no country has proposed such a variable model to describe a long-term forecast. In particular, no one in the world, except for Russian scientists, could predict the next waves of the epidemic.

At the opening of the II International Forum «Advanced Manufacturing Technologies», held on December 2, 2020, SPbPU Rector, Academician of the Russian Academy of Sciences **Andrei RUDSKOI**, commented on the activities of the working group and the significance of this development: *“The project consortium has developed a unique predictive mathematical model, data and integrated predictive analytics with a high degree of accuracy describes the possible course of the epidemic in the short and medium term. It is gratifying to realize that mathematical modeling, without exaggeration, allows to save people’s lives.”*

Since April 2020, the working group has been preparing regular presentation reports with the results of predicting the spread of COVID-19 in 10 regions of Russia (the Komi Republic, the Republic of North Ossetia-Alania, etc.). The working group continues to receive similar requests from other regions of the country to compile relevant analytics. The developers are convinced that the model can be scaled up and replicated in various countries of the world.

However, the SPbPU NTI Center participation in the fight against COVID-19 was not limited to making forecasts.

» **Unique mathematical model for long-term prediction of the spread of COVID-19**



The Center’s specialists solved several tasks for digital modeling of the spread of coronavirus infection in confined spaces. In the summer of this year, a working group of students from SPbPU Institute of Advanced Manufacturing Technologies and employees of the SPbPU NTI Center conducted a study of the spread of airborne infections in office buildings. The project was aimed at preparing socially significant facilities for working in post-pandemic (COVID-19) conditions. A grant from the Petersburg Foundation for Supporting Innovations and Youth Initiatives was allocated for its implementation.

A similar problem was solved to assess the effective social distance, as well as the safety of using personal protective equipment, on the example of the spread of infection in public transport.

The mathematical model developed by the researchers for predicting the spread of coronavirus infection continues to evolve, taking into account all the new circumstances in the course of the pandemic. So, according to the developers, in the near future it is planned to supplement the model with data on the vaccination of residents of the region, for which the corresponding analytics are compiled.

Methods of digital design and modeling within the framework of combating the spread of coronavirus infection will also be developed within the framework of the World-Class Research Center (WCRC) for Advanced Digital Technologies established this year. The consortium includes Peter the Great St. Petersburg Polytechnic University (coordinator of the Center) and Smorodintsev Research Institute of Influenza of the Ministry of Healthcare of the Russian Federation. As well, WCRC researchers use bioinformatics approaches to create an innovative vaccine platform based on self-replicating RNA technology. A candidate vaccine against COVID-19 is currently being developed. The project is being implemented within the framework of international partnership with the University of Maryland (USA) and Smorodintsev Research Institute of Influenza.



**DMITRY LIOZNOV**,  
Acting Director, Deputy Director for Research of the Smorodintsev Research Institute of Influenza, Russia

*It is clear that digital technologies in biology and medicine not only contribute to the development of tools for the diagnosis and prevention of infectious diseases, but also allow short-term simulation of the situation, which is a critical task in the early stages of the spread of infection. Modeling makes an important predictive contribution to strategic management decisions and is today an important tool in epidemiology.*





## KEY TAKEAWAYS OF THE ACADEMIC EXCELLENCE PROJECT 5-100: YOUNG RESEARCHERS ON THE SCIENTIFIC FRONTIER

It's high time to sum up the results of the Academic Excellence Project 5-100 aimed at boosting global competitiveness of the Russian leading universities since it is the last year of this initiative.

Having been enrolled in the Project 5-100 with only 1 QS World University Rankings in 2013 Polytech bottom lined good results in 2020 – 18 World University Rankings by Subject in QS, THE and ARWU totally, and 2 global World University Rankings in QS and THE.

As an overall outcome of the Project 5-100 we can claim the boost in research performance to compare with 2013. For instance, scholarly output as the number of publications in Scopus has soared by 7 times, and earnings from R&D works per one scholar has increased by 5 times.

Throughout the years Polytech has gained the status of the leading engineering university with the strong international focus, performing its best by the share of international students enrolled – leaping up to 18,04% among all the students. Having a promising share of overseas professors amounting to 13,24% St. Petersburg Polytech has appeared to be attractive regarding the University internationalization.

This year the SPbPU has launched an innovative management initiative offering R&D teams to participate in the Open Contest 5-100 aiming at supporting research and innovative education projects with the 5-100 Project grant. 25 projects out of 95 have been chosen and bottom lined with a high performance. Despite the pandemic (COVID-19) the overwhelming majority of the teams have struck the goal, and 11 of them have performed ahead of their targets. Fair enough to state a fortuitous increase in the number of publications in top research journals by 45% though a number of international conferences were suspended until better epidemiological situation.

One of the promising outcomes of the contest is that about 49% of young scholars, PhD and Master's degree students were involved in the projects as it's a strategic goal for the University management to bridge the generation gap and shape the environment for the talented and self-driven youth.

One of the successful projects which is worth to highlight was supervised by a young promising Principal Investigator (PI) – Nikolai Ushakov dedicated to

