



**Professor
Raj Rajagopalan**
Skoltech Provost

Table of Contents

Address@Skoltech	1
Startup Village@Skoltech	2-5
Official sources@Skoltech	6
News@Skoltech	7-9
Art Project@Skoltech	10-11
Diaries@Skoltech	12-15
Interview@Skoltech	16-17
Industrial Immersion@Skoltech	18-21
Discoveries@Skoltech	22-23
Space@Skoltech	24-27
Lecture@Skoltech	28-29
Mobile app@Skoltech	30-31

Dear Friends!

I am very pleased to note that we just completed spectacular Spring and Summer terms – full of very successful accomplishments!

The several very important events that took place in the Spring and the Summer terms include the International Conference on Biomedical Technology "Towards Therapies of the Future", organized in partnership with the MIT, where Nobel laureates Mr. Phillip Sharp and Mr. Shinya Yamanaka delivered speeches, the 2nd Startup Village 2014 International Forum, the 2014 Student Selection Weekend as well as the 4-week Innovation Workshop for all new Skoltech students.

Summer saw a full array of events, just as any other semester, for both the students and scientists and researchers. Our Masters students completed their 8-10 weeks of Summer Internships in industry and research centers. Over 15 organizations in Russia as well as abroad invited our students for the internships, and a similar number of collaborations and interactions is expected to continue in the future.

The new school year began in mid-June for over 100 new students with the Skoltech Innovation Workshop, in which students immerse themselves in entrepreneurship and innovation activities for 4 weeks before traditional studies begin on 1 September 2014.

We also saw some notable research achievements and discoveries by our faculty: For example, Professor Yuri Shprits and his research group developed a method to predict the state of earth's magnetosphere using point-based satellite measurements.

Our continued drive toward major, international partnerships included the signing of a collaboration agreement between the Skoltech Center for Advanced Structure, Processes and Engineered Materials and the Delft Technical University in the Netherlands and visits by a number of foreign delegations. One of the visits, by a Mongolian delegation, is featured in this Newsletter.

Skoltech also hosted the visits of two Nobel Laureates – Professor Harold Kroto, Florida State University, and Professor Sidney Altman, Yale University. We are pleased that such eminent and world-class scientists choose Skoltech as a platform for communication and interactions with the Russian scientific community.

The summer has finally come to an end, and we are excited to pick up pace again to our usual activities! We look forward to new students, new educational programs and new discoveries – a new academic year has begun!

*Professor Raj Rajagopalan
Skoltech Provost*

Startup Village@Skoltech

Mega-events

Startup Village 2014: Prime Minister Dmitry Medvedev Supports Skoltech

On June 2-3 Skolkovo Innovation Center hosted the 2nd international Startup Village conference. This year it was attended by nearly 10 000 innovators, entrepreneurs, representatives of major corporations, investors and journalists.

Skoltech professors and students took part in panel discussions, master classes and lectures. Skoltech student Engineering club organized a competition for small pilotless vehicles (UAVs), quadcopters. Center for Entrepreneurship and Innovation held the Skoltech Innovation Program Conference within the Startup Village.

On June 3 the Skoltech hall was visited by the Head of Government of the Russian Federation Dmitry Medvedev. Master program student Nikita Rodichenko showed to Prime Minister the capabilities of the aircraft created by the Institute's student Engineering club, and gave Dmitry Medvedev a copter-drone as a present (a copter

drone is a unique aircraft device, which is likely to be put into industrial production). The Prime Minister promised to personally test the copter in his spare time.

Addressing the participants of Startup Village, Dmitry Medvedev said that Skoltech will be a major scientific and educational center. He thanked the professors, representatives of the international scientific community for their decision to come to Russia to participate in the creation of a university of international scope.

"There will be an innovation center, there will be a university - Skoltech, which has already attracted a large number of foreign experts from different countries. I thank them for the work they do for us and for associating their future with Russia", - Dmitry Medvedev said. The Prime Minister emphasized that the intention of the Government to maintain and fund Skolkovo remains unchanged: "We will in any case complete the projects that have received state approval. And one of these projects, of these priority areas, is our Skolkovo project," - said the Prime Minister.



Prime Minister Dmitry Medvedev attended the Skoltech Copter Zone at the Startup Village international conference



Startup Village@Skoltech

The 4th Skoltech Innovation Program Conference

Another important event at the Startup Village 2014 was the 4th Innovation Program conference, organized by the Skoltech Center for Entrepreneurship and Innovation.

The research teams, whose projects had passed competitive selection in the fall of 2013 and had been accepted for participation in the program, delivered presentations at the conference. Each project was unique in its focus, but what all of them had in common was the participants' interest for the practical application of scientific results.

Six teams from Skoltech, MSU, HMTI and MISA presented their projects: on the first day of the conference the participants presented the results of their scientific activity up to the moment, and the second day was dedicated to individual work - closed communication with mentors on the plans and prospects of each project.

Minister of Education and Science of the Russian Federation Dmitry Livanov, who attended the conference, particularly emphasized the importance of such projects for the development of the Russian innovation ecosystem.

Participation in the conference was open to all who understand the importance of early support for innovative projects and are ready to make suggestions to improve their effectiveness, to take part in the development of common methodology and promotion of new approaches to the organization of implementational R&D in universities and research institutions.

The results

The teams receive funding for up to one year to carry out scientific research projects in the following areas: information technology, energy efficiency, biomedicine, space technologies and peaceful nuclear technologies. After the first year the participants of the program will continue the work, aiming at commercialization of the

results. Licensing of their invention to interested organizations will count as a successful result of a scientific collective participation in the program.

Research projects

1. "A search platform for new microcine-based antibacterial agents" <http://community.sk.ru/news/b/news/archive/2014/05/08/obyavleny-uchastniki-programmy-innovaciy-skolteha-2014.aspx> by Konstantin Severinov, Skoltech
2. "Nano-capillary electrochemical biosensors" by Peter Gorelkin, MSU
3. "Hydrophobization of synthetic materials by deposition of thin fluoropolymer solution films in supercritical carbon dioxide" by Marat Gallyamov, MSU
4. "Advanced materials based on graphene with high absorption rate in the visible and close IR range" by Stanislav Evlashin, MSU
5. "Multi-sensor device for instrumental evaluation of toxicity" by Dmitry Kirsanov, HMTI
6. "Super-pliable aluminum sheets" by Anton Kotov, MISA



Ilya Dubinsky, Director of the Center of Entrepreneurship and Innovation, opened the 4th Innovation program conference

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Skoltech student Nikita Rodichenko presented to Prime Minister Dmitry Medvedev a real copter

Anastasia Tyurnina - winner of the Science Drive contest

On the last day of the Startup Village 2014 event the winner and the first finalist of the Science Drive program for young scientists was announced. It was Anastasia Tyurnina - a graduate of the Department of Physics, Moscow State University and one of the leading and promising young graphene researchers. The Science Drive program is aimed at improving the professional level and supporting the research initiatives of young and talented Russian scientists.

Anastasia received a unique opportunity: she will spend two years in the University of Manchester (UK), where she will engage in scientific work under the supervision of Andrey Geim, Nobel Laureate in Physics. A. Tyurnina nomination was unanimously approved by the members of the Expert Advisory Council, which consists of leading professors and scientific figures of Russia in the field of physics. Announcement and award

ceremony for the winners was held on June 3, 2014 as part of Startup Village 2014 conference.

"The role and position of Skoltech in the modern scientific world is to become a link between Russian science and Western expertise, establish connections that will allow Russian scientists to become a part of the global scientific community, and Russian industry to obtain the much-needed access to modern technology and discoveries, and, most importantly, for outstanding Russian scientists abroad to influence the fate of Russia anew. And we hope that the Science Drive program will be one out of a great number of such connections", - says Natalia Berloff, Dean of Skoltech.

According to Pavel Shchedrovitsky, Vice President in Education, Skolkovo Foundation: "The importance of the Science Drive project for the Skolkovo Foundation is that it helps develop the

Startup Village@Skoltech

Anastasia attended the award ceremony remotely, in the body of the Webot robot, which was made possible thanks to the Wicron company - www.wicron.com



And the Winner is... Anastasia Tyurnina. The young woman will spend two years in the lab of the Nobel laureate A. Geim

Russian intellectual potential using prominent scientists from around the world and use it for a better future of the country." Anastasia Tyurnina does research on graphene, a new material with amazing properties discovered by Nobel Prize winners A. Geim and K. Novoselov in 2010. Anastasia is currently working for the Atomic Energy Commission in Grenoble, France [Commissariat à l'énergie atomique et aux énergies alternatives].

