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South Ural
State University

National Research
University



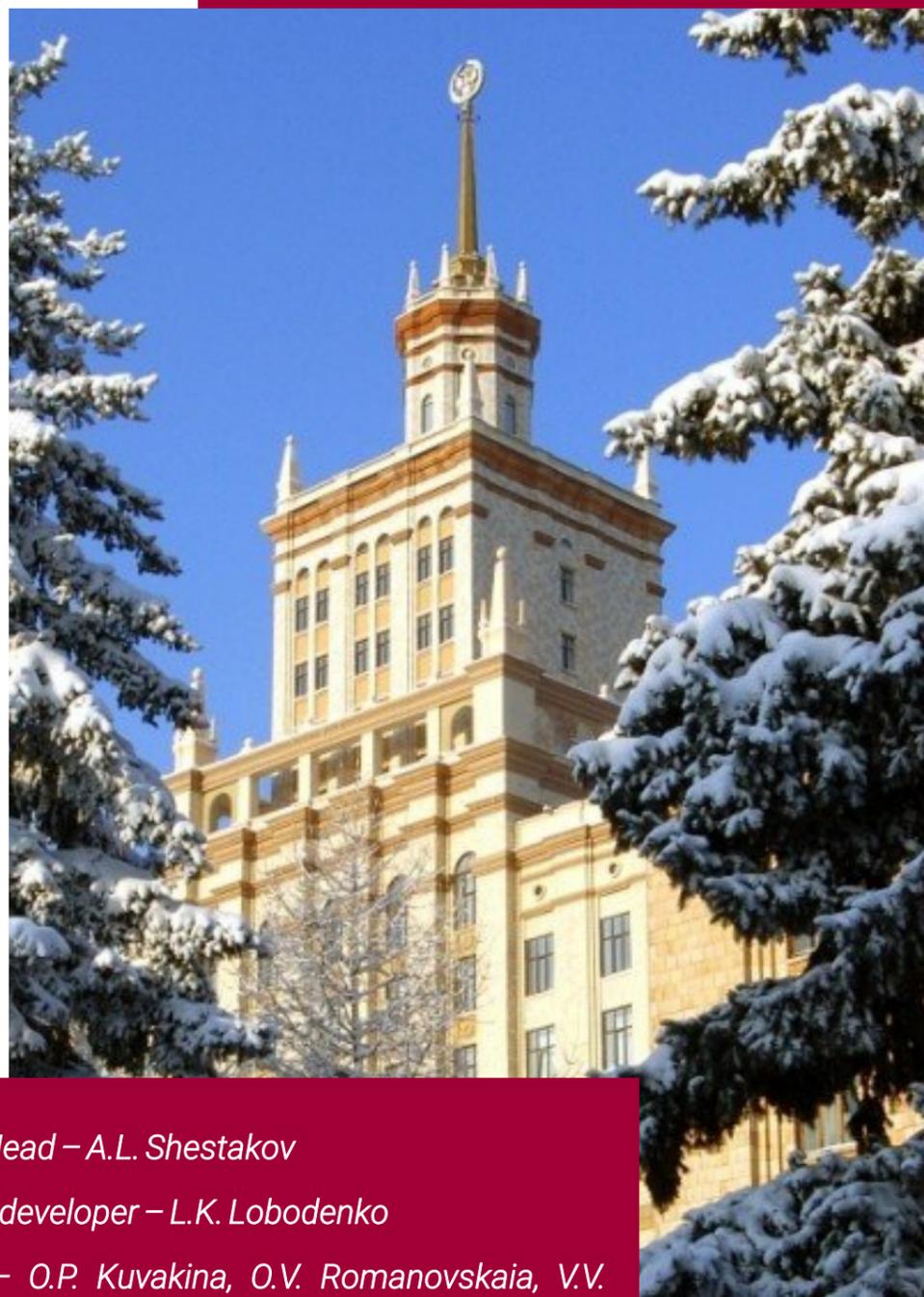
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South Ural
State University

5100 Annual Report 2019

**Digitalization. Materials Science. Ecology.
Strategy of Innovative Leadership**





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South Ural State University

Introduction

This Report presents the important achievements and results of the educational, scientific and research, innovative, international, and extracurricular activities of the University in the year of 2019.

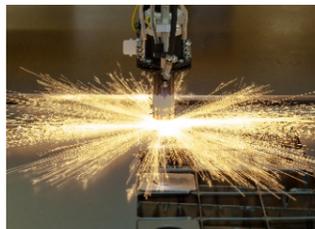
Over the past year, South Ural State University, as a member of Project 5-100, has conducted extensive work on improving its standing in Russian and international rankings, and it keeps steadfastly moving forward along the path of digital transformation.

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Aleksandr Shestakov

**Rector of South Ural State University
Chairman of the Council of University
Rectors of the Ural Federal District**

DEAR COLLEAGUES AND PARTNERS!

The year of 2019 became a milestone one in the life of South Ural State University. We summed up the interim results of the transformation within the frameworks of our participation in Project 5-100, an innovative program on enhancing the competitiveness of Russian universities among the world's leading scientific and educational centres, and we also established our new strategic priorities.

Today, the competitiveness of a university is measured mostly according to its standing in rankings, which applicants more and more often pay their attention to when choosing a university. SUSU is currently interacting with eight international and six national ranking agencies. Our university is listed in 25 rankings. In 2019, we made yet another breakthrough when we got included in a number of new authoritative rankings. For the first time SUSU entered the global international ranking of the Times Higher Education 2020 at the place of 1001+. This is a big achievement for SUSU. This had been our ambitious goal for more than three years.

This year, our university has become listed in the new ranking of THE Impact Ranking at the place of 301+, as well as, for the first time, in the subject ranking of THE Engineering & Technology, where it took its place in the interval group of 601-800 from among more than 900 universities of the world. We have held our standing in the global ranking of QS at the place of 801+; and we have climbed up in the ranking of QS BRICS from place 138 to place 112.

One of the reporting indicators of Project 5-100 is the number of publications in Web of Science and Scopus databases per one member of the academic staff over the recent three years. We met the target figures as per this indicator last year, and we will do it this year as well. However, in order to reach the planned values within the project in the future, we will need to double the number of such publications.

In 2016 we opened eight scientific and research laboratories headed by experts from foreign universities. Most

of these laboratories are functioning efficiently. This year, following a decision by the International Scientific Council, we have opened four more laboratories headed by leading Russian and foreign scientists. Those include a Laboratory for Magnetic Oxide Materials, Laboratory for Polycyclic Aromatic Compounds and Carbon Nanomaterials, Laboratory for Applied Research on Semigroups, and Laboratory for Digital Motion Simulation for Sports. We need to further develop our collaborations with the leading foreign scientists, universities and institutes of the Russian Academy of Sciences.

We must cooperate with those stronger than us. This will improve the level of our works and our publications results.

In 2019, we held a number of strategic sessions and with the guidance of the SUSU Supervisory Council we elaborated the strategy of the university's development. As a result of continuous discussions, three strategic fields were determined.

1. Digital Industry. We set ourselves a task to become champions among Russian universities in the field of digital industry. We now have a very strong industrial partner, Magnitogorsk Iron & Steel Works. Currently, we are fulfilling an agreement, which covers the main components of the Digital Industry ideology.

2. Materials Science. Our region is famous for its metallurgy sector, and we set ourselves a task to become prize-winners among our country's universities in this unofficial scientific competition.

3. Ecology. Main sections include: Clean Air; Clean Water; Technology of Industrial Waste Recycling; Environmental Law; and Humanitarian Ecoengineering, which includes shaping the minds of people with regard to ecology.

South Ural State University became a participant of the World-class Research and Education Centre for Advanced Industrial Technology, New Materials and Power Engineering. SUSU presented a number of scientific

projects reflecting the strategy of the university's development in such key fields as Digitalization; Materials Science; Rocket and Space Engineering; and Ecology. It is worth noting that every project must have an industrial partner. Currently, we are fulfilling about 15 projects jointly with the Chelyabinsk Region enterprises with the world-level development of engineering.

During the previous academic year we launched a system of project-based learning. In total, 53 projects were started within Master's degree programmes of our schools and institutes. All the projects are supported by industrial partners. An important aspect in a university's development is the availability of dormitories. Last year we began construction of an enhanced-comfort dormitory. Its commissioning deadline is September 1, 2020.

We set future-oriented tasks before ourselves and successfully collaborate with our partners. We see the problems and solve them. For our university to remain at the forefront of developing science and education, all its staff members must be involved. It is my strong conviction that in the coming year we will keep steadfastly moving forward and will improve our standing. I wish everyone new successes, achievements and victories!

**SUSU Rector
Aleksandr Shestakov**



SUSU Development Strategy

FIELDS OF DEVELOPMENT

SUSU focuses its scientific research on developing big cross-disciplinary projects in:

- Digital Industry;
- Materials Science;
- Ecology.

GOAL OF THE UNIVERSITY

- in a 5-years' time, take the place of 500-600 in the QS rankings
- in a 10-years' time, take the place of 400-600
- in a 20-years' time, achieve the complete change of the university's culture

PLATFORMS FOR THE STRATEGY FULFILMENT

- More than 20 scientific and research laboratories and research and education centres are functioning;
- Over the 2016–2019 time period, 12 world-class research laboratories were created at SUSU jointly with the leading foreign scientists from Australia, Great Britain, Germany, India, Canada, Mexico, the USA, and France.

PROJECT TEAM MEMBERS

Project teams formed for each field include:

- head of project section; head of scientific section; project managers; project working groups including staff members and postgraduates;
- students participating in research as part of project-based learning.

Strategic Fields

DIGITAL INDUSTRY

1 Sensory properties of industry objects

(Sensors of physical parameters; information transmission and storage; information processing; assessment of equipment condition)

2 Digital twins

(Identifying variables; assessment of object condition; prediction of condition)

3 Information security

(Protection of information during data transmission from sensors; protection of databases received from sensors)

4 Energy saving

(Assessment of the condition of power-generating units and systems; developing the algorithms of energy-efficient control; developing the Computer-aided Process Control Systems for energy-efficient control)

5 Designing based on 3D technology

(Designing 3D models of equipment; developing mathematical models of the equipment being designed; optimization of engineering solutions; elaboration of engineering documentation)

MATERIALS SCIENCE

1 Materials and coatings based on high-entropy systems

(New magnetic, superconducting and semiconducting materials based on high-entropy oxide, intermetallic, carbonitride and chalcogenide phases, new construction materials based on high-entropy alloys)

2 Metals and alloys

(Nano- and microadditives for alloys; predicting the properties of metals and alloys; experiments on determining the properties of metals and alloys; technologies of metals and alloys production; technologies of manufacturing products from metals and alloys)

3 Composite materials: organic, laminate, and ceramic materials

(Chemical makeup of composite materials; technology of creating composite materials; assessing the properties of composite materials; industrial application of composite materials)

4 Magnetic materials

(Nano- and microadditives; assessing the properties of magnetic materials; products made of magnetic materials)

ECOLOGY

1 Clean water

(Developing the best available technologies of water treatment; technological remediation of water bodies; technologies of transferring industrial and agricultural enterprises to a closed loop cycle in terms of water usage)

2 Humanitarian ecoengineering

(Forming and promoting the image of the Chelyabinsk Region using modern world-class media practices and technologies; developing educational practices and technologies aimed at shaping the environment-friendly attitude among the graduates of the engineering training programmes; developing occupational-guidance and patriotic practices and technologies)

3 Clean air

(Monitoring the condition of the atmospheric air and emissions; modelling and predicting the condition of the atmospheric air with the use digital twins; controlling the quality of the atmospheric air using the best available technologies)

4 Integrated MSW management system

Integrated MSW management system (Development of the best available technologies for processing solid technogenic waste; design of finished products based on the life cycle, taking into account following collection and disposal.



01

Strategic Fields of Development

Strategic Fields of Scientific Research

DIGITAL INDUSTRY FIELD

Head of scientific section:
Prof., Doctor Theodore E. Simos, King
Saud University, Saudi Arabia

The goal is to become a champion in the field of Digital Industry in Russia and join the group of the leading universities in the international educational space.

Within the frameworks of this field our university is fulfilling a number of big scientific and research projects, such as the one started last year: an anchor interdisciplinary project with Magnitogorsk Iron & Steel Works on elaborating a data-mining and prediction system to analyse the trends of development of damages in the rolling mill equipment, which is headed by A.L. Shestakov. Another outstanding project is the engineering of fundamentally new transducers, sensors, and digital methods of controlling physical values, which is headed by Yu.V. Mikliaev.

Among the projects being currently fulfilled is the one on developing a digital platform based on using artificial neural networks in order to monitor, predict and control the road traffic in big cities. The Transport Department of the Chelyabinsk City Administration and OOO UralDorProekt act as the industrial partners here. The academic partners of this project being fulfilled at SUSU are: Industrial University of Tyumen, Kazan Federal University, Department of Computer and Networks Engineering of University of Jeddah, Saudi Arabia.

In 2019 a project within the Resolution of the Russian Federation Government No. 218 was launched: Creation of High-tech Production of Hydraulic Drives with Hydrostatic Guides of a Wide Range with Low Resistance to Movement of Moving Parts and Increased Resource for Bench Test Equipment, which is headed by D.V. Ardasev.

Within this scientific field, our university is fulfilling a project on the urban infrastructure digitalization titled

“Smart City” on the territory of Chelyabinsk.

The goal is to improve the competitiveness of our city, its image and ecological situation, and to form a comfortable urban environment and improve the demographical situation.

November 29th through December 1st, while fulfilling one of the International Council's recommendations on enhancing the competitiveness of the top universities of the Russian Federation among the world's leading scientific and educational centres, South Ural State University acted as a venue for the “Chelyabinsk, a Smart City” project and analytical session held with the participation of representatives of the governmental and municipal authorities of our city and our region, as well as representatives of businesses, healthcare, education, culture, and art.

As a result:

- foundation for the “Smart City” management system was elaborated, including in the fields of housing-and-utilities sector, power sector, urban transport, business, town planning, education, healthcare, ecology, culture, and art;
- target indicators were determined for the development of the city of Chelyabinsk within the logic of the concept of the “Smart City” project and the projects facilitating the achievement of those;
- memorandum of understanding and interaction was signed by the Head of the City of Chelyabinsk Natalya Kotova and SUSU Rector Aleksandr Shestakov for the purpose of fulfilling the «Smart City» project on the urban infrastructure digitalization on the territory of Chelyabinsk.

The «Smart City» project is being managed through CityLab, a special laboratory created by the university as a link to unite and coordinate the actions of the city authorities (local authorities), the scientific-and-teaching and expert community, business community, and city enthusiasts, as

well as to develop and implement the engineering solutions within the “Smart City” project on the territory of Chelyabinsk; and as an open platform to discuss the problems, solutions and results within this project.

The interaction is being fulfilled in the following fields:

- forming of the concept of the “Smart City” project on the territory of Chelyabinsk, which will determine the priorities, goals and tasks of the development of digital technologies in Chelyabinsk; creating the conditions to conduct research and implement promising design and experimental developments; using and implementing engineering and organization-and-economic solutions based on modern technologies, which may be in demand in the city of Chelyabinsk;
- implementing and developing promising educational technologies in the field of digitalization of the urban economy facilities with the use of project-based learning approaches in order to supply highly qualified specialists to the city of Chelyabinsk;
- creating a digital twin of the city of Chelyabinsk – a unified city platform of data on the urban infrastructure, control systems, citizens, and business environment;
- developing, testing, and implementing the engineering solutions using of digital technologies when organizing the urban space and managing the urban infrastructure; forming of a «Smart City» culture, including educating young people in terms of their attitude towards the values and involving the citizens of Chelyabinsk in solving the issues of the city's development.

All the projects comply with the fields of the strategic development the Russian Federation, determine the directions of research mid-term, and contribute to changing the culture of the university.

Over the period from 2017 through

2019, the number of scientific collaborations in the Digital Industry field increased from 40 to 95, and the number of industrial partners nearly tripled and amounted to 16.

The university is actively developing the scientific and research infrastructure and laboratories relevant for this field.

The 2018-2019 saw the opening of:

1. SUSU-Emerson Laboratory in the field of digital technologies and production automation.
2. Samsung Internet of Things Academy Laboratory.
3. Digital Industry Leading Research Centre.

The SUSU Mechanical Engineering Research Institute assembled a unique milling complex based on a KUKA six-axis industrial robot with a possibility to study the methods and manufacturing of geometrically complicated parts for mechanical engineering, power generation sector, and metallurgy.

In the nearest future the university is planning to create an artificial intelligence centre in a satellite town of Chelyabinsk, based on Greenfield system.

Network collaboration with academic partners is being developed. Thus, within the National Technology Initiative, a “Mirror” Engineering Centre for new production technologies was opened jointly with Peter the Great St. Petersburg Polytechnic University. A consortium on robotics and sensory systems was created with Innopolis University.

As part of the project-based learning, the Asteroid Youth Design Bureau is fulfilling a project on the Development of Spacecraft Designed to Land on a Cosmic Body Having Small Gravitational Field. Within this project 70 students of various specialties are being trained. At the Summer School on Asteroid Safety, 6 teams created their projects of spacecraft for landing on asteroids and held a competition on

landing execution.

Jointly with Korpus educational community established by Everypixel Group, the university opened a Centre of Artificial Intelligence (AI) at the Department of System Programming of School of Electronic Engineering and Computer Science. With the help of experts of Everypixel company, students will be studying the technology of Generative Adversarial Network (GAN) and implementing it into production.

This technology has a powerful innovative and economic potential and is capable of changing the market of media and social networks in the whole world. Besides the research, educational courses on Machine Learning will be offered, as well as science-to-practice seminars for the university staff and students. Also, the project participants will be solving real business tasks from the Everypixel's partner companies.

A pilot project was fulfilled on independent external expert review of the university's educational programmes by high-technology companies operating in the global market: for instance, by such companies as Emerson, Kaspersky, SMS Group, and others.

The university significantly increased the number of its publications in the field of Engineering & Technology, including in highly rated journals listed in Top 25 as per SNIP, with the number increasing from 10 as of 2014 up to 113 in 2019; and in Top 10 journals as per SNIP, from 5 as of 2014 up to 41 in 2019.

Digital Industry:



95
scientific collaborations



16
industrial partners

Number of publications in TOP 10 as per SNIP



MATERIALS SCIENCE FIELD

Head of scientific section:
Prof., Doctor Victorino Franco,
University of Seville, Spain.

The goal is to become a leader in Russia in the field of engineering education, and a world's leader in creating/designing of new materials.

Within this scientific field, several interdisciplinary projects are being fulfilled at the university. The project on the Development of a Fundamentally New Approach to the Natural Gas Liquefaction Using Magnetic Cooling is being fulfilled by the staff members of the functional materials laboratory and is supported by the Russian Science Foundation and the Helmholtz Association of German Research Centres, Germany. This project is headed by S.V. Taskaev, and is aimed at solving the fundamental problem of the condensed matter physics and the physics of metals and alloys: developing materials with specified properties suitable for use in the new perspective gas liquefaction technology with the help of magnetocaloric effect. The international collaboration among SUSU, Technische Universität Darmstadt and Helmholtz-Zentrum Dresden-Rossendorf was organised within the frameworks of the project.

The projects on creating new composite materials are being fulfilled, such as Development of New Hybrid Polymer Composite Materials for Protective Structures with Increased Energy Absorbing Capability, under the leadership of O.A. Kudryavtsev, as well as Development of New Polymer Fibre Composite Materials with Controlled Non-linearity in Mechanics and the Methods of Using Them to Design Turbofan Elements, under the leadership of S.B. Sapozhnikov.

Elaboration of the project on the Development of New Methods and Technologies for Creating Products of Electrotechnical and Structural Designation Made of Carbon-graphite Composite Materials by Means of High-speed Dynamic Moulding, under the leadership of M.N. Samodurova, will allow to expand the sphere of application of products based on graphite and its compositions as parts for various engineering systems, including in the field of electric motors

manufacture.

Another project is the Organic Photovoltaic Materials for New Generation Solar Panels, headed by O.A. Rakitin. It was theoretically and experimentally proved that chalcogen-nitrogen-containing heterocycles of certain chemical structure are highly photoactive. The problem of synthesis of these compounds has already been successfully solved.