### » Towards cost-effective and portable optical fiber sensing systems



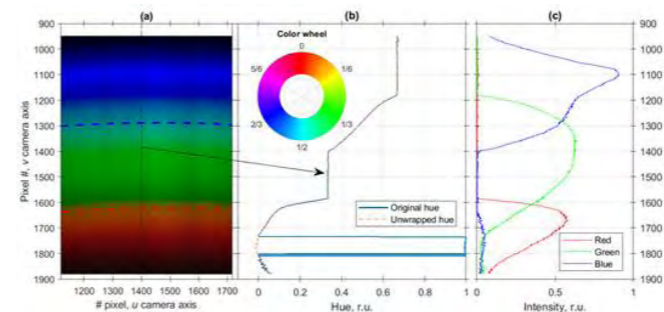
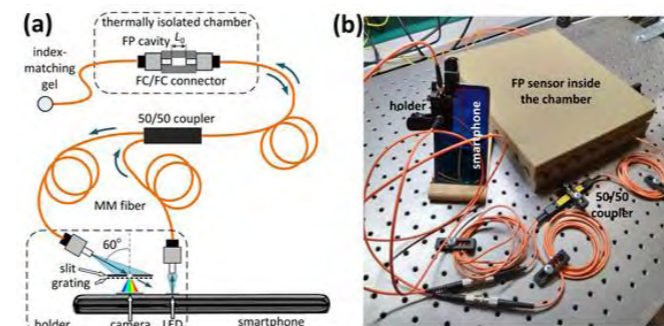
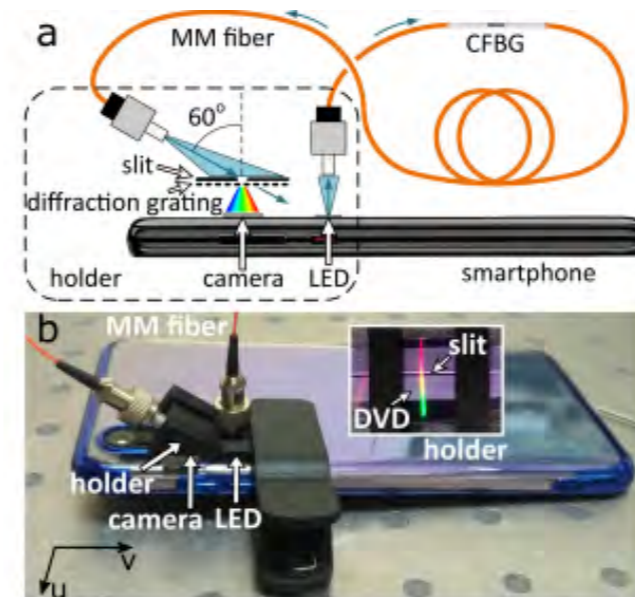
Optical fiber sensors offer a wide range of sensing capabilities and have found numerous applications in various areas, including but not limited to aerospace technology, oil & gas, nondestructive structure health monitoring and biomedical inspection. Their advantage

compared to traditional electric sensors is the ease of interrogation of distributed and quasi-distributed sensors, immunity to electromagnetic interference, absence of electric current at the sensing element, small footprint and capabilities of multiparameter sensing. One of the main limitations, currently preventing widespread usage of optical fiber sensors, is the relatively high cost of the interrogation devices, which contain low-noise lasers, photodetectors and signal processing electronics.

The project was aimed at advancing optical fiber sensors interrogation technology in order to pave the way for portable and cost-effective solutions such as smartphone-based ones. This, however, requires some modifications of the optical fiber sensing elements due to different properties of light irradiated by the smartphone flash light, acting as a light source in such systems. Additional attention must be made to development of novel signal processing approaches with increased robustness against different noise sources and able to be executed on smartphone processors.

The breakthroughs, achieved during the execution of the project, include the world's first demonstration of

smartphone-based interrogation of an optical fiber sensor, based on fiber Bragg grating [1], which is one of the most commercially successful and widely used types of optical fiber sensor, as well as a novel spectral calibration approach, which will substantially improve the accuracy and stability of smartphone-based optical fiber sensing systems and will allow their plug-and-play operation [2]. Also, signal processing approaches aimed at increasing the accuracy of interferometric optical fiber sensors [3] and processing signals of inter-mode optical fiber interferometers [4], which can allow distributed optical fiber sensing systems with smartphone-based interrogation. In addition, practical questions of using novel polymer fibers, allowing to increase sensitivity of optical fiber sensors were considered [5].



**ARTHUR H. HARTOG,**  
Director and Scientist, Worthy Photonics UK

I refer to the recent work by A.A. Marvart, L.B. Liokumovich, I.O. Medvedev and N.A. Ushakov on the use of the optics within a smartphone and a few easily available components, such as part of a DVD disk. This work demonstrates remarkable ingenuity together with excellent scientific analysis of the results. It builds on the experience of the team from their earlier work on fibre-based Fabry-Perot interferometers and other optical fibre sensors. Apart from allowing the research to be carried out at modest equipment and materials cost, their approach opens up the possibility of deploying their solutions in wide, perhaps economically disadvantaged, geographical areas and so bring technological benefits to a wider section of the population. It is also reminiscent of how some of the great scientists in the past furthered their research under challenging conditions.



[1] A. Markvart, L. B. Liokumovich, I. Medvedev, and N. Ushakov, «Smartphone-Based Interrogation of a Chirped FBG Strain Sensor Inscribed in a Multimode Fiber,» *J. Light. Technol.*, pp. 1–1, Sep. 2020.

[2] A. Markvart, L. Liokumovich, I. Medvedev, and N. Ushakov, «Continuous Hue-Based Self-Calibration of a Smartphone Spectrometer Applied to Optical Fiber Fabry-Perot Sensor Interrogation,» *Sensors*, vol. 20, no. 21, p. 6304, Nov. 2020.

[3] N. A. Ushakov and L. B. Liokumovich, «Abrupt  $\lambda/2$  demodulation errors in spectral interferometry: origins and suppression,» *IEEE Photonics Technol. Lett.*, vol. 32, no. 18, pp. 1159–1162, 2020.

[4] I. Chapalo, A. Petrov, D. Bozhko, M. A. Bisyarin, and O. I. Kotov, «Averaging methods for a multimode fiber interferometer: experimental and interpretation,» *J. Light. Technol.*, vol. 38, no. 20, pp. 5809–5816, Jun. 2020.