After two years' internship in Manchester under the guidance of Geim, Anastasia will return to Russia and continue to work at the Research Center for Quantum Materials in Skoltech. According to the concept of the new Research Center, modern physics is supposed to come to the aid of modern technology. That is why the main areas of scientific research of Skoltech Research Center will be the development of a new class of integrated chips, combining dense packing of logic elements and new technology of information transfer on chips.

According to Dmitry Harzeev, professor of physics at New York Stony Brook University, the Science Drive program is a rare opportunity for young scientists of Russia to get to learn from the world's leading professors and adapt the gained knowledge to the Russian realities.

"It's really a rare chance for talented young people. If such opportunities were available to young researchers 15-20 years ago, much of the Russian science could be different", - says Professor Harzeev.

Anastasia Tyurnina is winner #1, heading to Manchester, UK in 2015 to proceed her scientific work at the Manchester University. The Search for the 2nd, a talented young scientist who will show a similar opportunity, is to continue. An abundance of candidates from all over Russia will be given a chance to test their potential - applications period is now open and runs till December 15, 2014.

Want to participate in the Contest?
 Apply before December 15, 2014
 sending an email to
postdocoffice@skoltech.ru
 Details online:
www.skoltech.ru

Official sources@Skoltech

New Member on Board: Mr. Alexander Galitsky Joined the Skoltech Board of Trustees

On June 26, the 12th session of the Skoltech Board of Trustees took place in the Hypercube (the Skolkovo Innovation center). New member of the Board, Mr. Alexander Galitsky, Managing Partner of the Almaz Capital Partners Venture Fund, was elected at the meeting.



Mr. Alexander Galitsky
Managing Partner
Almaz Capital Partners

Alexander Galitsky is a Managing Partner of Almaz Capital Partners - a venture capital fund, built on the basis of a 'bridge' model with offices in Moscow (Russia) and Menlo Park (California, USA), created in 2008, with the participation of such anchor investors as Cisco, EBRD and IFC. Alexander is a well-known entrepreneur and inventor in the field of technology, founder and director of many successful technology companies in Russia, Europe and the United States.

Before the creation of Almaz Capital Partners, Alexander built the practice of investment in information and communication technology in the Russian Technologies venture trust, one of the first venture trusts to appear in Russia, and did a number of successful private investments as well. The list of his past and current investments include: Parallels, Yandex, Vyatta (sold to Brocade), Acumatica, Jelastic, NavMaps (sold to TeleAtlas), 2Can, Alawar, AlterGeo, SJLabs (sold to VocalTec), EverNote, GridGain, WikiMart and others.

Prior to his investment career, he created and led as CEO five successful companies in the field of software development, information security, Internet services, telecommunications and microelectronics; among others: Elvis +, TrustWorks Systems (sold to Hamsard), EzWIM (sold to TMT Ventures), ELVIS Telecom (sold to Telenor) and NPC ELVIS. Alexander stood at the origins of WiFi and VPN technologies and products in the world market in partnership

with Sun Microsystems and was a pioneer of the Russian internet industry back in the 90s.

Prior to starting up a business, Mr. Galitsky was one of the key technical leaders in the Soviet space industry, being the chief designer of computer systems and software for satellites, and digital communication in space. Alexander holds more than 30 patents and inventions. At the Davos Economic Forum in 2000, Alexander Galitsky was called a "pioneer in the field of technology", and he is recognized as the most powerful man in Russia in the field of information and Internet technologies by independent agencies, as well as by the Forbes magazine.

In 2012, Alexander was nominated as the best venture investor of the decade in Europe, and in 2013 won the "Russian Entrepreneur of 2013" contest and received the title of "Best General Partner of 2013" in the Russian venture industry. Alexander graduated from the Moscow Institute of Electronic Technology as engineer-physicist and defended his Ph.D. thesis in Technical Cybernetics at the Moscow Institute of Physics and Technical Sciences at the Research Institute of Microdevices (NPO ELAS). Alexander is a member of the Board of Trustees of the Skolkovo Foundation and holds the Chair of the Advisory Board of RVC (Russian Venture Capital).

News@Skoltech

A government delegation from Mongolia visited Skoltech

On July 24, A. Sitnikov, Vice President of Institutional and Resource Development, hosted the official government delegation from Mongolia. The meeting took place a day after the talks between the Minister of Education and Science of the Russian Federation D. Livanov with the Minister of Education and Science of Mongolia L. Gantumur, and the visit of the delegation to the Institute of Oriental Studies of the Russian Academy of Sciences..

The Mongolian delegation included Luvsannyam Gantumur, Minister of Education and Science and Shukher Altangerel, Ambassador extraordinary and plenipotentiary of Mongolia to the Russian Federation, T. Dorzh, Vice President of the Academy of Sciences of Mongolia, P. Erdenenbulgan, Head of Department of higher education of the Ministry of education and science of Mongolia, N. Tuyaa, Head of Department of international cooperation of the Ministry of education of Mongolia, G. Suglegmaa, Rector of The Mongolian State Institute of improvement of qualification, L. Gantsetseg,

Rector of Mongolian State University of Education, C. Tungalag, Second Secretary of the Embassy of Mongolia, N. Lhagvasuren, Press attaché at the Embassy of Mongolia.

At the meeting in the Hypercube Mr. Sitnikov told the guests about the model of education at Skoltech, implemented initiatives, relevant projects and prospects of development of the Institute. After a 40-minute long presentation members of the delegation, accompanied by representatives of the meeting party, went up to the roof of the Hypercube, where they took a look at the surroundings of the Skolkovo Innovation Center and had the opportunity to assess the scale of the ongoing construction. After that, members of the delegation got acquainted with the technical gadgets created by Skoltech students. The Minister of Education and Science Gantumur told the audience that the government of Mongolia is interested in creating a center like Skolkovo in their own country. So, it is no surprise that the Embassy of Mongolia in Russia requested to visit Skolkovo. At the end all members of the delegation received presentation materials and souvenirs with Skoltech insignia.



A.Y. Sitnikov, Vice President of Institutional and Resource Development, tells the members of the official state delegation from Mongolia about the peculiarities of Skoltech



News@Skoltech

Skoltech CREI and TU Delft sign Cooperation Agreement for Composites Center

The Skoltech Center for Composites signed today a partnership agreement with TU Delft, The Netherlands. At a ceremony held at the Skolkovo Innovation Center in Moscow, representatives from the leading Dutch research center and Skoltech agreed to work together on developing the CREI (Center for Research Education and Innovation) which focuses on applicable research into advanced structures and composite materials.

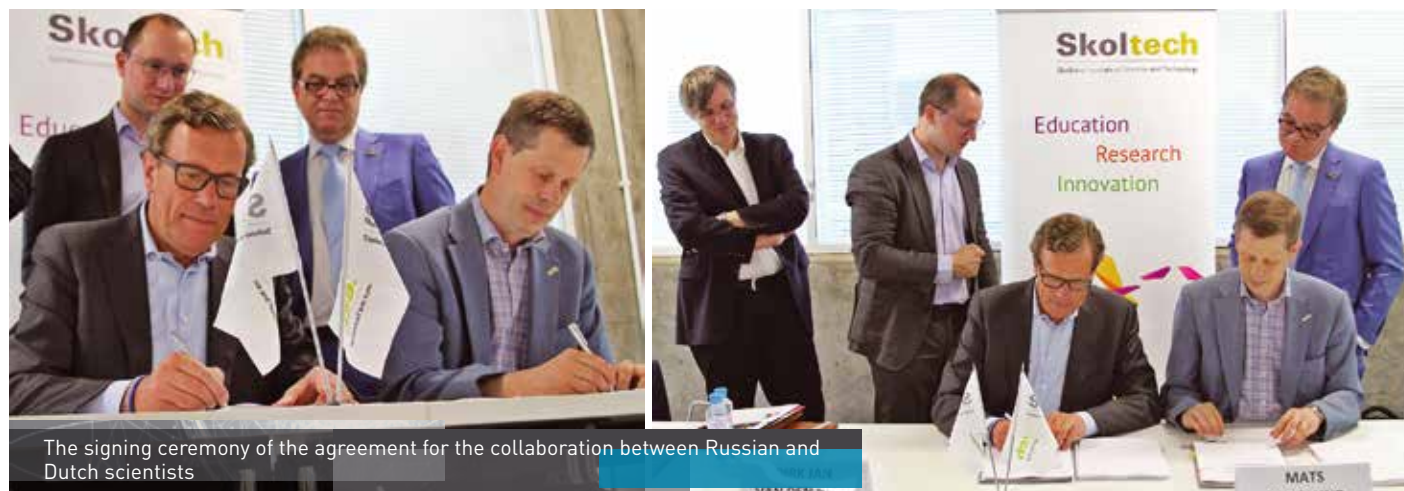
The Composites center aims to conduct basic and applied research into developing advanced structures that are lighter, more durable, more cost-effective, multi-functional, and environmentally friendly. This will be achieved by combining innovation and insight into and developing an integrated multidisciplinary approach for materials, processes and manufacturing techniques. The cooperation with Delft TU will involve scientists, faculty and students from both sides with the aim of conducting joint research projects and sharing facilities.

