



2015 RESULTS

NEWSLETTER
www.skoltech.ru

Dear friends!



Edward Crowley,
Skoltech President

I will always remember 2015 with great warmth as it was filled with so many wonderful events! In June we let our first students graduate, and I will permit myself to repeat the words I said at the festive ceremony: it was on this day that the first group of students graduated, that we became a real university. It was a historical day for Skoltech, a historical day for Russia.

In late spring we finally moved into our own building, equipped with modern classrooms and laboratories, and I am very glad that the university has found a permanent home.

It was a very busy year. Our professors taught, conducted research together with their students, prepared scientific publications, participated in conferences, delivered public seminars, applied for grants to the Ministry of Education and Science and to the internal Skoltech programs. This year, the Skoltech Translational Research and Innovation Program, created a few years ago (and which up to this point was supporting projects of scientists from different Russian universities), made a full switch to supporting Skoltech-only professors and researchers. The latest contest, which supported seven projects, was perhaps, the strongest one throughout the whole period of the Program's operation.

Our students and graduates don't cease to surprise us with their determination and focus on success, and with their desire to make the world better. Under their professors' guidance, the students conduct important research and create start-ups and projects that seek to make a difference. Every year, the projects presented by Skoltech students at one of the largest start-up conferences, Slush, become more interesting and comprehensive. And here's the result: this year our graduate's project took the second place at the Helsinki conference, beating 1,700 other applications!

I will also remember 2015 as a last year of my serving as a Skoltech president. In late December, the founders of Skolkovo Institute of Design and Technology had approved the recommendation of the Board of Trustees to appoint Alexander Kuleshov as a new Skoltech President. I will, of course, continue to participate in the development of Skoltech in the role of the institute's Honorary President and founder, but with 2015 the whole epoch of my life came to a close. I fully support and welcome the appointment of Alexander, who has for 4 years been serving as a member of the Skoltech Board of Trustees and like no one else understands and shares priorities of Skoltech's development.

We have attempted to bring all the most interesting and significant events of the past year under the cover of this final newsletter. Hope you enjoy reading it!

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Edward Crowley, Skoltech President

IN BRIEF @Skoltech



On March 20-22, 2015 Skolkovo Hypercube hosted the 3rd International Conference on Robotics - Skolkovo Robotics.

The conference, attended by 9 technology start-ups working in the field of robotics, gathered the best mentors and experts in the robotics industry. Skoltech professors held plenary sessions and round table discussions on key areas of advanced scientific research in robotics. On March 20 Dzmitry Tsetserukou, Skoltech professor, held a round table "Smart Robotic Interfaces: Designing the Future of Human." Intelligent robotic interfaces are rapidly developing technologies, including exoskeletons, prosthetics, wearable and remotely operated robots, sensors for scanning information, and biological systems. They extend the capabilities of people and submerge them into the world of machines.

On May 19-20, 2015 Skoltech held the 6th Conference of the Translational Research and Innovation Program.

The program, which was raised in the cradle of the Skoltech Center for Entrepreneurship and Innovation, is one of the unique support tools for the Russian scientific teams interested in bridging the gap between the lab and the market. May conference brought together over 60 participants, featuring research teams, mentors, catalysts, representatives of the venture capital industry and the Moscow government, as well as technological entrepreneurs. The event included

presentations of the projects of leading Moscow and St. Petersburg universities, which completed the previous cycle of the Skoltech Research and Innovation Program, as well as the new projects, exclusively by Skoltech. In addition, the event saw the in person selection process of Skoltech scientist projects for 2015-2016 cycle, where the expert council had to

choose from 12 projects in areas such as IT, energy, biotechnology and new materials. The winners of the competitive selection get a unique opportunity for the development of their projects, including consultations with Russian and foreign catalysts with focus on potential partners in Russia and abroad, access to the Knowledge Transfer Office services to protect created intellectual property, as well as an appropriate financial support to confirm the applicability of emerging technologies for the real economy.



IN BRIEF @Skoltech

On June 2 and 3, 2015 the Skolkovo Innovation Center for the 3rd time hosted the largest Eastern European "Startup Village" conference, the aim of which is to facilitate communications between startup founders and successful entrepreneurs, large industrialists, investors, government officials, as well as introduce them to each other. In partnership with the Skolkovo Foundation, Skolkovo Institute of Science and Technology is co-organizer of this open-air meet-up.

In the course of two days more than 10 thousand people participated in the Startup Village – among them were representatives of startups from Russia, CIS and other countries, more than 700 investors, venture capital foundations and development institutions, representatives of the government and the media. Skoltech Center for Entrepreneurship and Innovation organized a number of events under the common name "From Science to Market. Bridging

the Gap." The meeting brought together the leading experts in the sphere of technology transfer from the US, Great Britain, Finland, China and Hong Kong who shared their experience and best practices in supporting applied research at Russian and foreign universities and transferring the technologies. The events were held under the aegis of the newly created International Proof of Concept Centers Association whose establishment was initiated by Skoltech.

On June 3 the first graduation ceremony of Skoltech students was held as part of the Startup Village, and it was attended by Russian Prime Minister Dmitry Medvedev.

Many of the 53 graduates of the first Skoltech class came to the last-bell ceremony in the status of owners of startups, launched while they were studying at the university. The Russian Prime Minister placed his signature in the Skoltech "collective diploma" and took part in the giant student selfie.



IN BRIEF @Skoltech

On September 7, 2015 Skoltech hosted the conference of the Stanford US - Russia Forum / SURF. Its purpose is to bring together students from leading American and Russian universities for research in the fields of economy, technology entrepreneurship, public policy, business and other areas.

Each year students are selected to participate in the program, which starts with the autumn conference in Moscow, and lasts eight months as students work together on research projects. The culmination of the program is a spring conference at Stanford University.

This year 53 students of American and Russian universities participated in the program. They were split into working groups on biomedicine, energy technology, aviation and space technology, as well as entrepreneurship and innovation. In the course of the event, students, united in working groups, held discussions with experts in the field of technology, innovation, education and business, as well as could participate in joint workshops with Skoltech professors and students. "The ideas that have arisen as a result of this communication, should form the basis of the research projects which will be presented at a Stanford University conference in April 2016," said Alexei Sitnikov, Vice President for Institutional Development, Skoltech.



Alexei Sitnikov, Vice President for Institutional Development

On October 28 - November 1 Moscow hosted the annual "Open Innovation" forum, which was held at the VDNKh renewed 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.



Edward Crawley, Skoltech President



Deputy Prime Minister Arkady Dvorkovich with Skoltech students

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

Moreover, the Skolkovo Innovation Center booth hosted products and services developed by Skoltech students and graduates, who have become 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 Ilia Dubinsky, Director, Skoltech Center for Entrepreneurship and Innovation. The participants discussed such issues as the goals, approaches and methodologies for teaching innovation and entrepreneurship, as well as the need for training lecturers in this field.

IN BRIEF @Skoltech

On October 29-30 Skoltech held the 7th Conference of the Skoltech Translational Research and Innovation Program

The program of the 7th conference was divided into two days. On the first day the 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**.



Alexey Kosik

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

Following the presentations, special guest of the conference, Alexey Kosik, founder of Gravitonus, held a public workshop on “How to present your project to industrial partner and negotiate the terms of the partnership”. The conference and master class became a public platform for interactions between students, scientists and Skoltech partners.

In July 2015 Skoltech turned into a venue for the selection process within the Bortnik Foundation UMNİK Program, and in December the results of this national innovation competition were summed up and brought to the table.

The application period lasted till October 25, followed by the absentee semi-finals and in person finals.