[5] I. Chapalo, A. Theodosiou, G. Pobegalov, S. Chapalo, K. Kalli, and O. Kotov, «Effective Cleaving Parameters for Multimode Gradient Index CYTOP Polymer Fiber,» *Polymers (Basel)*, vol. 12, no. 11, p. 2491, Oct. 2020.



## POLYTECH SCIENTIFIC GROUPS PRESENTED THEIR RESEARCH PROJECTS TO HUAWEI



OLGA VASILIEVA

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Back in 2014, Huawei and SPbPU began cooperation. One of the first joint projects was research in the field of coding methods, which was carried out by the team of the Higher School of Software Engineering at the request of the company. The results of the work in this area were highly appreciated by Huawei.

Over the past few years, the partnership between the university and the company has received a significant boost. Today SPbPU carries out research on a wide range of topics, which are of interest to Huawei: information technology, new materials, electronics, etc. With the active participation of the university's International Office staff, Huawei specialists and SPbPU researchers maintain an active communication on a regular basis. Currently the university is performing a number of research and development projects for the company.

**On October 26, within the framework of the Huawei-SPbPU Open Day 2020, SPbPU research groups presented promising projects for cooperation with Huawei.**

At the event, the leaders of research teams and SPbPU graduate students, together with the Huawei high-level management, discussed the key tasks for research

» **Wide range topics of SPbPU research, which are of interest to Huawei: information technology, new materials, electronics, etc.**



work that is being carried out. For example, the use of artificial intelligence in medicine, data compression without loss of quality for corporate storage systems, current problems in transport monitoring systems and many others.

Director of Institute of Computer Science and Technologies (ICST) **Lev UTKIN** delivered a report to Huawei representatives about university's experience and competencies in the field of artificial intelligence. SPbPU scientists are conducting a series of research in the fields of AI and machine learning, based on Neural Network Technologies and AI Lab. For example, SPbPU has developed a software package for the diagnosis of cancer tumors. One of the new areas of the laboratory's work is Explainable Artificial Intelligence, a modern and still understudied topic that can be widely used, including for the development of Huawei products.

The presentation by Alexander Fedotov, the ICST senior lecturer, was devoted to the method of remote determination of parameters for small unmanned vehicles in various environments. This research direction connects to the topic of a «smart city», which is very relevant today. Key issues in the infrastructure of modern cities are design, development and improvement of devices that accurately calculate the position of vehicles, pedestrians, road signs and other objects in space. The scientific group under the leadership of Professor **Vladimir KUPTSOV** from the Institute of Physics Nanotechnologies and Telecommunication is engaged in a study of radio frequency signals of special forms that will minimize the occurrence of errors and calculate the position of objects with the highest possible accuracy. These technologies can be applied, for example, in the development of unmanned vehicles.

Young scientists are also engaged in a research for smart city. Nikolay ABRAMOV, a graduate student of ICST, told Huawei experts about developing a software module for detecting and tracking pedestrians. Such module can be used in traffic control complexes at unregulated pedestrian crossings. Another young SPbPU researcher Yaroslav Khutorov suggested the company to consider

new ways to measure the speed of vehicles using optical methods. Modern systems for monitoring the vehicle speed using video have certain errors. Polytech's approach could minimize such errors. Both studies are carried out in cooperation with the laboratory «Industrial streaming data processing systems» of the NTI SPbPU Center on the basis of laboratory projects in the field of technical vision and artificial intelligence.

Part of Huawei-SPbPU Open Day 2020 agenda was devoted to software verification and analysis. Postgraduate students and faculty of the Higher School of Intelligent Systems and Supercomputing Technologies under the supervision of Dr. **Vladimir ITSYKSON** delivered detailed reports on the several research projects, aimed at solving problems of ensuring the quality of software systems.

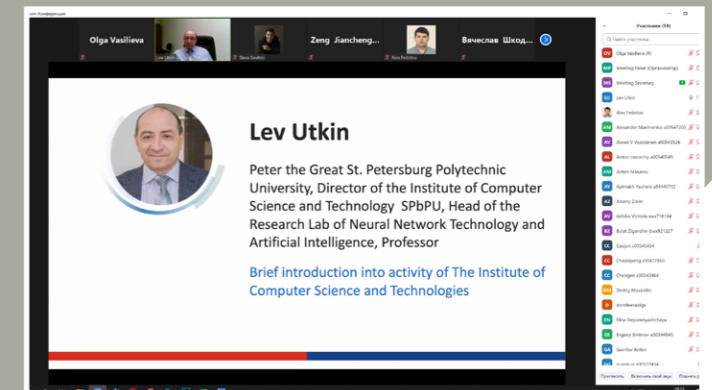
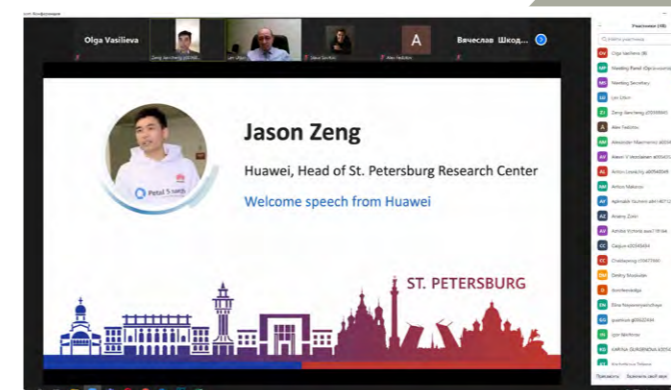
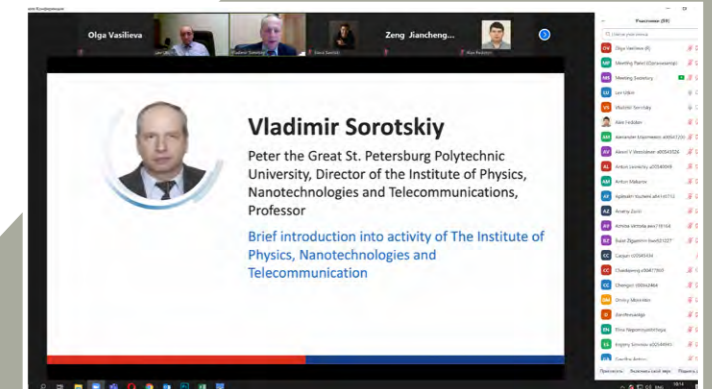
Research groups of the Institute of Physics Nanotechnologies and Telecommunication proposed projects, related to signal transmission in communication systems of 5G and 6G standards, to Huawei. The researchers of the Industrial Internet of Things laboratory are actively involved in these issues. Taking into account growing demands of the market for information transfer speed, Huawei has shown interest in the university's research, the results of which can help to overcome the barriers to mass adoption of next-generation telecommunication standards.