The Center for Composites has already secured cooperation agreements with two international partners – University of South Carolina, USA and KU Leuven, Belgium – and one Russian partner (The Institute of Continuous Media Mechanics

RAS). It is one of the six Skoltech CREIs which have so far been established.

Zafer Gürdal, the Director of the Skoltech Center for Composites: "The cooperation with TU DELFT offers our CREI an excellent opportunity to grow and flourish. What we plan to do at the Center for Composites wasn't done in any other place in the world. Usually research centers focus on manufacturing or characterization, but here we'd like to have those put together and cover every relevant challenge – from composite materials design through manufacturing to material afterlife."

Central to its research mission, Skoltech is founding 15 multidisciplinary Centers for Research, Innovation and Education (CREIs), which will address critical problems facing industry and society, particularly in the Russian context. These centers are key components in building capacity at the university, including world-class research teams, instruments, and facilities. The CREIs are the institute's major scientific growth engines. The establishment of CREIs is carried out in close cooperation with one (or more) international and Russian academic partners. Skoltech strongly believes that this is the most efficient and fastest way to establish a new world-class graduate research university.



The signing ceremony of the agreement for the collaboration between Russian and Dutch scientists

News@Skoltech

Pilot Edition Of CDIO Academy Hosted At Skoltech

On May 29-30, 2014 the final stage of the pilot program of improving training for managers and faculty staff of Russian universities called "Implementation of CDIO concept in engineering education" took place. This was part of the "CDIO Academy" project jointly developed by Skoltech and Tomsk National Research Polytechnic University.

The 5th module of the program was held at Skoltech and was dedicated to the following topics:

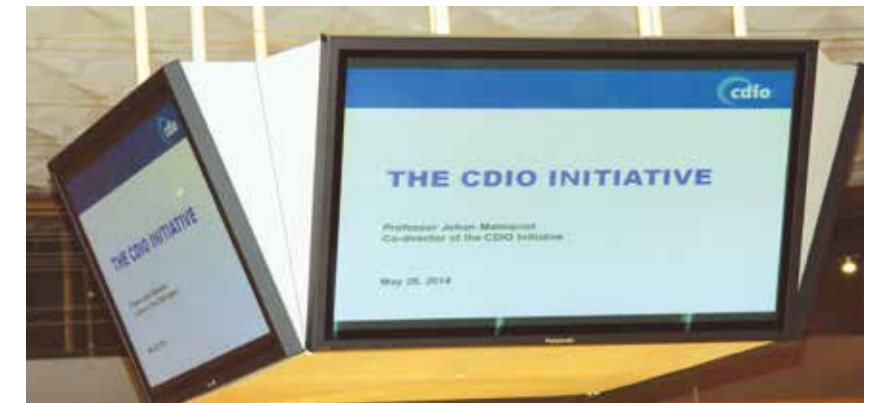
- Development of CDIO competencies with the faculty staff;
- Enhancement of tutors' teaching skills.

Presentations were made by international experts in CDIO: Edward Crawley, President of Skoltech, Johan Malmquist (Chalmers University of Technology), Christina Edstrom (KTH Royal Institute of Technology), as well as Russian experts from Tomsk Polytechnic University, where the CDIO standards have been successfully applied in educational programs for several years.

24 participants, representing 12 universities from all over Russia, attended the program.

Organizers noted that the "CDIO Academy" project provides excellent opportunity to assess the prospects of project-based education in Russia, as well as form the necessary competence in the field of effective implementation and adaptation of the CDIO concept for modernization of engineering education in Russia.

In the end of May, the second annual all-Russian conference "CDIO RUSSIA 2014" was held. The main results of the conference were the assessment of the outcome of the first pilot program of CDIO Academy, the presentation of the new improvement training program, which starts in autumn of 2014, and summing up of the main results and further development of the CDIO initiative in Russia.

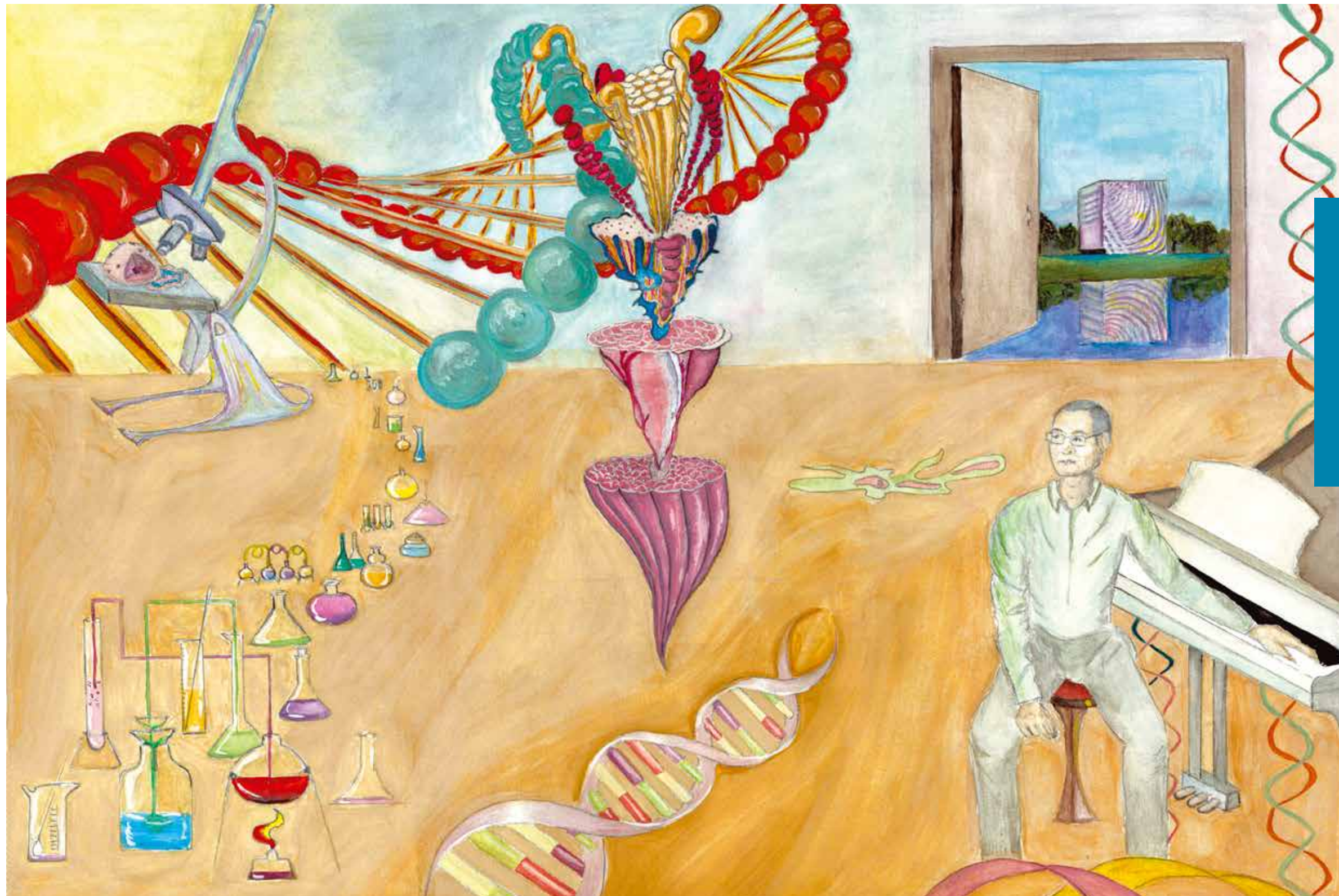


At the end of May the II Annual All-Russia CDIO RUSSIA 2014 conference took place. This is another step ahead in the perfectioning of the Russian engineering education



Art Project@Skoltech

Art Project@Skoltech



On May 26-28 "Towards Therapies of the Future" conference organized in partnership with the MIT, took place in the Hypercube. At the conference the biomed experts, Nobel laureates Shinya Yamanaka and Phillip Sharp, delivered speeches.

Skoltech Newsletter asked designer Woody to depict the main turns of the conference in paints. Here's the result.