In the first stage over 70 applications were filed for the participation in the contest, 22 projects made it to the finals - in five thematic areas: “Biotechnology” (8 applications), “Medicine of the Future” (5 applications), “Information Technology” (2 applications), “New devices and hardware systems” (2 applications), “Modern materials and

technologies for their creation” (5 applications). The jury consisted of experts from the business community, mentors, experts in technological entrepreneurship, PhDs and postdocs of the leading Russian universities.

This year 11 students became UMNİK finalists, and will receive grants in the amount of 400 thousand rubles for two years. Five of them are Skoltech students. Those are Ksenia Yershova, who became one of the winners in the “Medicine of the Future” section, Alexander Menshikov, winner in the “New devices and hardware systems” category, Ksenia Tsvetkova, Anna Shiryaeva and Darya Vorontsova, who received grants for studies in the field of biotechnology.

“Holding UMNİK contest in Skoltech is quite an important and significant event for our Institute, - said **Igor Seleznev**, Innovations and Technology Transfer Director at Skoltech’s Center for Entrepreneurship and Innovation. - The Foundation has entrusted us hosting the contest in Skoltech. This means that our ability to attract talented participants, professional and competent experts of the jury received another important recognition. Participants of the contest are not only applicants from Skoltech, but also from other universities. It is also very important - we can compare the projects and, of course, such a variety significantly supports transparency and openness, and hence the prestige of our site, and competition in general.



UMNİK competition finalists

IN BRIEF @Skoltech

In August 2015 Skoltech Center for Entrepreneurship and Innovation together with the Skolkovo Foundation launched a new program for research and commercialization in the field of civil unmanned systems and devices.

Within the UVP Program Skoltech professors and researchers will receive, on a competitive basis, mini-grants to support applied research projects with commercial potential.

THE PROGRAM SAW THE FIRST QUALIFYING COMPETITION, AND OF THE SEVEN PROPOSALS FOUR WERE SELECTED AND WILL RECEIVE FUNDING.

1. Alessandro Golkar // Extended calibration and validation for satellite products derivatives using unmanned aerial vehicles

2. Victor Lempitskiy // A training system of the coordinate markers for reliable unmanned vehicle navigation

3. Dzmitry Tsetserukou // SwarmAir: a swarm-like right-into-the-hands delivery system with the use of drones

4. Alexander Ustinov // Induction charging of an unmanned aircraft during flight

On September 8, 2015 Skoltech hosted the first conference on unmanned vehicles, which was attended by 15 industrial companies, as well as the Ministry of Emergency Situations and the National Aeronet technical initiative.

The Conference sparked a dialogue between the industry representatives and Skoltech researchers, seeking to more accurately determine the vector of research projects and thus contribute to the successful commercialization of university projects.

At the end of the year the UVP Program, in collaboration with Professor Alessandro Golkar, signed agreements for joint project work with the Polytechnic University of Catalonia (Universitat Politècnica de Catalunya), the Italian company 'Progressive Systems srl' and the Spanish company 'CATUAV', which are developing unmanned vehicles. As part of these contracts the first prototypes will be designed and tested in the beginning of the next year.



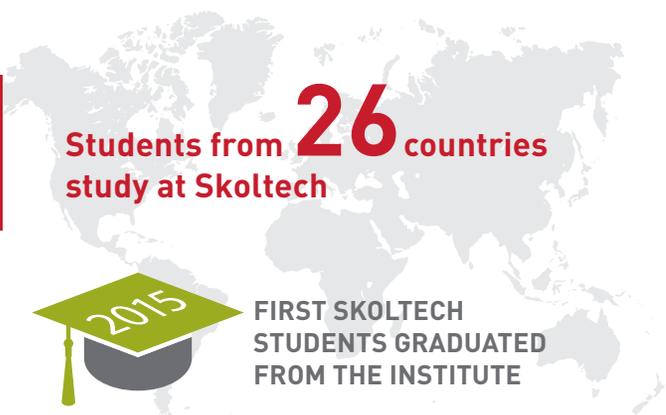
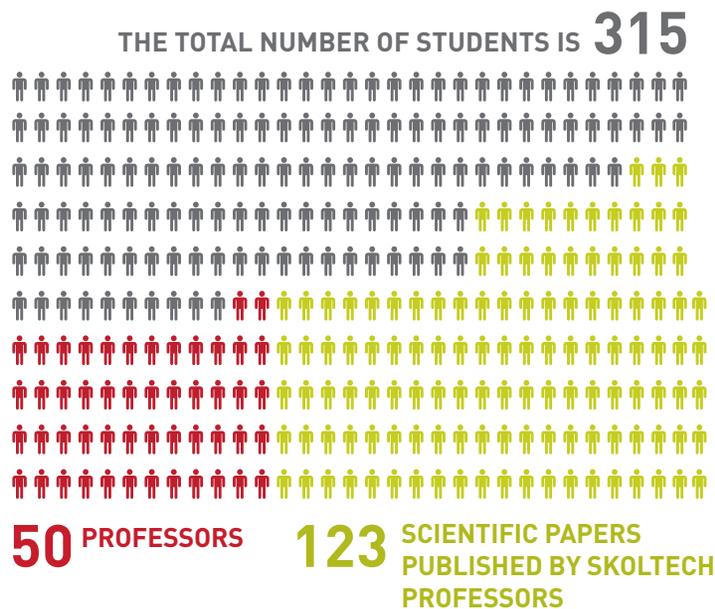
Skoltech professor Alessandro Golkar addresses the conference participants



Dzmitry Tsetserukou

2015 in figures @Skoltech

- <50 DELIVERED BY SKOLTECH PROFESSORS
- <60 OPEN SEMINARS AND COLLOQUIA WERE HELD AT SKOLTECH
- <100 COMMENTS IN MEDIA GIVEN BY SKOLTECH PROFESSORS
- 119 SCIENTIFIC PAPERS SKOLTECH PROFESSORS PUBLISHED
- 8 RESEARCH CENTERS ARE OPERATING AT THE UNIVERSITY



FIRST COMMERCIAL TECHNOLOGY TRANSFER LICENSE SIGNED BY SKOLTECH KNOWLEDGE TRANSFER OFFICE



Education @ Skoltech

Skoltech's First Graduates

We will remember 2015 for many things, but few can beat the graduation of the first Skoltech class. Fifty-three graduates received their diplomas in June and stepped into a new life. Some of them decided to continue their education, others landed interesting jobs, and some dove straight into development of their own companies founded while they were still studying in the university.

The first graduation ceremony was held on June 3 during the Startup Village conference, under the open skies of Skolkovo. On that day the graduates received "a collective diploma", signed by Dmitry Medvedev, and took a giant selfie with Prime Minister of Russia. But in fact it was just a grand rehearsal then. Individual diploma awards and the ceremony, designed for the students' relatives and guests of the university, took place on June 17. On that evening, parents, Skoltech guests and partners, as well as the students' current and future employers witnessed the university graduates and professors wearing gray robes, their faces happy; they saw Skoltech president Edward Crawley, who called the ceremony "a historic event in the life of Russia;" and nodded to Deputy Prime Minister Arkady Dvorkovich, who stopped by at Skoltech to congratulate the graduates. "This is a very important event for Skolkovo, Russia and, especially, for you. Skoltech is the most ambitious startup in Russia, simply because it just can't be a failure. You are the first and the most important graduates of this university," the Deputy Prime Minister said.



Today, when more than six months have passed since the graduation day, it's nice to realize that the diploma award ceremony was not a full stop, but a springboard to new achievements. About one third of the graduates have chosen to continue their education in graduate school, both in Russia and abroad. Among the schools, where Skoltech graduates matriculated are Skoltech itself, Innopolis (Russia), University of Toronto (Canada) and California Institute of Technology / Caltech (USA).