Based on the results of the workshop, SPbPU and Huawei formed a pool of research topics and formed working groups, thus detailed discussions of future joint projects are already underway.



JASON ZENG,  
Director of St. Petersburg  
Research Center of Huawei

Today we are working with huge amount of data. Questions remain, how to operate it, how to organize it, how to ensure high-quality connection and fast information transfer. At the same time, we aim to make the processes as automated as possible, and the management models - simple and understandable. Huawei has already started cooperation with SPbPU in a number of areas. We are confident that Huawei-SPbPU Open Day 2020 will help us establish new contacts and start new joint projects.





JOINT PAPER OF SPbPU AND AIRBUS WAS AWARDED IN THE ASME MECHANICAL ENGINEERING CONGRESS



DR. SERGEY LUPULEAC

Head of SPbPU VIM Lab, Lead Researcher of ASRP project  
lupuleac@spbstu.ru



Over the past years, Virtual Modelling Lab (VIM Lab) of SPbPU, together with Airbus, has participated in the Variation simulation and design for assembly section of ASME IMECE. Several papers were presented at the last three conferences that significantly contributed to the expansion of scientific contacts and the recognition of the scientific works of VIM Lab. Thus, this award is, although somewhat unexpected, but well-deserved recognition of the merits of this research team from the SPbPU Institute of Applied Mathematics and Mechanics.

For fifteen years Peter the Great St.Petersburg Polytechnic University and Airbus collaborate in simulation of the airframe assembly process and optimization of the assembly technology. Researchers from VIM Lab have significantly contributed to the development of the assembly modelling techniques. The proposed approach is based on the modeling of the stress-strain state of assembled structures, taking into account the contact interaction between parts. An important feature of assembly process is that the same design is used in the assembly line for all produced items of the same type. Therefore, in the analysis of the assembly quality, it is necessary to take into account the shape variations of the assembled parts caused by the manufacture discrepancies, fixation tolerances, etc. Hundreds of random initial gaps between the connected parts are generated in order to take these variations into account. The parameters of generated gaps are obtained as a result of statistical analysis of measurements, or by theoretical analysis of the previous assembly stages. Thus, the numerical analysis of the assembly process implies the massive solving of the contact problems on fine computational grids (a separate calculation is performed for each initial gap), that makes it impossible to use standard approaches (for example, finite element analysis) due to the limited computing resources. The proposed approach is aimed at development of special modeling strategy, benefiting from the problem specifics. In the framework of this research program SPbPU and Airbus collaborate on development and deployment



In November 2020 the paper «Complex fastener model for simulation of airframe assembly process» jointly prepared by SPbPU and Airbus has won the first runner up for the Outstanding Paper of the Advanced Manufacturing Track within the International Mechanical Engineering Congress and Exposition (IMECE) that is organized by American Society of Mechanical Engineers (ASME) by competing with 190 submissions. IMECE is the biggest annual event run by ASME. Usually the conference is held in one of the largest science and technology centers of the United States, but this year it was held online. It was attended by 1,700 participants from all over the world. The conference covering practically all topics in mechanical engineering is regarded as one of the most prestigious events in this area. The ASME IMECE is very popular both in academic community and among world leading technology corporations.

» For 15 years SPbPU and Airbus collaborate in simulation and optimization of the airframe assembly process.



of ASRP (Assembly Simulation of Riveting Process) software complex. **ASRP is a specific and exceptional software solution with a great deal of complexity. It is said to be the only computer code developed by the University that is officially deployed in Airbus.** From now this mathematical solution is allocated into the company's technological chain and is being used.

Speeding-up airframe assembly process in improvement of assembly quality are the important tasks for Airbus. Being a partner, the SPbPU has been working on simulation of the airframe assembly process and optimization of the assembly technology for years, and the company delegated the University to elaborate this issue. And, as a result, the special mathematical model combining dimension reduction with the use of the state-of-the-art optimization algorithms was developed and implemented in the computer code.