The San Diego Diaries@Skoltech

At the editorial assignment from the Skoltech Newsletter, master students Alexandra Kudryashova and Katherine Kotenko made some notes during their week stay in San Diego, California and participation in the ESRI UC conference



Esri UC is one of the biggest events in the field of satellite imagery in the world. San Diego attracts the leading specialists in the field of satellite assembly, imagery processing, OCR and satellite application in business, defense and the public sector. This year's conference was attended by more than 1,000 people from 300 companies. About 200 events, lectures, master classes and competitions were held.

Participation in this conference opens the way for many start-up companies, because most of the participants are leading industry players and have been part of Esri UC for more than 10 years.

Katherine Kotenko,
Skoltech master
student, co-founder
of ImageAiry

Day One: Defining Strategy

The flight from Moscow to San Diego was very long and tedious. While flying, we tried to put together our calendar for the next week, and the task was not an easy one: several dozen (!) sessions are held at the same time



at the conference. Objective: understand what activities are worth a visit, extract maximum benefit from the trip.

Our key task: tell about our company to the largest possible number of companies providing services in the field of GIS, and register them in our system. This means that this week we will need to have about a hundred meetings! Exhale.

Day Two: First Impressions

The morning started very early. 11-hour time difference with Moscow made itself felt - I woke up at around 5 am. And no sign of sleep. Number of things to take care of - up to here! Confirm appointments, check the system for bugs (because those will be extremely out of order during the demonstration), set up analytics in the system.

San Diego - a very beautiful place that combines the rhythm and energy of a big city with a relaxed affability of a seaside resort. The conference is held at the Marriott Hotel right on the beach. We arrived at the venue around 10 am, prepared the booth, and already at 1pm the first visitors began to approach us.

A great feeling - it's our first show as a company. Exciting and very pleasant.

Day Three: "it's getting bigger and bigger"

Here's a couple of words about the organization of the exhibition. Esri UC has been run annually for many years, and according to the participants, "it's getting bigger and bigger". Not surprising: the industry develops at a crazy pace, new players are entering the market. The first small victory for ImageAiry - a new customer, an American company called Airphrame, doing aerial photography.

Day Four: The art of selling

Every day we laid out a dozen meetings. Approximately 5-7 before lunchtime and after it. Frankly, "selling" is not easy at all.

The first days I literally snapped at representatives of the company with a fiery speech about our product, just the way to bring

Katherine Kotenko



Business trips always mean new acquaintances

people into confusion. With each new meeting comes the understanding that it would be more useful to listen, ask questions instead, and lead the interlocutor to the idea that ImageAiry is the solution to a number of their problems. I know it's written in all the books on the art of sales, but one can only really feel it with their own skin.

Day Five: Connected with Moscow

Good news from Moscow - new investors are interested. Agreed to meet next week. Also, in the coming days an article about women entrepreneurs (Russian Startup Rating supported by RVC) is supposed to come out, where they are writing about us. Today is the last day of the exhibition itself. A few final meetings, and in the afternoon - the awards ceremony in the field of GIS.

Day Six: closing of the exhibition

Today is the closing day of the exhibition. The

event went at very large scale - hundreds of people in the luxurious space at Convention Center. Talked a lot about the prospects of growth and development of the industry. It is clear that now is the best time for ImageAiry.

In the evening we went to the San Diego Zoo, world-famous for its two charming pandas.

Day Seven: apart from the exhibition

Time to write follow-up letters, sort out business cards, and get some rest. Went to see the ocean, walked around the city. San Diego is lovely. And, of course, the climate here is just perfect. About 20-22 degrees all year round - you happy people! Day Eight: The Way Home.

Time to pack and get ready to fly to Moscow. We will certainly come here again. A year later. To ESRI UC 2015.

The San Diego Diaries@Skoltech

Alexandra Kudryashova,
Skoltech master student,
co-founder of ImageAiry



Day one: work at the stand

We have our own booth at the Esri UC, and we talk about how huge the spectrum of problems that can be solved with the help of satellite imagery is. One girl, a PhD-student at GIS, asked if we were looking for staff. When told that we are a student startup, she was seriously surprised.

Day Two: The opening of the exhibition

Today is the long-awaited opening of the large conference. Leading experts of the field attending. These people have come up with a way to see the entire surface of the planet, and even things the human eye cannot catch. It's amazing how much information can be extracted from satellite imagery and its processing results.

Day Three: from relict forests to Twitter

At the conference, more than 250 companies from around the world showcase their designs and solutions in the field of image processing. In the Environmental section a lot of projects, such as monitoring changes in the area of relict forests or populations of rare species were presented. Particularly impressive were the projects related to the aggregation of data from social networks to obtain a more accurate and timely information. One of those uses data from Facebook and Twitter to determine what is located at any point on the map, and whether the object is a military or a civil one.

Day Four: meetings and negotiations

More than 30 companies responded to our invitation to meet and let us describe how the ImageAiry project can help increase the number of their customers. Some of those we didn't fit because they were focused on other business segments, but we managed to find a company



At the conference there was room for both work and fun



Alexandra Kudryashova



In San Diego Skoltech students Ekaterina Kotenko and Alexandra Kudryashova did it right



who would be interested in cooperation with ImageAiry.

Day Five: on the silver screen

We continued to meet with companies. At lunchtime a reporter approached us and asked to tell her about our experience of the conference, what we have managed to do and see so far. I told her about the environmental section and its participants, who discussed the problems of the environment and had taken specific steps to improve the situation on the planet. This TV show is a great opportunity for us to shine on the screens and show a close-up of ImageAiry logo. We must admit, as producers of our own project, we love to be in the picture.

Day Six: closing of the exhibition

On this day developers of mapping services were awarded in more than 30 nominations. All participants gathered in one room, so that it was possible to estimate the scale of the event. The Conference proved to be very fruitful for our team, we met many experts in the field and will continue to work with them.

Interview@Skoltech



Zafer Gurdal, Director, Skoltech Center for Advanced Structure, Processes and Engineered Materials (Composites)

Mr. Zafer Gurdal, Director, Skoltech Center for Advanced Structure, Processes and Engineered Materials (Composites)

58 years old, Skolkovo, Moscow region.

I am a very boring person. When I start speaking about technical matter, I go so deeply into details that one can hardly stop me.

You may be able to create amazing pieces of modern art out of composites. Both Kandinsky and the mustache-man Dali would have probably loved these materials.

I was born in Ankara, Turkey, quite far from the town of Yalova, where the carbon fiber production plant is located. But I spent my childhood in Istanbul.

My name means Victory in Turkish.

It was already at school that I decided I would become a professor when I grow-up. Later on I got a scholarship to study in the United States and left Turkey.

My first professional achievements are linked with America. I worked at Virginia Tech for nearly 25 years, and left just before the tragic deadly shooting episode in campus.

I speak quite old-fashioned Turkish, because I haven't lived in Turkey for many years. Turks no longer use some words that I still use.

I have not been watching TV for over ten years now. I acquired this habit living in the Netherlands.

I drive really slowly and hardly ever break the traffic rules. I don't drive in Moscow: my car is still in America, but I will move it here soon.

The mode of driving in Moscow is not as terrifying as some may think. Apart from the fact that some shuttle bus drivers may drive like kamikazes, the cab drivers are usually very attentive to details on the road.

I would not hesitate to cross the road in Moscow with eyes closed. I am absolutely confident that the drivers would stop and let me go.

I like scuba diving and skiing. I once tried surfing in Hawaii....., could not stand up on the board more than 10 seconds. And I love racecars, too.

These days we may be witnessing a revolution in usage and applications of composite materials in various fields.

Black planes of composite materials are being constructed in an old-fashioned way: the structure of the plane should be modified and the innovations should be integrated. Not just copying the standard aluminum planes in black.

The engineers use a good amount of imagination applying composite materials in the construction of spacecraft. The creative approach is definitely a part of the process here.

Golf clubs and tennis rackets are widely built out of composite materials – they are not cheap, but real sports fans would not mind paying that much to get the perfect product.

My favorite travel destination is definitely Italy: people are kind, and the historic background is fantastic. Wherever you go in Italy – there's pleasure everywhere waiting you. But my favorite city is still New York City.

Social networks are waste of time. I have no time to be there. My Facebook page was created by my daughter about seven years ago, but you would hardly see me there.

To be truthful, I am not an early morning bird. I don't like getting up too early.

I am a fan of Armenian and Azeri cuisines.

I am now reading the book called Start-up Nation: The Story of Israel's Economic Miracle, recommended to me by one of my students.

Innovation is using the things we are used to in new ways.

