Skoltech

Skolkovo Institute of Science and Technology

NEWSLETTER
WWW.SKOLTECH.RU

Edward Crawley,
Skoltech President

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Dear friends!

So 2015 is coming to an end. The last few weeks have been busy and pleasantly fussy with participation in several conferences, opening of new research labs, manned with the most modern equipment, as well achievements of our colleagues and graduates receiving grants for their research and recognition of their start-ups.

The end of October was particularly hot. A Skoltech delegation attended a conference of the Russian-American Science Association (RASA-USA) where Irina Dezhina, Head of Skoltech scientific and industrial policy group, presented an analytical report dedicated to the cooperation with Russian scientists working abroad.

Once again we took part in the main event of the year – Open Innovations forum.

This year Alexei Sitnikov served as the moderator of the Day of Education, and some students of the new 2015 batch presented their projects and prototypes, which they developed at the Innovation Workshop, while 3 graduates demonstrated their projects - a 3D-scanner, a copter equipped with a camera and Sharxi - at the Skolkovo Innovation Center booth.

In those days the Institute also hosted the 7th Conference of Skoltech Translational Research and Innovation Program, and we can claim with confidence that with time the program of the conference gets more and more interesting.

Early November, Skoltech students and alumni attended Slush startup conference in Helsinki, and our graduate Catherine Kotenko-Lengold took the second prize in the pitch-session – with her project, Astro Digital (over 1700 applications were filed for the contest). We are all very proud of Catherine's achievement and wish her success in further development of her project!

The culmination of the academic and calendar year is to be the next round of Sci-Talks, this time dedicated to Energy. Directors of the three Skoltech energy research centers will make presentations and tell about their scientific research and collaborations with the industry players.

Enjoy reading and happy holidays!
Edward Crawley
Skoltech President

SciTalks 2.3@Skoltech

SciTalks 2.3 on New Frontiers of Global Energy

The final event of 2015 is Skoltech SciTalks 2.3 where three Skoltech energy research centers – Center for Energy Systems, Center for Electrochemical Energy Storage and Center for Hydrocarbon Recovery – presented its scientific research and cooperation with the industry.

Centers for research, education and innovation are convergent research units of Skoltech, dedicated to certain thematic vectors. 6 out of 15 planned centers are already operating (by 2020 all CREIs will open its doors).

Speakers were prof. Janusz Bialek, Director of the Skoltech Center for Energy Systems, Prof. Keith Stevenson, Director of the Skoltech Center for Electrochemical Energy Storage, Mikhail Spasennykh, Director of the Skoltech Center for Hydrocarbon Recovery

Skoltech strives to place science in the service of industry, so improving the operation of energy systems, increasing battery capacity and new methods of oil and gas are all areas where the scientific research, conducted at the Institute, can lead to innovations that will have an undeniable impact on the real economy.

Skoltech@RASA Conference

In November 2015 Skoltech representatives again participated in the annual Russian-American Science Association conference. This year's focus was on the prospects for Russian expert communities that involve Russian expatriate scientists. The event took place at George Washington University (Washington, DC), with more than 160 visitors from the US and Russia.

Edward Crawley, Skoltech President, gave a talk 'Complexity – is it complicated?', and Alexei Sitnikov, VP, Institutional and Resource development, outlined a new Global Education program and possible ways of involvement for the scientific diaspora within this project.

The scientific part of the conference featured an analytical report by Irina Dezhina, Head of Skoltech scientific and industrial policy group. The topic of the report was cooperation with Russian scientists working abroad. The deductions were made on the basis of the poll involving more than 150 researchers and representatives of 35 Russian universities that work with their fellow nationals abroad. As the political and economic situation keeps constantly changing, provoking alterations within the relationship with the scientific diaspora, as well as conditions and opportunities for further interaction – so in order to ensure a successful collaboration, it's really important to understand what attitudes within the scientific diaspora are, what forms of cooperation are preferred by scientists, what issues arise in this area. All these points were considered while working on the report. With the conference participants Irina Dezhina shared her views on the situation, emphasizing the positive aspects of cooperation, as well as brought to the light proposals on the new modes of collaboration.

Irina Dezhina, Head of Skoltech scientific and industrial policy group

As Mrs. Dezhina said, the work on the report will be continued, because its main purpose is to find the most interesting and promising areas of cooperation with Russian scientists working in foreign universities and in industry.

To add, in the run of the conference, Russian scientists working in leading American universities, expressed interest in joint research and academic projects, willingness to accept Russian graduate and post-graduate students, as well as visit Russia for lecturing.

Skoltech@SLUSH

7 startups, crafted and created by Skoltech MSc and PhD students and graduates, are displayed at the Slush conference, which opened today in Helsinki, Finland. All the projects are a result of the Skoltech educational process focused at innovation and entrepreneurship studies to motivate students develop innovative products and further monetize their findings. The institute presented startups in such areas as robotics, satellite data, e-marketing, e-taxi business.

Skoltech students applied for the contest as well – the pitch-sessions, where the winner gets a big money prize. In total the organizing commitee received 1700 applications. Jury selected 100 apllications and promoted them to the on-stage pitch-session, with 20 getting to semi-finals and 4 – to finals. Skoltech filed several applications, and the application of the institute's graduate, Ekaterina Kotenko-Lengold, was selected. Katya's application made it not only to the on-stage session, but to the finals as well – together wih Austrian Caremonkey.com, Estonian Velmenni.com и and German Plugsurfing.com. In the long run, Astro Digital took the second prize, which is for today – the greatest achievement of Skoltech alumni on the international arena.