Part of 2015 graduates landed jobs in companies like TION, SAP, Research Institute of Computational Complexes, Tengizchevroil, Parallels, Runa Capital, Renaissance Capital and the Government of Moscow. In the meantime graduates who found jobs at TION, got to know the company during their summer internship when they proved themselves well, having successfully implemented a two-month long project.

About one-third of the graduates launched their own projects – many received financial support, and some have become Skolkovo Foundation residents. Easy Wallet, a startup to manage financial flows of personal bank accounts, and Sharxi, a share-taxi service that helps users significantly reduce taxi ride costs, are actively developing on their own. The project of accessible space and aerial footage - ImageAiry, software for video projector Dream Beamer, Tsuru Robotics unmanned flying vehicles, and the human body 3D Scanner project all received support of the Skolkovo Foundation. TermoMotors, a prototype of the engine with an external supply of heat, became one of the winners of UMNİK contest and got a grant for its development from the Bortnik Foundation.

We can say with confidence that Skoltech curriculum and principles of studying prepare students, demanded by both the economy and the academia. We're just at the beginning, and in the future Skoltech will face an abundance of graduation ceremonies and successful alumni.



Education @ Skoltech

As of today 50 companies, Skoltech's industrial partners, have provided internships for the schools' students or offered them jobs. The first Skoltech graduates work in various sectors of the economy – oil & gas and investment, software production and public administration.

One of the companies to hire Skoltech graduates is Novosibirsk-based TION, which has developed an innovative system of air purification. TION became one of the first members of the Skolkovo Innovation Center and passed a proper expertise test. Today the company boasts multimillion dollar sales and offices in several capitals of the world. TION is also a Skoltech partner and university students were on

a two-month long internship at the company. While interning, they have successfully implemented a project, which resulted in a job offer.

For the new academic year, which began in fall of 2015, Skoltech Office of Industrial Cooperation developed and launched a new format of job fairs, called 5W+H.

The purpose of fairs is to bring together students and university partner companies allowing them to communicate closely.



THESE MEETINGS ARE HELD IN THE FOLLOWING FORMAT:

WHO

First and second year Skoltech MSc. students, representatives of Skoltech partner companies and field-specific university professors.

WHAT

Meetings seeking intersection between students' research interests and companies' technological objectives.

WHERE

All fairs take place only at Skoltech.

WHEN

Fairs began in October, new meetings of students with companies' representatives are held approximately once every 2 weeks, between October and December Skoltech hosted 8 fairs

WHY

These job fairs are just the first step in the implementation of a more ambitious project. Skoltech and its partners plan to launch student-driven projects which are of interest and beneficial to companies. These projects lie at the intersection of students' interests and companies' bottlenecks, and will be implemented in three formats: a summer internship, a Master's degree and a separate independent project.

HOW

Within the Skoltech educational process, students have specific time slots they can use for implementation of various projects. This kind of format is very attractive to companies as they don't have to pay to students for their time investment.

Education @ Skoltech

The first academic year for the new Skoltech class began at the end of August with a two-month long Innovation Workshop course.

Within this specially designed program MSc students learn about the structure and anatomy of Skoltech, and how to get the most out of the upcoming study here. This workshop brings together professors and mentors from around the world, and at the end of it the students make final project presentations. The main objective of the two-month course is to teach the students to never fear the obstacles, turning ideas into products, as well as to create innovative projects.

In the beginning of the course the students were split into several teams, inside of which they were divided into groups to work on a common project. While learning and communicating with mentors and industry experts, students improved their ideas and created a prototype of an innovative product. First-year Skoltech students, numbering 123, 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 at the institute in the end of October. Among the proposed ideas and presented prototypes were a heated laptop sleeve for winter transportation; air-bag for drones, which solves the problem with their regular crashes; and much more.



Ilya Dubinsky, director of the Center for Entrepreneurship and Innovation



Questions from the experts during the final project presentation



Education @ Skoltech

Achievements of Skoltech professors and researchers



Sergei Krikalev

In January **Sergei Krikalev**, an outstanding cosmonaut and space researcher, who spent more time in space than any other man on Earth, was appointed Professor of Practice of the Skoltech Space Center.

Artem Oganov, Skoltech professor and a famous Russian scientist, became one of the characters in Leonid Parfenov's new documentary 'Made by Russians'. Artem Oganov invented the method of predicting crystal structures. Thousands of scientists around the world, as well as companies such as Sony, Toyota, Fujitsu and Intel, develop new materials using this method.



Artem Oganov

Alexei Buchachenko, Skoltech and MSU professor, and the head researcher at the Institute of Problems of Chemical Physics, Russian Academy of Sciences, developed a method for predicting the rates of chemical reactions near absolute zero. This method can help predict with high precision at least the upper bound of a chemical reaction rate in ultra-low temperatures. It is also useful for determining the effect of external factors on the reaction behaviour.

Skoltech researcher published a monograph on the application of statistical physics to complex non-thermal phenomena. "Statistical Physics of Non-Thermal Phase Transitions", a book by Skoltech researcher **Sergey Abaimov**, focuses on how to build analogies between statistical physics and phenomena such as earthquakes, avalanches and landslides, faults in engineering designs and economic crises. Understanding the issue can help to prevent such disasters.

In July the International Council on Systems Engineering (INCOSE) named the article written by **Edward Crawley**,



Edward Crawley



Alessandro Golkar

Skoltech President, and Professor **Alessandro Golkar** the best publication of the year. The article "A Framework for Space Systems Architecture under Stakeholder Objectives Ambiguity", published in the Systems Engineering journal in 2014, relates to issues lying at the intersection of systems engineering, computer architecture, design and optimization of multi-disciplinary systems, modelling of ambiguous situations and the study of social sciences. The award was announced at the 25th anniversary INCOSE International Symposium in Seattle, USA.

A team of scientists from the Skolkovo Institute of Science and Technology, Aalto University (Finland) and the University of Rhode Island (USA), led by Skoltech Professor **Albert Nasibulin**, proposed a new technology to create diodes made from macroscopic films of single-walled carbon nanotubes (SWNT), and demonstrated their practical application for photovoltaics.



Albert Nasibulin



Athanasios Polimeridis

A group of scientists led by Skoltech Professor **Athanasios Polimeridis** developed a method to describe the electromagnetic fluctuations in heterogeneous environments. The team of researchers continues to work on technique and its application in various tasks of measuring the heat output. The theoretical solution of these problems will create a medium with predetermined electromagnetic properties.

Education @ Skoltech

Academic Cooperation

Skoltech and **Moscow Institute of Physics and Technology (MIPT)** offer a double degree program to MSc students in the areas of IT and Energy, launched in 2013. This collaboratively-



offered two-year program leads to award of Master Degree from each of the participating institutions. The goal of the program is to broaden academic and scientific cooperation between Skoltech and MIPT.

Tomsk Polytechnic University and Skoltech offer a three-year double degree program on Computer Science and Engineering. The program is a good combination of application-oriented courses, research projects and internships in IT industry. The program envisions studies in Tomsk (year 1) and Skoltech (year



2 and year 3). Upon completion of second year the students defend their MSc. thesis at TPU, and if successful, they may apply and be enrolled in TPU graduate school. In parallel, the students continue their Master studies in Skoltech.

Skoltech and **HSE** offer a student exchange program established in 2014. The Program provides students from Skoltech and HSE with an opportunity to attend courses offered



at both institutions. Credits earned at the host institution are transferred and counted towards a student's degree. Skoltech and HSE offer a number of complementary courses and projects, which allow both institutions to build

additional capacity and offer students a unique opportunity to expand options for coursework. The program also strengthens cooperation between the two institutions and creates opportunities for collaborations between faculty and students.