Interview@Skoltech



Zafer Gurdal gets real pleasure from his work: it was yet at school he decided he would like to be a university professor

In fashion today are the 3D printers, each of which costs approximately \$1000. You can modify those things to print objects of carbon fiber plastics.

I love going back to Istanbul, and I would like to swim across the Bosphorus once, from Europe to Asia. This is my dream which I constantly delay realizing.

When I was living in America, I would go to Istanbul once a year, when I worked in the Netherlands, I would travel there once in every three-four months, and now I live in Russia and go to the Turkish cultural capital almost every weekend. I leave the office on Friday evening with just a small bag and go directly to the airport.

One of my former classmates works for a company that is building the tallest tower in the Moscow City skyscraper complex.

Today the Russian-Turkish relations are in a great shape. Actually, I don't think they have ever been better than these days.

My favorite composer is Aram Khachaturyan. Especially his Masquerade waltz.

I occasionally wear a bow-tie.

Have I mentioned that I am a boring person....?

Industrial Immersion@Skoltech

And What Did You Do This Summer?

Summer Internships Of Skoltech Master Students: Plunging Headlong Into The Industry

Studies in Skoltech, like at any university in the world, include a summer internship – practice in a company or a research center for 8-10 weeks after completion of spring semester and passing exams. However, it is not just practice for our students – it is work on real projects. This year more than 15 companies, both in Russia and abroad, invited our students for summer internships, and plan to continue active interaction further on. Some students underwent practical training in small groups, some conducted scientific research in pairs with their professors or classmates, and others joined an entirely new team of colleagues. Still, let the guys share their impressions on the new knowledge, experience and the results of the summer work.

Vladimir Eremin

Skoltech, IT

Place of internship: Dauriya Aerospace, Moscow, Russian Federation

My summer internship I spent at Dauriya Aerospace – Russia's first private company to develop and produce low-cost satellites. The staff of the company is an open and sociable team, spreading great vibes. I'm pleased to note how harmoniously combined the experience of the older generation and the enthusiasm of young people are. At first, it seemed a trivial task was put in front of me, however, in the course of its execution we identified obstacles that we managed to avoid with the help of colleagues and knowledge gained at the Satellite Engineering and Systems Architecture courses. It was very interesting to see the initial stages of the spacecraft design in real life; I also witnessed the process of establishing communication with a series of Perseus-M devices recently put into the Earth orbit.

Dmitry Vasilyev

Skoltech, Energy technologies

Place of internship: University of South Carolina at Columbia, USA

My internship took place in the laboratory of the University of South Carolina – AMRL Lab. Currently, due to the boom in the field of three-dimensional printing on the one hand, and the trend in switching to the composite construction materials in the industry on the other hand, several ideas on how to take advantage of both directions came about. It is therefore we worked on an interesting scientific research in the lab. The details of that research still can not be uncovered to the public, but the main objective is to create cheap quality durable parts with a 3D printer so that those parts can potentially be used even for industrial purposes.

The base material for such parts is ABS plastic.

I'm very happy with how I spent my internship. There's great atmosphere in the lab and enthusiastic people, as it should be in a scientific team. The one complaint concerns the temperature; it was about 40°C outside and cool in the lab. I went from winter to summer several times a day.

Aidana Nurzhanova

Skoltech, IT

Place of internship: Laboratory for Atmospheric Research, Research Division NSU, Novosibirsk, Russia

My summer internship was held in the Laboratory of Space Experiment, which deals with micro-satellites, or rather, it tests the on-board equipment at the early stage.

First comes the design of the card, then the assembly of components on it, further on there's a comprehensive check and the board is covered with two layers of special varnish. I did the testing at the initial stage of the microsatellite assembly. The goal is to ensure that the on-board equipment is functioning properly, works according to the standards, and therefore can be launched into orbit. When the card is ready, testing begins: thermal test, vibrotest, thermo-vacuum test. After each test it is necessary to check if the card functions properly. In the process I discovered one simple but important rule: don't change anything immediately. One needs to introduce changes

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gradually, first change one component and assess the situation. If everything went smoothly, then change the next component, and so on. Otherwise it is very hard to find the problem area.

Despite the fact that the laboratory adheres to the State Standards [GOST] in all its activities, employees still have the opportunity to show their creative potential, make decisions quickly all the while not violating the standards.

Oleg Urzhumtsev

Skoltech, IT

Place of internship: ABBYY, Moscow, Russian Federation

My work consisted of two parts: the development of a product component, and the research activity. At first, I was advised to get in the course of affairs in the software development department, where my main responsibility was to create an environment testbed for mobile applications, which certainly requires versatile programming and linguistic

information processing skills. The second phase of the work was more focused on text processing; I took part in the research that helps optimize the pre-parsing of texts for some business cases.

And in general, ABBYY as a company really is a great place for people with science oriented approach to life. Here, employees have excellent opportunities for self-development and self-education: at almost any given moment you are able to choose from a number of short-term courses or seminars, usually organized by employees for employees. I was happy to attend a course on aviation.

Tatyana Smirnova

Skoltech, Biomedical Technologies

Place of internship: Intel, Moscow, Russian Federation

I was an intern at the Moscow office of Intel. My team worked on a project in analysis and fragmentation of the Internet of Things market, as well as the development of possible business



Skoltech students got some great professional experience this summer – in the leading tech companies and research centers

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strategies for Intel. I learned a lot of new things, starting from teamwork subtleties (I think one cannot know everything about those!) up to Intel promotion in different fields, as well as how the business analysis for industry giants is done. This resulted in a fundamental analytical status report on the market, based, among other things, on interviews with both Skolkovo resident companies and companies of the scale of IBM.

In addition, we provided suggestions with exact action plans for Intel, most favorable in both current and forecast market conditions. The main experience for me since the beginning of the internship is that I can apply the knowledge received only a couple of months ago, in a particular project, as well as feel on an equal footing with my peers in a large company. The feeling of being relevant and, at the same time, the new opportunities for constant self-development are the most valuable elements of my internship!

Sergey Madaminov

Skoltech, IT

Place of internship: Google, Moscow, Russian Federation

I was a trainee in Google along with several other Skoltech master students. I was looking for errors related to memory leaks in the Chromium project, which the renowned Google Chrome browser is based on. Working on this issue, I became acquainted with the tools which are being used for such purposes, as well as learned how to work with them. I always wanted to learn more about how applications are tested in order to identify such errors. The lesson I learned instantly: in order to avoid a snowball of problems, it is very important to monitor those things right from the beginning, from the very first steps. This knowledge will help me avoid such errors in my own projects!

Artem Naumov

Skoltech, Energy Technologies

Place of internship: US National Laboratory, Los Alamos, USA

Me and Kirill Kalinin were interns at the National Laboratory in Los Alamos, USA. We worked in the theoretical department, in the field of computational chemistry. Our scientific group was

engaged in research of the electronic properties of molecules, on the results of which the progress in the field of photochemistry and photonics depends directly. One promising way to go is to increase the efficiency of solar batteries, and to do this, we must understand, which material has the best characteristics, and be able to simulate them.

We participated in the current research of the group. Our goal was to simulate and explain the properties of the polyphenylene vinylene molecule, that potentially has necessary properties to be used in solar batteries.

Last month has been very intense in terms of new knowledge and skills. We worked over many articles to gain insight into the topic, learned new programs for molecular modeling and got the basic skills in the use of computing cluster. I learned a completely new programming language in the process!

Despite the fact that we had already had a course in computational chemistry at Skoltech, here the knowledge we gained and its application feel completely different. It is not a studying process, but a serious scientific work. One of the features of the laboratory is close cooperation of people with very different backgrounds - chemists, biologists, physicists - both practitioners and theorists. For us it means the ability to verify constructed models in real practice pretty quickly, and receive ideas for new research directly from the experimenters.

At Los Alamos National Lab work the best experts in their respective fields, and indeed, literally every week they make discoveries. Einstein, Feynman, Fermi and other legends of physics used to work here. Besides, the nature is awesome here - one can think over a scientific challenge walking along the mountain paths.

Of course, just in 2 months you cannot achieve significant results in big science, but it is possible to gain invaluable skills being part of a strong research team, and contribute to the current experiments, at least at the scale of checking others' hypotheses.

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Vage Taamazyan

Skoltech, Energy technologies

Place of internship: Intel, Moscow, Russian Federation

In June and July 2014, I had the opportunity to participate in a summer internship at the Moscow office of Intel along with a group of 11 Skoltech undergraduates. 4 projects were offered to choose from. Me and two other guys considered the proposal to develop a smart refrigerator to be the most interesting project to work on. Participation in such an endeavor is a unique opportunity to face a real challenge and make my own, though small, contribution to the development and future of a huge corporation. The degree of trust Intel employees showed toward both our decisions and the work we did was a nice unexpected moment. Eight weeks ended very quickly and swiftly, but I am sure the extensive experience I gained will be the perfect stepping stone for the future!