Edward Crawley, Skoltech President, commented on Astro Digital success: 'We are thrilled that Katya is being on the pathway of becoming a successful entrepreneur, because it's really the embodiment of what we are preparing our students here at Skoltech to be. The idea that she took a technical discipline like Earth imagery (which we discussed in my class – Katya was my student at Skoltech), combined it with an interesting IT approach, put it into entrepreneurial framework, and is now being a successful young entrepreneur – is exactly the pathway that we want our students to follow. So in many ways Katya is both an embodiment of the spirit of Skoltech, and a very important contributor to our space strategy'.

Slush is Northern Europe's biggest events for innovators and developers, interested in attracting global investors and networking with the heads of transcontinental companies. It's the fourth time in a row that Skoltech participated in the event that took place in Helsinki first week of November. This year's conference sees more than 15 000 visitors and 1700 participant-company registered.

Skoltech@SLUSH

Skoltech projects presented at the Slush exhibition

1. **TSURU Robotics // Nikita Rodichenko, Anastasia Uryasheva (Skoltech graduates, 2015)**

Tsuru Robotics (resident of the Skolkovo Foundation) – a company, engaged in the development of autonomous quadrocopters, tiltrotor, capable of developing speed up to 150 kilometers per hour and levitate up to 3 kg. **www.tsuru.su**

2. **ASTRODIGITAL // Ekaterina Kotenko (Skoltech graduate, 2015)**

Astro Digital (resident of the Skolkovo Foundation) – a platform to access satellite data, which makes searching, processing and integration of satellite imagery into web and mobile applications simple, fast and convenient. **www.astrodigital.com**

3. **SHARXI // Andrei Omelyanovich, Boris Urman (Skoltech graduates, 2015)**

Sharxi is a mobile application for iOS and Android enabling users to book a taxi and split the cost of the trip with fellow travelers. **www.sharxi.ru**

4. **AGRO HD // Ivan Maslov (current Skoltech MSc student)**

Agro HD is an analytical platform for agriculture, allowing to obtain information using drones and manage the processes of crop and livestock **www.agrohd.com**

5. **OPEN SPACEWARE // Anastasia Galanin (current Skoltech MSc student)**

Open Spaceware is an innovative platform on space technologies, which is also aimed at the developers of the 'cubesat' nano-satellites. One of the objectives of the platform is to reduce costs of space missions at least twice and to make knowledge about space technologies more accessible space. **www.openspaceware.com**

6. **EMOTICAM // Alexander Kudryashov (Skoltech graduate, 2015)**

Emoticam is a tool for measuring intensity of emotions and heartbeat rate using a web camera stream. Can be used for remote marketing analysis, engagement monitoring for online courses and media content recommendations.

7. **HAIRDRESSERY // Darya Stepanova (Skoltech graduate, 2015)**

Hairdressery is gaming platform in the form of a virtual mirror where you can choose a hairstyle **www.hairdressery.com**

Education@Skoltech

Direct speech. Prof. Michael Chertkov: between Skoltech and Los Alamos

I moved abroad in 1992, first to Israel, where I earned my Ph.D. in physics at the Weizmann Institute in 1996, and later to the United States, where I worked for three years at Princeton University, Physics Department as a Dicke Fellow. Since 1999 I have been working at the Los Alamos National Laboratory (LANL), first as an Oppenheimer Fellow and then as a staff member. Throughout these years I have maintained scientific contacts with researchers in Russia, including the Landau Institute of Theoretical Physics in Chernogolovka, as well as the Novosibirsk University (my alma-mater) and several Novosibirsk-based institutes. I come to Russia often. Many times during the last 25 years I was invited to attend conferences. I have also invited many of my Russian colleagues to visit me in the USA, so I can't say I was cut off at all from the Russian research community. In modern Russia, almost nothing makes me surprised today. I neither fall into any euphoria, nor disappointment.

Los Alamos National Laboratory (my main job) is not just a handful of people working in one room (as "lab" is commonly envisioned in Russia). It's a huge research center, one of the largest in the United States. It is located in the mountains of the Southwest (Rocky Mountains), in the Northern New Mexico, close to the Colorado's border. Research-wise LANL is engaged in a lot of different disciplines. There are approximately 10 000 employees here, and in general the population of the city, or rather the village - a residential part of the settlement next to LANL – is about 18 000 people. About 50 families are of Russian origin. The nearest town – Santa Fe, is relatively small. Some laboratory staff live there. I believe the county of Los Alamos holds the first place in the United States in the level of education, because almost all the inhabitants are LANL staff, many with a Ph.D. We've got a real international team here. Now I have six postdocs in my group - one Swiss, two Indians, one Russian-French and one American (of Russian origin).

At LANL I have a lot of freedom in the choice of research focus, and I'm actually doing what I like to do. Before moving here, I was mainly engaged in theoretical physics, and that's what I basically continue doing, but now I'm also captivated by the problems of theoretical engineering.

For me, Los Alamos is a very natural extension of Akademgorodok, the Weizmann Institute and Princeton. Academic sites are all similar in style: small towns located in a beautiful setting with a rich scientific culture. For some, the only drawback, perhaps, is that Los Alamos is located far from the big cities. But I do not miss the mega-cities. I like to live in the mountains, spending a lot of time outdoors – running, hiking, skiing. I was born and lived the first twelve years of my life in Moscow, and I apparently sufficed this lifestyle of a big city. And then I went with my mother to Kamchatka. My mother was a geologist. In Soviet times, there was a good science-Olympiad program in operation, I kept winning regional Olympiads in mathematics, was invited to physics-math school in Akademgorodok and eventually stayed there for undergraduate studies and beyond.