MIT is one of Skoltech's key international partner institutions. A number of courses offered at Skoltech have been developed and transferred to Skoltech by MIT. Several MIT Faculty have taught at Skoltech and continue to come as Guest Lecturers and Speakers. In 2012 students from Skoltech's



first class spent the pilot academic year in Boston. Since then Skoltech and MIT jointly developed and offered a study abroad opportunity for Skoltech students – Skoltech MIT Flex Program. This is a competitive program, which allows second year MSc students to come to MIT for one academic semester to either take coursework they need in order to complement and complete their MSc degree or to work on research/innovation projects under the supervision of MIT faculty. Credits earned at MIT are transferred towards a student's degree at Skoltech.

EPFL (École polytechnique fédérale de Lausanne) offers Skoltech students from the Space Science and Technology Program an outstanding opportunity to study in Lausanne, Switzerland for part of the Master's program. As part of the program students take classes offered by the EPFL Space Center and other departments and work on semester-long research projects designed by the Space Center. The program provides a unique opportunity for students to work in advanced laboratories in one of the leading international engineering schools. Credits earned at EPFL are transferred towards a student's degree at Skoltech.



Research@Skoltech

New labs

This past year several world-class research laboratories opened their doors at Skoltech

One of them is the Laboratory of Energy Systems, which consists of two major parts: electricity-generating and heat-generating. A miniature power grid, called the Mini Grid, is under construction at the lab. The set consists of generating and consuming units. Solar panels and wind turbines are installed on the roof of Skoltech building to generate electricity for the Institute. In addition, the experts are putting together a pumped-storage unit. The Mini Grid is equipped with pioneering energy storage systems, some of the very first both in Russia and the world. The lab's heat unit will research all processes occurring at the power stations. When the lab is certified next year, it will be allowed to take official certification measurements, and thus will turn into an independent platform where different equipment manufacturers will be able to test and compare their devices.

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 begins operations at full capacity, will be developing and testing prototypes of batteries with improved properties.

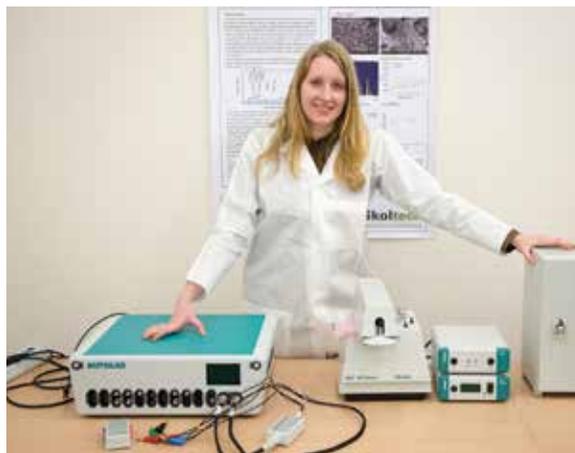
The Laboratory for Concurrent Engineering, developed by the research group of Professor Alessandro Golkar is the first lab of its kind in Russia.

Studies of the concurrent engineering methods are conducted at the lab. It also hosts educational programs for Skoltech students and crash-courses for the industry professionals. Laboratory for Concurrent Engineering enables a much faster (3-6 times on average) production of schematic design as compared to the standard methods.

The Laboratory of Composite Materials is engaged in the preparation and testing of new materials used in various fields of industry and construction. Biochemical experiments on cell cultures are conducted at the Biomedical Lab along with the recovery of DNA, RNA, proteins, metabolites and li-

pids from biological samples. The Big Data Processing Lab is engaged in the storage and management of hundreds of terabytes or petabytes data volumes, the organization of unstructured information and analysis of ways of dealing with such information.

The Intellectual Space Robotics Lab, which opened its doors at the end of the year, is home to several concurrent projects. This is SwarmFLEye - supervision of a swarm of robots operator to create panoramic 3D images of a distant space; the HapticBoARd project, which is an augmented reality system with tactile gloves; NurseSim - a virtual reality system for training medical personnel; and SwarmAir - copters for personal B2C delivery of goods. Moreover the lab is building a DroneLander system for landing drones on complex surfaces and for non-contact charging, and works on industrial RoboTelePrint robots, which will be used for 3D-scanning and 3D-printing.



Research@Skoltech

Ministry of Education and Science grants for Skoltech researchers

Three of Skoltech's professors — Ivan Oseledets (Center for Computational and Data-Intensive Science and Engineering, Scientific Computing group), Viktor Lempitsky (Center for Computational and Data-Intensive Science and Engineering, Computer Vision group) and Philipp Khaitovich (Center for Data-Intensive Biomedicine and Biotechnology) — had won the grants of the Russian Ministry of Education and Science given out as part of the Federal Action Program "Research and development in priority areas of Russia's science and technology sector for 2014-2020".



Ivan Oseledets

Prof. Ivan Oseledets was awarded a grant for research entitled "QTT-based technology for solving multiscale problems." Prof. Oseledets' group is going to work on this topic in collaboration with Prof. Christoph Schwab's group, Swiss Federal Institute of Technology in Zurich (ETHZ). QTT (named quantized tensor train) is a unique computational tool for

solving multidimensional problems. The multidimensional problems are physical problems with periodic/quasiperiodic structure. Such problems arise in photonics and the science composite materials. Researchers plan to develop a "unified" fast method for solving such kind of problems.

Prof. Victor Lempitsky won a grant with a project "Efficient Object-Centric Detection, Indexing, and Spatiotemporal Analysis of Unstructured Dynamic Environments". His international partner for the grant is Computer Vision and Geometry Group from ETH Zurich (lead by Prof. Marc



Victor Lempitsky

Pollefeys). Their proposal is about developing new types of representations for 3D scenes that the robots would use to navigate, interact with the world, and anticipate the changes in the scene. Current robots mostly use quite low-level representations such as "point clouds" or "occupancy maps", which contain the information about the geometric shape of the scene, but do not readily possess information about the semantics, e.g. data on the exact location of the objects. Prof. Lempitsky's group will focus on developing more high-level and compact representations of 3d scenes based on objects, and their colleagues from Zurich will perform spatio-temporal analyses of such representations (e.g. predicting which objects are moving, or which objects have appeared or disappeared since the last observation of the same scene).

Prof. Philipp Khaitovich was awarded a grant for his research in "Regulation of brain ageing: transcriptional and epigenetic maps and computational regulatory models of the ageing human brain."

Prof. Khaitovich's group is going to work on this project with teams lead by Konstantin Severinov and Raul Gainetdinov from Skoltech and also with Shanghai Institute of Biological Sciences. The plan is to bring together the top-level expertise in the fields of data analysis (Khaitovich's and Chinese team), molecular biology (Severinov's team) and molecular neuroscience (Gainetdinov's team), that will create a synergy necessary to decipher complex regulatory mechanisms guiding human brain ageing. The researches aim to generate comprehensive transcriptome and epigenome maps of ageing human neocortex. On the basis of these maps, they will reconstruct regulatory network controlling age-dependent changes and create mathematical model, describing this network behaviour. The results will enable the researchers to predict the effects of physiological or pharmacological intervention directed at specific regulators or network modules. This provides a powerful tool for further work on developing physiological or pharmacological treatment aimed at prevention and even reversal of age-dependent changes in the human brain.



Philipp Khaitovich

Research @ Skoltech



FIRST-CLASS EQUIPMENT, WORLD-RENOWNED SCIENTISTS, INSPIRING ATMOSPHERE - THIS KIND OF EXPERIENCE HASN'T GONE IN VAIN FOR THE PHD STUDENTS.

Professor Albert Nasibulin who joined Skoltech after years working at the Aalto University (Finland), received a joint grant from the Russian Ministry of Education and Science and the European Commission to study single-walled carbon nanotubes. Below is a short interview with Professor Nasibulin.