Islam Amirul

Skoltech, Energy technologies

Place of internship: University of Cambridge, Cambridge, UK

As part of my dissertation, together with my supervisor Professor Vasily Kantsler, we worked on the experimental investigation of the production of biofuel out of green algae (*Chlamydomonas Reinhardtii*). The focus was set on the creation and implementation of a microfluidic reactor which would enable us to optimize the production of biofuel (bio-hydrogen) on green algae. The initial study on this project will continue until the end of August 2014. Its plausible success can have a huge positive impact on the energy sector. Scientific work is carried out in the UK: at the Department of Applied Mathematics and Theoretical Physics, University of Cambridge and Department of Physics at the University of Warwick.



Watch the video about the Skoltech student internships:
<http://www.youtube.com/watch?v=4MOElTbP9YE>



Passion for technological improvisation is one of the special traits of the Skoltech students

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Vasily Kantsler
Skoltech Professor

Secrets of Sperm Swimming Upstream Unveiled by Skoltech Researcher.

Vasily Kantsler had his spermatozoid eureka moment when a bored friend dropped by for an unexpected visit at his lab. Now the Skoltech researcher publishes his surprising findings in the journal eLife. His experiments could help explain what makes sperm so good at swimming upstream to reach the egg – and might help men and women who have problems conceiving.

"It was the weekend and a friend of mine was visiting the lab. She was bored, and asked to see something exciting through the microscope",

reminisces the 34 years old Russian born biophysicist, "so I had to improvise. The only thing available at the lab was a sperm sample." Then things got interesting. Without any change of temperature or the use of chemicals, the spermatozoids swam upstream inside a designated channel. It was as if the cells voluntarily performed this incredible athletic feat, which mystified and fascinated researchers for centuries.

"That got me thinking." Says Kantsler, "and I came up with an intuitive explanation. Swimming against the flow and close to the surface, where the current is relatively weak, the head of the cell feels a weaker force than the tip of the tale – that's the force that aligns the cell



Skoltech Professor Vasily Kantsler knows how and why spermatozoids move against the current

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against the current. It seemed like a mechanical phenomenon more than a biological one."

The next challenge was to translate his hypothesis into experiments. Kantsler aimed at shedding light on the mechanism that causes sperm to navigate successfully in the dark Fallopian tube, swim a distance that is approximately one thousand times their own length and travel across a viscous terrain. Hundreds of millions of cells begin the journey, but only a few resilient swimmers reach their final destination, the egg. It is a journey against the odds – and the currents.

Kantsler, who is currently on a yearlong Faculty Development Program with the MIT-Skoltech initiative in Cambridge, Massachusetts, teamed up with Jorn Dunkel, an assistant professor of physical applied mathematics at MIT; Raymond Goldstein, the Schlumberger Professor of Complex Physical Systems at the University of Cambridge; and Martyn Blayney, chief embryologist at the Bourn Hall Clinic in the UK.

In a bid to understand what the cells are capable of, the researchers built a series of artificial channels of different sizes and shapes, into which they inserted the sperm. First using bull sperm, then human, they were able to modify the flow of fluid through the tubes and investigate how the cells responded to different current speeds.

They discovered that at certain flow speeds, the sperm cells were able to swim very efficiently upstream. "If the flow is too strong the cells will be washed away, if it's too slow the mechanical effect would not be strong enough," says Kantsler, "we have also realized that the sperm tail is asymmetrical, which causes additional transversal migration."

Trajectory of sperm cell swimming upstream combined over several images. Image courtesy of the researcher

This explains why the sperm were not swimming in a straight line upstream, but in a spiraling motion in a tube. The researchers also think that

their experiments explain how sperm cells can travel such long distances before they get very close to the egg and start detecting chemical signals in the Fallopian tube. "We're all very excited about it. There's always a flow – this is how the cells know where to travel to. We have possibly explained a major mechanism."

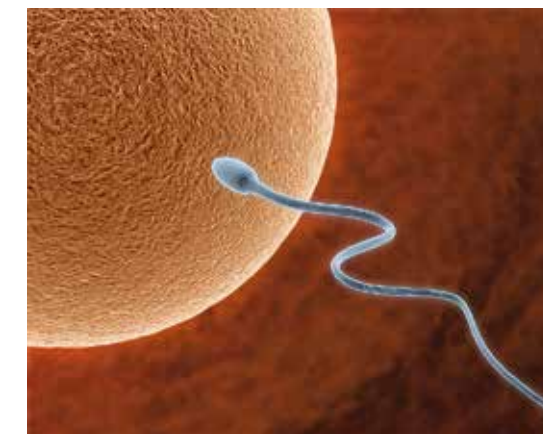
Kantsler believes the team's findings might provide ideas for future treatments for both men and women, in order to help childless people conceive more easily. "It could help both men who have too little cells or women who don't have enough fluids. Usually the problem is a combination of both."

Another possibility is that, since we found a way to control sperm cells, we can now try to separate cells and select them according to their swimming abilities. We can separate different cells, analyze the DNA and see if the genetic makeup is related to sperm motility and movement skills."

What will you show a friend next time they drop by for an unexpected visit?

"Possibly a device called spermatron." He smiles "It's where we bring cells together and increase concentration to test the collective behaviors and the patterns forming. It's quite fascinating."

We think so, too.



In and Out of Space@Skoltech

Space Forecast: Skoltech Researchers Achieve Unprecedented Accuracy in Magnetospheric Reconstruction.

More than a thousand operational satellites are currently orbiting the Earth and each of them is prone to the severe disturbances known as "space weather". Now researchers from Skoltech, UCLA and MIT have developed a method that allows to restore the current state of the radiation belts in the Earth's magnetosphere and predict its evolution.

This "space forecast" is usually based on sparse observational data. Yet the team of Russian and American scientists has been able to improve its accuracy to an unprecedented level, as they report in the Journal of Geophysical Research (JGR), Space Physics. Researchers believe the new method might also be used for weather forecasting and the dynamics of the oceans.

Working in space could be a nightmare mission when it comes to sensitive electronics. When outside of the protection of atmosphere, devices operate under a heavy bombardment of high-energy particles originating mainly from the Sun and trapped in the Earth's magnetic field. The intensity of radiation can vary in orders of magnitude, depending on solar wind conditions as well as on processes inside the magnetosphere. In order to determine where and when space equipment might fail, researchers and space agencies must constantly monitor the space environment with research satellites.

However, raw satellite data is not enough, says Skoltech professor Yuri Shprits. "One of the major difficulties in understanding space environment is that observations are limited to a particular point in space and time while applications require a global and continuous coverage", explains Shprits. The method developed by him and his co-authors allows reconstruction of the entire radiation belts. Their findings, along with the method which made those possible, are published in two papers in the Journal of Geophysical Research (JGR), Space Physics (see links here and here).