Subsequently, it is planned to refine the technology of producing the prototypes, what will allow to create new materials and high-technology manufacture.

In 2019 a project within the Federal Targeted Programs on Research and Development 2014–2020 began to be fulfilled to develop a complex of technological solutions on producing new metallic materials, and using them to manufacture tanks for storing radiation radioactive, along with improving the method of their vitrification. The project head is I.V. Chumanov.

In 2018 a Laboratory for Functional Materials as created. Results of the research by the staff members of the Laboratory for Functional Materials were published in more than 60 articles on journals indexed in WoS/Scopus (Q1/Q2) over the year of 2019, with about 7 publications thereof in journals listed in TOP 10, and more than 40 articles in journals listed in TOP 25. In 2019, during the meeting of the SUSU International Scientific Council with regard to the field of Materials Science, it was approved to open two international laboratories to be headed by leading scientists: Laboratory for Magnetic Oxide Materials and Laboratory for Polycyclic Aromatic Compounds and Carbon Nanomaterials.

A partnership with KU Leuven, Belgium, was formed in the field of composite materials, with the scientific team of the Department of Engineering Materials Science; the head is Professor S.V. Lomov.

Within the frameworks of project-based learning, a programme in Additive Technologies is being fulfilled, as well as a project on the Studying

the Durability of Concrete in Reinforced Concrete Structures in Case of Cyclic Impacts, and more.

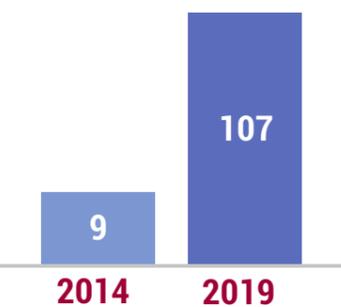
During the period from 2017 through 2019, the number of scientific collaborations in this field increased from 31 to 86, and the number of industrial partners also grew.

The university significantly increased the number of its publications within Materials Science, including in highly rated journals listed in Top 25 as per SNIP, with the number increasing from 9 as of 2014 up to 107 in 2019, and in Top 10 journals as per SNIP, from 3 as of 2014 up to 22 in 2019.

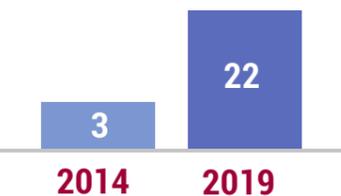
Materials Science



Number of publications in TOP 25 as per SNIP



Number of publications in TOP 10 as per SNIP



Ecology Field

Head of scientific section: Prof., Doctor Andrew Cundy, University of Southampton, National Oceanography Centre and Geography Centre, Great Britain.

The goal is to create a Russian Federal Centre of the best available ecology-related technologies and competencies.

Ecology is one of the prioritized fields of research both for the Chelyabinsk Region and other industrial subjects of the Russian Federation. The university has set before itself a task to become a leader in our country and in the international educational and scientific space. Currently, in our studies on industrial ecology, we have involved researchers from different spheres of science, and we use the best practices from various fields.

Professor Cundy conducted an expert assessment of the ecological scientific projects in order to jointly determine the vectors for further development of promising research in ecology.

The Ecomonitor project is currently being successfully developed at the

university. Under the leadership of D.A. Drozin, a mathematical-model-based program was developed, which with the reference to geographical map of a location allows in a real-time mode to display the ground-level concentrations of pollutants, in accordance with the specifics of the technological processes at an enterprise. Within the framework of Clean Air project, Emerson company signed agreements with SUSU and MegaFon company aimed at accelerating the development and fulfilment of ecological monitoring in both our region and our country.

Within the frameworks of Clean Water subdirection, a project connected with treatment technologies of natural waters and industrial wastes is being fulfilled, as well as a project on nonchemical cleaning of water off persistent organic pollutants. The implementation of the project will allow to get rid of phenol (one of the strongest toxicants in the list of persistent organic pollutants) in process water of coke-chemical production, what will significantly reduce the negative effects on the environment and population. All the

projects are cross-disciplinary.

A new eco-friendly composite material made of plant ingredients for the production of disposable tableware and biodegradable film materials was designed within a project headed by I. Yu. Potoroko.

Ecology



Number of publications in TOP 10 as per SNIP



02

International Scientific Council – 2019



International Scientific Council – 2019

GOALS AND TASKS

May 31st through June 1st of 2019, a two-day meeting of the International Scientific Council was held at South Ural State University. The world's leading scientists and heads of major corporations expressed high appreciation of the achievements and discussed the prospects of development of SUSU as participant of Project 5-100. The International Scientific Council was established at SUSU for

the purpose of coordinating the university's scientific and research, and educational activity in compliance with the best world practices. Establishment of the International Scientific Council is one of the crucial initiatives within the frameworks of fulfilling the university's Road Map program. The International Scientific Council aims at coordinating the scientific and research and educa-

tional activity of the university under Project 5-100, a program of enhancing the competitiveness of Russian universities in the world's scientific and educational space. Among the Council's members are the world's leading researchers with rich scientific and research experience in fundamental and computer sciences, engineering, and medicine.

PARTICIPANTS

Within the third in-person ISC meeting, the university was visited by:

- new Chairman of the Council, President of Emerson transnational corporation Michael Train;
- Director General of SMS Group Company Pino Tesè;
- Professor of the University of Melbourne, Doctor Ashokkumar Muthupandian;
- Professor of the Korea Institute for Advanced Study, Doctor Jaewan Kim.

The following scientists joined the Council's meeting online:

- Professor of the University of Barcelona, Doctor Maria Josefa Yzuel;
- Professor of Psychology at the University of Illinois, Doctor Mohammed Milad;
- Professor of the University of Leiden, Doctor Ron de Kloet

New members of the ISC:

- Professor of the University of Seville, Doctor Victorino Franco;
- Professor of Beihang University, Fei Tao, and responsible for the section of Materials Science;
- Professor of the University of Southampton (National Oceanography Centre, Southampton, Great Britain), Doctor Andrew Cundy, responsible for the section of Ecology.



RESULTS

1. The International Scientific Council members were presented the strategy of the university's development, which implies three global relevant fields: Digital Industry, Ecology and Materials Science.

- Following the Decree by the President of the Russian Federation, a complex of measures on improving the ecological situation was determined, and in the end of 2018 national project on Ecology was approved. In this context, the university set itself a goal on creating a Russian Federal Centre of the best available ecology-related technologies and competencies. It is planned to find solutions under such blocks as: Clean Air; Clean Water; Developing a Technology for Solid Waste Recycling; Environmental Law; and Humanitarian Ecoengineering. Active work is being done in each of the directions, and various departments of the university get involved. At the end of discussing the strategy, the International Scientific Council members provided several recommendations on improvement of the quality of working over projects targeted at changing the environmental situation in the Chelyabinsk Region for the best. The partners of the Ecology project are the Government of the Chelyabinsk Region, the Ministry of Ecology of the Chelyabinsk Region, and the Rosprirodnadzor Directorate for the Chelyabinsk Region.

- The International Scientific Council discussed the strategy of South Ural State University's development in the sphere of Materials Science. Within the meeting with foreign scientists, three key directions which presently are being actively developing at SUSU were introduced: Metals and Alloys, Composite Materials, and Magnetic Materials. Big-scale research projects are being implemented in these directions, and research articles on these topics get published in high-rank international journals. The university is fulfilling

projects on invention of unique materials and high-quality alloys and their application. However, research is being carried out in other spheres of materials science as well, including the improvement of production processes, and disposal of wastes from metallurgical manufacture, which are hazardous for the environment.

- Digital industry is one of the key fields of SUSU as a SMART University of Digital Transformations, which suits the priority tasks of the scientific-and-engineering development of not just our country, but of the whole global scientific community. According to the SUSU's development strategy, the following digitalization fields were outlined: sensory properties of the digital industry objects, artificial intelligence, digital twins, designing based on 3D model optimization, energy saving, and information security. All these technologies are already being actively implemented by the university in joint projects together with its industrial partners.

2. South Ural State University presented the International Scientific Council the results of work of the eight unique laboratories headed by the leading scientists from different countries of the world. These laboratories are solving most relevant tasks in developing the digital industry technologies, studying the migration processes, food industry, stress mechanisms, improving the properties of materials, and in other promising fields of science.

3. South Ural State University filed applications for opening four more scientific laboratories, specializing in materials science, mathematics, chemistry and sports. Within the ISC meeting the projects were presented, the teams shared the plans, development strategies and scientific fields for these laboratories.

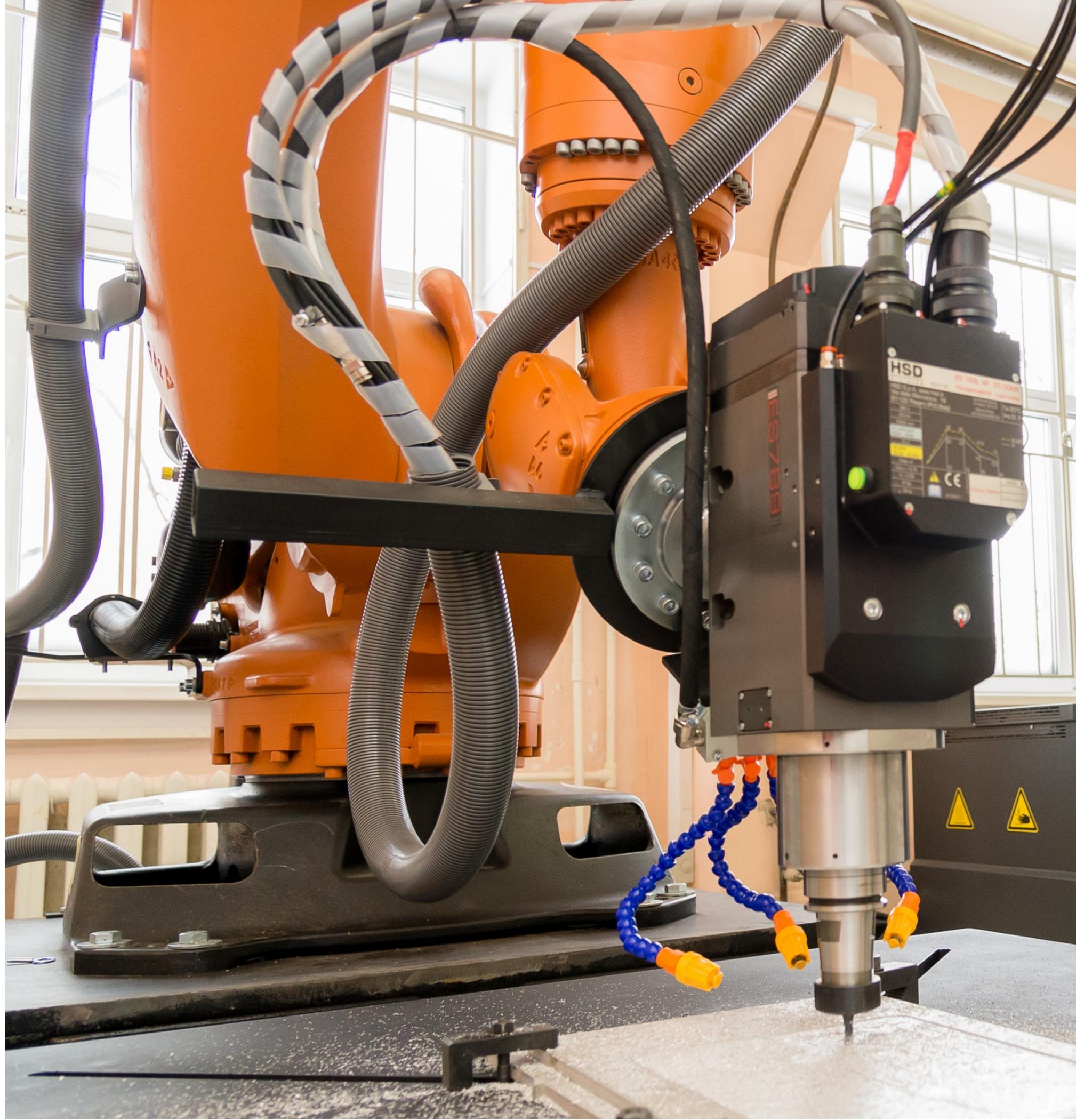
SUSU is becoming not only a big educational centre in our country, but it also is greatly contributing to science and economics of Russia. The guests of the forum saw the progress and were impressed by the results of the work being done. The world's leading scientists expressed their readiness to further facilitate the active development of the university. Over the three years of participating in the national program Project 5-100, SUSU has accomplished a lot. The results are visible in all the fields of the university's strategic development, and new significant steps are waiting ahead.

The International Scientific Council was established at SUSU in 2016 for the purpose of coordinating the university's scientific and research, and educational activity in compliance with the best world practices.



11

participants
of the SUSU International
Scientific Council



03

Science
and Innovation



Science and Innovation

RESULTS OF SCIENTIFIC AND INNOVATIVE ACTIVITY

The key event of 2019 is the joint work on the elaboration of an application for the creation of a world-class research and education centre as part of the federal project on Developing Scientific and Research-and-production Cooperation under the Science National Project with the support of the Russian Presidential Envoy for the Ural Federal District and the governors of the Sverdlovsk, Chelyabinsk and Kurgan regions.

The university is becoming a driver for the development of Chelyabinsk as a "Smart City". In November, a project and analytical session was held, a memorandum was signed with the administration of Chelyabinsk, and the main stages of the implementation of this big-scale project were determined.

In collaboration with leading foreign scientists from Australia, Great Britain, Germany, India, Canada, Mexico, USA, France, South Africa, twelve international research laboratories are

successfully operating at the university.

In the end of 2019, applications were formed and submitted in the framework of a competition for the selection of projects on the implementation and introduction of cross-cutting technologies of AO Russian Venture Company (RVC) and the provision of grants for state support of leading research centres in such fields of study as Neurotechnology and Artificial Intelligence, and New Production Technologies. The application of the SUSU Digital Industry Leading Research Centre advanced to the final. As a result of the activities of the leading research centres in 2020, it is planned to develop and implement equipment and digital twins of turbine generating units, steam boilers, combined heat and power plant (CHP), central power plant (CPP), steam-blower power plant 1 (SBPP-1), steam-blower power plant 2 (SBPP-2), a digital twin of the water supply

network for the industrial site of Magnitogorsk Iron & Steel Works jointly with Polytech-Avtomatika Research and Production Enterprise.

In June 2019, as part of the development of innovative projects of the university, a representative of the Laboratory for Supercomputer Simulation Polina Semenikhina won the START program within the Start SUV 2019 competition with the theme entitled Technology for Automatic Analysis and Classification of Surface Defects in the Production of Large Diameter Pipes. Funding for the project was allocated in the amount of 2 million roubles.

In 2019, a SUSU small innovative enterprise UralGis LLC took part in the 21st Golden Autumn Russian Agricultural Exhibition in Moscow for the first time. The work of the company was noted, and it was awarded gold and silver medals in two categories: «For the Successful

Implementation of Innovations in Agriculture», and «For Effective Information and Consulting Support for the Agro-industrial Complex».

INDUSTRIAL PARTNERS

In 2019 big-scale joint projects with industrial partners were being implemented within the Resolution of the Russian Federation Government No. 218 as of April 9, 2010:

- joint project of the university in collaboration with OOO Ural Engineering Centre on the creation of a high-tech production of hydraulic drives with hydrostatic guides of a wide range with low resistance to movement of moving parts and an increased resource for bench test equipment. The overall project budget amounts to 225.4 million roubles for the period of 2019–2021;
- joint project of the university in

collaboration with the OOO PK Khodovye Sistemy Production Company on the development of a stepless steering differential group with a follow-up control system for off-road and road-building machines of a new generation. The overall project budget amounts to 260 million roubles for the period of 2018–2020.

Implementation of projects with industrial partners under the federal targeted programs, under the Resolution of the Russian Federation Government No. 1060 as of October 3, 2015:

- joint project of the university in collaboration with OOO MIAN and OOO Nikhard-Servis Repair and Engineering Works on the development of a complex of technological solutions on producing new metallic materials, and using them to manufacture tanks for storing radiation radioactive, along with improving the method of their vitrification. The overall investment

amounts to 100 million roubles for the period of 2019–2020, including 30 million roubles of the budget share allocated for its funding for the year of 2019;

- joint project of the university in collaboration with OOO Control Systems Russian Instrumentation Engineering Corporation on the development of an integrated self-adaptive control system of the sophisticated technological complex of production, transmission and consumption of heat energy and water based on BIM and BEM technologies using predictive data analysis of wireless sensors and intelligent microprocessor devices. The overall investment amounts to 112.5 million roubles for the period of 2018–2020, including 25 million roubles of the budget share allocated for its funding for the year of 2019;
- joint project of the university in collaboration with OOO Ural Engineering Centre on the creation of an energy-efficient and environ-



mentally friendly technology for applying solid chromium coatings to bodies of revolution. The overall investment amounts to 180 million roubles for the period of 2017–2019, including 30.45 million roubles of the budget share allocated for its funding for the year of 2019.

FEDERAL PROJECTS

A number of projects were also implemented within the framework of such federal projects as New Opportunities for Everyone and Export of Education, as well as under Education National Project:

- Development of Pedagogical Competencies among Academic Staff of Educational Organisations and Workers of Employing Organisations in the Design and Implementation of Continuing Education Programmes under the project on Training Academic Staff and Workers of Employing Organisations for the Implementation of Advanced Continuing Education Programmes. The overall investment in grants amounts to 15 million roubles.
- Development of 10 Specialized Websites on the Internet to Attract International Students, Directed Towards a Targeted Audience, Taking into Account the Reference Groups of Partner Countries as part of implementation of the development of at least 10 specialized websites on the Internet to attract foreign citizens to study, targeted at a specific audience, taking into account the reference groups of partner countries under the Export of Education Federal Project. The overall investment in grants amounts to 20 million roubles. The project was implemented jointly with the SUSU International Office, Informatization Office, Marketing and Strategic Communications Department, and Research and Innovation Services.
- Creation of a Web Resource for the Promotion of Master's Degree Programmes of South Ural State University in Electrical and Heat Power Engineering in the Foreign Language Segment of the Internet in order to Position the Competitive

Advantages of Programmes and Attract Talented International Applicants. The overall investment in grants under Export of Education National Project amounts to 1.5 million roubles.

SMALL INNOVATIVE ENTERPRISES

Small innovative enterprises of SUSU deal with a wide range of problems for the development of the economy of our region and our country in general. Their main goal is to place products and technology on the innovative market, as well as to sell their products and services. Since the beginning of 2019, the university has been working with university startups and their joint implementation on the basis of the Skolkovo Foundation (Chelyabinsk branch).

As part of this work, more than 25 projects participated in the international expert review of the Foundation. In 2019, one of the small innovative enterprises, StandUp Innovations, successfully completed this expert review and became a resident of Skolkovo.

In 2019, a small innovative enterprise of SUSU, StandUp Innovations LLC, submitted 2 applications within the framework of the Innovation Promotion Fund's programs (Development of Socially Oriented Projects, and Sport and Development of National Technology Initiative V) with a total budget of 30 million roubles. As a result, the small innovative enterprise won with a project on the Development of Sports Equipment, Supplemented by a Smart Climbing Wall Hardware and Software Complex, Using Digital Augmented Reality Tools and an Artificial Intelligence System with a total grant funding of 10 million roubles.

In the 2019 academic year, OOO Armocompozit, a small innovative enterprise implementing the "START-1" program, was opened at South Ural State University. The Innovation Promotion Fund finances the project of university scientists entitled Development of Energy-efficient Technologies for Creating Metal and Composite Materials for the Needs of Various Industries in the amount of 2

million roubles. The head of the small innovative enterprise is Andrei Anikeev, a scientist from the Zlatoust branch of SUSU.

NEW LABORATORIES

In 2019, new breakthrough laboratories were opened at SUSU.

The Laboratory of Robotics as part of the Mechanical Engineering Research Institute is unique for educational institutions in Russia as it is fitted with the new technological equipment, which allows processing large-sized items of 2.5x2.5 m in a confined space. The equipment is also designed to solve complex scientific and industrial problems.