Please tell us briefly about a joint grant from the Ministry of Education and Science and the European Commission. Will this grant be used to continue research of carbon nanotubes, which you have been conducting?

Yes, that's right! The grant will be used to study the properties of single-walled carbon nanotubes (SWCNT) and their use in the energy sector. Carbon nanotubes are a very promising material for creation of surface layer of cell, which are optically transparent and electrically conductive. Moreover, it's precisely these alloyed carbon nanotubes at the interface with silicon that create the heterojunction, which we use for the conversion of sunlight into electricity.

This year, we also received funding for the three-year project "Development of flexible hybrid nanostructures with heterojunctions for optoelectronics", which was filed within the ERA NET RUS (subprogram of HORIZON 2020) together

with the German innovative company NEXT ENERGY and Tallinn University of Technology. The project is aimed at developing flexible thin film solar elements with the use of crystalline and amorphous silicon and single-walled carbon nanotubes.

What are the practical applications carbon nanotubes?

SWCNTs are a unique material with many useful properties that can be used in many fields of science and technology. SWCNTs have remarkable mechanical, thermal and electrical properties. SWCNTs are the strongest of all known materials with an extremely high Young's modulus and tensile strength. Their high longitudinal thermal conductivity is of great interest in many applications. The possibility of obtaining both semiconducting and metallic CNTs and their resistance to passing high currents are important properties in the micro and nanoelectronics for the creation of high-speed transistors, memory elements, sensors, switches, and also for applying CNTs as conductors in integrated circuits.

The application for the European Commission grant, as you said, was filed in conjunction with the German company NEXT ENERGY and Tallinn University of Technology. What are each partner's responsibilities in this project?

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This project enables us to share skills and experience gained at Skoltech with our foreign partners and to gain their experience. On our side, we bring to the table the existing technology of creating carbon nanotubes. The Tallinn University of Technology is engaged in the study of physical and chemical properties and the production of conductive polymers. NEXT ENERGY is responsible for the production of thin-film silicon solar elements, their research and modelling of their lifespan. We expect that the results obtained in the process of this project will become the basis for creation of industrial designs of the new generation solar cells through the use of nanostructures with heterojunction.

Please tell us a little about your collaboration with the Aalto University. Do you conduct joint research, meet with colleagues there?

I worked at the Aalto University for almost 12 years, and, obviously, I continue to closely collaborate with the Finnish researchers. In addition, I am still a part-time employee at the University, Associate Professor at the Department of Applied Physics.

This year I brought a group of 23 MSc and PhD students of my "Carbon nanomaterials" class to Aalto University, where we spent three fruitful, enriching and busy days. The students were engaged in the synthesis of graphene and carbon nanotubes, manually transferred these materials to the substrate, and after that characterized them by transmission and scanning electron microscopy, atomic force microscopy and the scanning tunnelling microscope. At the end of the visit Dr. Brown, CTO of Canatu, our spin-off company engaged in the commercialization of the aerosol method of synthesis

of SWCNTs and their applications in electronics, told the students about his business experience and gave us a tour of the company. I believe that for our university, which puts innovation in the first place, communication with such an entrepreneur is very valuable.

In December guests from Aalto University came to Skolkovo. Professor Tanja Kallio (engaged in the use of nanomaterials for energy storage and conversion) and Dr. Antti Kaskela and Kimmo Mustonen (specialists in the synthesis of SWCNTs and their application in electronics) shared their experiences and delivered presentations at Skoltech. Next year we plan to organize the official opening of our Skoltech laboratory and will invite a large delegation from the Aalto University to a scientific seminar dedicated to this event.

Do Skoltech MSc and PhD students take part in your studies? If so, what tasks do they face, how well are they prepared for this kind of job?

In the last year my PhD students Alexey Tsapenko and Evgeny Gilshteyn spent 2 months at the Aalto University, in the groups of Professors Olli Ikala, Antti Ryassyanen and Esko Kauppinen. Their primary task was to adopt the best practices of working with carbon nanotubes directly from the research professionals who have been doing it for many years.

First-class equipment, world-renowned scientists, inspiring atmosphere - this kind of experience hasn't gone in vain for the PhD students. They returned to Skoltech as 'scientifically mature' persons and were ready to continue their research at the alma mater. Next year we plan to continue joint research, implementing joint scientific projects now.



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Skoltech's Translational Research and Innovation Program in details

The Translational Research and Innovation Program was launched in 2012 as a result of cooperation between Skoltech and MIT Deshpande Center for Technological Innovation, which uses the methodology of translational research since 2002. The program is designed to help translate research results into products and processes that are of practical interest for the economy and society. Starting in 2015, all of the program's grants are given to Skoltech professors and researchers only. Applications period for participation in the next round of funding started in April, and in early September the expert jury selected seven winners.

1. Prof. Konstantin Severinov

Development of a personal genetic screening system

2. Prof. Victor Kotelianski

Targeted delivery of modified RNAs to the liver – an alternative Hepatitis C therapy

3. Prof. Athanasios Polymeridis

CompuLife: A simulation platform for modelling interactions of electromagnetic waves with biological tissue in next-generation MRI systems

4. Prof. Artem Oganov

Low dielectric constant material design

5. Prof. Dzmitry Tsetserukou

BabyFeel: Smart Baby Bed Platform with Contactless Heart Rate Monitoring

6. Prof. Alexander Ustinov

Development of a novel cooling technology for power inverters

7. Prof. Victor Lempitsky

Learning-based Gaze Correction for Videoconferencing

At the very end of the year came the news that the Translational Research and Innovation Program moved to the new stage of its development. One of the Program's participant projects was approved by the expert council of the Skolkovo Foundation and was given the right to apply for the status of the Skolkovo Innovation Center participant. The project entitled "Superhydrophobic and oleophobic textile finishing in supercritical carbon dioxide" was carried out under the Program's aegis in 2014-2015 together with the team of scientists from the Faculty of Physics of Moscow State University (M. Galyamov, M. Kondratenko, I. Elmanovich et al.). The research team worked on developing a new technology for application of polymer coating on textiles. After participating in the Program the scientists created the prototypes of superhydrophobic fabrics for athletic clothes, nonwoven filtering materials and gas-diffusing electrodes for fuel cells. Their application to the Skolkovo Foundation is meant to help the team to scale the technology and establish pilot production.

Program Director Dmitry Pebalk gave a detailed overview of the Program, talking about criteria for successful projects, why it may take more than a year to get from prototype production to technology transfer, and the regular clashes between scientific research and realities of production, while professors Alexander Ustinov and Victor Lempitsky shared their thoughts on the Program.



Dmitry Pebalk: We started with one-year projects, and then it became clear that one year is not enough for the full development, and in fact it turned out that a year and a half is the best time fit. If in the course of this period the team doesn't meet

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the challenges it set for itself, either the aims are too ambitious or there exist certain deviations that cannot be really overcome: so in this case, the second year wouldn't help much. On the other hand, it turns out that it takes the first quarter of the year for the participants to understand the rules, to shape the budgets, and to build communications. Plus take out the summer and the year-end. We also have no illusions about the fact that Skoltech professors, who manage these projects, have other priorities in the scientific and academic fields and in working with the students. In fact, these 18 months really become just one year, if you consider the real time the team can actually devote to the project.