During the realization of the project the team of senior

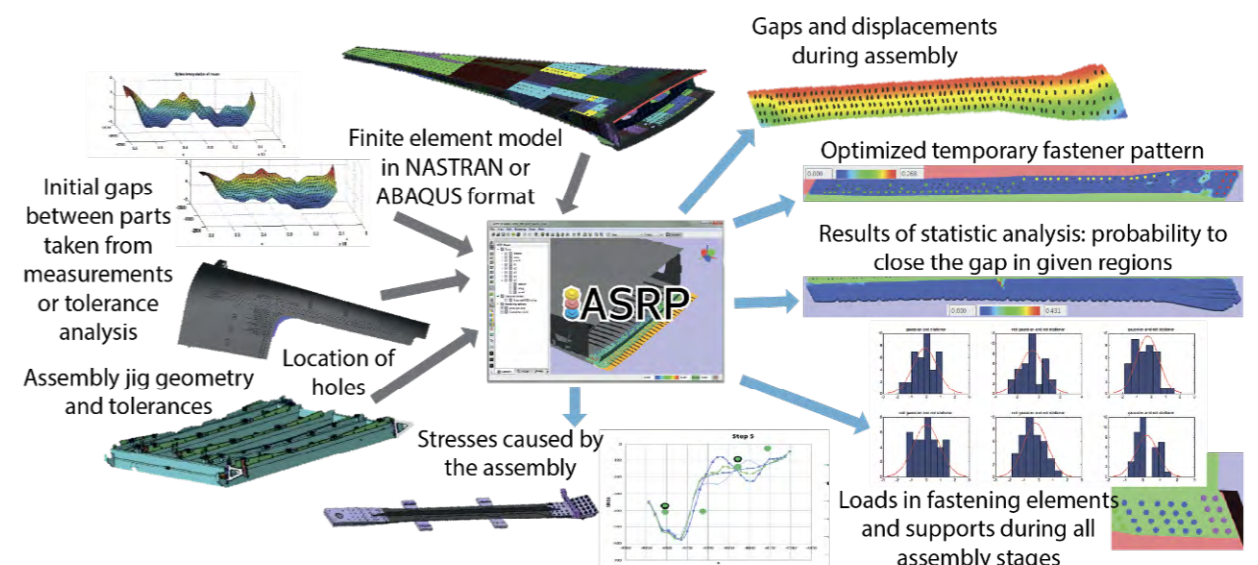


WILLIAM J. EMBLOM, Ph.D., P.E., Department of Mechanical Engineering, University of Louisiana at Lafayette USA

The Awards Committee and I want to congratulate you on being awarded the Runner Up for the Outstanding Paper for the ASME IMECE Advanced Manufacturing Track for Paper Number: IMECE2020-23588, COMPLEX FASTENER MODEL FOR SIMULATION OF AIRFRAME ASSEMBLY PROCESS. Competition was extremely fierce this year with 190 submissions. This award is a tribute to your efforts.

and young researchers has crystallized in the University as a specialized laboratory (VIM Lab). The members of the laboratory have the internships in the Company carry out specific studies and effectively develop this research area.

ASRP was thoroughly tested by Airbus on many cases. ASRP now has TRL6 grade that means that it was fully tested and recommended for internal use by the company. Abbreviation TRL stands for Technology Readiness Level and it comes from NASA. Experts from St. Petersburg Polytech University were the first in Russia who got TRL 6 in Airbus. The work on the project is under way. Presently experts from SPbPU work on optimization of assembly process for new generation of Airbus aircrafts. More than 20 joint scientific papers of SPbPU and Airbus were published during the cooperation. These works are becoming more and more recognized in the international scientific community, as evidenced by the latest award.







## POLYTECH COMMUNITY: NEW APPROACH IN THE WORK OF FUNDRAISING CENTER AND ALUMNI OFFICE



**ANASTASIA BALOVATSKAYA**  
Director of SPbPU Fundraising Center and Alumni Office  
[alumni@spbstu.ru](mailto:alumni@spbstu.ru)

In October 2020, SPbPU Fundraising Center and Alumni Office (FC&AO) POLYTECH COMMUNITY website, where alumni and other people can learn more about the Center's activities, the Endowment Fund and how to contribute to the development of the university.

*"World experience shows that relying on and interacting with alumni is very important for a university. Therefore, we are developing a community of polytechnics - Polytech Community - a territory for personal and professional development, communication, new discoveries and support of the university,"* SPbPU Rector **Andrei RUDSKOI** underlined.

Currently POLYTECH COMMUNITY is not just a community of polytechnics, but also a digital platform for the Fundraising Center and Alumni Office, where you can learn about the activities of the Center, the Endowment Fund and the mechanism of its functioning, about how to contribute to the development of the university etc. As well, the site presents projects implemented with the support of the SPbPU Endowment Fund, including the First Russian Solar Vehicle, the Badge for Educational Achievements "Excellent Student", the Blagovest Open Choir Competition of Technical Universities, Reconstruction of the Assembly Hall of the Academic Building of the Higher School of International Educational Programs and others.

➔ **SPbPU Fundraising Center and Alumni Office has launched an official website**



Global practice shows that endowment capital plays an important role in the development of a particular company. At the Polytech, the Endowment Fund was established in 2012 at the initiative of the alumni. It is intended for non-commercial purposes in favor of the university in the framework of educational, scientific, cultural, educational and patriotic projects. To put in the nutshell, an endowment is an additional resource that helps to implement projects that are important for the development of the university.

Fundraising provides for the search for resources necessary to carry out any activity and support the development of an organization in additional areas. Funds raised by university fundraising go to the Endowment Fund. For these purposes, the Polytech has a Fundraising Center and Alumni Office; its activities are closely related to the Endowment Fund and its operation, as well as with the establishment of mutually beneficial relationships with donors, many of them being graduates of the Polytechnic University.

The scheme of the endowment is that philanthropists - graduates and friends of the university - donate funds for various purposes of the university's development, forming endowment capital, which is invested in shares, bonds, mutual funds, currency, real estate - everything that can generate income. Further, the income from investment is directed to the needs of the university through the management company, and the capital of the fund itself remains untouchable, "eternal".