On March 19, the School of Economics and Management, as part of the Green Apple festival, opened the Laboratory of Marketing Solutions - a joint project of business representatives and students to develop marketing solutions for business cases. As part of its opening, presentations of the cases of the festival partner companies (TRIDIVI, Intersvyaz, and Zubry Graphics) were delivered, in which issues were raised and problems were set for a joint solution. In September, new laboratories were opened. These are Financial Technology in Business and Teaching Bank. New training facilities of the SUSU School of Economics and Management are fitted with modern equipment and are aimed at developing economic competencies in an interactive mode.

The Laboratory of Digital Motion Simulation for Sports was opened at the SUSU Sports Science Research Centre in December. Scientists are developing a hardware and software complex, including a digital twin, in order to determine an individual optimal movement pattern to achieve high sports results.

The key partners of the project are cooperate with SUSU. Among them are P.F. Lesgaft National State University of Physical Culture, Sports and Healthcare, and AO Sarapul Radio Plant.

INTERNATIONAL RESEARCH LABORATORIES

Self-Validating Sensors, Systems, and Advanced Instrumentation Laboratory
Head is Dr. Manus Henry, University of Oxford, Great Britain. Head on behalf of SUSU is Doctor of Sciences (Engineering), Professor Aleksandr Shestakov.

In 2019, 3 articles were published in journals indexed in SCOPUS.

An agreement was concluded on the project on Developing the Method for Diagnosing the State of a Choke Pressure Transducer. Customer is AO PG Metran. The overall funding amounts to 1.3 million roubles.

An application for a grant as part of the 2019 competition on Conducting Initiative Research by Young Scientists under the Presidential programme of Research Projects implemented by leading scientists, including young scientists, was prepared. Project topic is Development, Research and Implementation of Algorithms for Metrological Self-control in Intelligent Pressure Sensors.

Laboratory of Mechanics, Laser Processes and Digital Production Technologies

Head is Ph.D. Philippe Bertrand,

National Engineering School of Saint-Étienne, France. Head on behalf of SUSU is Doctor of Sciences (Engineering), Professor Marina Samodurova.

Jointly with SMS group, research activities are being carried out on the use of equipment in technological processes for the repair and restoration of machine parts in metallurgical units. The work of the laboratory is introduced into the educational process of the Department of Metal Forming as part of the project-based learning in Additive Technologies.

A project was won jointly with the Department of Mechatronics and MISIS to create a Master's degree programme in Additive Technologies.

Work is under way to develop a computerized detonation spraying complex (test research work on the technical requirements specification of customer enterprises).

The results of the research work were published in scientific periodicals (5 articles were published, including 5 in Scopus, 1 in WoS, and 4 patents for inventions and utility models were obtained, 3 licensing agreements were

signed; and a monograph was prepared).

Multiscale Modelling of Polyfunctional Compounds Laboratory

Head is Ph.D. Artem Masunov, University of Central Florida, USA. Head on behalf of SUSU is Doctor of Science (Chemistry), Professor Ekaterina Bartashevich.

An application has been submitted for a grant from the Russian Foundation for Basic Research on the topic of Theoretical Studies of the Influence of the Nature of Strong Non-covalent Bonds on the Optical and Mechanochromic Properties of Molecular Crystals.

The topic of modelling the kinetic properties of reactions of supercritical carbon monoxide is being successfully developed.

In 2019, 5 articles were published with the participation of the leading scientist A. Masunov, including one in Top 10%, two in Q2, and two in Q3.

An oral presentation was made at the 1st International Conference on Noncovalent Interactions (ICNI-1) held in Lisbon.



Synthesis and Analysis of Food Ingredients Laboratory

Head is Professor Shirish H Sonawane. Head on behalf of SUSU is Doctor of Sciences (Engineering), Professor Irina Potoroko.

Innovative technologies for increasing the bioavailability and bioactivity of functional food ingredients (dihydroquercetin and fucoidan) based on sonochemical micronization were developed and tested.

With the help of innovative and improved methods, the biochemical characteristics of plant biocomposites were determined, the most promising combinations of plant ingredients were identified to ensure the maximum bioactivity of the functional food ingredients, and working models were obtained that adequately describe the properties of biocomposites.

Basic technological schemes for the production of biocomposites of the functional food ingredients based on the technology of encapsulation in starch polysaccharides were created.

The results of the project were presented in 10 articles in journals

indexed in Web of Science and Scopus, 3 book chapters (Elsevier), 8 articles in journals indexed in the Russian Science Citation Index, 3 reports at conferences, and 2 patents. The grant from the Russian Foundation for Basic Research entitled Ultrasound-assisted Encapsulation of Bioactive Compounds to Be Placed in the Food Matrix is being implemented. The overall investment in the grant amounts to 2.4 million roubles. сумма 2,4 млн руб.

Laboratory for Problem-Oriented Cloud Computing Environments

Head is Ph.D., Andrei Tchernykh, Centre for Scientific Research and Higher Education, Mexico. Head on behalf of SUSU is Candidate of Sciences (Physics and Mathematics), Associate Professor Gleb Radchenko.

Comparative studies in the field of methods of virtualization and containerization of computing resources of high-performance computing centres for solving problems in the field of big data were carried out.

In cooperation with the Republican University of Uruguay, Montevideo,

Matrosov Institute for System Dynamics and Control Theory of Siberian Branch of Russian Academy of Sciences, and Moscow Institute of Physics and Technology, a method for optimizing the passenger transport schedule based on a multiobjective cellular genetic algorithm was developed.

New algorithms for the distribution and secure storage of data in multi-cloud distributed computing systems were developed and tested.

Postgraduate student Ameer Basim Abdulameer Alaasam, who works in the laboratory, received a grant from the Russian Foundation for Basic Research for the implementation of scientific work on the topic of Technology for Organizing Foggy Computing Environments that Provide Streaming Data Processing to Support Digital Twins.

The results of the laboratory's work are reflected in 4 articles in Scopus Q1 journals, 2 articles in Scopus Q2 journals, 3 articles in Scopus Q3 journals, 3 articles in the journals of State Commission for Academic Degrees and Titles, and 15 articles in international conference proceedings.

International Molecular Electronics Laboratory

Head on behalf of SUSU is Candidate of Sciences (Physics and Mathematics), Associate Professor Fedor Podgornov.

A method of nonlinear impedance correlation spectroscopy for studying the material parameters of organic materials was proposed.

A method of nonlinear Schottky-Mott analysis of semiconductor materials and components was proposed.

The spectral method for the analysis of thin films of wide-gap semiconductors was adapted.

The effect of the conformational state of the chiral component on the physical properties of ferroelectric liquid crystal mixtures was studied. Three articles in journals indexed in Scopus and WoS, including two in Q1, and one in TOP 10%, were published.

Participation in the conferences: Electrochemical Impedance Spectroscopy of Organic Polyiodides with Different Anion Composition and Proton Disorder, and the 3rd International Conference "Scanning

Probe Microscopy" (SPM-2019-RCWDFM), Ekaterinburg, August 25-28, 2019.

The following projects were submitted under the UMNIIK Program: Development of a Method of Nonlinear Impedance Spectroscopy for Measuring the Electrical Parameters of Complex Materials for Non-invasive Glucometers; and Study of the Influence of the Technology of Applying Thin Zinc Oxide Films on the Presence of Defects and Mechanical Stress. Опубликовано 3 статьи в журналах, индексируемых Scopus и WoS, две из которых – в Q1, одна – в TOP-10%.

Laboratory for Migration Studies

Head is Ph.D., Professor Jeff Sahadeo, Carleton University, Canada. Head on behalf of SUSU is Doctor of Sciences (History), Professor Olga Nikonova

Six scientific articles were published in journals included in the peer-reviewed Scopus and WoS databases.

The laboratory staff took part in four international conferences, submitted 4 applications (instead of the planned 2) for grant support of research projects,

1 of which has already received the support.

A partnership agreement was concluded with Omsk State University to develop research fields in the work under the program of Monitoring of the Ethnic and Religious Situation in Multi-Ethnic Regions...; and also SUSU joined the Belt & Road Cultural Heritage Conservation and Sci-Tech Innovation Alliance.

The results of the laboratory's work are actively integrated into the educational process: in 2019, Bachelor's and Master's degree students defended their graduation qualification works on migration topics at the Department of Russian and Foreign History, and also a doctoral dissertation was defended.

Neurohepatology Laboratory

Head on behalf of SUSU is Doctor of Sciences (Biology), Professor Vadim Tseylikman.

Joint research with the SPF vivarium of the Federal Research Center Institute of Cytology and Genetics, Siberian Branch of the Russian Academy of Sciences, Novosibirsk, provided new data on the influence of



post-traumatic stress disorders on various regions of the brain.

The article "From Allostatic Load to Allostatic State – An Endogenous Sympathetic Strategy to Deal with Chronic Anxiety and Stress?" was published in the *Frontiers in Behavioural Neuroscience* journal.

The article on Post-Traumatic Stress Disorder Chronification via Monoaminooxidase and Cortisol Metabolism was published in collaboration with Professor of Psychiatry and Neurobiology Rachel Yehuda.

Director of the SUSU School of Medical Biology, Professor Vadim Tseylikman made a report on neuropsychopharmacology at the international congress in Athens, Greece. Within the framework of the congress, cooperation was established with the Professor of the University of Athens, George Kruzoz (Hirsch index is 185).

The results of the project are presented in 7 articles in journals indexed Web of Science and Scopus.

In 2019, 4 new international laborato-

ries headed by the world's leading scientists were created at South Ural State University.

Laboratory of Magnetic Oxide Materials

Head is Doctor of Sciences (*Physics and Mathematics*), Professor of Ural Federal University Vladimir Gudkov. Head on behalf of SUSU is Doctor of Sciences (*Chemistry*), Associate Professor Denis Vinnik.

Research field is magnetic crystals and their properties. Close contacts were established with scientific groups and individual scientists at the Institute of Inorganic Chemistry at University of Stuttgart, Germany; and Lappeenranta-Lahti University of Technology, Finland. In Russia, these are Lomonosov Moscow State University; Institute of Geology and Mineralogy of Siberian Branch of the Russian Academy of Sciences; Institute of Semiconductor Physics of Siberian Branch of the Russian Academy of Sciences; and others.

Joint research is planned with the High Magnetic Field Laboratory, Germany; University of Texas in Austin, USA; the

Moscow Institute of Physics and Technology; the Ioffe Institute, and others.

Negotiations are underway with an industrial partner LLC "Holding Company" Pigment", St. Petersburg

Laboratory of Applied Research on Semigroups

Head is Professor Jacek Banasiak, University of Pretoria, South Africa. Head on behalf of SUSU is Georgy Sviridiuk.

Research fields are positive solutions of implicit evolutionary equations, degenerate evolutionary models in natural science, singularly perturbed models and degenerate semigroups.

Based on the properties of Banach lattices, the multipoint initial-final problem and the Showalter-Sidorov problem for the Barenblatt-Zhel'tov-Kochina equation and the linearized Hoff equation in sequence spaces are investigated. The form of a positive decision is obtained provided that infinity is a removable singular point of the relative resolvent.

Sufficient conditions are found for the existence of positive solutions to the Cauchy problem and the Showalter-Sidorov problem for an abstract linear Sobolev-type equation with a relatively p -sectorial operator.

In spaces of sequences, which are analogues of Sobolev function spaces, the constructed abstract theory is applied to study one mathematical model.

In the future, it is planned to continue the study of mathematical models of Sobolev type by methods of the theory of degenerate semigroups of operators, as well as to continue the search for sufficient conditions for the existence of positive solutions.

Laboratory of Polycyclic Aromatic Compounds and Carbon Nanomaterials

Head is Doctor of Sciences (*Chemistry*), Professor Konstantin Amsharov, Martin Luther University of Halle-Wittenberg, Germany. Head on behalf of SUSU is Candidate of Sciences (*Chemistry*), Senior Staff Scientist

Dmitry Zherebtsov.

Research field is a synthesis of polycyclic aromatic compounds as materials for organic electronics and obtaining new crystalline forms of carbon.

A manuscript was prepared for publication in the Q1 journal (Scopus).

The crystal structure was solved and the properties of several new aromatic compounds were investigated, the mechanism of electron transport in such crystals was also determined.

Laboratory of Digital Motion

Head is Professor Guillaume Laffaye, Université Paris-Saclay, France. Head on behalf of SUSU is Doctor of Sciences (*Biology*), Associate Professor Vadim Ehrlich.

Research field is digital modelling of kinematic parameters of human movement. Research was carried out aimed at comparing the parameters that determine the work of various human organs and systems: analysis

of 3D-kinematics of movements; daily monitoring of the musculoskeletal system; analysis of posture in a sitting position according to pressure coordinates; standing position analysis based on pressure coordinates.

6 utility model patents were obtained:

- No.2682486 A method for a comprehensive assessment of the functional state and level of functional fitness of hockey players;
- No.159613 Corrective insole;
- No.176192 Mechatronic device for the rehabilitation of patients with lower limb dysfunction;
- No.163596 Device for non-contact registration of human electrocardiogram;
- No.176791 Device for recording human ECG for continuous monitoring;
- No.189006 Device for monitoring the functional state of newborns.



JOINT PROJECTS WITH FOREIGN AND RUSSIAN PARTNERS

All fields of international cooperation are actively developing at the university, including in research; the geography of international partnership is expanding, and the number of joint projects is growing. Strengthening ties with leading domestic industrial companies and searching for new partners are among the priority tasks of the university's development.

At the moment, there are 337 agreements on research cooperation between the university and partner organisations, including 220 ones with foreign companies and universities. In 2016, the same indicator was 245 agreements, in 2017 - 254, and in 2018 - 282.

South Ural State University has been cooperating with the New Manufacturing Technologies Centre of the National Technological Initiative since 2017. The university is a member of this consortium that brings together leaders of science, education and industry in aircraft engineering, helicopter engineering and aerospace, motor vehicle industry, engine manufacturing and power-plant engineering, shipbuilding engineering, as well as in the design, development and application of advanced production technologies.

In 2019, at the Skolkovo Institute of Science and Technology, as part of the second Ostrov 10-22 intensive educational course, South Ural State University and Peter the Great St. Petersburg Polytechnic University signed an agreement on the creation of the first "Mirror" Engineering Centre.

The universities cooperate in scientific, innovative and educational fields within a joint "Competence Centre for New Manufacturing Technologies. Ural Region" Research and Education Centre. The key activity of the centre is the development of solutions for the creation of high-tech world-class products using new production technologies and cross-industry and multidisciplinary competencies of engineers and scientists of St. Petersburg Polytechnic University, as well as members of the project consortium, which includes 52 participants and more than 25 partner companies as of June 2019.

Innopolis University and South Ural State University signed a cooperation agreement aimed at establishing long-term partnerships for the implementation of a series of joint activities within the framework of the development of the National Technological Initiative Centre in the field of robotics and mechatronics and the development of science and education in the field of robotics. Participation in the consortium gives all its parties the opportunity to carry out joint research projects, including the implementation of contractual work, using the human resources, scientific and infrastructural potential of partner organisations. Also, such cooperation gives advantages in the submission and further consideration of applications for competitions and grants of different levels.

The university presents itself as a "university of digital transformations". Many events were successfully held in the frameworks of this field. One of these significant events is the creation of the Digital Industry Research and Education Centre. The centre's objective is to develop such fields as Sensing Industry Objects, Information Security, Digital Twins, and Energy Saving. The major output of activities of the centre is the successful implementation of research work in the interests of the State Atomic Energy Corporation ROSATOM on the creation of fibre optic sensors in 2018 and continuation of the research and development work on the same topic in 2019.

In collaboration with leading foreign scientists from Australia, Great Britain, Germany, India, Canada, Mexico, USA, and France, 12 international scientific laboratories are successfully operating at the university, including 4 laboratories opened in 2019 under the guidance of scientists from South Africa, France and Germany: Laboratory for Magnetic Oxide Materials; Laboratory for Polycyclic Aromatic Compounds and Carbon Nanomaterials; Laboratory for Applied Research on Semigroups; and Laboratory for Digital Motion Simulation for Sports.

SUSU is actively working on the projects on creating of a high-tech production under the Resolution of the

Russian Federation Government No. 218. The project on the development of a stepless steering differential group with a follow-up control system for off-road and road-building machines of a new generation is being implemented. The customer is OOO PK Khodovye Sistemy. The priority fields are transport and space systems.

In 2019, within the framework of the above-mentioned Decree, the implementation of the project on the Creation of a High-tech Production of Hydraulic Drives with Hydrostatic Guides of a Wide Range with Low Resistance to Movement of Moving Parts and an Increased Resource for Bench Test Equipment began. Project manager is D.V. Ardashev. Industrial partner is OOO Ural Engineering Centre..

In 2019, under the Federal Targeted Program on Research and Development in the Priority Fields of the Science and Technology Sector of Russia for 2014-2020, the work on the following projects was carried out:

- Creation of an energy-efficient and environmentally friendly technology of applying hard chromium coatings on rotary bodies. Project manager is D.V. Ardashev. Project partner is OOO Ural Engineering Centre.
- Development of an integrated self-adaptive control system of the sophisticated technological complex of production, transmission and consumption of heat energy and water based on BIM and BEM technologies using predictive data analysis of wireless sensors and intelligent microprocessor devices. Project manager is A.L. Kartashev. Project partner is OOO Control Systems Russian Instrumentation Engineering Corporation.

Winning project under the Federal Targeted Program on Research and Development for 2014-2020 in 2019 was the Development of a Complex of Technological Solutions on Producing New Metallic Materials, and Using Them to Manufacture Tanks for Storing Radiation Radioactive, along with Improving the Method of their Vitrification. Project manager is I.V. Chumanov. Industrial partners are OOO MIAN and OOO Nikhard-Servis Repair and Engineering Works.

In 2019, in the competition for grants issued in the form of subsidies from the federal budget under the project on Training Academic Staff and Workers of Employing Organisations for the Implementation of Advanced Continuing Education Programmes within the framework of the New Opportunities for Everyone Federal Project and the Education National Project, the project on the Development of Pedagogical Competencies Among Academic Staff of Educational Organisations and Workers of Employing Organisations in the Design and Implementation of Continuing Education Programmes managed by I.A. Voloshina won.

In 2019, the project on the Development of 10 Specialized Websites on the Internet to Attract International Students, Directed Towards a Targeted Audience, Taking into Account the Reference Groups of Partner Countries led by O.N. Yaroshenko became the winner in the competition for grants issued in the form of subsidies under the Export of Education Federal Project within the Education National Project.

The project on the Creation of a Web Resource for the Promotion of Master's Degree Programmes of South Ural State University in Electrical and Heat Power Engineering in the Foreign Language Segment of the Internet in order to Position the Competitive Advantages of Programmes and Attract Talented International Applicants led by L.B. Sokolinsky won in the competition for grants issued in the form of subsidies from the federal budget with the view to implementing the event on the Availability of Organisations with Regularly Updated Versions of the Official Website in the Information and Telecommunication Networks of the Internet in Foreign Languages, Focused on the Requests of International Applicants and Students under the Export of Education Federal Project within the Education National Project.

Under the guidance of E.V. Bunova, a grant issued by the Rosmolodezh Federal Agency for Youth Affairs and the Resource Centre for Youth under the project entitled School of Advanced Information Technologies won. More than 70 students involved

in information technology are participating in the project.

The work is ongoing on the project of fundamental scientific research carried out jointly with the Russian Foundation for Basic Research and the Department of Science and Technology of the Government of India entitled Ultrasound-assisted Encapsulation of Bioactive Compounds to Be Placed in the Food Matrix under the guidance of I.Yu. Potoroko. The partner organisation is the National Institute of Technology, India. The results of the research work are aimed at revealing and describing theoretically the molecular mechanisms of sonochemical effects on food dispersed media.

With the support of the Russian Science Foundation, the project on New Materials for Photonics and Spintronics Based on Chalcogenazyl Heterocycles is being implemented in cooperation with N.D. Zelinsky Institute of Organic Chemistry of the Russian Academy of Sciences.



In 2019, 3 new projects of the university received support:

- creation and study of high-entropy phases with a perovskite structure;
- gradient substitution of iron atoms in crystal structures based on M-type hexaferrites;
- science diplomacy in the Arctic as an instrument of foreign policy influence.

In 2019, 2 leading research centres (LRC) were opened and applications were submitted for grant support of LRCs programs by the Russian Venture Company Foundation.

Digital Industry LRC. Industrial partner is PAO Magnitogorsk Iron & Steel Works.