I visit Skoltech quite often - 3-4 times a year for a total of 2-2.5 months. I really like the fact that a lot of Skoltech M.Sc. students are well prepared academically in math and physics and now they wish to be engaged with more applied/engineering sciences - this is my contingent. We are talking about the engineering sciences that emerged and matured during the last 20 years, and typically are not yet rooted in Russia. In this sense, my academic activities in Skoltech are aimed at "helping to set the right impetus" to those students who wish to become successful researchers in the new fields of the engineering sciences after graduation.

I'm a theorist, I don't build instruments but write formulas, translating them often into computer programs. I am into

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both natural and engineering (man-made) systems - such as electric grids and natural gas network, gas - which burns and that it is necessary to distribute over long distances. In the context of these theoretical engineering problems I work with such concepts and processes as control, optimization and analysis of the risk of failures. There are a lot of open challenges here, the majority of those are pretty new and interdisciplinary, often requiring the ability to quickly learn and adopt unconventional solutions – and here am I – hunting for students, at Skoltech and all over the world, capable of doing it.

The course, which I'm going to lecture at Skoltech in April-May next year, called "Stochastic Modeling and Computations", is a total premiere – a new course I have never taught before. This course is interdisciplinary and should be of interest to those students who deal with uncertainty and statistics in their studies of natural and engineering systems. It is a course that assumes basic knowledge (standard for good BA programs in Sciences and Engineering in Russia and abroad) of Mathematics (analysis, algebra, differential equations), but it does not require special knowledge of statistics or engineering disciplines - as all these key concepts will be presented gracefully within the course. "Stochastic Modeling and Computations" will be useful to those students who want to learn how to think about and deal with uncertainties in their laboratory or theoretical studies of large and complex engineered (man-made) and natural systems. Two senior Ph.D. students from the Landau Institute of Theoretical Physics help me in creating this course, especially with recitations/seminars, homework and exam. Apart from Skoltech MSc and PhD students, we hope to attract M.Sc. and Ph.D. students and from other Moscow universities, for example, MIPT and the Higher School of Economics. We will also test the new technology of remote (or partially-remote) training, to engage students from Novosibirsk, Tomsk, Irkutsk, and other scientific and technological centers of Russia.

Interview by Alexander Zolotarev

Education@Skoltech

Francisco Kajatt-Vaccari, Peru, 26 years old.
Education: Combined Major in Business and Computer Science, The University of British Columbia, Canada.

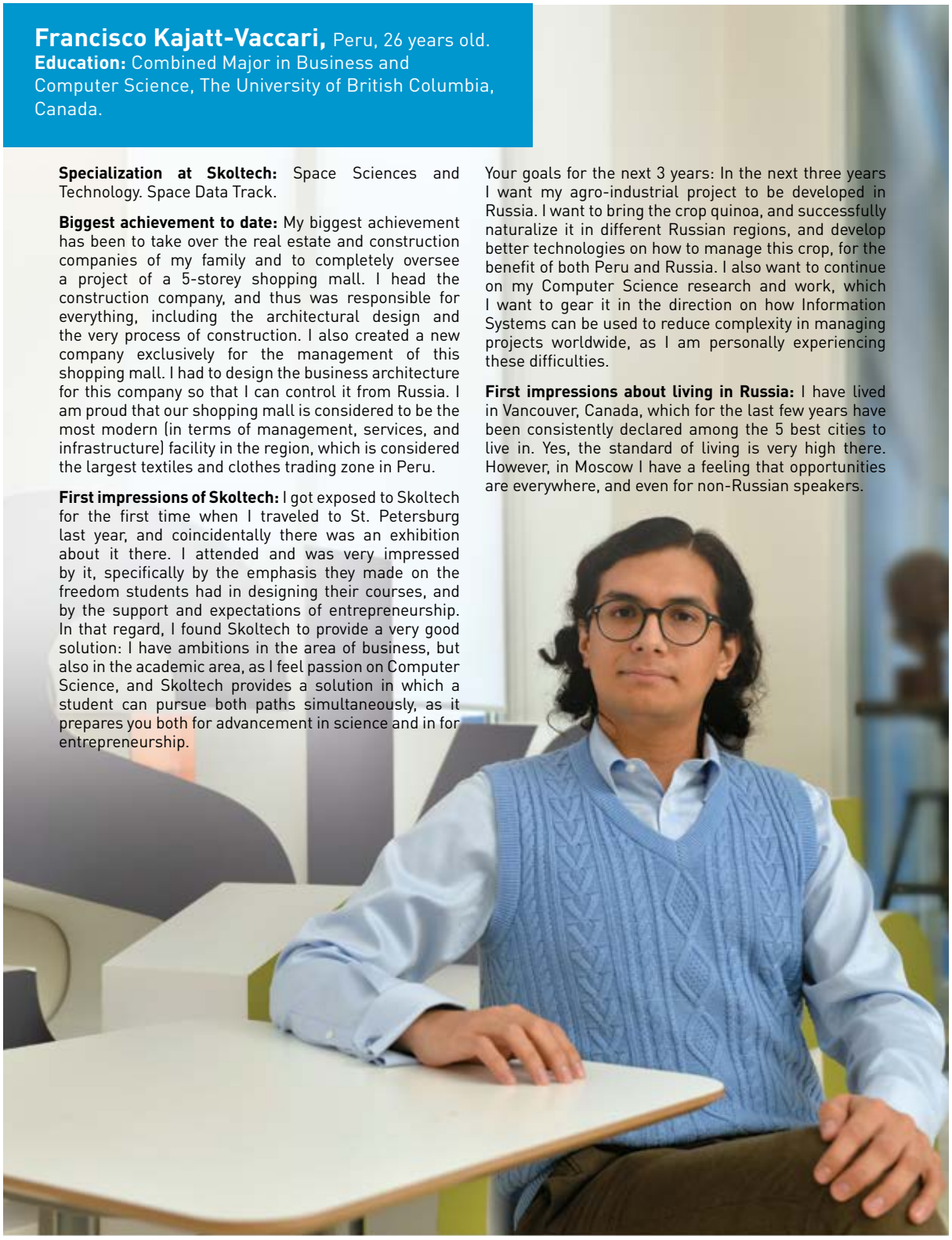
Specialization at Skoltech: Space Sciences and Technology. Space Data Track.