Among its activities, SPbPU FC&AO is engaged in maintaining contacts with graduates of the Polytechnic University. It organizes alumni meetings and prepares



graduation albums. Significant figures in the development of the SPbPU endowment fund are as follows **Yuri LEVCHENKO** - donator, Senior Vice President of VTB Bank, member of the Board of Directors of the St. Petersburg Currency Exchange, **Alexey ORYSHCHENKO** - Corresponding Member of the Russian Academy of Sciences, Doctor of Technical Sciences, Professor and Honored Mechanical Engineer of the Russian Federation, **Vitaly LOPOTA** - General Designer of the Central Research Institute of Robotics and Technical Cybernetics, **Eduard TIKTINSKY** - President of the RBI Group and others. Many of them are graduates of the Polytechnic University, as well as **Issa TOGO** - professor at SPbPU Department of Water Management and Hydraulic Engineering, a 1985 graduate of Leningrad Polytechnic University: "It's hard to study at the Polytechnic University, it's not a secret. Most of our students turn out to be good specialists and we are not ashamed of them. I always tell them that Polytech is an opportunity. So take this opportunity. It has always been very important for me to do research. I am glad that I am a graduate of the Polytechnic University, and now I teach at SPbPU and do what I love".

SPbPU FC&AO seeks to contribute to the development of careers and young professionals who have recently graduated and are now in search of a "dream job". One of such initiatives has become a joint project in cooperation with the HR department of the Skolkovo Institute of Science and Technology, aimed at developing the career of technical specialists. It is a cycle of free online webinars that are held once a month with representatives and leading specialists of large industrial companies of Russia from IT to energy. The speakers of the project talk about building a job search strategy, dealing with job interviews, employment opportunities for young specialists and about the prospects for career growth in these companies. The uniqueness of the project is that participants have the opportunity to ask their questions directly to a potential employer in real time, which means that the project is relevant not only for graduates looking for a job, but as well for senior students who are already thinking about their future career.

The SPbPU FC&AO team realizes that the path to success implies hard work and personal interaction with each donator on the implementation and development of projects. Thanks to your openness, desire to meet the needs of the university, interest in preserving and developing cultural and educational heritage, our relations are becoming stronger, and this gives us support in multiplying the existing result!



**MAXIM PASHOLIKOV**,  
Vice-Rector for Information and Social Work, SPbPU Russia

*The idea of forming a fund, whose body cannot be spent, but only multiplied, turned endowments many years ago into a powerful strategic tool for the financial*

*stability of organizations, especially in the field of education and culture.*

*I am convinced that our graduates and partners know firsthand that finding an independent source of income from different stakeholders: students, government, research institutions is a unique and extremely important task, especially when it comes to preserving our uniqueness, traditions and scientific schools.*

*Therefore, we invite everyone who is interested in the development of Peter the Great St. Petersburg Polytechnic University to take part in the formation of the fund's capital and strengthen it by becoming our donator.*



You can support the SPbPU Endowment Fund right now:  
<https://donate.spbstu.ru/>



**#POLYTECHCOMMUNITY:**





## NIKHIL MOHANAN (SPBPU ALUMNI 2020): INTERNATIONAL DEGREE PROGRAMS OF SPBPU ARE A GREAT START FOR A SUCCESSFUL FUTURE



OLGA DOROFEEVA  
SPbPU International Office PR manager  
o.dorofeeva@spbstu.ru

*International Degree Programs of Peter the Great St. Petersburg Polytechnic University attract students from all over the world and provide a good start for career growth. For example, a student from India Nikhil Mohanan successfully completed the International Master's Degree Program «Mechanics and Mathematical Modelling» at the Higher School of Theoretical Mechanics (HSTM SPbPU) and continued his postgraduate studies at one of the leading universities of France - École Polytechnique, which is a partner university of SPbPU*

- Nikhil, congratulations on the successful completion of an important stage in your life! Please share your impressions of SPbPU International Master's Degree Program!

- I have been studying at the Higher School of Theoretical Mechanics Based on my personal experience with the staff and faculty of the HSTM, I can certainly say the department takes good care of the student's progress and provides a vast number of opportunities for him/her to excel both academically as well as professionally.

- Which opportunities did you enjoy the most?

- As a student of the International Master's Degree Program, I had the opportunity to get to know professors and researchers from abroad and, at the same time, to be in touch with domestic researchers at the Russian Academy of Science. The curriculum is very intriguing and supportive, with the additional option of taking courses from other departments of the institute like the Higher School of Mechanics and Control.

- What can you say about the courses you have

studied? Which disciplines did you like the most?

- As an incoming international student, I felt that the mathematics taught was very different and hard. After discussing with the relevant professors, they gave additional lectures and materials so that by the mid-first semester, mathematics became easier to understand. A critical aspect of HSTM is the Gazpromneft Research Center, which offered graduate students to work part-time conducting research on the Oil and Gas sector. As I was able to work at this center, I could make friends and got to understand the department and staff better.

- What do you think about professors?

- Eminent Professors like Prof. Huppert (Cambridge University), Prof. Charkaluk (École Polytechnique), Prof. Altenbach (University of Otto von Guericke), etc., delivered lectures and, at times, offered students to pursue research at their Labs. And during one of those lectures, I happened to obtain an opportunity to start research at Ecole Polytechnique (EP) in Paris, France.

- What is your research dedicated to?

- At Ecole Polytechnique, I worked during the summer on a crystal plasticity model for micromechanics employed at the Laboratory of Mechanics of Solids (LMS) at EP, which later led to my graduate thesis focused on microstructure evolution during Additive Manufacturing. During this time, I chose to continue my research in micromechanics at LMS-EP, and I was given a full scholarship at their Doctoral School to pursue my research.

- Are you satisfied with the education you have got in Polytech?

- My education at HSTM offered me many opportunities, like working with various professors, working on advanced projects at the research center, and at the same time opportunities to pursue research abroad. In conclusion, I can be certain to say my career wouldn't be the same without my research-study at HSTM SPbPU.

- Nikhil, thank you for the informative interview! We wish you luck, success and new exciting discoveries!