Goals of the Digital Industry LRC:

- to increase the efficiency of the energy and metallurgical production complex of PAO Magnitogorsk Iron & Steel Works with an economic effect of at least 200 million roubles based on the development and implementation of the Energoeffect automated control system;
- on the basis of the created Energoeffect automated control

system, to develop unified platform solutions for monitoring and managing the efficiency of energy production complexes using model-predictive control methods, digital twins and the industrial Internet of things for the purpose of subsequent commercialization and replication at other enterprises of the Russian Federation.

Artificial Intelligence LRC. Industrial partners are AO Papiilon, OOO TRIDIVI, OOO Intersvyaz.

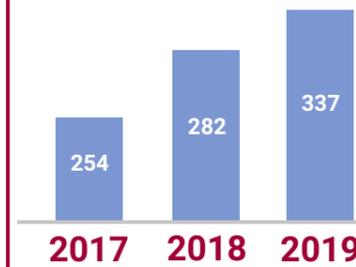
Goal of the Artificial Intelligence LRC is to create a digital (software or hardware-software) solution that provides:

- automation of the process of collecting statistics of transport and pedestrian flows;
- automation of the process of working with customer requests to technical support;
- user identification by fingerprints and palms.

In November 2019, at the conference on Monitoring Industrial Emissions, Wastewater Control, Compliance with Federal Law No. 219-ФЗ within the

Clean Air project, Emerson Company entered into an agreement with South Ural State University on cooperation in the field of environmental monitoring.

Agreements with partner organisations



220

agreements with foreign companies and universities

SUSU ACADEMIC PUBLISHING ACTIVITY AND SCIENTIFIC PAPERS

The general tendency for the university is a noticeable increase in the number of publications in the international high-ranking scientific journals; an important indicator in assessing the scientific activity of the university is the growth in the number and quality of citations.

At present, the Web of Science search platform has indexed over 2900 SUSU publications over the past 5 years (2015–2019), which is 1.93 units per 1 academic and teaching staff member, with the planned value of 1.20 units. A similar indicator for the Scopus database makes over 4000 articles for 2015–2019.

According to this indicator, SUSU is fulfilling the plan: the actual value is 2.49 units per 1 academic and teaching staff member (with 1.90 units as planned) for 2015–2019. Over the past 3 years (2017–2019), the Web of Science search platform has indexed over 1978 SUSU publications, which is 1.36 units per 1 academic and teaching staff member, with a planned value of 1.00 units. A similar indicator for the Scopus database makes over 2575 articles for 2017–2019.

According to this indicator, SUSU is fulfilling the plan: for 2017–2019 the actual value is 1.77 units per 1 academic and teaching staff member (with 1.50 units as planned).

Among the significant publications by the academic and teaching staff of the university, the article "The Formation of Human Populations in South and Central Asia" should be highlighted, which was published in September 2019 in one of the most authoritative journals in the academic environment "Science" (SNIP = 7.311). The co-author on the part of SUSU was A.V. Epimakhov, Doctor of Sciences (History), chief researcher of the Eurasian Studies Research and Education Centre. The article is the result of a big-scale project, which scientists from University of Cambridge, University of Copenhagen and a number of scientific centres in Sweden, Denmark, Russia and other countries took part in. One should mention the top-rated articles: "Oxyphor 2P: A High-Performance Probe for Deep-Tissue Longitudinal Oxygen Imaging" by A.E. Masunov, Head of the Laboratory for Multiscale

Modelling of Polyfunctional Compounds, published in Cell Metabolism (SNIP = 4.225); "A Machine Learning Approach to Analyze Customer Satisfaction from Airline Tweets" by S. Kumar, M.L. Tsymbler, the academic staff members of the Department of System Programming, published in the Journal of Big Data (SNIP = 4.117). Among other achievements in publishing activities, one should mention that 2 SUSU international scientific journals "Supercomputing Frontiers and Innovations" and "Bulletin of the South Ural State University, Series: Mathematical Modelling, Programming and Computer Software" are included in the Top 50 of Scopus databases by SNIP (0.952 and 0.958, respectively). According to the Web of Science database, publications for the period from 2015 to 2019 were quoted 5117 times (including self-citation) and 3339 times (excluding self-citation), i.e. the average citation rate per 1 academic and teaching staff member, calculated on the basis of the totality of articles recorded in the Web of Science database, is 3.51, which exceeds the planned figure of 2.90 citations per 1 academic and teaching staff member.

According to the Scopus database, publications for the period from 2015–2019 were cited more than 8211 times (including self-citation) or more than 4688 times (excluding self-citation), thus, the average citation rate of the articles indexed in Scopus is 5.64 per 1 academic and teaching staff, which is higher than the planned value of the indicator (4.70).

Citations (2015–2019)

5 641

WoS

9 028

Scopus

Top-rated publications of the SUSU academic and teaching staff over 5 years (2015–2019)

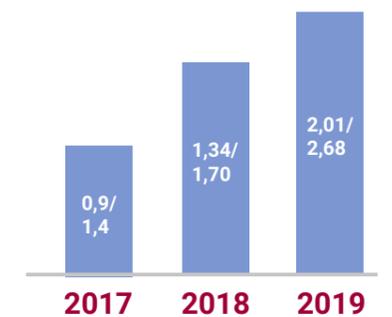
2 980

WoS

4 000

Scopus

Number of publications per 1 academic and teaching staff member (WoS / SCOPUS) over 5 years



Publications in SCOPUS TOP 25



WORLD-CLASS URAL INTERREGIONAL RESEARCH AND EDUCATION CENTRE FOR ADVANCED INDUSTRIAL TECHNOLOGY, NEW MATERIALS AND POWER ENGINEERING

This Research and Education Centre is being created to implement the goals of the federal project "Development of Scientific, Research and Development, and Production Cooperation" of the "Science" National Project in the Ural Federal District.

The goal is to unite educational and scientific organisations, enterprises and companies of the real sector of the economy of the Sverdlovsk, Chelyabinsk and Kurgan regions in carrying out applied scientific research and development of the world level, obtaining competitive technologies and products and their subsequent commercialization, as well as training personnel to solve science and technology problems with the aim of breakthrough development in priority fields and increasing the competitiveness of the economies of the subjects within the perimeter of the centre.

At the international industrial exhibition "Innoprom – 2019", the heads of the three regions signed an agreement on cooperation in the field of scientific and industrial cooperation on the "Science" National Project, which involves the creation of a world-class interregional research and education centre in the Ural region. The corresponding agreement was signed by the Governor of the Sverdlovsk Region E. Kuivashev, the Acting Governor of the Chelyabinsk Region A. Texler and the acting Governor of the Kurgan Region V. Shumkov.

The activities of the Research and Education Centre (REC) are aimed at launching social and economic mechanisms of technological entrepreneurship in the region, providing:

- innovation development;
- formation of new industries that provide employment for the population;
- introduction of high-tech products with high added value to global markets.

As part of their activities, the participants of the research and education centre will support research fields for the benefit of industrial enterprises, what will contribute to the develop-

ment of the regions and bring a significant economic effect.

SUSU is responsible for coordinating the activities of the centre on the territory of the Chelyabinsk Region within the framework of cooperation. Within the scope of the key topics of the centre, the University oversees the Aerospace Technology field and has key technological groundwork in the following fields: Digital Industry, including sensorics, information security, digital twins and energy conservation, and also has competencies in the fields of New Materials, and Industrial Ecology.

In addition to universities, business representatives take part in the cooperation. On behalf of the Chelyabinsk Region, the agreement was signed by two SUSU industrial partners: ANO South Ural Industrial Cluster for Road, Construction and Agricultural Machines Components and Parts Production and OOO Chelyabinsk Electric Equipment Plant. In the future, the centre plans to involve other industrial companies in the region.

SUSU PROJECTS AT THE RESEARCH AND EDUCATION CENTRE:

1. Rocket and Space Complex with a Fully-reusable Launch Vehicle and a Multipurpose Space Platform.
2. Ecomonitor complex of environmental monitoring and forecasting is a system for managing environmental risks of industrial enterprises.
3. System for planning equipment repairs based on the actual technical condition.
4. Development of materials and coatings based on high-entropy systems in Ekaterinburg and Chelyabinsk.
5. Materials for new production laser technologies (surfacing for extreme operating conditions, welding).
6. REC educational platform.

As a result of the strategic session in November 2019, the following organizational decisions were made:

- correspondence of the REC priority research field with the Strategies of Research and Technological Development of Russia was determined;
- structure and functions of REC collegial governing bodies were determined (Council of World-class Research and Education Centres; REC Supervisory Board; REC Management Board);
- sequence of actions for the admission of new REC participants and the performance indicators of the participants of the centre were determined;
- temporary algorithm for reviewing the applications was formed to finance projects from the budget by analogy with the Resolution of the Russian Federation Government No. 218 with the co-financing of the project at least 100% of the subsidy amount, including at least 20% for R&D; The planning horizon of indicators is at least 3 years);
- models of the system of measures of state support for science and innovations and possible additional support measures were proposed.

LONG-TERM REC DEVELOPMENT STRATEGY

2020–2024: the launch of the cooperation mechanisms based on projects to modernize traditional industries. The mechanisms of interaction between the participants will be worked out, and the level of trust between them will be increased.

SUSU "BOILING POINT"

In 2019, South Ural State University opened a university "Boiling Point", a space for team work on innovation projects and holding educational and other socially significant events. "Boiling points" are being opened with the support of the autonomous non-profit organisation "Platform of the National Technology Initiative" ("NTI Platform").

This work is being carried out on behalf of the Agency for Strategic Initiatives within the framework of the National Technology Initiative since 2014. The spaces are intended for the representatives of all spheres of activity that have an impact on the development of the society.

At "Boiling Points", they can share their experience and jointly work out new projects and development models for the Chelyabinsk Region.

The involvement of universities in this project is due to the fact that they make a significant contribution to the development of innovations. The new space will be in demand for promoting priority projects and implementing

measures to improve the business environment.

The first city "Boiling Point" in Chelyabinsk was opened at the IT park. SUSU became the only university in our region to join the NTI Platforms project. The SUSU Boiling Point team consisted of a program director Viktor Batuev, an innovation specialist Elena Bunova, and a project leader, Head of the Research and Innovation Services Anton Nurkenov.

The first event that took place at the university's "Boiling Point" was a plenary session on the topic of "Human Capital in the Era of Changes: a Place in the Strategic Development of the Region." The representatives of the regional authorities, the university, the WorldSkills Russia Association, and leading IT companies discussed the impact of the society on the improvement of the Chelyabinsk Region.

In addition, the "Boiling Point" presented reports on the ecosystem of the Agency for Technology Initiatives, the development of technical creativity,

the markets of the National Technology Initiative, and the prospects for additional education. The experts also spoke about the tasks of the "Smart City", the formation of future skills and innovation development programs. At the end of the "Boiling Point" opening program, a project session on "Autumn Marathon. Work of Project Teams and Presentation of the First Results" was held.

The Agency for Strategic Initiatives is a non-profit organisation created by the Russian government to implement a set of measures in the economic and social spheres.

The National Technology Initiative is a program of measures to form fundamentally new markets and create the conditions for Russia's global technological leadership by 2035.



VUZPROMEXPO-2019

In December 2019, the University took part in the annual national exhibition "VUZPROMEXPO-2019", held at the central exhibition complex "Expocentre" in Moscow.

VUZPROMEXPO is a big-scale representative exhibition for demonstrating the achievements of the Russian science and building effective communication between the scientific and educational community, government and businesses. SUSU being one of the leading universities in Russia presented developments in automation and control of technological processes focused on the needs of specific industrial partners. Subsequently these developments are being successfully implemented at enterprises in the real sector of the economy.

The VUZPROMEXPO-2019 exhibition helped the SUSU research team to evaluate the innovations of industrial partners and universities in Russia, meet like-minded people and outline new fields of cooperation. The high concentration of new technological solutions, the exchange of knowledge, experience and ideas in the interdisci-

plinary and intersector industrial space became an impulse for the exhibition participants for further intensive development of the partnership between science and business.

South Ural State University being one of the leading universities in Russia presented a number of stands demonstrating the most significant developments designed by the scientists of the university specifically for the needs of industrial partners.

The exhibition became a launch platform for hundreds of unique research developments successfully introduced into production. The objectives of the exhibition are determined by the Strategy of Research and Technological Development of the Russian Federation, approved by the Decree of the President of the Russian Federation No. 642 as of December 1, 2016.

During the business program, the first results of the approved REC programs were considered and discussed; the administrative staff of the Ministry of Education and Science of Russia met

the rectors of universities following the results of work in 2019; and meetings of the Coordination Council on the Resolution of the Russian Federation Government No. 218, the Council for Mega Grants, the Council for Priority Field of the Strategy of Research and Technological Development of the Russian Federation were held, as well as a series of other significant events.

The following results were presented to the participants and guests of VUZPROMEXPO. At VUZPROMEXPO-2019, SUSU demonstrated the development of an integrated management system for a complex technological complex of production, transmission and consumption of heat energy and water. The system uses BIM and BEM technologies with the use of predictive analysis of data from wireless sensors and intelligent microprocessor devices. The project is being carried out within the framework of the Federal Targeted Program 2018–2020.

The project to create a high-tech production of a stepless differential swing mechanism with a tracking control system for off-road and road-

building machines of a new generation is being implemented within the framework of the Resolution of the Russian Federation Government No. 218 with the financial support from the Ministry of Science and Higher Education of the Russian Federation. The mechanism being engineered will be equipped with a tracking control system, which, in turn, plays the role of an assistant to the machine operator and allows to strictly maintain the trajectory of the machine, set by the operator, regardless of such external conditions as the presence of a slope, surface irregularities, various obstacles, or sliding of one of the sides of the machine on the ground.

The project of automatic monitoring of engineering systems in industry presented at the exhibition is a demonstration of the development of IoT technologies, which are receiving great attention within the Digital Industry field. The researchers demonstrated a set of equipment designed for operational data collection from the process metering systems: temperature, humidity, vibration sensors for recording various parameters in industry, housing and communal services.

Another SUSU project is related to the problem of equipment diagnostics. A research engineer of the Research and Innovation Services Vladimir Sinitsin presented the WAS machine tool diagnostics system. The system does not require additional sensors, and the diagnostics itself takes about 20 minutes. With the help of a mobile application, the system sends a notification to the machine operator on what modes and how many rotations need to be done to check, and as a consequence, the result is given whether the machine is suitable for the operation or not, and what kind of the operation life it has.

The project to create an energy-efficient and environmentally friendly technology for applying solid chromium coatings to bodies of revolution, developed by the SUSU researchers, is important for improving working conditions at various enterprises since this technological process can pose risks for human health. The main problem is that this is a brownfield: when applying coatings, a chromium

solution is used, which is harmful to humans and the environment.

Artem Semashkov, an engineer-developer of the Educational Equipment and Technology Research and Production Institute, presented a set of simulators for training specialists in the field of servicing aircraft engines, aircraft installations for airplanes and helicopters. With their help, it is possible to train both students who are studying at the university, and the already working specialists in order to improve their qualifications.

Several projects were presented by the specialists from the Centre of Computer Engineering, the main engineering division of SUSU aimed at solving applied problems for the benefits of industrial enterprises. They demonstrated projects for the transmission of KAMAZ vehicles, for power drives, transport engineering, rail vehicles, and technological equipment for cleaning various devices and equipment.

Another project presented at the exhibition is a passive exoskeleton for the rehabilitation of children with cerebral palsy. "In this project, we are using a new rehabilitation method by limiting the mobility in the joints of the lower extremities. Thus, a child can only walk forward, and the walking becomes more physiologically correct," said Aleksei Petrov, junior researcher at the Institute of Sport, Tourism and Service.

The VUZPROMEXPO-2019 exhibition helped the SUSU research team to evaluate the innovations of industrial partners and universities in Russia, to meet like-minded people and outline new fields of cooperation. The high concentration of new technological solutions, the exchange of knowledge, experience and ideas in the interdisciplinary and intersector industrial space became an impulse for the exhibition participants for further intensive development of the partnership between science and business.

SUSU Rector Aleksandr Shestakov noted: "From my point of view, SUSU is distinguished by the fact that we effectively work with the industry of our region, not only with the

Chelyabinsk Region, but also with the industry of the Big Urals region. We cooperate with the companies that operate on the global market. And the projects presented here have been made specifically for the industry. Of course, we have fairly big ideas in terms of artificial intelligence, metallurgy, and the oil and gas complex. We must understand the needs and challenges of the industry in order to transform our competencies into the product they need. As a result of the exhibition, we expect to compare ourselves with other universities, and I think it is important to focus on the tasks of the next year."

"VUZPROMEXPO" is a big-scale representative exhibition for demonstrating the achievements of the Russian science and building effective communication between the research and educational community, government and businesses.

 **12**
exhibits presented
by SUSU in 2019





04

**Educational
Technologies
for Leaders
of the Future**



Educational Technologies for Leaders of the Future

10 SUSU SCHOOLS AND INSTITUTES: MILESTONE RESULTS

School of Electronic Engineering and Computer Science

technologies by the Emerson company. In the 2018-2019 academic year, jointly with AO "PG Metran", the laboratory organized and conducted advanced training courses under the program "Automation of Control of Technological Processes" in the amount of 70 hours. 26 students graduated from the courses: 15 certificates of professional development and 11 certificates of completion of an additional training program were issued.

Within the framework of the Emerson Competence Centre of the School of Electrical Engineering and Computer Science, a new training course was launched aimed at developing the competencies necessary for the professional occupation in the development, implementation and operation of modern automated process control systems.

Within the framework of the Samsung IoT Academy laboratory, project-based learning in the Internet of Things course was organized for SUSU students. In 2019, 3 projects were selected for participation in the Federal competition of projects held by the company. The results of the competition were as follows: 1 project received the Grand Prix of the competition; 1 project won a place in the category "Business and Society"; a senior lecturer of the Department of Automation and Control Evgeniy Kanashev received the "Teacher of the Year – 2019" award.

Jointly with the Information Security Research and Education Centre, Kaspersky Lab products and technologies were introduced into the main educational process. In November 2019, a competition for research projects Kaspersky OS IoT Security was launched among the students of the School of Electronic Engineering and Computer Science.

School of Medical Biology

A project-based learning in the Master's degree programme 19.04.01 "Biotechnology", and Master's degree program "Agrobiotechnology" (project-based approach) were implemented effectively, supervisor: Doctor of Sciences (Engineering), Professor I.Yu. Potoroko. As a result of the implementation of the technical assignment of the industrial partner of the program for the period of 2018-2020, the students of the project group obtained 5 patents for the inventions, published more than 20 articles, including in the State Commission for Academic Degrees and Titles edition, and Scopus edition, and submitted 3 applications for participation in grant competitions. A grant was won within the UMNİK program.

In the 2019-2020 academic year, a package of documents was formed and an application was submitted for licensing the Bachelor's degree program 19.03.01 "Biotechnology". The

opening of this field of training will increase the number of students studying at the Department of Food Technology and Biotechnology, and ensure the continuity of the educational process at all levels of higher education.

The elite training of students of the Department of Food Technology and Biotechnology is being effectively implemented. As part of attending the courses of the elite training at the School of Medical Biology, students master not only the specifics of future professional activities, but also expand their knowledge and skills, communicating with leading scientists, participating in the research work of international laboratories.

School of Economics and Management

Training under the lean production program for the employees of OOO Chebarkulskaya Ptitsa, Unichel, PAO Ptitsefabrika Chelyabinskaya (Chelyabinsk Poultry Farm), Chelyabinsk Compressor Plant, GC Chelyabortgtekhnika, etc. The total number of students is 98 people; the turnover is 1.46 million roubles.

During the academic year, within the framework of project-based learning, the departments of the School of Economics and Management implemented 8 projects.

The Genplace project (jointly with the Avuar Group) is included in the register of the participants in the project for the creation and maintenance of the Skolkovo innovation centre.

The "Smart Startup" interdisciplinary project (during one semester, students work within project groups in the TRELLO software product) is the development of a real business, from marketing to calculating the cost of a new enterprise.

In the "Accountant 4.0" laboratory, master classes are held by specialists from partner companies Avuar Group, PAO "Mechel", AK "Listik and the

Partners", and others; additional training of students under the 1C ZUP program (commissioned by PAO "Mechel"); work with NK "Accounting Methodological Centre", Moscow.