Biggest achievement to date: My biggest achievement has been to take over the real estate and construction companies of my family and to completely oversee a project of a 5-storey shopping mall. I head the construction company, and thus was responsible for everything, including the architectural design and the very process of construction. I also created a new company exclusively for the management of this shopping mall. I had to design the business architecture for this company so that I can control it from Russia. I am proud that our shopping mall is considered to be the most modern (in terms of management, services, and infrastructure) facility in the region, which is considered the largest textiles and clothes trading zone in Peru.

First impressions of Skoltech: I got exposed to Skoltech for the first time when I traveled to St. Petersburg last year, and coincidentally there was an exhibition about it there. I attended and was very impressed by it, specifically by the emphasis they made on the freedom students had in designing their courses, and by the support and expectations of entrepreneurship. In that regard, I found Skoltech to provide a very good solution: I have ambitions in the area of business, but also in the academic area, as I feel passion on Computer Science, and Skoltech provides a solution in which a student can pursue both paths simultaneously, as it prepares you both for advancement in science and in for entrepreneurship.

Your goals for the next 3 years: In the next three years I want my agro-industrial project to be developed in Russia. I want to bring the crop quinoa, and successfully naturalize it in different Russian regions, and develop better technologies on how to manage this crop, for the benefit of both Peru and Russia. I also want to continue on my Computer Science research and work, which I want to gear it in the direction on how Information Systems can be used to reduce complexity in managing projects worldwide, as I am personally experiencing these difficulties.

First impressions about living in Russia: I have lived in Vancouver, Canada, which for the last few years have been consistently declared among the 5 best cities to live in. Yes, the standard of living is very high there. However, in Moscow I have a feeling that opportunities are everywhere, and even for non-Russian speakers.



Education@Skoltech

Tamara Banjevic, Serbia, 24 years old.
Education: Bachelor's degree in biology, Faculty of Biology, University of Belgrade, Serbia (also Master of Sciences in Developmental Biology)

Specialization at Skoltech: Biomedical Sciences and Technology

First impressions of Skoltech: I knew that coming to Skoltech will give me the opportunity to fulfil my goals and dreams. But, what keeps motivating me every day to work harder and be better are these amazing young people who study here with me. I would also like to mention professors who "water the seeds of love for science" inside each student.

Your goals for the next 3 years: In next 3 years my aim is to finish masters program and start PhD in order to be just one more small (but important) step closer to my main goal in life - to succeed in the intention of understanding the miracle of origin of life and how the world around me functions, by merging science and metaphysics.

First impressions about living in Russia: Coming here from a little country such as Serbia, I thought I will have hard time adjusting to the fast life and people of one of the biggest cities in the world. I am glad to say – I was wrong. It appeared that Russians are not so different from their "Slavic cousins" on the South. So, even though I sometimes get nostalgic and miss my family, part of me still feels like I am home.

Education@Skoltech

Daria Satikova, 23 years old.
Education: specialist, law faculty, National research university – Higher School of Economics

Specialization at Skoltech: Business and innovations, focus on Intellectual Property law

Main achievement for today: As my greatest achievement and highlight of my life I consider receiving a fellowship from the Russian Economics Foundations. These people change my life every day, they are my drive and inspiration.

First impressions of Skoltech: I'm probably the only student at Skoltech with no technical backgrounds, so for me this place sometimes looks like a school of magic. My first impression of the institute was also the first impression of science as it is, such as in science fiction movies - I'm delighted to accept everything that's going on here. To be serious, Skolkovo is a place where one desires and takes the pleasure of working. And not just because of the cozy and inspiring atmosphere of Technopark, but also as people here are good, open, passionate and experienced professionals. I like being part of this world, and would be happy to help this world develop and grow, and that's why I decided to join the Skoltech Student Council.

The goal for the next 3 years: In the near future I plan to develop professionally in my field - the field of law: in Russia it is so intriguing, young and undeveloped yet, so it's a pleasure to explore it. In addition, the Skolkovo air is filled with much inspiration and opportunities, so I won't get surprised if I join some good and useful project very soon.

Education@Skoltech

Kirill Khripko, 22 years old.
Education: : MSc, Department of Management and Applied Mathematics, Moscow Institute of Physics and Technology. Co-founder of a technology company Vodtekhkomplex-STK, engaged in purifying water from oil by new physical methods, and a new resident of the Skolkovo Foundation.

Specialization in Skoltech: Information Technology

First impressions of Skoltech: Skoltech has attracted the most motivated kids from all over Russia and from abroad. I like the atmosphere here – each and everyone wants to do something useful. We face a lot of tasks related to teamwork and public speaking, as the era of «lone inventors» is gone. Discoveries are being made nowadays by groups of researchers, and you should be able to tell your colleagues about them.

The goal for the next 3 years: Using student projects at Skoltech as an example, I'm trying to figure out the right ways to engage with the venture funds. I want to become a specialist in evaluating technological projects, which transform production lines and improve the quality of products. A competent selection of such solutions by state-sponsored institutes of development and private investors affects the technological future of the country. By developing my skills in this area, I hope to help Russia in the development of science and modern technologies.