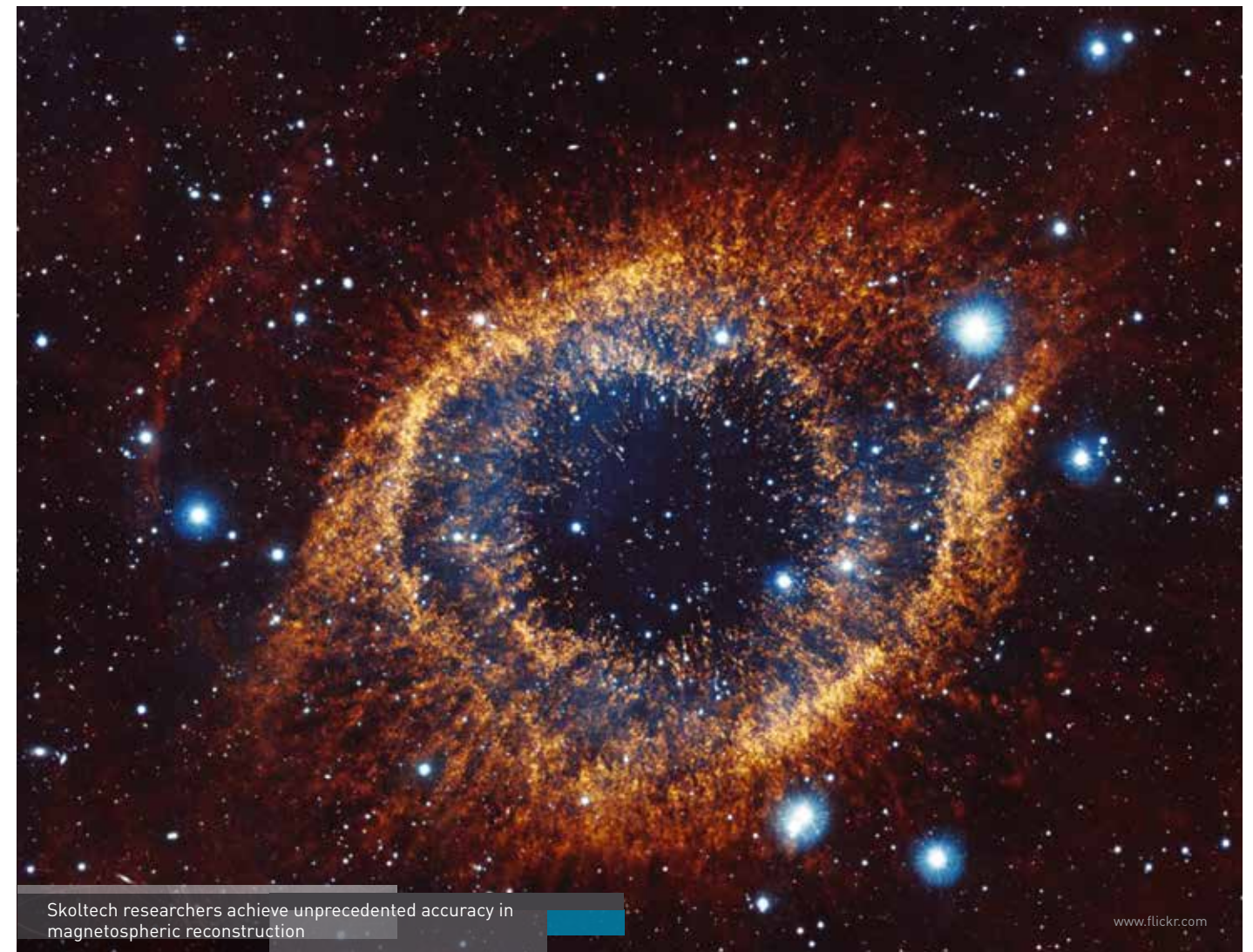
"Our model works similar to a GPS navigation device like the one you use in cars," says Shprits, "a navigation device assumes that when you are moving at a speed of, say, 70 kmph, in five seconds you are likely to be about a hundred meters away from the previous spot. When the tracker receives new data from satellites it blends this model with new data to calculate new coordinates. This requires the usage of a mathematical model of the moving vehicle. We analyze the evolution of the magnetosphere in a similar way but our model is much more sophisticated".

The prominent feature of the new method is that it makes it possible to determine both the uncertainties of the physical model of near-space environment and uncertainties of the satellite observations in order to combine those in an optimal way to achieve reconstruction with guaranteed accuracy. "This method is applicable not only to the studies of the space environment, but also can be used for weather forecasting, in the studies of ocean dynamics, and for a number of studies that utilize large amounts of measurements," adds Tatyana Podladchikova, a Skoltech postdoc and the



Professor Yuri Shprits

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first author on both of JGR publications. "The satellite data flow nowadays is so huge that development of new methods of handling it is as important as launching new satellites".

By utilizing the new method authors plan to create an online service where the current state of the magnetosphere can be monitored in real time. They also intend to look through the archive satellite data in order to reconstruct the state of space weather in the past. Earlier Shprits's group have managed to explain the

unusual behavior of high-energy particles in the near-Earth space environment in August 2012, when the two well-known Van Allen radiation belts were joined by a temporary third one. The new method will allow to "replay" this and other unusual moments in the history of the magnetosphere over the past couple of decades.

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Tatiana Podladchikova
Skoltech Postdoc

Skoltech postdoc Tatiana Podladchikova sharing her impressions of participating in the COSPAR 2014 conference with the Skoltech Newsletter

On the threshold of the majestic main building of Moscow State University one's glance involuntarily rises and dives into the infinite space.

From August 2-10, 2014 the 40th Assembly of COSPAR (Committee for Space Research), one of the most ambitious scientific meetings in the field of space exploration, was held on campus of Moscow State University. 2,500 scientists from dozens of countries attended. Two thematic sessions, thousands of

reports, round tables, thematic tours and lectures – the unusually broad program of the conference reveals the latest space results in the field of physics, astrophysics, and the dynamics of celestial bodies, gravity waves, the effects of space weather, radiation, biomedical research related to long-term space flight, study of exoplanets (planets orbiting other stars, similar to the Earth), and others.

COSPAR unites aspirations, ideas and people and brings scientific discoveries to real practical application. Our radiation belts group, including Skoltech employees and colleagues from UCLA and MIT, gathered in full force at the conference. It was led by Professor Yuri Shprits, who partook in 18 presentations and organized two scientific sessions. It is a great honor and a great responsibility at the same time.

The days of the conference were dense and filled with action for our group. Michael Dobynde, a member of our radiation belts group and Skoltech undergraduate student, delivered presentations on biological threats and radiation protection

during long-term interplanetary missions, as well as measurement of the electron spectrum in magnetosphere. Discussions in connection with this work led to new plans, new contacts with universities and companies.

The grand opening of the conference, which took place on Monday, August 4, in the historic auditorium of the main building of Moscow State University, began with official greetings of the Government of the Russian Federation, the members and organizers of COSPAR.

Future plans for the Russian space science, such as the design of automatic lunar station for a manned flight to the Moon and the development of new landing platform for Mars exploration. The crew of the International Space Stations welcomed the participants of COSPAR during a live cast from the orbit and supported the ambition for longer expeditions to the Moon or Mars. Another important event was the awards ceremony for the new scientific achievements and discoveries. Moscow government supported the conference in the form of providing free tickets for all means of public transportation for all COSPAR participants, and it was a pleasant bonus.

A conference like this serves as a mirror for every scientist. How is his work reflected in the world? How does the scientific community relate to his thoughts and research? A scientist passes along his knowledge and gains new knowledge. As for me, active participation in the conference began on Sunday, August 3 with the poster report in collaboration with colleagues from the Royal Observatory of Belgium, which was dedicated to forecasting the amplitude of the 11-year cycle of solar activity. Sun is the source of life, and one could learn a lot about the impact of solar activity on biological systems at the conference.

All the days were filled with lectures, discussions, new contacts and fresh ideas. On Thursday, August 7, I presented a paper co-authored by colleagues from the Institute for Space Research dedicated to the future geomagnetic storm amplitude forecasting service <http://spaceweather.ru/content/extended-geomagnetic-storm-forecast>

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On August 7-9, in the final round of the conference, I gave two poster presentations on the Earth's radiation belts recovery dynamics based on satellite measurements, which aroused

great interest on the part of international colleagues. Such communication and knowledge sharing leads to practical implementation of the boldest scientific fantasies.

Committee on Space Research (aka COSPAR; English: Committee on Space Research) - Committee of the International Council for Science, ICSU. Was formed in 1958 to help scientists around the globe exchange information obtained by means of satellites and automatic interplanetary stations (AWS). Its headquarters are located in Paris.