Two subdivisions of the "Financial Technologies in Business" laboratory complex of active teaching methods named after B.N. Khristenko and "Teaching Bank": ABC Programmabank program was introduced into the educational process.

Institute of Natural Sciences and Mathematics

Within the framework of project-based learning, the project on the "Nonchemical (Photocatalytic) Cleaning of Water off Pollutants Resistant to Oxidation" is being implemented since September 1, 2018; it has a real customer (PAO Magnitogorsk Iron & Steel Works). Projects to be implemented:

- "Modelling of the Structure and Properties of Crystalline and Hybrid Nanomaterials" (Department of Physics of Nanoscale Systems);
- "Software Package for Modelling of Continuum Behaviour in Case of Dynamic Loads" (Department of Computational Mechanics).

Educational programmes in English were developed:

- Major in 04.04.01 Chemistry. Master's degree programme "Chemistry for Environmental Engineering";
- Major in 01.04.01 Mathematics. Master's degree programme "Partial Differential Equations";
- Major in 03.04.01 Applied Mathematics and Physics. Master's degree programme "Biophotonics and Physical Methods for Living Beings".

Students of the Department of Applied Mathematics and Programming won bronze medals and second-degree certificates in the Open International Student Internet Olympiad in Mathematics 2018, a third-degree certificate in the annual Ural Championship in sports programming, second and third degree certificates in

the Open International Student Internet Olympiad in Mathematics at Volga State University of Technology, an honorary certificate in the 2019 professional skills competition "Praise to Men of Labour!".

Institute of Linguistics and International Communications

The Institute of Linguistics and International Communications is currently implementing 5 educational projects. Four projects are fundamentally new and cover a variety of professional fields.

Open lectures on political sciences by leading scientists and teachers of the Department of International Relations, Political Science and Regional Studies are being offered. Topics for open lectures are selected jointly with the Chelyabinsk Branch of the Russian Association of Political Science, lecturers being the SUSU leading scientists.

The Department of Modern Languages has introduced a system of continuous linguistic training, covering all the levels of professional education: Bachelor's, Master's degree programmes and postgraduate studies. Such courses as "Foreign Language", "Foreign Language in Professional Activity", "Foreign Language for Scientific Purposes" are being implemented in a 50/50 mode (blended learning): 50% of the time is classroom work, 50% of the time is the work in electronic environment.

For postgraduate students, the courses "Foreign Language" and "Foreign Language for Scientific Purposes" are being implemented mainly using the inverted class technology, when postgraduate students study educational materials at home, and in classrooms they actively master practical skills. At the same time, the emphasis is put on personalized learning, when a teacher answers the questions of postgraduate students and gives recommendations on learning the material of the courses with the help of the "Electronic



SUSU" online platform in the feedback mode, and postgraduate students master the materials at a time most convenient for them.

A big-scale extracurricular event "Economic Games in English" was held for students of elite training groups, and a "Jeopardy" game was organized and conducted for students of the Automobile and Tractor Engineering Faculty of the Institute of Engineering and Technology, where students competed in the level of professional knowledge in English.

Institute of Media, Social Sciences and Humanities

The "Eurofactcheck" international project of the European Journalism Training Association was implemented jointly with 20 universities in Europe: the materials by the SUSU students were published on the pan-European portal and were marked among the best ones; the "Eurofactcheck" national portal was created; the 4th International Scientific and Educational Forum "Communication Leader of the 21st Century", dedicated to the global problem of "fake" news, was held at SUSU.

The SUSU historians completed one of

the most ambitious regional projects in Russia, they published "The History of the South Urals" from the Stone Age to the end of the 20th century, in 8 volumes. For the first time, the history of our region and its place in the Russian and world space became presented so fully. The variety of illustrative material and the availability of language make the publication a significant event not only in the scientific, but also in the cultural life of the South Ural region.

The official website was launched for the International Science-to-practice Conference "Building the Eurasian Bridge in Journalism Education" of the European Journalism Training Association to be held on October 15-16, 2020 at SUSU.

Students of the Department of Russian Language and Literature joined the editorial board of the SlavicumPress, a student electronic publication of the Slavic Studies Institute of University of Zurich.

The Department of Philosophy of the institute held an environmental forum "Ecoengineering 1.0" (environmental education, environmental literacy).

In 2019, the work of the major international project for the analysis of paleo-DNA in Eurasia was completed, in which the SUSU archaeologists took an active part. The research results are of great fundamental and applied importance in the reconstruction of the origin and early history of Indo-European peoples. Materials by the SUSU scientists are included in the work published in the Science journal, which is one of the most authoritative scientific journals in the world.

Institute of Sport, Tourism and Service

A pedagogical concept of a mass online course "Biomechanics of Motor Activity" was developed, and an application was submitted for the participation in a competition to develop massive open online courses among the academic and teaching staff of South Ural State University.

Educational projects of 2018 were successfully completed. Each project has an industrial partner and a result obtained.

The educational project "Theoretical and Technological Justification of the Goals and Directions of Modernisation of the Infrastructures of the Mass Scale Physical Education and Sports

of the Highest Achievements" was completed with the creation of a joint application with the industrial partner OOO "Kranovye Tekhnologii".

Educational project on the "Development of Methods for Using Seeds of Cereals and Oilseeds for the Production of Food Products" has the industrial partner of OOO SoyuzPishcheprom Association.

Educational project on the "Stable Development of Tourism in Specially Protected Natural Areas" has such partners as "Taganai" national park, "Arkaim" nature reserve, Geographical Institute Jovan Cvijić of the Serbian Academy of Sciences and Arts; and the result is the following: more than 30 articles were published, including 3 articles in journals indexed in the international SCOPUS database.

Educational project on the "Interconnection of the Results of the GTO (Ready for Labour and Defence) Performance and the Level of Health of Schoolchildren and Students" has such industrial partners as the Ministry for Physical Education and Sports of the Chelyabinsk Region, OGBU "Administration for Sporting and Mass Participation Events and the All-

Russian Physical Education and Sports Complex "Ready for Labour and Defence" in the Chelyabinsk Region", the Testing Centre of the All-Russian Physical Education and Sports Complex of SUSU, and the result is the following: in 2019, the Testing Centre of the All-Russian Physical Education and Sports Complex "Ready for Labour and Defence" was created at SUSU.

Institute of Engineering and Technology

Educational technologies are related to the foundation of youth design bureaus, among the participants of which are young teachers, students of the project-based learning and elite training, and schoolchildren. Project-based learning and youth design bureaus deal with big interdisciplinary faculty projects, some of which are presented below.

The Erasmus+ ASIAXIS project is being implemented at the Automobile and Tractor Engineering Faculty ("Enhancing University Teaching in Thermal Power Systems for Cleaner Environment with Parallel Improvements in PhD Skills Development"). The project partners are European and Asian universities: Northumbria University, UK; University

of Castilla - La Mancha, Spain; Marche Polytechnic University, Italy; Beijing Institute of Technology, China; Harbin Engineering University, China; Saken Seifullin Kazakh Agricultural Technical University (Kazakhstan); Toraighyrov University, Kazakhstan; South Ural State University, Russia; and Bauman Moscow State Technical University, Russia.

The Faculty of Aerospace Engineering launched a project jointly with students: "Development of a Spacecraft Intended for Landing on a Space Body with a Small Gravitational Field" and "Engineering of a Multi-purpose Space Platform".

The Faculty of Materials Science and Metallurgy Engineering launched a new Master's degree programme "Materials Science: Structure and Properties of Materials". Graduates in the field of "Materials Science and Technology of Materials" can work in research institutes, laboratories and scientific departments of metallurgical, chemical, mechanical engineering and mining enterprises. In the interests of OOO "Ural Engineering Centre", OOO "SMS-Metallurgical Service", SMS-Group, the projects on the following topics were completed:



"Repair and Restoration of Tooling Equipment for Metal Working Processes" and "Development and Research of Technology for Producing Parts from Titanium Alloys by Laser Surfacing Methods".

At the Faculty of Mechanical Engineering, research work was carried out on the interdisciplinary project "Creation of an Energy-efficient and Environmentally Friendly Technology of Applying Hard Chromium Coatings on Rotary Bodies". The project was carried out within the framework of the Federal Targeted Program on Research and Development in the Priority Fields of the Science and Technology Sector of Russia for 2014-2020. The amount of financing is 90 million roubles. In the course of the work, a specialized experimental laboratory-and-production site was created for applying hard chromium coatings on big-sized bodies of revolution of up to 320 mm in diameter and up to 4000 mm long. As part of this work, project-based learning was implemented for a group of students.

The Faculty of Energy and Power Engineering received a grant with a funding volume of 1.5 million roubles

to create a Web-resource to promote two educational programmes. An Erasmus+ grant in the field of academic mobility was won with the Aristotle University of Thessaloniki, Greece. A cooperation agreement was concluded with Riga State University, Riga, Latvia..

Institute of Law

Educational programme "Law and Digital Technologies" with the major in 40.04.01 "Jurisprudence" was developed and adapted for foreign students. The programme focuses on advanced knowledge in the field of law related to the digitalization of various spheres of life.

In 2019, the development of international cooperation of the institute continued:

- Agreements of cooperation were concluded with University of Gdansk, Poland; Faculty of Law of University of Maribor, Slovenia;
- Faculty of Law of Belgrade State University, Serbia. Researchers from Malaysia, Finland, Poland, Great Britain and Slovenia work at the departments of the institute.

As part of the SUSU Development Strategy, the Institute of Law imple-

ments interdisciplinary research projects in such priority fields as Digital Industry and Ecology:

- "Legal Tech: Legal Regulation of Artificial Intelligence and Robotics in the Russian Federation";
- "Ecological and Legal Compliance", designed to manage and reduce environmental risks in the work of industrial enterprises.

In 2019, 4 postgraduate students of the Institute of Law defended their theses for the degree of a Candidate of Sciences (Law).

The implementation of the project of elite training with the major in 40.03.01 "Jurisprudence" with in-depth study of a foreign language, focused on the selection of the most successful students of an individual educational trajectory, provided with the best pedagogical methods and interaction with key regional employers, is continued. The programme provides for the development of exclusive courses in the field of legal regulation of digital technologies in various industries.

In 2019–2020 students of the institute went on exchange training to Xi'an University, China, and took the

International Course on Crime Prevention in Dubrovnik, Croatia. The students of the Institute of Law took part in the prestigious Jassup International Law Moot Court Competition; the International Air Law Moot Court Competition of Leiden University, the Netherlands and Sarina, India; and in the International Lachs Space Law Moot Competition in Austria, and other events.

Institute of Architecture and Construction

Project-based learning is being implemented at the departments of the institute starting from the 2018-2019 academic year. The main topics of the projects are: Studying the Durability of Concrete in Reinforced Concrete Structures in Case of Cyclic Impacts; and Scaffolding Platform for Stone-masons in Frame House Building.

In March 2020, students of the institute took part in the "Youth Is Building the Future" competition of projects on the formation of a comfortable urban environment in the municipalities of the Chelyabinsk Region (Chelyabinsk, Kyshtym, Yuzhnouralsk, Miass, and Zlatoust). Jointly with Uralniistromproekt,

Master's degree students investigated the properties of various types of cements and fine-grained concrete (Department of Building Materials and Products).

The "Scaffolding Platform for Stone-masons in Frame House Building" project was completed within the framework of project-based learning for Master's degree students jointly with a partner enterprise OOO Kontrekspertiza (Department of Building Technologies and Structural Engineering).

Research and development work to "Conduct Research and Develop a Project for the Village of Roshchino in the Sosnovsky District of the Chelyabinsk Region" was carried out on the basis of interdisciplinary research with the participation of the teaching staff, students and postgraduates of the Institute of Architecture and Construction and the Institute of Engineering and Technology jointly with an industrial partner OOO Karat (Department of Architecture). With the participation of the students from the Department of Architecture, a project of the "Federal Centre for the Application of Artificial Intelligence Methods in Industry on the Basis of

SUSU" was developed. The draft design was handed over to the Governor of the Chelyabinsk Region (Department of Architecture). Since the 2018-2019 academic year, the institute has been implementing Double Degree programs with Xuchang University and the Yellow River Conservancy Technical Institute. In July 2019, 50 students from the PRC studied at the institute.



MODERN TECHNOLOGIES OF EDUCATION

An order "On the organization of the educational process using the "Electronic SUSU" portal in the second semester of the 2018/19 academic year" was issued. The goal was to expand the use of e-learning technologies in the implementation of basic educational programmes at SUSU. The "Requirements for e-learning courses placed in the SUSU information and training systems deployed on the basis of the Moodle distance learning system" were approved by the Rector's order. These requirements are a list of the necessary elements to ensure the uniformity of e-learning courses developed at the university.

In 2019, 476 SUSU employees successfully completed training under the SUSU staff retraining programme "Pedagogical Technologies at Smart University". To deliver the lectures within the course, 30 specialists were involved, among them there were 10 doctors of science. During the training, 20 broadcasts from the video studio were organized, which were held every Thursday. 15 video lectures were recorded and 4 face-to-face master classes were held.

A program of distance learning for students on the e-learning system is being implemented using the latest information Internet technologies and multimedia. For the convenience of learning, all the university curricula are posted on the "Electronic SUSU" educational portal.

It helps students to return to the class material at any time and to keep in touch with the teaching staff. The portal has almost everything students need for successful study: theoretical material, algorithms for solving problems, tips that students can use in case of difficulties, practice tests, reference materials, as well as various options for feedback from the teacher. A forum is always held for each course, where the most difficult issues are dealt with.

DIGITALIZATION OF SUPPLEMENTARY EDUCATION

The SUSU Catalogue of Supplementary Education was developed and launched; it is a resource that contains all the supple-

mentary education programmes developed at the university. With the help of the catalogue, listeners can get acquainted with the description of the programmes and register for the one they choose.

"SUSU Supplementary Education" is a new educational portal designed to organize training on supplementary education programmes developed at SUSU and implemented through distance learning technologies.

The catalogue and the training portal are interconnected, what contributes to the convenience of the listener, who can proceed to training on the selected programme after confirming the order.

PROJECT-BASED LEARNING (PROMISING CASES IMPLEMENTED)

In 2019, 77 project-based learning projects were launched at SUSU, 45 of them were new projects of the university. At the same time, 32 projects designed for several years are being successfully implemented. Project activities are gaining momentum in all structural divisions, for example, at the Institute of Linguistics and International Communications there was 1 project in 2018, and 4 projects in 2019.

In 2019, a fundamentally new topic was announced by the Faculty of Aerospace Engineering of the Institute of Engineering and Technology. This is a global project to create a multipurpose space platform. It is planned that it will involve the entire SUSU Institute of Engineering and Technology in the future and will be able to grow into a federal global program. It is this project that can serve as the basis for the concept of a new interregional world-class Research and Education Centre.

Students of the Institute of Engineering and Technology participate in the design of an electric car with a unique electric motor. Postgraduate students and young

teachers, including foreign students and postdocs, are actively involved in the projects. In this regard, the project headed by I.Yu. Potoroko ("Development of Efficient Technology for Grain Disinfection") is being developed successfully.

In the Master's degree programme in Journalism, the "Eurofactcheck" project is being continued, and a new interdisciplinary interdepartmental educational project "FactCheck-Ecology" has been launched. "Asteroid" Youth Design Bureau helps to solve educational problems and carry out experimental design development of real objects for the aerospace industry.

PROJECT DIGITALIZATION

The entire system for applications submission is automated, and any employee or student of the university, any external customer can submit an application remotely. Project managers also process applications remotely. After approval of the application, the participants of project-based learning fill out a digital project passport. A significant part of projects is implemented in a digital form (digital products).

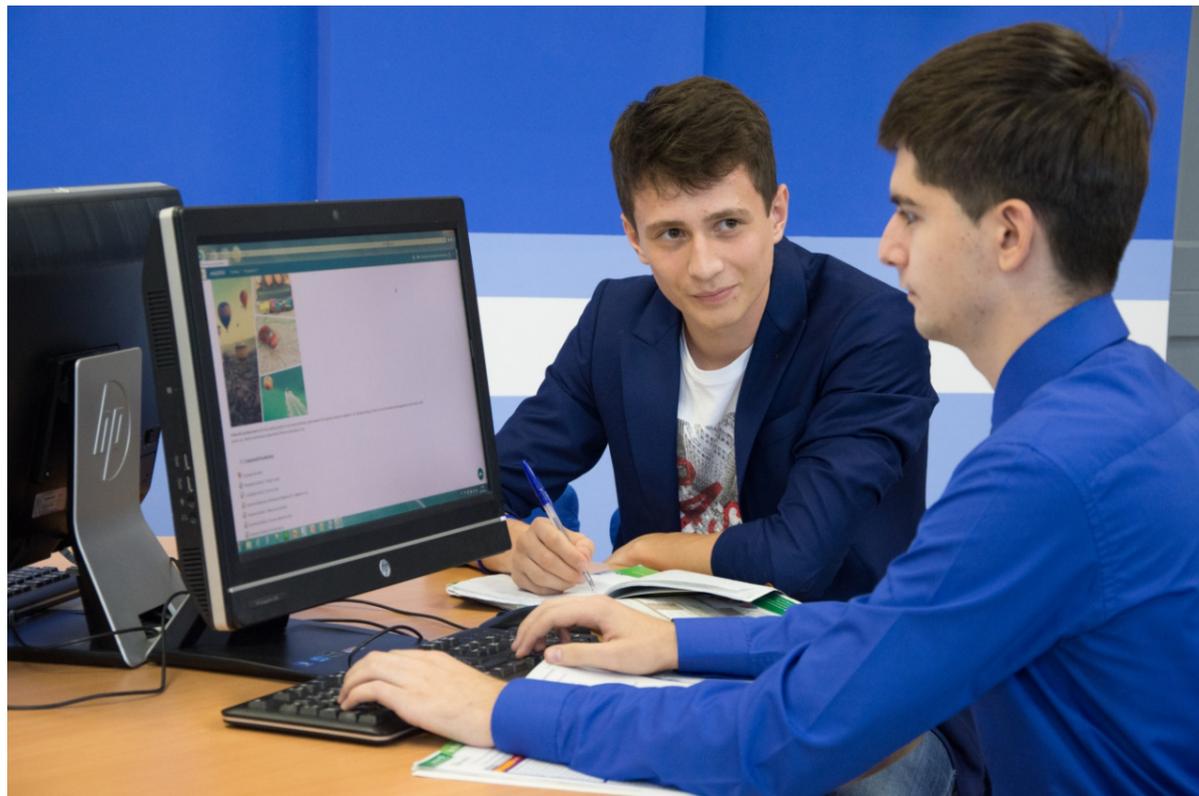
Interdisciplinary projects are able to "search" for students through the digital cloud themselves. Students can

INTERDISCIPLINARY PROJECTS

independently connect to any project that they see in the cloud. In the digital space of the cloud, potential employers can find students for their projects themselves.

The following courses have been developed and introduced into the educational process since 2019 (including elective courses): "Project Management", "TRIZ" (Theory of Inventive Problems Solving), "Patenting".

A project management advanced training course for managers of project-based learning programmes was developed (School of Economics and Management). Official transcripts for students participating in projects are being automated in the "Univeris" information and analytical system. Curricula for the 2019 admissions year (3++) were developed



MULTILINGUAL ENVIRONMENT AND INTENSIVE LANGUAGE TRAINING

SUSU has 27000 students, including over 2200 foreign students from 56 countries.

Since 2016, in accordance with the main goal of the Roadmap under Project 5-100, on the path to the SUSU's achieving leadership positions in international and educational activities, the task was to increase the level of foreign language proficiency by students to a level of no lower than B1+. In 2019, within the framework of the M 8.1.3 project "Implementing Advanced Language Training in Bachelor's Programmes" (supervised by E.N. Yaroslavova), the following results were achieved:

- multilevel model of continuous foreign language training for the Bachelor's degree programmes (international standards) is being implemented. A1-C1 levels;
- multilevel model of continuous foreign language training is being implemented for the elite training zone (included and additional). A2-C1 levels;
- system for monitoring learning outcomes is being implemented in the form of midterm attestation and final exams in the international

- format KET - for A1-A2 levels, PET - for B1 level, IELTS - for B2-C1 levels;
- Provision "On the procedure for organizing the elective course "English: Preparation for the International Exam" was elaborated. An elective course on preparation for international exams was launched (on a competitive basis);
- international certification system was introduced. 44 students passed IELTS in December 2018; 10 students passed IELTS and 20 - FCE in December 2019;
- blended learning was introduced; a system of continuous professional development of a foreign language teacher is being implemented (an online course was developed).