Research@Skoltech

New labs for Skoltech researchers

Skoltech means not only a quality education, but also an intellectual center with world-class laboratories. Several of these labs just opened their doors in the last months of the year.

One of them is the **Laboratory for energy systems**, consisting of two major parts: electricity and heat. In the lab the Mini Grid – a miniature power grid – is being installed. The set consists of generating and consuming units. Solar panels and wind turbines are installed on the roof of the Skoltech building to generate electricity for the Institute. In addition, the experts are putting together a pumping station – as part of the installation and the energy storage system, those are one of the first ones not only in Russia but in the whole world today. The lab's heat unit will research all processes occurring in the power stations. In addition, the center is working on termo-management of devices, involving the cooling of electronics not by the fans, pumping the air inside, but due to liquids in the two-phase mode. When the lab is certified next year, it will be possible to make measurements and official certification, and thus the lab will turn into an independent platform where different equipment manufacturers will be able to compare their devices. These and many other studies that will help Skoltech scientists to create the architecture of the energy network of the future, are conducted in a laboratory under the direction of Alexander Ustinov, Skoltech professor and deputy director of the research Center for Energy Systems.

Laboratory for electrochemical energy storage is a place where staff, on the one hand, is engaged in fundamental research in the field of electrochemistry, and on the other, creates more modern and cheaper devices for energy storage (batteries, fuel cells and electrolytic cells). The main objective of the laboratory, when it starts operating in the full capacity, will be developing and testing prototypes of batteries with improved properties. In the meantime, the analytical unit of the lab is open and actively operating - it's responsible for the study and analysis of the properties of various substances. Since Skoltech and its researchers set the European approach to working in the lab, all MSc and PhD students, working and studying in the Center for Electrochemical Energy Storage, have been trained to work with devices and can independently carry out measurements in the laboratory. The second part of the lab, which will contain equipment for the synthesis of materials, assembly and testing of prototypes will open its doors in mid 2016.

The **laboratory for concurrent engineering**, developed by the research group of Alessandro Golkar, Skoltech Professor, is the first laboratory of its kind in Russia. It is a room of 300 sq. meters, where up to 60 scientists and engineers from different scientific

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fields can easily work on the same complex multidisciplinary project. The spacious hall is equipped with a 3D-video wall and interactive LCD screens, which are controlled by a computer in the workplace. They all are equipped with a software for concurrent design, specially created for the lab. Studies of the concurrent engineering methods are conducted in the lab. It also hosts educational programs for Skoltech students and crash-courses for the industry professionals. Laboratory for concurrent engineering enables to make schematic design on average 3-6 times faster than the standard methods do. An example of the application of the Laboratory of concurrent engineering is a new concept of space communication based on the federal satellite systems, developed by a group of professor Alessandro Golkar.

Research@Skoltech

In search of new antibiotics

Dmitry Gilyarov is a young biology scientist, Skoltech researcher and part-time junior research fellow at the Institute of Gene Biology, Russian Academy of Sciences - received a grant from the Russian Foundation for Basic Research (RFBR). In the interview, he spoke about the studies financed by the grant, his collaboration with Skoltech professor Konstantin Severinov and his work in partnership with the institution and its students. Full text of the interview can be found at the Skoltech website (link).

What research was awarded a grant from RFBR?

I have received a grant for the study of new antibiotics. This topic is very relevant, because the big pharmaceutical companies are reluctant to invest in the development of antibiotics as drugs. For them it's just not profitable to spend the resources on the development, as the results they get can't justify the investment. There are not many patients who need the specialized antibiotics for treatment, because intractable bacterial infection is not a spread disease. It turns out that on the one hand, pharmaceutical companies are reluctant to deal with this problem, on the other hand - the problem of the treatment of patients with intractable bacterial infection is becoming more and more apparent. I'm talking about those infections that flare up in hospitals, where bacteria have developed resistance to any kind of treatment that can hit them. Accordingly, doctors are sounding the alarm and their hopes go for the biologists. First of all, we develop antibiotics that can kill gram-negative bacteria, which is more difficult to fight with. And secondly, it is important to find such substances that can affect the bacteria that have developed resistance to certain antibiotics. This problem has become so urgent that it is even pronounced at the state level.

Does it mean that in some time you will have to search for new antibiotics, as bacteria can develop resistance to those substances you might invent?

Yes of course. It is necessary to constantly work in this direction and not to sit still. These are the terms of natural selection. It is necessary to keep something in reserve, so other studies, which I am involved with, feature the targets of antibiotics. That is, the study of cellular processes which are antibiotics. Scientists need to understand how resistance occurs in bacteria and how it can be combated. Most groups of antibiotics were discovered in the 1940-60s, and then in this area there is a great failure. Using those methods, which were used to discover the first antibiotics, later on brought only a replica of already discovered compounds. All that was on the surface is already studied

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and discovered, so now we need to dig deeper. Or search for new substances in the genomes, as we basically do. Or grow uncultivable bacteria and try to get necessary substances out of them.

What are the conditions for obtaining this grant, and what was the role of Skoltech in this process?

This grant was released for a 3-year-period and the annual funding is about half a million rubles. Initially, I received a grant to work with the Institute of Gene Biology, but in the process I got some organizational issues, and Skoltech helped me to facilitate the transfer of the grant under its jurisdiction. I am grateful to the institution for their help and assistance in obtaining the grant and appreciate its pleasant and friendly atmosphere. Due to the fact that the biomedical laboratory is not yet open at Skoltech, we work in the laboratory of the Institute of Gene Biology, where I am also a researcher.

Are you going to get students involved in the project?