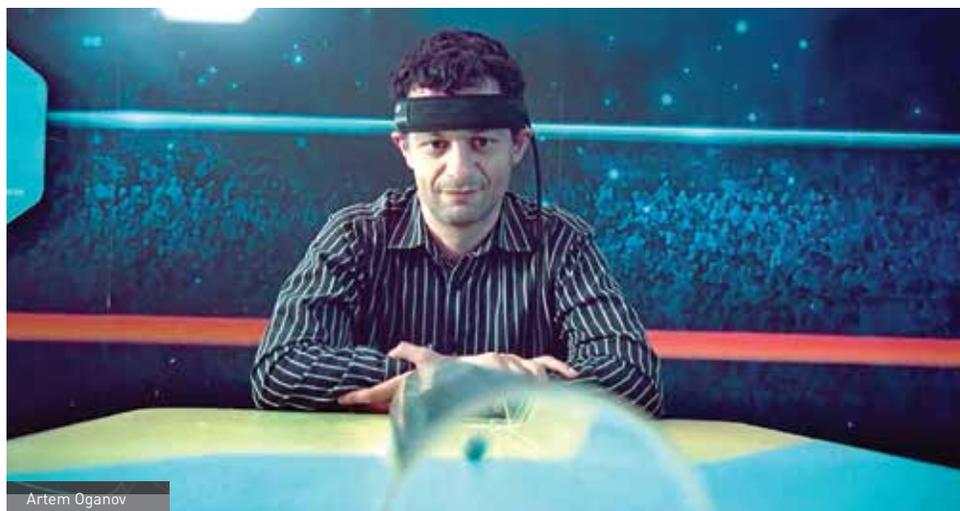
And now let's talk a bit about the progress our new projects have made since September, about their view of themselves and about what we think of them. First, the

Program does not accept the participants with nothing but an idea. It's important for us that a team of scientists has already completed some basic research and came to an understanding that it's possible to create a prototype model that will interest potential customers or the market. It is with this idea that the team comes to the selection stage, and if they manage to convince the jury that they now need more resources - financial, mentoring, organizational - to translate all of this into iron, new materials, biological products or in the form of a special code, then this type of a project has the best chances to joining the program.

It so happens that even in the early stages of development, the teams see their progress as significant. We try not to criticize such views. As a matter of fact, that's what we say to the participants: Skoltech will consider project successful, when the project takes what it believes to be a finished product, brings it to potential customers, to the testers, to the potential co-investors, and when these respected people, organizations, foundations, companies, investors give us a signal — to us and, of course, to the project team — that the development is mature enough to set the technology transfer wheels in motion, this is the moment we say the project is a success. In

our experience, this usually takes another full year after the formal completion of the projects for that to happen.

Part of our job is to help project teams communicate with specialists in intellectual property protection, as well as to use our personal networks and our mentors to help teams meet with the companies. We try to advance the development of presentation skills, promoting the culture of sample



Artem Oganov

transfers for testing and exchange of information. We also try to provide the first feedback for the projects, so that the participants are better prepared for real meetings with businesses, venture capital and other market players.

Speaking of the commercialization process, one must understand that there exist real limits and time factors related to the transfer of blueprints and their subsequent implementation, and to the commercial profit extraction, which are not determined by our subjective moods, but are inherent in high-tech industry. Big companies have their approved plans for technical development and the yearly business plans. The cost of development testing at the lab or university level hovers around one million rubles. Once you begin to scale the test at production and operation levels, the costs grow exponentially. In other words it means that if a company wants to decide whether it's going to acquire or license a technology for its subsequent widespread use, it should identify investment, provide professionals and create the required conditions. It often happens that potential customers of university R&D believe that the product is unready for their production and their needs, that it will take a long time – a few months, if not years – for its adaptation in accordance with industry standards.

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There are two possible ways to speed up the technology transfer process. The first one involves creation of a small company, a startup. Startup will go to investors for additional funding for testing and creation of the next version of the prototype. That's what we are ready to do in collaboration with the Skolkovo Foundation, as they have built their investment pipeline, and our task is to help Skoltech projects make their first steps. The second option is to pass the development to industrial partners and to ensure that the customer, after we provided our initial funding, comes and decides to advance this R&D, through an additional contract or creation of a joint lab.

Choosing the optimal scheme of commercialization is a very difficult and important decision. The objective of our Program is to assist the projects in making this decision and to acquaint all participants with the experience gained in Skoltech, as well as the knowledge we acquired from our partners, first and foremost, MIT. But, ultimately, the key to success lies in the project team's energy.

Alexander Ustinov, Deputy Director of the Skoltech Research Center for Energy Systems: In 4 months, which have passed since the launch of the program, many things have happened. First, we had gathered a team of researchers. I would like to give credit to the Center for Entrepreneurship and Innovation for their ability to craft such a program within Skoltech. I can only imagine the difficulties they went through carrying all of this through, so thanks a lot to them! Moreover, if any Skoltech professors are doing research outside of their Center's plan of work, then this Program turns to be - if not the only one - then just one of the few ways to get funding. It's definitely a positive thing for Skoltech, as it allows the university to diversify its project portfolio. Speaking of our group,

after winning in the contest, we received funding, put together a team, and already completed part of the work. I have here samples of surfaces for boiling, which we have designed while working on this project, so one of our project's state goals has been successfully completed.

Within the project we do communicate with mentors. The Center for Entrepreneurship and Innovation has organized a number of some very efficient meetings for us. We hosted Siemens folks, who got interested in our research and obtained results. We had a man from [energy holding] Inter RAO as our mentor, who also was very interested in our research, and communication with him was very fruitful, as in addition to this project, he became interested in a number of other studies done by our group, and we continue to discuss these projects with him.

Technology that we work on has two large audiences. They are the manufacturers of equipment, such as Siemens, and power grid operators, companies such as Inter RAO, which use transformers at their facilities. In addition, the results of our study were presented at the RU Grids exhibition, the largest energy industry expo in Russia, and after this presentation the American company Qualitrol, which makes measuring equipment for transformers, approached us with a suggesting we use their equipment in our R&D.

Victor Lempitsky, Skoltech Associate Professor: I would say that over the past four months we've made good progress. We are now working on a new method and began receiving first results. The method is based on deep neural networks, which are now the hottest topic in machine learning, and we are moving from our old method of tree based decisions to this new method. Some new people had joined the project. Apart from the new method, we have the first success in terms of commercialization, we are in negotiations with the first potential licensee who is interested in our technology, and to whose needs we're currently adapting it. The advantage of participating in the Program is that we now have the resources to develop and to improve the method, to attempt its commercialization. Thanks to the financial support of the Program, we were able to purchase a license for a specific software module that we need to improve the performance of



Alexander Ustinov

Research @ Skoltech

our method, and to hire a research engineer who is working on applied aspects of the project.

Speaking about mentor-capitalists, we met several times with Alex Kosik, a businessman from the United States, who shared his vision of how the project could develop, and we listened to his advice with care. And we met with Dmitry Halin, one of the top people in the Russian office of Microsoft, who also shared his views, and it was also very useful and interesting, and even in some ways surprising, and allowed us to adjust our original plans.

Our dream is to install our product into one of the major video conferencing systems such as Skype, Google Hangouts, or Facetime. Actually, we have already made the first

prototype, where our system is integrated with Skype. When Skype launches, our system runs in the background, giving Skype users an ability to look into each other's eyes while talking. We have reached this point even faster than we planned. At a maximum, this is what we want, an integration with a major system. At a minimum, we'll target a variety of niche customers, such as doctors, tutors, HR-specialists, for whom this functionality – the ability to look the other person in the eye – is a much-needed feature of their video conferences.

We have reached this point even faster than we planned. At a maximum, this is what we want, an integration with a major system.



VICTOR LEMPITSKY:
I WOULD SAY THAT OVER
THE PAST FOUR MONTHS
WE'VE MADE GOOD
PROGRESS.