### FOR REFERENCE:

*International Master's Degree program 'Mechanics and Mathematical Modeling for Oil and Gas Industry' is aimed at training highly professional scientists and engineers with the background and practical experience in mechanics of porous media and multiphase media, computational mechanics, mathematical modeling and simulations, and distributed computing. Special focus is set on oil and gas production, namely, simulation of hydraulic fracturing, geophysical and hydrodynamic methods for oil and gas well testing, development of oil and gas fields, rock mechanics.*



Nikhil Mohanan  
SPbPU Alumni 2020  
Ecole Polytechnique PhD student

## CONGRATULATIONS!

### Vitaly Saveliev, SPbPU Alumni 1977 is a new Minister of Transport of the Russian Federation



**SPbPU graduate (1977) Vitaly Saveliev, CEO of PJSC Aeroflot has been appointed Minister of Transport of the Russian Federation (according to the RF President Decree No.690 dated as of November 10, 2020)**

Vitaly Saveliev, graduated from Leningrad Polytechnic Institute in 1977 (Department of road-building machinery; currently – Higher School of Transport, Institute of Machinery, Materials and Transport).

From 1977, was engaged in the construction of the Sayano–Shushenskaya HPP, worked his way up from an engineer to the chief structural engineer in one of the KrasnoyarskGESstroy associations. In the period of 1993 - 1995 Vitaly Saveliev held a position of the Chairman of the Management Board of BANK ROSSIYA. In 2001 he took the post of a Deputy Chairman of the Management Board of Gazprom. In the period of 2004-2007 he served as a Deputy Minister of Economic Development and Trade of the Russian Federation and in the period of 2007-2009 - the First Vice President of PJSFC Sistema.

In 2009 Vitaly Saveliev became CEO of PJSC Aeroflot. Under his leadership the largest Russian airline company became a member of the global aviation elite, entered the top 20 aviation holdings in terms of passenger traffic. In 2018 Aeroflot was included in the Forbes Global 2000 list - a ranking of the largest and most influential companies in the world with shares traded publicly throughout the world.

**SPbPU Rector, Academician of the Russian Academy of Sciences, Andrei RUDSKOI:**

*"Peter the Great St. Petersburg Polytechnic University is proud of its graduate. We congratulate Vitaly Saveliev on his new responsible appointment and wish him success in his high position, fruitful and effective work on the development of the transport system of Russia".*

## INTERNATIONAL POLYTECHNIC WEEK – 2021 “HIGHER EDUCATION FOR SUSTAINABLE DEVELOPMENT”



MAY 24-27, 2021

Every year Peter the Great St. Petersburg Polytechnic University hosts our partners from all over the globe and provides opportunities for networking where we all set up new goals, encourage scientists and students to new achievements and strive for expanding horizons in scientific and educational activities.

The main goal of the IPW is to create an international platform for sharing knowledge and experience between the world's leading universities for sustainable development and strengthening competitiveness of partner universities.

IPW has become an excellent practice of attracting new partners and is the main annual international event of the Polytechnic University. Partner days, Education fair, thematic conferences and workshops, as well as student festivals, forums and competitions, bilateral meetings with partners and cultural events are constantly held during the IPW. By the reason of the global coronavirus pandemic it was decided to hold International Polytechnic Week - 2021 in the mixed format (online and offline).

*Recognizing the important role of education, the 2030 Agenda for Sustainable Development highlights education as a distinct goal (SDG 4) and also includes education targets under a number of other SDGs. In fact, education can accelerate progress towards all of the SDGs, and therefore should be part of strategies to achieve each of them. So we decided to choose “Higher Education for Sustainable Development” as the major topic of IPW2021.*

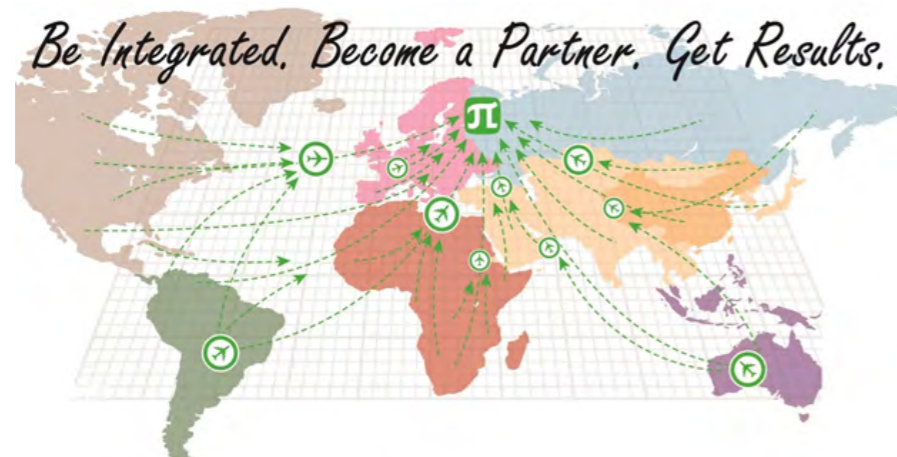
If you like to participate in the International Polytechnic Week 2021 and get all the updates of the Event, please contact us by the following e-mail [ipw@spbstu.ru](mailto:ipw@spbstu.ru) or fill-in the [Registration form](#).



About SPbPU  
International  
Polytechnic  
Week



Registration  
Form



## FIRE PROTECTION OF MATERIALS AND CONSTRUCTIONS: SPBPU FPM-2021

APRIL, 2021

<http://fpm.spbstu.ru/en/>

Topical tracks of the Conference:

- Development of fireproofing means for materials and constructions, investigation of their efficiency and performance mechanism;
- Effective technologies of fireproofing of materials and constructions in different objects and areas;
- Methods of fire tests and experimental investigation of fireproofing parameters;
- Calculation/software complexes and engineering approaches for estimation of technical parameters of fireproofing means;
- Quality and durability assessment of fireproofing means: methods and approaches;
- Regulatory and technical issues of application of fireproofing means;
- Certification and approval of fireproofing means, their identification.