Regular seminars are held to disseminate successful working experience with the involvement of external experts at the Department of Modern Languages. For example: a workshop on training of the IELTS exam expert teachers; Training Workshop on the "Skills of the 21st Century. Achieving Educational Results in Foreign Languages".



1 800+
students participating
in projects



5
online support courses

**International
Certification of students
(December 2019)**



10
IELTS



20
FCE



BACHELOR'S AND MASTER'S DEGREE PROGRAMMES TAUGHT IN ENGLISH

SUSU successfully implements 20 Bachelor's, Specialist's and Master's degree programmes in English. The university strives to keep up with the times and quickly respond to the changing demands from the international community. In 2018, students applied to 7 Master's degree programmes.

02.04.02 Fundamental Computer Science and Information Technology (Major "Data Technology")

The aim of the programme is to provide students with all the necessary knowledge in the field of database design, administration and development. Graduates are in demand in the engineering sector of any industry. Upon graduation, they will be able to pursue careers in such fields as distributed database management, information systems, high load systems, enterprise management systems, data definition languages, software development, etc.

13.04.01 Heat Power Engineering and Thermal Technology (Major "Heat Power Engineering")

Within the programme, special attention is paid to the theory and practical application of heat and mass transfer, recuperators, regenerators, systems and devices for transporting liquids and gases, heating, cooling, ventilation, air conditioning, equipment for thermal power plants, boiler plants, steam and gas turbines, as well as some aspects of application of these systems and their features in various industrial enterprises. These systems are in demand at enterprises of ferrous and non-ferrous metallurgy, mechanical engineering, chemical, oil and gas industries.

13.04.02 Power Engineering and Electrical Engineering (Major "Electrical Engineering")

The research field for this programme is the elements and systems of electrical equipment for cars and tractors. The aim of the programme is to form cultural and professional competencies and focus on training specialists who are able to conduct experimental research, production and technological, organizational and management activities and design calculations at transport enterprises working with automotive electronics.

15.04.06 Mechatronics and Robotics (Major "Mechatronics and Robotics")

The fields of professional knowledge of graduates include the development of new control methods, information processing and the search for new design solutions for mechatronics and robotic systems. Professional activities include: studying new methods of the theory of automatic control, artificial intelligence; theoretical and experimental research in the development of new samples and improvement of existing mechatronic and robotic systems using artificial intelligence methods; development of special software for solving problems of designing mechatronic and robotic systems, etc.

38.04.01 Economics (Major "Commerce in the Foreign Market of Goods and Services")

The aim of the Master's degree programme is to train holders of the Master's degree in Economics to carry out foreign economic activity in industry, trade and services. Students learn about the issues related to the specific character of organizing international business in the domestic market, as well as organizing business in foreign markets, the specific character of organizing an Internet business, explore the possibilities of international investment and financing; they assess the risks in the field of foreign economic activity.

338.04.02 Management (Major "Strategic and Innovation Marketing")

The aim of this programme is to train students in the field of marketing who are capable of developing customer-oriented marketing management structures. Master's degree students learn about the issues related to the forecasting of product market prospects, developing new technologies for promoting products and services, mastering brand management skills, creating and developing brands, managing brand capital, developing marketing plans and programs for introducing new products / brands to the market, rebranding traditional products / services of a company.

445.04.01 Philology (Major "Theory and Practice of the English Language")

Students obtain fundamental knowledge and professional skills in the field

of modern inter-language and intercultural communication. Graduates can carry out research and teaching activities in educational institutions, as well as find themselves in the field of literary and specialized translation, editorial work, project work in cultural institutions, consulting work in the field of linguistic and national politics and interethnic relations in administrative institutions.

In connection with the growing demand for highly qualified specialists in engineering fields and the humanities in the international educational market, 2 more Bachelor's and 8 Master's degree programmes were developed at the beginning of 2019.

38.03.01 Economics (Bachelor's degree programme)

The programme is aimed at training highly qualified managers and specialists with the skills and knowledge necessary to work in companies in international markets. In the process of training, the professional competencies in the field of international economics, finance, international trade and e-commerce are formed and developed. The intensive training is provided in the fields of information technology, supply chain management, sales management and marketing.

15.03.06 Mechatronics and Robotics (Bachelor's degree programme)

The field of professional knowledge of graduates includes the design, research, production and operation of mechatronic and robotic systems for automated production in industrial mechanical engineering. In the course of training, students master to develop software necessary for information processing in mechatronic and robotic control systems and their design; carry out theoretical and experimental research in the development of new samples and improvement of existing mechatronic and robotic systems; perform calculations and design composite devices and subsystems of mechatronic and robotic systems; conduct preliminary tests of prototype components of mechatronic or robotic systems in accordance with the specified programs and methods.

09.04.01 Informatics and Computer Engineering (Major "Internet of Things Technology")

The programme is designed for professionals with basic knowledge of electronic engineering or computer science. Graduates of this programme will be able to work as engineers, software developers, IT architects and team leaders in companies that provide solutions in such fields as Internet of Things (including Smart House, Smart City, etc.), IoT data analytics, computer networks, communications and embedded systems. Graduates successfully work in the world's leading IT companies, such as Microsoft, Google, Yandex, Intel, Sberbank, AirBnB, Facebook, and Kaspersky Lab.

38.04.08 Finance and Credit (Major "Financial Markets and Institutions")

The programme is aimed at training general financial specialists with a versatile knowledge of financial markets who understand modern global financial environment. Graduates acquire the following professional competencies: comprehensive knowledge of the nature, structure, functions and mechanism of financial markets, financial institutions

and instruments functioning; methods of analysis, forecasting of the state and development of financial markets and institutions, risk assessment when making financial decisions; development and justification of a strategy, management of activities in the structure of a financial institution or financial services of a corporation.

01.04.01 Mathematics (Major "Partial Differential Equations")

Graduates are trained to work in the government and corporate sectors, in the field of banking, insurance companies, expert and analytical institutes and centres, industrial enterprises. They are in demand where the knowledge of mathematics is required, the ability to build and use mathematical models, as well as the ability to create and apply computer technologies, information processing and control systems. Graduates of the programme will be able to continue their professional careers both in academic science and in applied research and management.

03.04.01 Applied Mathematics and Physics (Major "Fibre and Laser Optics")

Research work in the field of computer

technology, experimental and theoretical research headed by world-famous scientists are included into the curriculum of the programme. SUSU and RAS institute leading scientists deliver lectures to students. In addition to fundamental knowledge and a scientific base for continuing their postgraduate studies, students get an opportunity to take internships abroad, receive individual research grants and to publish research results in leading Russian and international journals.

04.04.01 Chemistry (Major "Environmental Engineering Chemistry")

The programme includes basic training in organic chemistry with the study of such courses as nanochemistry, supercomputer modelling, chemistry-related environmental problems, etc. Graduates have all the necessary knowledge to carry out professional activities in the field of chemical theory, chemical synthesis, ecology, pharmaceutical and medicinal chemistry and can work in various chemical laboratories, in forensic medical departments, in laboratories of hygiene and epidemiology centres, forensic medical examination, in quality departments and control at pharmaceutical factories, etc.

15.04.01 Mechanical Engineering (Major "Welding Production Equipment and Technology")

Students obtain advanced skills in the field of welding and welded structures modelling, programming of modern welding robots. The programme is focused on in-depth study and modelling of welding and surfacing processes by studying modern design methods, mathematical, physical and computer modelling of welding and surfacing technological processes. Students are offered the topics for their theses by partner enterprises with the possibility of subsequent employment.

38.04.05 Business Informatics (Major "Business Intelligence")

Master's degree programme in Business Intelligence is a multidisciplinary programme that aims to improve business performance and identify new business opportunities through the application of data mining techniques. This programme will provide in-depth knowledge of statistical and machine learning techniques, data mining techniques that will enable business analysts to understand how business works and predict its development and prospects.

42.04.02 Journalism (Major "Media Communications")

The programme was developed in collaboration with the European Journalism Training Association (EJTA). It is based on the international journalistic project EUfactcheck and is focused on training versatile media specialists for the interactive content industry, as well as specialists in the field of information and communications: press offices, advertising and PR agencies, and social media marketing. Graduates of the programme have the competencies of a media planner, media consultant, multimedia storyteller, manager for intercultural communication, media designer, moderator, press secretary, producer, scientific communication specialist, SMM manager, copywriter.

TRAINING OF TEACHERS FOR ENGLISH LANGUAGE PROGRAMMES

From February through June 2019, within the framework of the LINGVA supplementary linguistic training programme, 7 groups of teachers took an EMI advanced training course for subject teachers in the amount of 120 academic hours. The purpose of the EMI course is to develop the necessary competencies among subject teachers to design courses, deliver lectures and conduct seminars in English. This goal was achieved thanks to the teachers of the programme: Olga Yaroshenko, Ksenia Volchenkova, Nadezhda Kuzmina, Ekaterina Nenakhova, Daria Kochkina, and Elizaveta Kravtsova.

An exam was held by the results of the training. Each teacher had to give a lecture in English, which lasted 20 minutes, and to answer questions on the topic of the lecture from the listeners and examiners for 10 minutes. The examiners noted the high level of training of the students and the variety of scenarios and techniques for organizing and conducting interactive lectures. Upon completion of the course, the subject teachers filled out a feedback questionnaire in which they noted that they would be happy to use the learned techniques and strategies in their work, both with foreign and Russian students. In total, 88 teachers studied on the advanced training programme in 2019.



1 Bachelor's degree programme in English were launched in 2019

15 Master's degree programmes in English

SYSTEM OF MEASURES ON ATTRACTING APPLICANTS

The main fields of SUSU activity on attracting applicants are the following: organization of work to form motivation for an early choosing of profession and career guidance work; organization and development of the Olympiads and competitions movement.

PROFESSIONAL TRAINING CENTRES

As part of the work on the formation of motivation for an early choosing of profession and career guidance, SUSU coordinates the work of prevocational training centres, including: Biotechnology Minor Academy; Psyche Academy; Mediageneration Club; Law School; School of a Young Investigator; Engineering School; School of Linguistics and Translation; School of International Relations; and Minor Academy of Chemistry.

Prevocational training centre is the SUSU project aimed at conscious vocational guidance of schoolchildren by immersing students in the profession and project activities.

A feature of the work of the centres is the focus on project activities: schoolchildren can participate in design and research work, SUSU teachers act as professional consultants. Groups of 10-15 people are formed for each field. Training in the centres is free of charge.

DEVELOPMENT OF STUDENTS' TECHNICAL CREATIVITY

SUSU, jointly with the Quantorium Children's Technology Park, has developed and is implementing a set of measures aimed at developing the technical creativity of students in Chelyabinsk and the Chelyabinsk Region. Since September 2019, under the supervision of SUSU academic staff members, children's technical projects have been developed at the Quantorium Technology Park, which take part in various competitions, Olympiads and technical contests. Students of Quantorium visit the SUSU research and education centres and laboratories as part of career guidance excursions and master classes.

CAREER GUIDANCE

The "Horizons of Science" Pre-University educational and awareness-building project is aimed at motivating schoolchildren to study various courses, and helping them choose field of study when entering SUSU. As part of the work of the Pre-University, classes are held to prepare for the solution of Olympiad tasks and difficult tasks of the Final State Examination. Within the framework of the "A 100 Hundred Roads, and One Is Yours" project, meetings were organized and held between the representatives of the SUSU institutes and schools and pupils of 10-11 forms in the cities of Chelyabinsk (96 educational organisations) and Magnitogorsk (23 educational organisations).

The "5 Steps to Choose a University" project is aimed at informing students of educational organisations and their parents about the main stages and specifics of choosing a field of study and an institution of higher education.

SCIENCE POPULARIZATION

The international scientific summer school "Asteroid Safety" was held at the Faculty of Aerospace Engineering in 2019. The participants developed and manufactured a scale model of spacecraft for landing on asteroids with the rational placement of the instruments and propulsion system, developed the appearance of spacecraft propulsion systems performing the necessary calculations, testing the developed spacecraft model on a simulated landing on an asteroid in terrestrial conditions with the condition of providing minimum rebound and safety of the spacecraft elements.

The "Educational Holidays with SUSU" project, which has existed for several years, is carried out jointly with the children's health camps in the Chelyabinsk Region, "Lesnaya Zastava" and "Elanchik". The purpose of the "Educational Holidays" is the formation of the foundations of scientific knowledge in the field of the humanities, natural science research and mathematics; the promotion of the basis of scientific knowledge; the

acquaintance with the main fields of SUSU training through attracting schoolchildren to various forms of intellectual and creative activity.

The project "Easy and Interesting Science" gives schoolchildren of senior forms an opportunity to get acquainted with various sciences, feel the thrill of experiment and understand that we use the knowledge of physics, chemistry, mathematics, sociology and other sciences in our life every day. Participation in the "Days of Science" helps schoolchildren of educational organisations in Chelyabinsk to learn about the current fields of training at SUSU, about the prospects for education and employment.

ORGANIZATION AND DEVELOPMENT OF OLYMPIADS AND COMPETITIONS MOVEMENT

As part of the implementation and development of the Olympiads and competitions movement, SUSU conducts qualifying and final rounds

for the Zvezda (Star) Multidisciplinary Engineering Olympiad. It consists of 16 subjects and profiles, and is included in the List of the Russian Council of School Olympiads. Over the period of 2018-2019, 327936 schoolchildren took part in the Olympiad.

SUSU holds a great number of specialized Olympiads, contests and festivals for schoolchildren. Among them there are "Light Wings" Olympiad; Ural Geological Olympiad; Olympiad on Motor Vehicles and Safety; "I Am a Professional" Olympiad; "RoboFest" Regional Festival; the All-Russian Robotics Olympiad (regional stage); "VMESTE" ("TOGETHER") International Festival of Creativity, etc. ства «ВМЕСТЕ» и др.



INTERNATIONAL ACCREDITATION OF EDUCATIONAL PROGRAMMES

In the first half of 2019, South Ural State University identified an accreditation agency, the Russian Agency for Quality Assurance in Higher Education and Career Development AKKORK.

By Order No. 45 as of April 10, 2019, a working group was formed for the preparation for international accreditation of educational programmes, and an agreement was concluded with the Agency for Quality Assurance in Higher Education and Career Development to conduct international and professional-public accreditation in the 3rd and 4th quarters of 2019. In June-July 2019, the documents, necessary for the international accreditation of the 12.04.01 Instrumentation Engineering programme were formed and sent to AKKORK Agency: an application for international accreditation of the educational programme of higher education, a schedule of external assessment of the quality of education, international accreditation of educational higher education programmes, etc.

From October 7th to 9th of 2019, a full-

time external independent assessment of the quality of the educational programme 12.04.01 Instrumentation Engineering took place. The commission consisted of:

- Erika Soboleva, General Director of AKKORK Agency; Natalia Vetrova, Candidate of Sciences (Engineering), Associate Professor of the Department of Instrumentation Technology of Bauman Moscow State Technical University; senior researcher of Radioelectronics and Laser Technology Department of Bauman Moscow State Technical University, and member of the Academic Council of the Electronics and Laser Technology Department of Bauman Moscow State Technical University;
- Eduard Petlenkov, PhD, Associate Professor of the Department of Computer Systems, Head of the Centre for Intelligent Systems of Tallinn University of Technology, a member of the Council for the Assessment of Qualifications in Information Technology and Telecommunications;
- Vladimir Umanets, Deputy Head of

- the Design and Development Bureau of the Chelyabinsk Radio Plant "Polet".

As part of the face-to-face external independent assessment procedure, the following activities were carried out:

- meeting of the members of the expert team with the SUSU administration;
- interviewing on the issues of social support to students and assistance in employment to graduates;
- acquaintance with the material and technical resources used in the implementation of the educational programme;
- direct assessment of the students' competencies;
- interviewing of employed graduates;
- meeting with employers.

At present AKKORK Agency is preparing expert opinions on the main educational programme declared for the international accreditation.

CENTRE OF ELITE EDUCATION

The Centre of Elite Education was created at South Ural State University in 2017 as part of the Project 5-100 competitiveness enhancement program. The elite education system allows students to gain additional useful knowledge of a higher level, and for graduates - a competitive advantage in employment. The SUSU Centre of Elite Education offers students to enrol into academic elite groups and multidisciplinary elite groups. Elite education programmes implemented in academic elite groups consist of a basic educational programme and special additional elective courses. Multidisciplinary elite groups are formed from students of not one, but several related fields (specialties). Students in these groups attend their regular academic studies and, in addition, receive additional training in elite groups.

At present, there are 211 students in 10 academic elite groups and 74 students in 6 multidisciplinary elite groups. Elite groups are formed from students of the SUSU Institute of Architecture and Construction, the School of Economics and Management, the Institute of Law, the Institute of Engineering and Technology, the School of Medical

Biology, the Institute of Media, Social Sciences and Humanities, and the Institute of Linguistics and International Communications. Since September 2019, the number of fields of work with elite students has expanded.

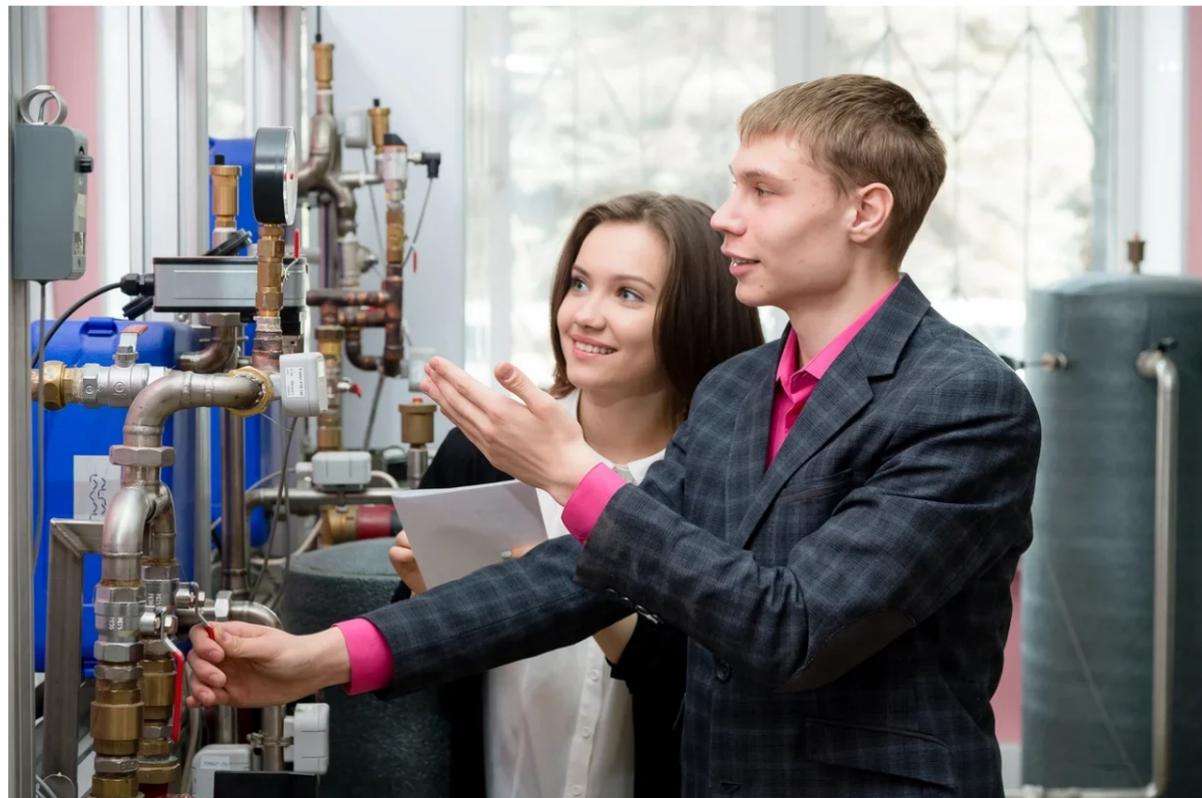
Today, small groups of elite students are assigned to leading professors for research activities (master classes in specialized fields); for elite students, classes are held for in-depth study of the courses in the relevant fields of training (elective courses); the preparation for specialized Olympiads is carried out; lectures are delivered by the SUSU leading professors, as well as seminars are held by employers.