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**ARE THE SCIENTISTS
READY "TO HELP THE
HOMELAND" DOING
SOMETHING ON THE
VOLUNTEER BASIS?**

Irina Dezhina and her report "Development of cooperation with the Russian scientific diaspora: experience, problems and prospects"

This past year Irina Dezhina, Head of Skoltech Scientific and Industrial Policy Group, compiled a major report entitled "Development of cooperation with the Russian scientific diaspora: experience, problems and prospects". Ms. Dezhina held her first survey among the Russian-speaking scientists working in the United States back in 1999, and since then she has been keeping an eye on this group.

The theme of the report is cooperation with Russian-speaking scientists working abroad. Conclusions are drawn on the basis of the poll of 150 scientists living abroad, as well as representatives of 35 Russian universities that work with their fellow researchers abroad.

Throughout this study Ms. Dezhina and her colleagues tried to understand why the scientists, who had left the country, aspire to collaborate with Russia, and most importantly – what might they be interested in doing in the sphere of Russian science and education, and would they be ready to "help their homeland", doing something with no compensation. It turned out that more people were willing to do things for

free than to work for money. Many expressed willingness to review projects and articles at no charge, work on the journals' editorial boards. Moreover, over two thirds of the survey respondents said that they were willing to teach for free and participate in different forms of education. However, only 6 of the 150 persons to fill out the questionnaire showed interest in publishing scientific articles in co-authorship with Russian colleagues. At the same time Russian universities, which participated in the survey, are interested in joint publications with representatives of the scientific diaspora.

Dezhina says that unfortunately the study left out those keep their work with Russia to themselves and do not take an active social position. We currently have to judge all of the Russian scientists on the basis of communications with the "active part" of the scientific diaspora, but we should not forget that the views of those who keep out of the public life, may be quite different.

There are still plenty of misunderstanding of people's motives and miscommunication, which means that Irina Dezhina and her colleagues will continue their studies.

Innovations @ Skoltech

Skoltech researchers have filed three new patent applications in Russia and abroad through the University Knowledge Transfer Office (KTO). Patent applications reflect the versatility of the University research, and its main task – to create innovative science that will have a positive impact on society and economy.

The first application is related to the method of correcting the image view and machine learning. This application for the national Russian patent was filed in March 2015 by Professor Victor Lempitsky, who leads the team of Computer Vision Group, and Daniil Kononenko - the group's PhD student. The proposed method solves the problem of the "eye-to-eye look" during video conferences. To solve this problem, Victor Lempitsky and Daniil Kononenko developed a method that adjusts the webcam image in real time, redirecting the look and setting up the visual contact. This method may work on a standard PC with a standard built-in camera.

Professor Konstantin Severinov of the Skoltech Center for Data-Intensive Biomedicine and Biotechnology and Sergei Shmakov, PhD student in biomedicine, together with MIT professor Feng Zhang, filed a patent application for a new class of Class 2 CRISPR-Cas system. CRISPR-Cas systems, also called "DNA modifiers", as published in Quanta Magazine and MIT

Technology Review, received the title of "the greatest biotechnology discovery of the century."

The team of the Skoltech Translational Research and Innovation Program has filed an international patent application (in accordance with the Patent Cooperation Treaty) for a calibration method and system. The project featured the development of multisensor device and a software program for the instrumental assessment of toxicity in the process of eco-monitoring.

Finally, in October 2015, the Skoltech Knowledge Transfer Office signed its first license for technology transfer with the Quantum Systems company.

With this technology the latest unmanned machines and robots of Quantum Systems will be able to determine the configuration of the environment and directly control engines and other components of robots, so that they will move in a given direction. This technology was developed by the Computer Vision Group led by Professor Victor Lempitsky. Dmitry Ulyanov, Skoltech PhD student, and Alexandra Fenster were the principal developers of the project.



Victor Lempitsky (left) and PhD student Dmitry Ulyanov

Innovations @ Skoltech

The young entrepreneurs of Skoltech

The educational process at Skoltech seeks to nourish the students' entrepreneurial spirit and provide them with skills to develop innovative products. No wonder that many of Skoltech's first graduates its walls as startup founders. Some of them stayed close, as they became residents of the Skolkovo Foundation.

Easy Wallet and Sharxi, established in 2014, when their founders were studying at Skoltech, and having represented the University at the Slush-2014 conference, are actively developing on their own. Alexander Ivanov's Easy Wallet started as a service to select profitable financial services but refocused on the management of financial flows of personal bank accounts. Boris Urman and Andrii Omelyanovich's Sharxi grew out of the student hackathon, when Skoltech students were asked to come up with ways to improve the learning environment in the innovation center under construction. Geared primarily towards students, Sharxi allows anyone to save money on a taxi ride if the duration of the ride and unfamiliar companions in the car are not a concern.

Dmitry Smirnov's TermoMotors, engaged in the development of an engine with an external heat supply, took part in the national innovations contest UMNİK and won a grant from the Bortnik Foundation.

Four projects by Skoltech graduates received support from the Skolkovo Foundation and stayed on to grow and develop in the vicinity of their alma mater. One of them is the project by

Vahe Taahmazyan, Mikhail Matrosov and Stanislav Podshivalov, called Tardis 3D Technologies, which has developed a three-dimensional scanner for the human body. Tardis 3D Technologies scanner allows an almost immediate 3D scan a person in any position (even in a leap) and gives a high-precision model image. There is a profusion of possible applications of this technology. Developers say that the most promising ones are the garment industry (hand-tailoring, online catalogue selection) as well as fitness, medicine, prosthetics, and entertainment industry.

Another successful project is ImageAiry by Astro Digital, co-founded by Ekaterina Kotenko-Lengold who is also the company's Vice President of Business Development. The idea of Astro Digital is to take data from different sources of space and aerial footage, process this data in the cloud and make it available to both the end users and developers in the form of API, allowing them to make all kinds of niche applications. Astro Digital seeks to make access to satellite data simple and affordable for everyone.

In addition, residents of the Skolkovo Foundation are Tsuru Robotics, a company by Nikita Rodichenko and Anastasia Uryasheva, and Dream Beamer, a project by Vyacheslav Sabirov. Tsuru Robotics is developing an autonomous quadcopter, a tiltrotor, capable of speeding up to 150 km per hour and levitating up to 3 kg. A Dream Beamer is creating special software that allows, by using a webcam, to dim a part of the projector beam aimed at the speaker's face, making the presentation process easier and safer for the eyes.



Innovations@Skoltech

Student innovators

In August it was announced that the project of “smart” knee brace, developed by Skoltech student Maria Goncharova, became the winner of the Summer Academy in Digital Healthcare in Sheffield, UK. The bandage is called FitNee, its main components being a special sensor that collects data on muscular activity and a small motor that causes the knee to move appropriately. The bandage is designed for people with chronic knee pain or disabilities.

Maria Goncharova is studying for her Master of Science, following the Advanced Manufacturing Technologies track, and works in the robotics laboratory of Professor Dzmitry Tsetserukou. The Sheffield Summer Academy in Digital Healthcare strives to find entrepreneurial solutions to the health issues and supports the participants in realizing their ideas. The Academy is organized by Startify7, a group of seven European summer start-up schools, devoted to IT & Communications.



Maria Goncharova



A group of Skoltech students has developed a telepresence robot Webot, aimed at children who are unable to attend school for health reasons.