## INSHS 2021 – 17TH ANNUAL CONVENTION AND INTERNATIONAL SPORTS SCIENTIFIC CONFERENCE

MAY 27-29, 2021

<http://inshs.spbstu.ru/>

The INSHS International Sports Scientific Conference will be held for the first time in Russia on May 27-29, 2021. INSHS 2021 is dedicated to all aspects of sport and exercise science, sport medicine, physical education, and sport management.

Themes: Sports Medicine and Rehabilitation, Healthy Lifestyles and Exercise, Violence, aggression, and abusive behaviour in sport, Sports Training / Coaching, Olympic Studies, Sports Management, Covid, Performance Analysis, Sport and Education.



## INTERNATIONAL YOUTH CONFERENCE ON ELECTRONICS, TELECOMMUNICATIONS AND INFORMATION TECHNOLOGIES (YETI-2021)

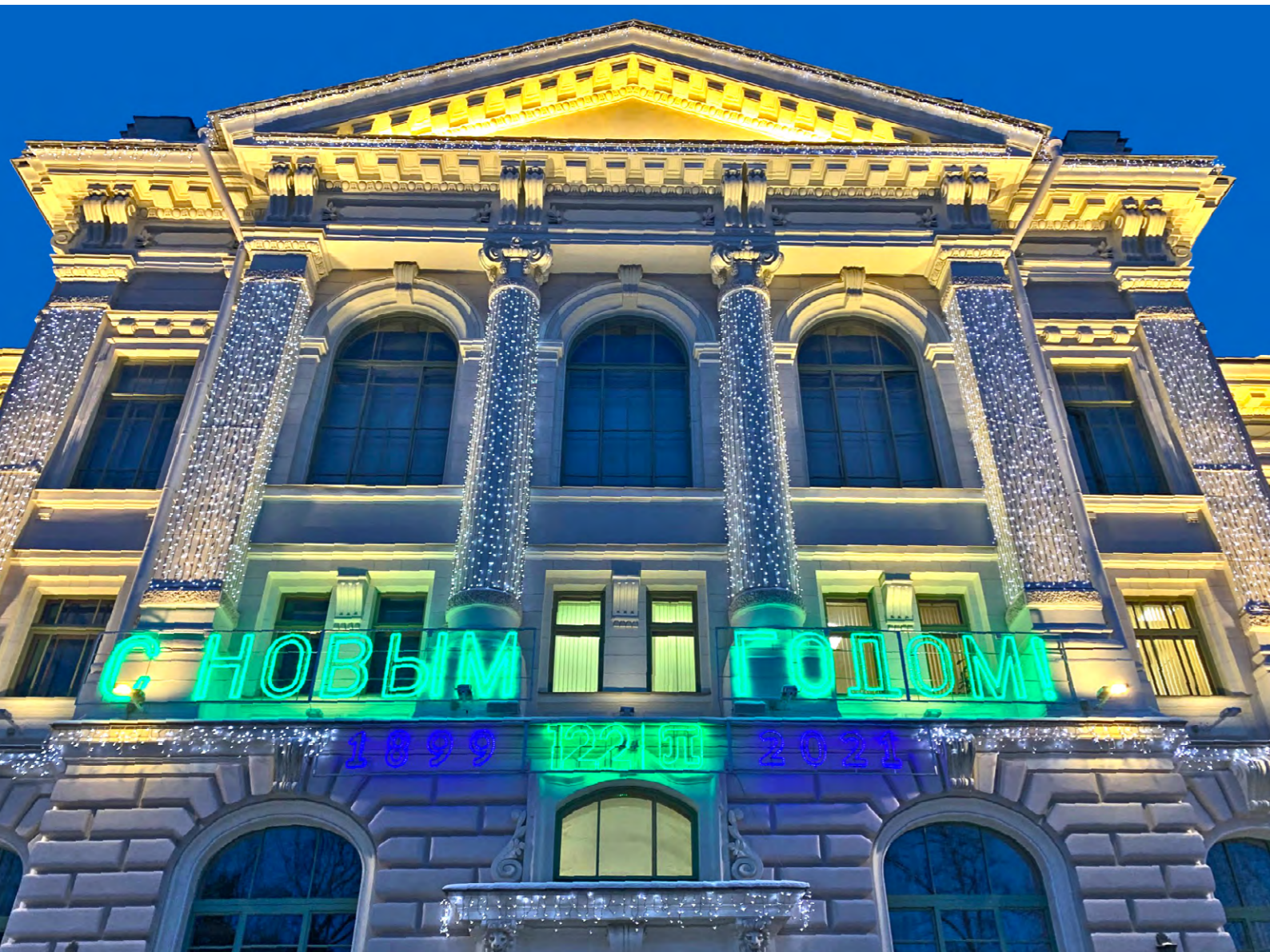
APRIL 22-23, 2021

<http://yeti.spbstu.ru/>

International Conference «INTERNATIONAL YOUTH CONFERENCE ON ELECTRONICS, TELECOMMUNICATIONS AND INFORMATION TECHNOLOGIES» (YETI-2021) is a conference that goals to bring young scientists for discussions on actual problems and major advances in electronics, telecommunications, and information technologies. The YETI-2021 Conference will give an opportunity to young researchers and early-career scientists to participate in a series of lectures which review the current trends and knowledge in the fields of electronics, nanoelectronics, telecommunications, optical and information technologies.

The main topics to be discussed at YETI-2021 are the following: Electronics and Nanotechnologies, Photonics and Optical Information, Information Technologies and Signal Processing, Telecommunications and Navigation Systems.







## PETER THE GREAT ST. PETERSBURG POLYTECHNIC UNIVERSITY

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