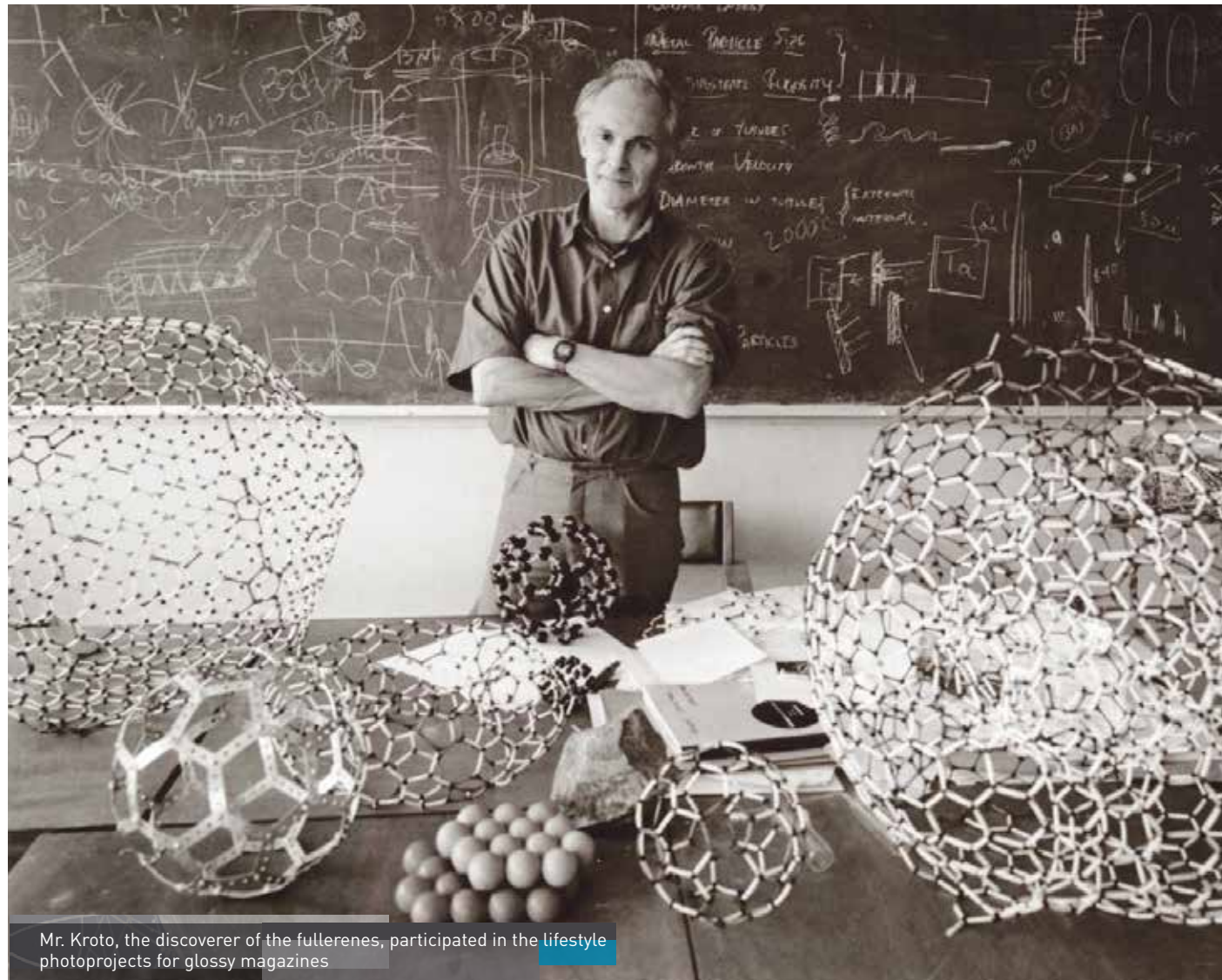
For more information please visit <http://spaceweather.ru/content/extended-geomagnetic-storm-forecast>.



COSPAR is one of the leading space conferences in the world

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Lecture@Skoltech



Nobel Laureate in chemistry, discoverer of fullerenes Sir Harold Kroto delivered a lecture at Skoltech on July 15

Fullerenes are large molecular compounds that are closed polyhedra of carbon atoms. In 1985, Robert Curl, Richard Smalley and Harold Kroto were able to empirically detect such molecules when irradiating graphite, all while they were studying chemical processes occurring within the stars. For this the three scientists shared

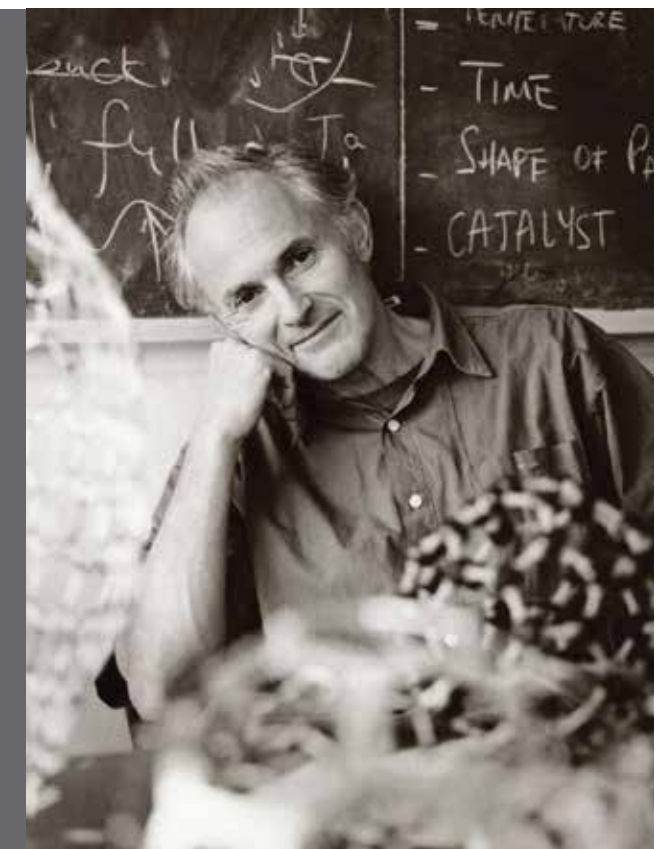
a Nobel Prize in Chemistry in 1996, and Harold Kroto was knighted by the Queen of Great Britain.

Professor Kroto, despite its high-profile titles, did not turn into a snob and became widely engaged in the problems of modern education, often working directly with children. In particular, he founded the Vega Science Trust website (www.vega.org.uk), where lectures by leading scientists of the world are presented free of charge.

Lecture@Skoltech

“You should not go to school to learn Russian. To do this, you need to come to Russia as a 3-4 year old child and start playing with Russian children in a sandbox, without serious effort - this is the natural way to learn a language. And to learn it at a desk at school or university is just a silly way to learn languages”

I do not do applied science, I am more interested in fundamental studies. I cannot know it all. I only do what I am interested in, as well as I can. I'm not very good at strategic science - to tell people what they have to develop and so on. The reason our discovery came to be is not because we were looking for something specific - I was just interested in stellar chemistry [TERM - http://en.wikipedia.org/wiki/Stellar_chemistry], none would largely sponsor such research. Still that is why it is crucial to finance fundamental science, the way I see it.



“You won't be able to appreciate the works of Shakespeare, if you are not proficient in English. Of course, you can understand the plot: well, the girl falls in love with a guy, the guy kills her brother, and they commit suicide. "Romeo and Juliet", well, you know. There are various attempts to stage the tragedy: by Prokofiev, by Tchaikovsky... But I think that "Romeo and Juliet" by Prokofiev is not Shakespeare, it is a separate opera”

On this and many other subjects Sir Kroto spoke in his lecture "Revolution in Education and the Goo-You-Wiki World» (read the full exclusive interview with Mr.Kroto in the Naked Science magazine" <http://naked-science.ru/article/interview/harold-kroto>)

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On Cloud Number Ten



Skoltech student Nikita Pestrov has launched a project that received approximately \$450,000 seed investment. Representatives of the Internet Initiatives Development Foundation (FRII) announced they had decided to finance the project after Nikita and his colleague Dmitry Zaryuta took part in the three-month accelerator program.


Easy Ten is a special mobile application that helps users learn English as they go. The plan for one day is ten new words. Among the users of the app first come the people who have absolutely no spare time, but are completely satisfied by such learning mode.

As it turns out, there's sky-high enthusiasm for the Easy Ten project today. The guys did not expect this kind of attention.

Most recently they attended the "Internet Entrepreneurship in Russia" forum, where President Vladimir Putin promised to give their startup needed state support in creating an app that would enable foreigners to quickly learn the Russian language. "We will spend the money on the further development of our product, we will create a special version for tablet computers and add new languages", - says Dmitry Zaryuta, head of Easy Ten and Nikita Pestrov's business partner.

At the request of Skoltech Newsletter, Amirul Islam, Skoltech student (Energy track) from Bangladesh, has compiled his list of 10 Russian words and expressions that are most difficult to pronounce, the ones it definitely makes sense to include in the new Easy Ten application for Russian language studies:

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Pred-shest-vo-vav-shi-mi - Eng. the preceding ones (participial adjective in instrumental case)
Vos-pol-zo-vav-she-mu-sya - Eng. the one who exploited smth. (participial adjective in dative case)
U-so-ver-shenst-vo-va-ni-ya-mi - Eng. improvements (participial adjective in instrumental case)
Pok-ro-vi-telst-vo-vav-shi-ye - Eng. the ones who patronized (participial adjective)
Ob-la-go-de-telst-vo-van-ni-ye - Eng. the ones being shown much favour (participial adjective)
Bes-pre-ze-dent-nii in-zi-dent - Eng. unprecedented accident
A-pe-lya-tsi-on-nim - Eng. Appeal (adjective in instrumental case)
O-po-sre-do-van-no-ye sub-si-di-ro-va-ni-ye - Eng. indirect subsidies
Ek-zal-ti-ro-van-nost - Eng. exaltation
Vi-kri-sto-li-zo-vav-shi-mi-sya - Eng. crystallized (participial adjective in instrumental case)





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