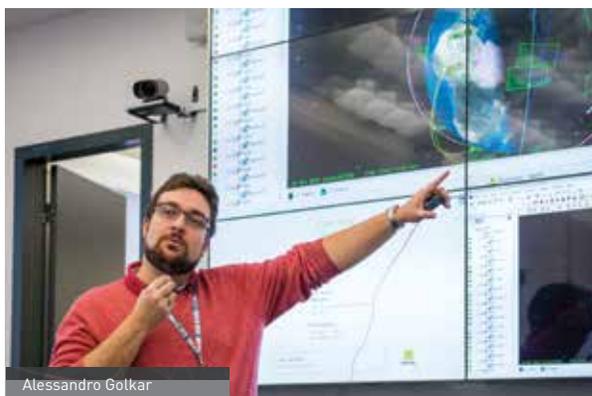
This year, mobile and friendly robots were installed in five primary schools in the Astrakhan region. Robots are equipped with a screen, a camera and a microphone, designed for fast transfer of all the needed information to students with disabilities: while at home, they can listen to the lectures, watch the classroom activities and learn about the homework. In addition, robots provide stay-at-home students with an opportunity to take part in the class, for example, by answering teacher's question. The project was developed by Stas Ashmanov, Dmitry Suvorov and Roman Zhukov. All Webot robot functions are controlled via the internet. A student needs only to turn the home computer on and go online. Connecting to its student, the robot presents him/her in class. "It's like Avatar, we kind of 'teleport' kids from home to school. We want children to know that even if they get sick or cannot move, they can still learn and participate in the school life. It's all about equal opportunities for all children," says Stas Ashmanov says.

The Webot project was launched with the help of crowdfunding, but also received the official support of the Ministry of Education of Russia. At this stage, five schools received one robot each. In the future, the project creators plan to distribute these robots across the country.

Awards @ Skoltech

This year the prestigious awards were given to Skoltech professors, researchers and graduates.

In July 2015 the International Council on Systems Engineering (INCOSE) named the article co-authored by Edward Crawley, Skoltech president, and **Professor Alessandro Golkar**, the best publication of the year. The award was announced at the 25th INCOSE anniversary international symposium in Seattle, USA. Professor Golkar, who heads a Skoltech Stra-



Alessandro Golkar

tegic innovations research group (SIRG) and who earlier had received the prestigious Luigi G. Napolitano award, thanked the editorial board of the journal. "I am delighted with this award and the recognition from INCOSE, - the Skoltech researcher said. - The Council plays an important role in the world in matters of determining the future of Systems Engineering. My students at Skoltech now seek for new approaches to systems engineering. I hope that very soon we will have themes for new publications in INCOSE."

In early November, Astro Digital, a project by Skoltech graduate **Ekaterina Kotenko-Lengold**, took the second place at the



Ekaterina Kotenko-Lengold

Slush conference startup pitch session in Helsinki. According to Ekaterina, this result came as a surprise: "Our team's main goal in Helsinki was to meet with partners and potential investors. All the same we did make a presentation at the Slush-100 pitch session. But I was aware that the probability to get into the semi-finals, not to mention the finals was very small. 1,700 companies applied for this competition, of which only 100 were selected for presentations. Then, just 20 companies were selected out of this hundred, and 4 made it to the finals. I was listening to the presentations by other guys. The projects were very strong, detailed, and pitches were of very high quality. Many projects in my section were in a rather mature state, with excellent technology and good user performance. That's what makes Slush different from other competitions - I've attended many contests and saw that the projects were rather weak, and you could easily beat them, but it's not the case with Slush. So, it's especially pleasing to make it to the finals." What's particularly important about this victory is that Astro Digital is related to space, and investors, who made up the majority of the jury, generally see this sector as somewhat niche and exotic. Therefore, Astro Digital's second place also means that the project is viable in the eyes of investors.

On November 23, 2015, **Tatiana Podladchikova**, mathematician and researcher of the Skoltech Space Center, was awarded the International Alexander Chizhevsky medal. The 'Chizhevsky medal', named in honor of an outstanding Soviet scientist Alexander Chizhesky - founder of heliobiology,



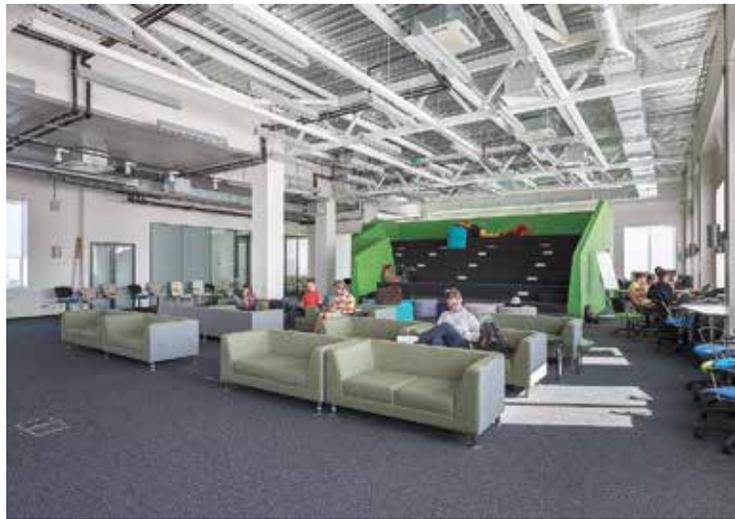
Tatiana Podladchikova

science of solar-terrestrial relations and the connection of man with space, has been awarded since 2013 for major contributions to space weather research. The medal was presented to Tatiana Podladchikova for a number of her achievements featuring participation in the development of solar activity forecasting service (Royal Observatory of Belgium, Brussels), and geomagnetic storms forecasting services (Space Research Institute, Moscow), as well as her study works on Earth's magnetosphere state (Skoltech, Skolkovo). Tatiana Podladchikova has been working at Skoltech since the moment of founding the Space Center in 2013, engaged in processing spatial data. She takes part in the studies of space weather forecasting.

New home @Skoltech

The new school year at Skoltech started this year at the new building located at Nobel Street, 3.

The university's own building is equipped with classrooms and laboratories, spaces for friendly chats and business meetings. Commenting on the move, Edward Crawley, Skoltech president, said: "This is my second happiest day at Skoltech. The first one was when students started classes."



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While Skolkovo Institute of Science and Technology is a non-governmental scientific and educational institution, thanks to its focus on innovation and aspirations to repatriate the scientists who had left Russia in the past, the institute enjoys close attention and support of the Russian government, particularly the Prime Minister Dmitry Medvedev and Deputy Prime Minister Arkady Dvorkovich.



Dmitry Medvedev visited Skoltech in early June, when the open-air conference Startup Village was in full swing at Skolkovo, and took part in the graduation ceremony of the first

Skoltech class, signing the “collective diploma” and taking a giant selfie with the graduates. Arkady Dvorkovich visited the official graduation ceremony held in Skoltech two weeks later, and addressed the graduates naming Skoltech the most ambitious start-up in Russia, for which failure is not an option. Apart from this, the Deputy Prime Minister visited the university a number of times this year, regularly meeting with students.

Dmitry Medvedev, Prime Minister of Russia: “Skoltech is a huge investment in our common future. I hope that as years go by, there will be more and more graduates. And most importantly is that you, everyone who stands today on this stage, and the next generation of graduates will be in high demand by the market, will engage in science and production, will do research – and will make money, which is also rather good.”

Arkady Dvorkovich, Deputy Prime Minister: “This is a very important event for Skolkovo, Russia and, especially, for you. Skoltech is the most ambitious startup in Russia, simply because it just can’t be a failure. You are the first and the most important graduates of this university.”

Mikhail Margelov, Vice President, Transneft: “We, as a state company, a strategic company, support research and education in general. And we consider Skoltech an investment in future.”



Natalia Berloff, director of the Center for Photonics and Quantum Materials, and Chairman of the Russian Government Dmitry Medvedev

At the end of December 2015 Chairman of the Government of the Russian Federation Dmitry Medvedev issued a commendation to a large group of Skolkovo Foundation employees. Three of Skoltech’s employees were among those who were cited by the Prime Minister: Natalia Berloff, director of Skoltech’s Center for Photonics and Quantum Materials; Alexei Ponomarev, Vice President for Strategy and Industrial Cooperation; and Raj Rajagopalan, professor.



Herzog & de Meuron

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