It's for many years that I have been attracting students to the work I am doing. In particular, two students from the Faculty of Bioengineering and Bioinformatics, Moscow State University, are now working under my direction. At the moment I'm not yet working with Skoltech students, but I think it will happen soon. In the meantime, Skoltech students work in the Institute of Gene Biology lab, in other areas.

What role scientific adviser Professor Konstantin Severinov plays in your research?

I've known professor Severinov for long. We met when I was a student at the university, and Konstantin held workshops. In his lab, I have been working long enough. I find several points to be quite important here in working with Konstantin. Firstly, it is a certain freedom of action which he grants researchers in his lab. We can participate in grant projects, conduct our own projects, research and experimentation. We can always address Konstantin and ask for his help and advice. For example, when I had to go to the UK and conduct my research using instruments which can't be found in Russia, but in the UK, Skoltech and Konstantin helped me in all organizational matters. Secondly, Konstantin always provides the influx of new ideas and knowledge. During his business trips around the world he is actively communicating with people from different areas and always shares with us the ideas, thoughts, knowledge and contacts he acquired. And thirdly, thanks to Konstantin I was enrolled in Skoltech, and I am very grateful to him for this. As a scientist, I find myself just at the beginning of my way, so people like Konstantin are priceless for me. I would also wish Skoltech and all that it involves, of course, to evolve. It might be that at some point I would like to lecture here, as experience transfer is really important. But before moving to the next level at Skoltech, I would like to acquire profound knowledge and experience.

Interview by Anna Shimanskaya

Research@Skoltech

Chizhevsky Medal for Skoltech Researcher

On November 23 Tatiana Podladchikova, Skoltech researcher and applied mathematician, was awarded the International Alexander Chizhevsky medal for Space Weather and Space Climate.

The Chizevsky Medal, named after outstanding Soviet scientist Alexander Chizhevsky, founder of helio biology, science of Sun-Earth connections and links between humans and space, has been awarded since 2013 for major contributions to space weather research. Tatyana has been honored for a number of achievements – participation in the development of solar activity forecasting services (Royal Observatory of Belgium, Brussels), geomagnetic storms forecasting service (Space Research Institute, Moscow) and reconstruction of Earth's magnetosphere (Skoltech, Skolkovo).

Tatiana Podladchikova has been working at Skoltech since the foundation of the Space Research Center in 2013. She is involved in processing of space data. The main task here is to define the useful signal in the vast stream of noisy experimental data and search for hidden patterns for the understanding of the observed phenomena.

What is space weather? First of all it is related to sunspot numbers, the origin of extreme ejections of solar energy, propagating toward the Earth in the form of eradiation, energetic particles, magnetic and plasma clouds. These phenomena greatly affect the conditions of the Earth's magnetosphere and ionosphere, and cause geomagnetic storms. Such cosmic whims may affect the performance and reliability of space-based and ground-based technological systems and endanger the health and even, in some cases, human live. Therefore today forecasting of space weather is used to plan space missions, to predict equipment failure, and to provide its protection.

"We strive to understand the core of observed cosmic phenomena, as they are inextricably linked with our plans on Earth. Magnetic storms happen to everyone in the live. I wish you all good space weather", - says Tatiana.

Skoltech@Open Innovations

October 28 - November 1 Moscow hosted the annual «Open Innovation» forum, which was held at the renewed VDNKh exhibition center. Skoltech team once again participated in this main event of the year. Alexei Sitnikov, Vice-President, Institutional and Resource Development, served as the moderator of the Day of Education, which was held on October 31, while Edward Crawley, Skoltech President, took an active part in several discussions.

"Today is a very important event for Skoltech, - said Edward Crowley, Skoltech President. ***- Everything that is connected with Skoltech, is directly related to innovations, with the development of innovative content for strengthening of the Russian economy and the creation of an educational platform. This forum is dedicated to all this, so in all respects it lets Skoltech fulfill its primary mission."***

Skoltech was also presented at the forum by the projects of the Skoltech Translational Research and Innovation Program and student prototype projects, created during a two-month **"Innovation Workshop"** course, which traditionally opens a new school year.

One of these projects is Forget-me-not. That's what the development team told us: ***"We have created a prototype of beacons that can be attached to all the things that can be lost. Beacons are linked to a bracelet and connect with a mobile application. When the item with an attached beacon is removed from the owner at some distance, a bracelet or phone starts beeping. It's great that we were able to not only demonstrate our project at such an important forum, but also to get external expert feedback. For us it is a great step forward!"***

Moreover, at the Skolkovo Innovation Center booth were presented products and services developed by Skoltech students and graduates, who have become Skolkovo Foundation residents. These are Tardis 3D Technologies, founded by Vahe Taahmazyan (Skoltech graduate), Mikhail Matrosov (Skoltech graduate student) and Stanislav Podshivalov (a graduate of MIPT). Young science-entrepreneurs have created a three-dimensional scanner of the human body - one of the possible applications of it is the 3D-printing of the individual figures. Vahe Taamazyan, who spent all five days at

Alexei Sitnikov, Vice-President, Institutional and Resource Development

Skoltech@Open Innovations

the forum by the scanner, shared his views: ***"I have positive impressions of the Open Innovations forum. Firstly, participation in the exhibition allowed us to test in real life the technology itself and the reactions of folks to it. Right on the stand we were repairing, correcting and refining something, and eventually managed to scan about 300 persons. Secondly, we were able to announce ourselves and attract some interesting contacts. Hopefully, next year we will present a ready, selling project there!"***

In addition to a 3D-scanner project, the Skolkovo Foundation booth saw 'Sharxi', a car-share taxi service co-created by Skoltech graduates Andrei Omelyanovich and Boris Urman, and Tsuru Robotics copters by Nikita Rodichenko and Anastasia Uryasheva, also Skoltech alumni, who are now Skolkovo Foundation residents.