At present, there are 38 elective courses, which are attended by 545 students, including 9 master classes (115 students); 16 elective courses (281 students); 12 classes of preparation for Olympiads (136 students); and 1 employers' lecture (13 students). The number of elite group students is 286.

 **286**
students of elite groups

 **38**
elective courses

 **545**
students attending elective courses



SUSU in Rankings

INTERNATIONAL RANKINGS



QS World University Rankings

✓ 801–1000



QS EECA

✓ 128

The top universities from emerging Europe and central Asia



THE World University Rankings

✓ 1001+



THE Engineering & Technology

✓ 601–800



THE Physical Sciences

✓ 801+



THE Impact Ranking

✓ 301+



The Three University Missions

✓ 801–900



RUR (Round University Ranking)

✓ 791

RUR Technical Sciences

✓ 620

RUR Natural Sciences

✓ 517

RUR Life Sciences

✓ 289

RUR Social Sciences

✓ 631

RUR Medical Sciences

✓ 289

RUR Humanities

✓ 494



RankPro

✓ 330

NATIONAL RANKINGS



Interfax Ranking

✓ 32



RAEX Ranking (100 Top Russian Universities) Ranking of the Top Russian Universities in IT (RAEX)

✓ 58

✓ 28



Forbes Ranking of Russian Universities

✓ 81



Ranking of the English-language Websites of Russian Universities

✓ 15

International Activity

JOINT DOUBLE DEGREE PROGRAMS

Nowadays, joint educational programs, or double degree programs are becoming more and more popular. Such educational programs are implemented by South Ural State University jointly with partner universities from foreign countries. They allow students to obtain a higher education diploma from two universities at once, SUSU and the partner university from a foreign country. Education is conducted both in English and Russian (bilingual education). In addition, foreign students can take a Russian language course. They can also learn the curriculum in advance, and the distance education system provides additional content that allows them to learn the specifics of studying certain educational courses.

At present, SUSU is actively developing relations in the international educational space and cooperating with the major universities in China, the CIS countries and the United States,

including Clark University, North China Electric Power University, Al-Farabi Kazakh National University, China University of Petroleum.

Double Degree programs with Clark University, USA, are especially popular with students. In Russia, the training of Master's degree students is carried out in three profiles: "Geoinformation Systems in Management", "Innovative and Strategic Marketing" and "Human Resources Management". In the United States, students are awarded a Master's degree in IT and a Master's degree in Professional Communications.

The program with the China University of Petroleum "Automation of Chemical Processes in Oil and Gas Industry" combines two fields of training at once and implies students obtaining degrees in two different specialties: "Chemical Technology" (in China) and

"Automation of Technological Processes and Production" (in Russia). Today, 81 SUSU students obtain education under Double Degree programs. In total, the university implements 8 joint educational programs. This training format is rapidly gaining popularity among students, as it represents the path to a successful career; such professionals are in demand in the national and international labour markets.



ACADEMIC MOBILITY PROGRAMS

The academic mobility program is one of the most attractive forms of education for students since participants can gain unique experience and get acquainted with the basics of a future profession in a different linguistic and cultural environment.

Academic mobility programs provide an opportunity to study for one or two semesters at a foreign university, which South Ural State University cooperates with. At the same time, those courses that are studied at a partner university are credited to SUSU upon returning to Russia. This is a chance to get a high-quality higher education and a unique experience of studying in another country, to get acquainted with a new system of education at a foreign university, as well as to learn a foreign language among its native speakers and combine study with travel.

Education is usually offered in English; along with specialized subjects, students can also study the language and culture of the host university's country. Strengthening the students' motivation and position in the labour market, improving the efficiency of

training and the competitiveness of the university, and integration into the global educational space are the integral advantages of academic mobility for both the student and the university.

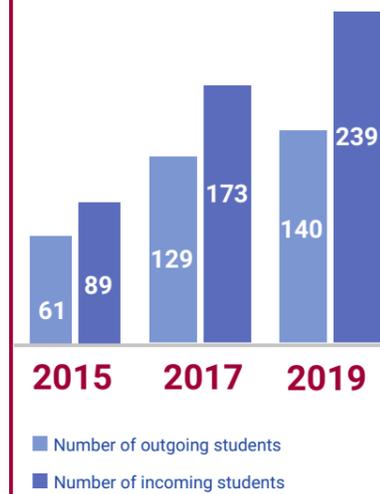
At present, the geography of SUSU cooperation in the framework of academic mobility programs with foreign universities is actively expanding, and students can study in China, Czech Republic, Slovakia, Hungary, Poland, Turkey, Kazakhstan, and Kyrgyzstan. The following foreign universities are SUSU partners:

- China University of Petroleum, PRC;
- Zhejiang Ocean University, PRC;
- Charles University in Prague, Czech Republic;
- University of Economics in Bratislava, Slovakia;
- Eötvös Loránd University, Hungary;
- Bingöl University, Turkey;
- Lodz University of Technology, Poland;
- Al-Farabi Kazakh National University, Kazakhstan; and others.

At present, SUSU implements 61 academic mobility programs with 28 foreign universities. In total, 379

foreign and Russian students took part in the programs in 2019.

Number of students on academic mobility programs



POSTGRADUATE PROGRAMMES WITHIN DUAL MENTORING MODEL

In 2017, postgraduate programmes within dual mentoring model were created at SUSU in order to expand international relations and implement the program of international academic mobility within the framework of Project 5-100. This is a form of international cooperation that helps a young scientist to be engaged in scientific research under the supervision of two scientific leaders from universities in different countries.

Postgraduate students of South Ural State University can defend two theses at once, that is a candidate's thesis in Russia and PhD abroad, as well as conduct research both at SUSU and at a foreign university, what helps not only to establish international scientific contacts, but also to expand the empirical base of research.

At present, postgraduate students in the following fields are studying in the postgraduate programmes within dual mentoring model: "Electrical and Heat Engineering", "Informatics and Computer Engineering". In addition to South Ural State University, they conduct their research at leading foreign universities, including: North

China Electric Power University, Beijing Institute of Technology, Klagenfurt University.

Education at these foreign universities is carried out during the entire period of training in the postgraduate programme. In addition, postgraduates go to universities to take internships and conduct research both for a short time (up to six months) and for a long time, which reaches the full term of study in the postgraduate programme.

SUSU has established partnerships with leading universities, educational and technological centres of the world. Since 2014, SUSU postgraduate students have been conducting research and training at the following universities for 6 months:

- Lappeenranta University of Technology, Finland;
- Aalborg University, Denmark;
- Universitat Politècnica de Catalunya, Spain;
- Saint-Étienne National School of Engineering, France.

Within the framework of grants and competitions, SUSU graduate students were able to take internships abroad

as employees at Uppsala University, Sweden, and Monash University, Australia, in 2019.

Internship programs within the framework of competitions, including those held by the university for the staff members, may include presentations with reports at international conferences, symposia, seminars, visits to world's leading laboratories, promotion of scientific ideas, etc. During the internship, partnerships are established with foreign universities and scientists, new cooperation agreements are concluded.

The advantages of international internships are that postgraduate students independently choose the country of interest and the duration of the program. Based on the results of the internship, scientific articles are published in foreign publications that contribute to the development of the scientific potential of young scientists.



LANGUAGE AND PROFESSIONAL TRAINING SCHOOLS

SUSU international summer schools, in addition to classes in the Russian language, include an extensive cultural program: tours around the city and the region, sightseeing tours, sports competitions, outdoor recreation, etc.

LANGUAGE SUMMER SCHOOL FOR INTERNATIONAL STUDENTS

The Russian Language Summer School is held by the Department of Russian as a Foreign Language of the SUSU Institute of Linguistics and International Communications for students from around the world. It is especially popular with students from China, since after it many of them continue their studies at SUSU in in-demand specialties.

During the summer school, the biggest attention is paid not only to the grammar of the Russian language, but also to the development of speaking and listening skills, what allows students to overcome the language barrier and begin to communicate fluently in Russian on everyday topics.

The training programme is combined with such extracurricular activities as museums, theatres, fishing, tennis, swimming, horse riding, and trips to national parks.

Upon the completion of the summer school, students take an exam on their knowledge of the Russian language, which includes traditional tasks, tests and an interview, which is attended by the representatives of the SUSU schools and institutes. Experts from the SUSU departments help in determining the level of proficiency in the Russian language and suggest choosing one or another major based on the results.

PROFESSIONAL TRAINING SUMMER SCHOOLS FOR INTERNATIONAL STUDENTS

In addition to the language schools, SUSU invites international students to participate in professional training schools. The university organizes summer schools in such fields as information security methods or automation of technological processes, in which students from the

partner universities like China University of Petroleum, Shenyang Institute of Technology, or UNITEN National Energy University in Malaysia take part. Here students are provided with the opportunity to work in the university laboratories with the Delta-V system, Festo equipment, and attend the lectures on digital technologies or renewable energy.

In total, in 2019, more than 100 international students from China, India and Germany became participants in the language and professional training summer schools.

SUSU Summer schools participants



SOCIOCULTURAL ADAPTATION CENTRE

The Sociocultural Adaptation Centre was established within the framework of the 3.3.2. "Developing the Infrastructure of a Bilingual Environment, Forming the Linguistic and Intercultural Competence of Staff Members" project in 2016. It is supporting international students in the educational, social and domestic spheres. The purpose of the centre is not only to help international students adapt, but also to involve Russian students into socially useful work, to form a sense of patriotism in them.

Volunteer movement

In 2019, the staff of volunteers expanded significantly and continued to grow constantly. 111 volunteers were recruited from among Russian students of SUSU; they were interviewed to determine their willingness to work with international students. Trainings are systematically held for volunteers, where they get acquainted with the specifics of working in mixed groups, as well as the basics of intercultural communication. Volunteers are an important part of the team of the centre.

Learning support

The centre's team, consisting of its staff members, as well as of volunteers from the SUSU institutes and schools, actively provides academic support to international students. This support includes consulting foreigners on subjects, preparing for exams, and helping with making notes during lectures.

It is also worth noting that there is a Conversation Club, which has been helping foreign students to overcome the language barrier and speak more Russian for 3 years now. The Conversation Club meetings are very popular with students. Every week, students get together and talk on certain topics, play board games, get acquainted with each other, and make friends.

For 30 students from China, the Institute of Architecture and Construction has launched free additional courses of the Russian language on technical topics. Volunteer tutors work with the Russian language courses groups to help the

teachers and students: there are 15 tutors for 11 groups.

Sociocultural support

Since the beginning of the year, the centre has held over 127 events, including festivals, competitions, excursions, lectures and master classes. Such events help students discover their talents and learn the Russian culture.

Visits to theatres, museums, concerts, skating rink, tours around the city, and tubing have been organized for foreign students and volunteers.

From June 20 through June 25 of 2019, the 7 representatives of the centre took part in the youth forum of the Ural Federal District "UTRO-2019" ("MORNING-2019") at the "International Ural" venue.

The CreaTEAvity program has been created to learn the culture of not only Russia, but also other countries; as part of this program, master classes in dancing, drawing, and crafts are held.



ASSOCIATION OF INTERNATIONAL STUDENTS

The Association of International Students (AIS) has been successfully operating at the university since 2013. This is an association of international students, the main goals of which is to help foreign students in adaptation, in solving problems and issues related to education, accommodation and leisure, to acquaint them with the specifics of the Russian culture, and to develop international friendship. In May 2018, the student organisation expanded its range of interests and acquired the status of the South Ural Association of International Students.

South Ural AIS organizes cultural and mass events with the support of the national diasporas of the Chelyabinsk Region (from Tajikistan, Uzbekistan, Kyrgyzstan, Kazakhstan, Azerbaijan, etc.) and works closely with the consulates and embassies (China, Iraq, Sudan, India, Egypt, etc.), and the Administration of the City of Chelyabinsk. Jointly with them, informational meetings are held, at which issues of concern are discussed and days of cultures are held.

The AIS organizes a number of annual national holidays such as Nowruz, the

Day of Arab Culture, Chinese New Year, the Day of African Culture, and the Day of Eurasian Culture, Tea Ceremony by South Asian students, etc. In 2019, the Day of African Culture became the biggest one among those events, as it was attended by the Advisor for Student Affairs of the Embassy of the Republic of Zimbabwe in the Russian Federation Muponisi Muchechetere Dzapasii.

International students are sports enthusiasts. Tournaments in futsal, basketball, badminton are held annually. In 2019, the shooting competition was a new challenge for the students, which they successfully passed and gained a lot of new emotions and an unforgettable experience.

Grant support from the "Rosmolodezh" Federal Agency for Youth Affairs for the implementation of the South Ural Youth Model of the SCO project was an important event in 2018. More than 230 students became the project participants, who acted as official representatives of the SCO member states and attended the conference to discuss issues on the agenda.

Based on the successful experience of the SCO and BRICS model, AIS initiated the Ural Forum of International Students and Graduates URAL FEST project, for the implementation of which grant support was also received. It was successfully held at South Ural State University on November 14-16, 2019. The event brought together students from different countries, who had chosen Russian universities to obtain prestigious higher education. The experts discussed the specifics of foreigners' studying and living in new conditions, intercultural communication, effective interaction of students, university alumni, and many other issues. As a result of the URAL FEST, a resolution was drawn up and a decision was made to create an Association of International Students and Alumni of the Ural Region.

One of the tasks of AIS is helping international students in their adaptation and the presenting national specifics. This is facilitated by the development of such student projects as "Tutoring", "Ambassador", and "Association of International Alumni".

Tutors are SUSU students who are ready to help new students. Before the start of the academic year, a group of tutors is recruited from among university students who help foreigners at the first stages of their adaptation in a new environment: they accompany them, tell about the specifics of studying at SUSU and the life in Chelyabinsk.

After graduation, the foreigners remain a part of the university and the Association of International Students. In December 2018, the Association of International Alumni was opened. It is a public organisation uniting foreign citizens who studied at South Ural State University created with the aim of representing and protecting common, including professional, interests in order to achieve socially useful goals.

The Association of International Alumni is a space for maintaining ties with the university, exchanging experience, fulfilling professional and creativity potential. Membership helps to keep in touch with the university, gives the opportunity to always be aware of the current successes of the

university. Alumni form the associations in their home countries.

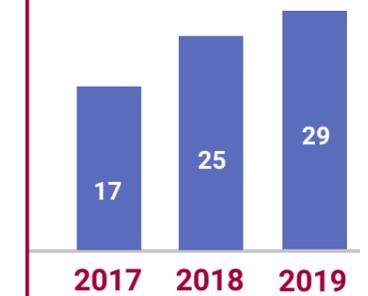
Thus, within a year, organisations have already begun to operate in Sri Lanka, China, and Kazakhstan.

The Association of International Alumni serves as a powerful resource for the dissemination and promotion of the culture, values and technologies of the Russian education. Returning to their home countries international students become the "agents of influence" who replenish the national elite and retain personal loyalty to the countries where they spent their student years, become ambassadors of the Russian education.

Coming to a university, a foreign citizen becomes not only a student, but also the owner of important life knowledge and experience: s/he lives his/her student life all from admission through graduation. It is important for such a student (later, a graduate) that his/her compatriots, who also want to obtain education in Russia, experience less difficulties in adaptation and training while studying at a reliable university. For this purpose, the

Ambassador project was launched. It allows applicants to learn about the real and interesting student life at SUSU firsthand.

Количество мероприятий:



GLOBAL REPRESENTATION

INTERNATIONAL AND TRANSNATIONAL COMMUNITIES

Since 2019, SUSU has been cooperating with the International Association for Media and Communication Research (IAMCR).

On September 9, South Ural State University joined the University Alliance of the Silk Road (UASR).

URAL INTERNATIONAL INTEGRATION CENTRE

On January 8, 2019, the opening of Ural International Integration Centre took place at South Ural State University. SUSU brought together the heads of public associations and national cultural centres of the Chelyabinsk Region, representatives of religious associations of the South Ural region, and legal experts in the field of migration legislation.

On April 22, 2019, the first meeting of the Ural International Integration Centre took place. At the meeting, the chairman of the centre was elected, its members were approved, and agreements on cooperation between SUSU and public associations and national cultural centres of the South Ural region were signed. Based on the signed agreements on the cooperation between SUSU and public associations and national cultural centres of the South Ural region, the members of the Ural International Integration Centre became: Chelyabinsk Regional Social and Legal Public Organisation "Azerbaijan", Uzbek National and Cultural Centre "Bobur", Armenian Cultural Centre, Tajik National and Cultural Centre "Somoniyon", and Kazakh Public Centre "Azamat".

INTERNATIONAL INTER-UNIVERSITY PARTNERSHIP

In 2019, 65 agreements on international inter-university cooperation were signed. The geographical scope of cooperation has expanded taking into account the first partnerships with universities from such countries as Azerbaijan, Bangladesh, Bosnia and Herzegovina, Zimbabwe, Indonesia, Syria, and Turkey.

Today, South Ural State University has more than 300 international agreements and more than 200 foreign partners. Among them are representatives of leading universities and organisations from more than 50 countries of the near and far abroad. Active international cooperation takes place in various fields, including academic mobility of students and teachers, Double Degree programs, internships for students, organization of international conferences, inviting foreign professors to deliver lectures, and participation in joint research projects.

ORGANIZATION OF INTERNATIONAL INTER-UNIVERSITY COOPERATION

Every year SUSU is impressively represented at international forums and exhibitions dedicated to international cooperation.

From March 25th through 29th of 2019, the Annual Asia-Pacific Association for International Education Conference and Exhibition (APAIE) 2019 was held in the city of Kuala Lumpur, the capital of Malaysia. As a result of the SUSU participation in the conference and exhibition under Project 5-100, 7 agreements on international cooperation were signed with universities of Canada, Hungary, Czech Republic, Turkey and Bangladesh.

New partners of SUSU:

- University of Manitoba, Canada;
- University of Pannonia, Hungary;
- University of West Bohemia, Czech Republic;
- Abdullah Gul University, Republic of Turkey;
- Middle East Technical University, Republic of Turkey;
- Bolu Abant İzzet Baysal University, Republic of Turkey;
- Daffodil International University, People's Republic of Bangladesh.

On March 27, 2019, as part of the state visit of the President of the Russian Federation V.V. Putin, the First Forum of Rectors of Russian and Kyrgyz Universities "Development of Science and Education - Investing in the Future"

was held in Bishkek. As a result of the SUSU participation in the Forum of Rectors, 2 cooperation agreements were signed.

As a result of the SUSU participation in the Fourth Silk Road International Exposition in Xi'an (Shanxi Province, China) from May 11th through 13th of 2019, 2 cooperation agreements were signed.

From September 24th through 27th of 2019, the Annual European Association for International Education Conference and Exhibition (EAIE) 2019 was held in Helsinki, Finland. As part of the SUSU participation in EAIE 2019, 70 meetings were held to strengthen the existing ties and find new promising academic partners.

On November 12, 2019, the First Russia-UK University Rectors Forum was held with the support of the Association of Commonwealth Universities and the Russian Rectors' Union, British Council and the British Embassy in Russia. The purpose of the forum is to demonstrate the leaders of British universities the quality of Russian education, the latest trends in the development of science and engineering research, as well as the forms of cooperation, the development of academic mobility programs and the possibilities of co-financing on the Russian part.

VISITS OF FOREIGN DELEGATIONS TO SUSU

In 2018, 55 visits by 158 foreign citizens took place at SUSU, and in 2019, there were 80 visits by 255 foreign citizens.

This testifies to the growth of the university's recognition in the global scientific and educational space. Among the foreign guests who visited SUSU in 2019 were representatives of more than 40 countries. As a result of the visits in 2019, more than 30 delegations discussed the prospects for cooperation with SUSU, more than 30 foreign guests took part in international scientific events of the university, 60 foreign guests took part in national holidays and international festivals, and 16 foreign citizens took training at SUSU.