Another forum highlight was a roundtable to exchange experiences in the field of technological entrepreneurship and engineering innovations, which was attended by Ilya Dubinsky, Director, Skoltech Center for Entrepreneurship and Innovation. The participants discussed such thesis as the goals, approaches and methodologies for teaching innovation and entrepreneurship, as well as the need for training of the lecturers in this field. According to Dubinsky, the result of this talk might be the creation of a community of universities, interested in the exchange of courses, professors and this subject teaching methods.

Vage Taahmazyn and the 3D scanner at Skolkovo booth

Innovation@Skoltech

Innovation Workshop

Education at Skoltech traditionally starts with "Innovation Workshop" - a special course telling the MSc students about the structure and anatomy of Skoltech, and how to get the most out of the upcoming study here. This workshop gathers together professors and mentors from around the world, and ends with the final project presentations. The main objective of the two-month course is to teach students not to be afraid of obstacles, turning ideas into products, as well as create innovative projects.

The course starts with splitting students into several teams, inside which they are divided into groups to work on a common project. While learning and communicating with mentors and industry experts, students improve their ideas and create a prototype of an innovative product. Fresh Skoltech students, numbering 130 people, were divided into 22 groups, and each participant received $25, that would be spent on the creation of a working prototype.

The projects of the Innovation Workshop were presented in the institute at the end of October. Among the ideas proposed by the students and prototypes were a laptop sleeve with a heating, allowing its transportation at low temperature; airbag for drones that solves the problem with regular aircraft crashes; and many more. Project presentations to Skoltech professors and Workshop mentors turned into a real defense, as mentors set tricky questions to students. After the projects were defended at Skoltech, students got an opportunity to receive additional comments, presenting their prototypes at the Skolkovo Innovation Center booth at the Open Innovations forum.

We asked a few students, completing their training in the "Innovation Workshop", to share experiences.

What project did you present at the Innovation Workshop? What is its potential impact for society, economy, etc?

Igor Stolbov: Our project was called Forget-me-not (a prototype of beacons that can be attached to all the things that can be lost).

Daler Amanbaev: Self-heating insoles. The significance of this project is that it increases the level of comfort. Feet get frozen in winter, and it makes people who want to get warm, angry. With these insoles people will have one less reason to be angry

Ivan Sosnovik: We've made a prototype of smart noise-subduing headphones.

Maria Viktorova: Our project was called "Power Your Phone by Advertisement". It happens often that during long flights folks have no chance to charge phones: we thought that if we make it available, without creating interference to normal operation of the airport, and getting the airport at the same time to receive at least a small income of it, then such a scheme might work well.

Eugene Izraelit: I worked on a FlatFinder project (5min2home.ru) - a web service that helps to change the rented apartment. The main idea of the project is to help people to find flats close to work, so they have more free time and vitality, and to relieve the roads and the subway.

Guzel Aziatskaya: Our project was called ProfyPassion, it is a tool of vocational guidance. Generally speaking, it's not anything outstanding, but is much fun.

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What useful things you learned from participating in the Innovation Workshop? What is learned? What new knowledge you gained? Did anything change in your attitude to yourself, life, Skoltech, the subject of innovation?

Igor Stolbov: Innovation Workshop gave me more confidence, showed that even in the absence of many important prerequisites I can get a good result. I saw how significant are people with a "humanitarian" vision of the world, with a better developed 'perception of beauty'. This course made me believe in the efficiency of "brainstorming" and developed my teamwork skills, gave me an ability to assess the characteristics of colleagues, their strengths and weaknesses, has helped me to see many, not so eye-catching, nuances in working within the team, not just as a group with common targets. I believe that this course was very useful for my future development.

Daler Amanbaev: This course has given me a great deal. Before participating in the Innovation Workshop I thought that science and business just go separate ways. A businessman-scientist was just an abstraction to me. Now I see that turning your own research benefits into a company and / or product is one of the possible models, and it's actually logically true. Now, I've been thinking of this development model.

Ivan Sosnovik: I have made new friends, and teamwork skills.

Maria Viktorova: I think that the main point is the team. We overcame difficulties together, and although we are now scattered in different subjects, we have something in common. I realized that I wanted to work in a team, I took a proper niche in the team, despite the fact that at first I was a bit skeptical as I hardly knew anyone. In the process, we have radically changed our subject - and this is a great experience: to get brave and be able to create something new in time. It is also very important to realize that the simpler the idea is, the better it is. Initially we tried to delve into the area, which was not really familiar to anyone of us, and it was clear that our goal was simply unattainable for the time period. It was possible to realize our second project, putting efforts into it, despite the fact that it was all too new for us.

We realized that the companies are closer to us than we might think, because we can just call there, and there is nothing wrong, it works. Several times we were invited to come to a meeting and show a prototype.

Eugene Izraelit: Before that, I participated in a couple of Hackathons and business school-type accelerators, so the experience was not new to me.

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Guzel Aziatskaya: I learned to communicate with people working in the fields, far from my own, and I really liked it, and now my mind is open to many new things.

What was the most useful and interesting in the course? What is the most memorable?

Igor Stolbov: The part I remember best is the presentations and responses to criticism. At such moments, you feel as if you are not at the training but at a real competition.

Daler Amanbaev: I really liked "projects of rapid success" - they were demonstrated so well that teams could simply "go and do" the things that you never expect to be done. And, of course, I enjoyed lectures by Ilya Dubinsky. These ideas - talk with folks, innovations have no definite trajectory, an "impact-problem-technology" triangle - they are simple and at times naive, but I never thought about them before.

Ivan Sosnovik: Most of all I remember the "classes of rapid success."

Maria Viktorova: I remember how low-spirit was everyone after the pre-defense. But it was an important step. I remember the final stage as well, it was interesting to feel yourself a little bit more professional and answer the mentors' questions.

Eugene Izraelit: The most useful for me was the free time that I could spend on realizing my ideas. All these years, I have had no spare time, so it was useful.

Guzel Aziatskaya: 'Projects of rapid success' proved to be a good format to get people to communicate and work together. It was an excellent opportunity to get acquainted with useful and interesting people during the presentations.

What you need to change in the course?

Igor Stolbov: I think that the format of previous years, when the workshop was held in July, better suited for this course. Firstly, because of this course not being assessed, many people (and in our team were such persons, unfortunately) did not spend much time on it. Secondly, I am deeply convinced that 'the start-ups for part-time' is a bad strategy. It's best to either plunge into the project completely, or not even touch upon it. It would be best to devote 2 months to these course, ie 12 credits. Third, you may want to introduce some sort of rating system, or at least writing progress reports. Fourth, it seems to me, that 1 month given to elaborating an idea and making a presentation is too much. Less time should be given to this task.

Daler Amanbaev: I would strengthen control over the development of the course work and would not tell students that the course is not rated. Students relax, do not take the course seriously and lose motivation. Of course, a student is the one responsible for his education, but education reminds treatment. First you force a patient to accept treatment, even against his will, and then he realizes how useful it was.

Ivan Sosnovik: After talking to people from other teams, I realized that they had a lot of "extra" participants. So I think that it is better to split folks into groups of 3-4 persons and bring together people with similar interests. It can get more interesting results and better-elaborated projects.

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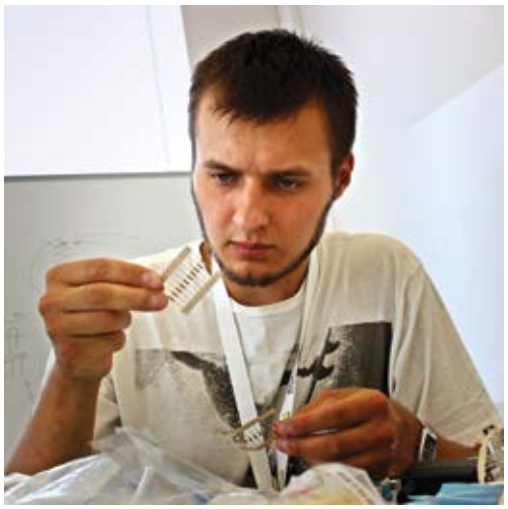


Maria Viktorova: Some lectures were too long, and all students were seating and thinking - well, we have to go and work in a team!

Eugene Izraelit: I liked the classes, especially guest lecturers. There were too many people in groups, so it was difficult to communicate efficiently. I really liked the idea that the Innovation Workshop lasts 1 month, but without other classes, as it was last year. It's complicated and inefficient to change the setting all the time. All of us are engaged in different directions, and we have classes at different times. To gather and work together was often inconvenient.

Guzel Aziatskaya: I have a suggestion re building of the teams - it would be nice to make this process more chaotic and more interactive at the same time so that people can "find" each other.

Innovation@Skoltech

Theory and practice of innovation

The 7th Conference of Skoltech Translational Research and Innovation Program

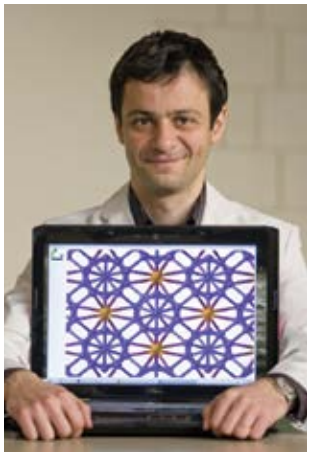
The last days of October were very busy for Skoltech. In addition to participating in the Open Innovations forum, the Institute once again hosted the 7th Conference of Skoltech Translational Research and Innovation Program set up to facilitate the practical implementation of research results obtained by Skoltech professors and researchers, in products and processes demanded by the real economy.

The program of the 7th conference was divided into two days. On the first day teams of innovative projects held consultations with mentors and experts. The second, main day of the conference, saw presentations of working groups under the guidance of Skoltech professors and a master class delivered by a special guest - Alexey Kosik, founder of Gravitonus.

Leading scientists of the Institute presented new projects in such areas as energy systems, new materials, video conferencing systems, bio-technology and intellectual systems.

"I find this conference to be more than positive, – said Alexander Ustinov, Skoltech professor, deputy director of the Laboratory for energy systems. - ***This is the only event at Skoltech, that supports ideas and projects of the professors if those go beyond the interests of laboratories, i.e. become interdisciplinary. This is a very important program! It helps to achieve interesting results that may be shown to the public."***

"In Russian universities there is a deep belief that practice and academia do not intersect. In this regard, one of the main missions of Skoltech is to instill a culture of high applied science to researchers, – said Artem Oganov, Skoltech Professor. – ***This program not only supports practice-oriented projects, but also "forces" us to meet the industry, to understand the language of practical engineering business thinking."***



"The range of the presented technologies shows the diversity of interests in Skoltech. And I was pleasantly surprised by the fact that each of the proposed project has a real scientific basis, – commented Jose Estabil, commented Jose Estabil, Director of Entrepreneurship and Innovation, MIT Skoltech Initiative. – ***To add, professors try to find a solution of social problem and present it to the industry. And most importantly, that all of these are Skoltech projects!"***

After the presentations a special guest of the conference, Alexey Kosik, held a public workshop on "How to present your project to industrial partner and negotiate the terms of the partnership."

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