INTERACTION WITH DIPLOMATIC REPRESENTATIONS

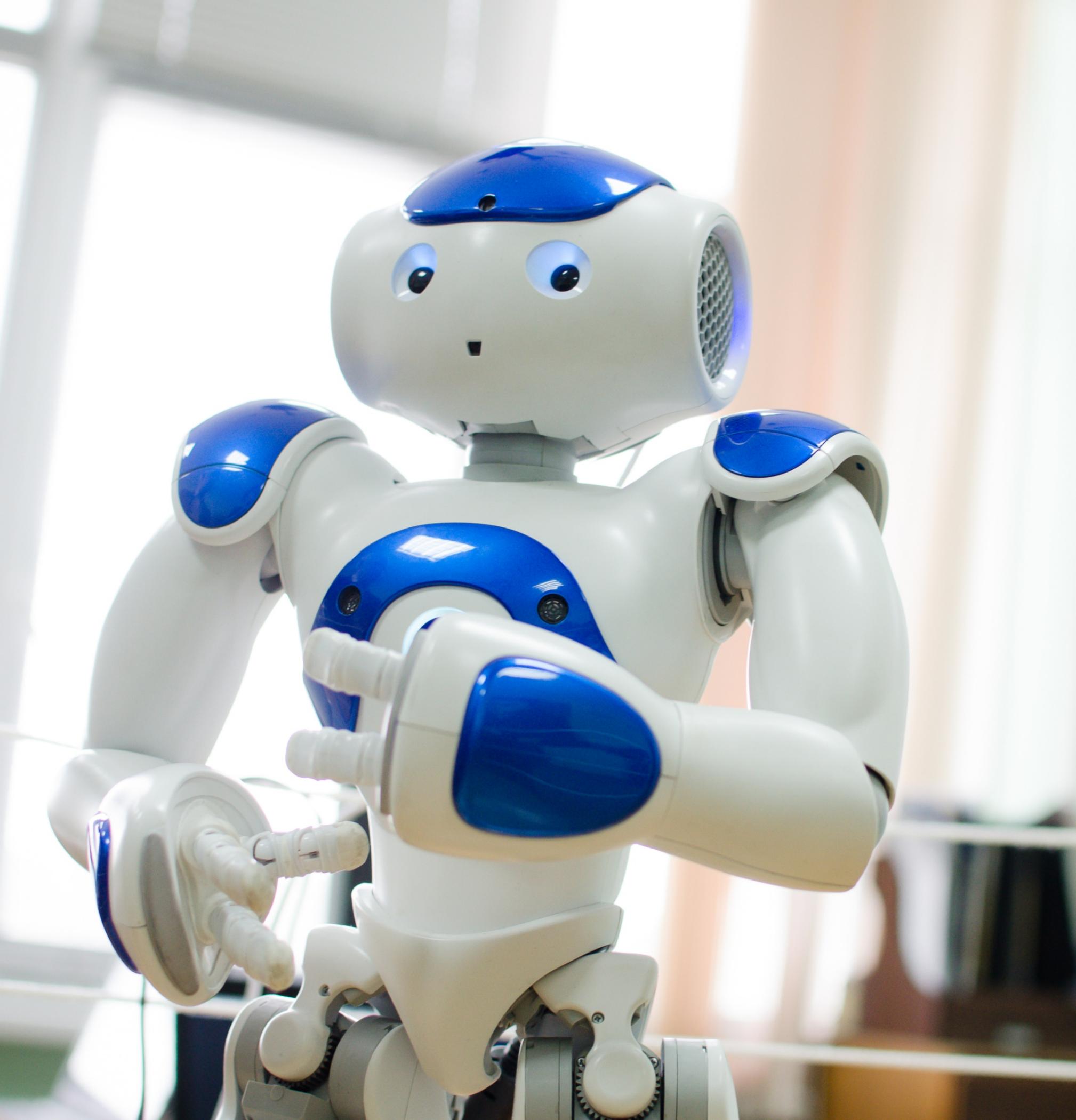
SUSU actively interacts with diplomatic representatives. Thanks to partnerships with embassies (Egypt, Sudan, Iraq, Yemen, Algeria, Syria, Armenia, Azerbaijan, Iran, Mongolia, Jordan and China) and consulates (Great Britain, the USA, and Hungary in Yekaterinburg), SUSU is successfully expanding its international partnerships with universities in other countries and also implements a student enrolment strategy. This contributes to enhancing the competitiveness and promotion of the university at the global level.

In the process of communication with embassies and consulates, the International Relations and Development initiates meetings between SUSU representatives and diplomatic representatives. In 2019, 17 such meetings were organized. It was for the first time that SUSU representatives visited the embassies of France, Sri Lanka, Vietnam, India, Turkey, Morocco, Yemen, Lebanon, Kazakhstan, and Tajikistan.

On September 27, 2019, due to cooperation with the Embassy of Iraq in the Russian Federation, South Ural State University entered into an agreement with the Ministry of Education and Science of the Republic of Iraq. The signing of the cooperation agreement took place within the framework of the official visit of the Minister of Education and Science Qusay al-Suhail to Moscow after a meeting with the Minister of Higher Education and Science of the Russian Federation Mikhail Kotyukov.

In 2019, 10 visits of representatives of embassies and consulates to SUSU took place. For the first time, interaction with the consulates of Germany and Kazakhstan, the embassies of Finland, South Africa and Zimbabwe was organized.





06

SUSU Pushkin
Institute Centre

SUSU Pushkin Institute Centre

STRUCTURE AND DESCRIPTION

Pushkin Institute Research, Education and Coordination Centre, established in accordance with the decision of the SUSU Council, was opened as part of the Action Plan to Support the Russian Language and Education in Russian upon the instructions by the Ministry of Education and Science of the Russian Federation. The centre was created to promote the Russian language and education in Russian in Russia and abroad.

With a view to the implementation of the "Development of Open Education in Russian and Teaching the Russian Language", the forming of a Pushkin Institute partner network with the leading universities of our country, including South Ural State University, was adopted by a Government Decree. The Pushkin Institute partner network is a voluntary association of legal entities that share common approaches to the promotion and popularization of the Russian language and literature, and are also active in

creating conditions for providing access to Russian language learning programmes.

The following foreign universities are also participants of Pushkin Institute Centre partner network: Tianjin Foreign Studies University; Shenyang Institute of Technology; Beijing Language and Culture University; Beijing Union University; Zhengzhou University of Aeronautics; Xuchang University; Zhejiang Yuexiu University of Foreign Languages; Zhejiang Ocean University; and China University of Petroleum. The head organization of the partner network is Pushkin State Russian Language Institute.

The main tasks of the Pushkin Institute Centre are:

- forming of a network of research, education and coordination centres to support the Russian language and education in Russian at educational organisations;
- organizing of a trial period for

educational resources for distance learning of citizens in Russian, including motivating users of target groups to study the Russian language (massive open online courses on teaching the phonetics of the Russian language, a virtual classroom work programme);

- organizing and conducting of classes on programmes of continuing education, including vocational retraining.

RESULTS OF WORK

As part of the work of the centre, a number of activities that should arouse a wide interest in the Russian language and Russian culture among students and schoolchildren are carried out. The contests are not only educational, but also entertaining ones; in the process of preparing and completing assignments students have the opportunity to learn more about the difficult aspects of the Russian language, immerse themselves in Russian culture, and learn the fundamentals of Russian calligraphy.

In 2019, SUSU hosted calligraphy competitions, a project competition, a photo competition, a master class in Russian phonetics, and other events. In addition, as part of the celebration of the 220th A.S. Pushkin Birthday Anniversary, students took part in the #ПушкинWorld festival.

International students and attendees are also regularly involved in organizing and conducting awareness-raising

events and campaigns: days of the Russian language and Russian education; international forums and exchanges, exhibitions, congresses, and Nationwide Dictation Quiz.

Much attention in the centre's activities is paid to the use of innovative technologies in the promotion of the Russian language among foreign citizens. Thus, the research team has developed a software and hardware complex that enables to recognize the language and generate answers in Russian, which is used as an assistant to teachers of the Russian language.

In November 2019, a new professional retraining programme called Translator in Professional Communication (Russian) was launched. Work is underway to complete such professional retraining programme as Theory and Practice of Teaching Russian as a Foreign Language, which will be delivered in distance learning mode.

In total, 58 attendees took up continuing education programmes in 2019, including citizens from such foreign countries as China, Iraq, Jordan, Sudan, Uzbekistan, and Sri Lanka. Also in 2019, 36 attendees from Russia and China entered SUSU's continuing education programmes.



58
graduates of the continuing education programme



36
students entered the continuing education programme



400
hours is the workload under the new professional retraining programme





07

Human Resources
Development

Human Resources Development

LECTURES BY FOREIGN SCHOLARS

South Ural State University regularly conducts public lectures, seminars and master classes by leading foreign teachers, scientists and experts. In 2019, university staff and students had the opportunity to attend lectures by world scholars on environmental problems, materials science, protection against cyber threats and research in fundamental mathematics.

May. During a meeting with students, Professor of the University of Pretoria Jacek Banasiak spoke about the specifics of higher education at universities in South Africa. South Ural State University and the University of Pretoria signed a cooperation agreement in 2018. Both parties are interested in conducting joint scientific research in fundamental mathematics.

September. Professor at Condensed Matter Physics Department of the University of Seville, Spain, and member of the SUSU International Scientific Council Victorino Franco

visited SUSU. Victorino Franco gave a lecture to SUSU's teachers and students on the topic of "Magnetocaloric Effect: From Energy Efficient Cooling to Fundamental Problems of Phase Transitions".

October. During his visit to SUSU, Professor of the University of Southampton, Great Britain, and a member of the SUSU International Scientific Council Andrew Cundy gave a lecture on the search for effective ways to solve environmental problems. He is one of the world's leading experts in the field of ecology, geology and radioactive environment. Ecology is one of the three most important fields of strategic development of SUSU, which is relevant not only for Chelyabinsk, but for the whole world as well.

December. The President and Director General of SMS group Inc., USA, Pino Tesè visited SUSU, where he delivered a lecture to SUSU students and staff

on CO2-free Steel Production Technology – Concept of the Future in the Metallurgical Industry.

December. Lectures and seminars were held by a well-known scientist in computer science with a worldwide reputation - Andrei Tchernykh, Professor at the Ensenada Centre for Scientific Research and Higher Education, Mexico. As part of his visit to the university, he introduced SUSU students and teachers to possible solutions to such pressing problems as optimization of computing resources and methods of protecting cloud storage from man-caused and cyber threats.



НЕ ВЛЕЗЛО

TRAINING OF HIGHLY QUALIFIED PERSONNEL

The total number of postgraduate students in 2019 (as of 01.12.2019) is 549 people. The number of foreign postgraduates is 84 people. The number of fields of study is 26, the number of programmes is 79. TOP 5 in-demand fields of study are: 09.06.01 Informatics and Computer Technology (13.87%); 13.06.01 Electrical and Heat Engineering (12.79%); 15.06.01 Mechanical Engineering (9.01%); 22.06.01 Technology of Materials (7.75%); and 38.06.01 Economics (7.75%).

In 2019, 7 postgraduates won the Russian Foundation for Basic Research grant competition among 2nd-year postgraduates for the best projects of fundamental scientific research carried out by young scientists:

- Ameer Basim Abdulameer Alaasam, scientific advisor is G.I. Radchenko;
- Iu.O. Gubanova, scientific advisor is O.K. Sharutina;
- A.E. Kovalenko, scientific advisor is Iu.G. Kuzmenko;
- A.G. Riazanov, scientific advisor is G.G. Mikhailov;
- A.Iu. Sologubov, scientific advisor is I.M. Kirpichnikova;
- D.V. Sergeev, scientific advisor is I.V. Chumanov;
- A.V. Lut, scientific advisor is A.A. Zamyshliaeva.

Defences in 2019 (as of 31.12.2019):

- R.R. Gimazetdinov, applicant for a degree of candidate of sciences from 01.10.2017 to 30.09.2020. Scientific specialty is 05.04.02 Heat Engines. Dissertation defence was held on 27.12.2019, SUSU.
- T.S. Demyanenko, applicant for a degree of candidate of sciences from 01.10.2018 to 31.01.2019. Scientific specialty is 08.00.05 Economics and Management of National Economy. Dissertation defence was held on 31.01.2019, SUSU.
- A.V. Khlopova, postgraduate student from 01.09.2016 to 31.08.2020. Field of study is 20.06.01 Technosphere Safety, scientific specialty is 05.26.01 Labour

- Protection. Dissertation defence was held on 25.06.2019, SUSU. P.V. Lonzing, postgraduate student from 30.08.2013 to 29.08.2017. Scientific specialty is 05.09.12 Power Electronics. Dissertation defence was held on 22.10.2019, SUSU.
- R.S. Morozov, postgraduate student from 30.08.2013 to 29.08.2017. Scientific specialty is 02.00.04 Physical Chemistry. Dissertation defence was held on 15.05.2019, SUSU.
- N.S. Diuriagina, postgraduate student from 01.09.2014 to 31.08.2018. Field of study is 03.06.01 Physics and Astronomy, scientific specialty is 01.04.07 Condensed Matter Physics. Dissertation defence was held on 15.05.2019, SUSU.
- D.A. Zherebtsov, doctoral student from 01.06.2018 to 31.12.2018. Scientific specialty is 02.00.04 Physical Chemistry. Dissertation defence was held on 18.12.2019, SUSU.
- Ia.M. Ridnyi, postgraduate student from 01.09.2014 to 31.08.2018. Field of study is 03.06.01 Physics and Astronomy, scientific specialty is 01.04.07 Condensed Matter Physics. Dissertation defence was held on 18.12.2019, SUSU.
- A.V. Gollai, doctoral student from 01.06.2017 to 31.12.2018. Scientific specialty is 05.13.10 Management in Social and Economic Systems. Dissertation defence was held on 27.12.2019, SUSU.
- O.V. Varnak, applicant for a degree of candidate of sciences from 13.12.2011 to 30.11.2017. Scientific specialty is 05.16.01 Metallurgy and Heat Treatment of Metals and Alloys. Dissertation defence was held on 27.03.2019, SUSU.
- Zing Zhi, postgraduate student from 01.09.2015 to 31.08.2018. Field of study is 45.06.01 Linguistics and Literary Studies, scientific specialty is 10.02.19 Theory of Language. Dissertation defence was held on 24.04.2019, Ural Federal University.
- Al-Bagdadi Bara Mohsen Hossein, postgraduate student from

- 01.09.2014 to 31.08.2018. Field of study is 01.06.01 Mathematics and Mechanics, scientific specialty is 01.02.06 Dynamics, Strength of Machines, Devices and Equipment. Dissertation defence was held on 26.04.2019, Ufa State Aviation Technical University.
- O.V. Sobolev, postgraduate student from 01.10.2015 to 31.08.2018. Field of study is 40.06.01 Jurisprudence, scientific specialty is 12.00.14 Administrative Law; Administrative Process. Dissertation defence was held on 16.05.2019, Ural State Law University.
- A.S. Domchenko, postgraduate student from 01.10.2015 to 31.08.2018. Field of study is 40.06.01 Jurisprudence, scientific specialty is 12.00.14 Administrative Law; Administrative Process. Dissertation defence was held on 16.05.2019, Ural State Law University.
- E.V. Fedorova, postgraduate student from 01.10.2012 to 30.09.2015. Scientific specialty is 01.10.01 Russian Literature. Dissertation defence was held on 12.04.2019, Ural State Pedagogical University.
- D.F. Khabarova, postgraduate student from 01.09.2014 to 31.08.2018. Field of study is 15.06.01 Mechanical Engineering, scientific specialty is 05.04.13 Hydraulic Machines and Hydraulic Pneumatic Units. Dissertation defence was held on 06.12.2019, Ufa State Aviation Technical University.
- D.G. Uskova, postgraduate student from 30.08.2013 to 29.08.2016. Scientific specialty is 05.18.15 Technology and Commodity Science of Food Products for Functional and Specialized Purposes and Public Catering. Dissertation defence was held on 02.11.2019, Ural State University of Economics.
- A.A. Iaushev, postgraduate student from 30.08.2013 to 29.08.2017. Scientific specialty is 01.02.06 Dynamics, Strength of Machines, Devices and Equipment. Dissertation defence was held on 06.12.2019, Ural State University of Economics.

RECRUITING INTERNATIONAL ACADEMIC STAFF

In 2019, an analysis of the university's needs for the recruitment of international academic staff was carried out.

Constant work is under way with the departments of the university to attract foreign employees to work at the university.

The university's structural divisions receive information and consulting support for attracting and recruiting international academic staff. Work with foreign candidates has been organized with regard to employment process at the university (agreeing the working conditions, terms of signing documents for employment).

A system of service support for highly qualified foreign specialists to be recruited (preparing a work permit for the Russian Federation, meeting at the airport, assistance with checking into superior rooms, migration registration, registration at the place of stay, medical clearance, safety training, etc.) has been organized and is being successfully implemented.

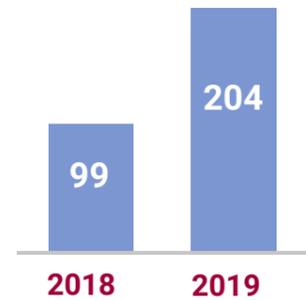
The outcome of the work in this field for the year of 2019 was the employment of 64 new international staff members at the university.

In accordance with the Road Map, the university's key performance indicator, "The share of foreign professors, teachers and researchers in the number of academic staff, including Russian citizens holding PhD degrees received at foreign universities," is 5%. The planned targets for the year of 2019 have been met.

Foreign academic staff working at SUSU



Number of publications in Scopus with the participation of foreign academic staff



RESULTS OF THE SUSU POSTDOC-2019 CONTEST

The third SUSU Postdoc Competition was held in May 2019.

Currently, 17 postdocs from different countries such as Russia, Belarus, Ukraine, India, Croatia, China, Tunisia and Mexico are conducting research at the university.

The competition was held in two stages:

The 1st (internal) stage is a Scientific Project Competition. Applications were accepted from February 4 to 20, 2019. During the competition, the university scientists submitted 15 applications that included a description of a scientific project, for which it was planned to attract young scientists (postdocs), indicating the professional requirements for applicants for a postdoc position. All academic staff members of the university, whose research work was carried out within the framework of the university's priority development fields, as well as within interdisciplinary studies in engineering, Big Data and data mining, natural sciences and mathematics, socio-humanitarian, economic and human sciences, sports and related sciences, had the opportunity to

participate in the competition.

The 2nd (external) stage is a Postdoc Competition. Based on the applications that won at the 1st stage in the project competition, postdocs vacancies were opened at Russian and foreign HR platforms.

The meeting of the competition committee was held on March 18, 2019, at which the applications received within the framework of the Scientific Project Competition, the 1st (internal) stage of the SUSU Postdoc Competition, were considered and selected.

Implementation

All postdoc candidates pre-registered on the job portal "http://ученые-исследователи.рф" (before June 14, 2019) and submitted their applications for a job at the university, after which, as a result of consideration by the SUSU competition committee, they were given preliminary approval for a job of academic researchers on June 27, 2019.

As part of the support service for foreign specialists, complex follow-up support is provided for already employed postdocs in competition procedures carried out under the labour legislation of the Russian Federation: submission of the necessary documents for visa and work permit renewal, medical support, etc. (Prateek Pathak, Bagale Uday Dasharath, Sakthi Dharan (India), Alexey Trukhanov (Belarus)).

10 candidates for vacant positions were given approval by the scientific projects managers.

In 2019, 7 postdocs were admitted to the university, 3 more people will come to Chelyabinsk and will be employed at SUSU in 2020.



39
WoS and Scopus
indexed articles
with postdocs'
participation in 2019





08

University
Brand Promotion

University Brand Promotion

MARKETING AND STRATEGIC COMMUNICATION

The main goal of the Marketing and Strategic Communications Department is to develop and consistently implement the marketing strategy of SUSU, ensure a unified policy in the implementation of the university's marketing activities, plan and organize a university promotion program aimed at increasing its brand awareness, strengthening its image in the global scientific and educational space.

In its activities the department pays particular attention to the development of a communication strategy based on the creation of a promotion program and the formation of a single information agenda for regional, federal, and foreign media, as well as various Internet resources.

During 2019, the university was mentioned more than 90 times in TOP 20 Russian media, including RIA Novosti, TASS, Kommersant, Rossiyskaya Gazeta, Izvestia, etc., what contributed to the active promotion of the university brand all around the country. In total, there were

more than 370 mentions in the Russian federal media in 2019.

Publications in the international media contributed to the promotion of the SUSU brand in the international academic environment and among potential applicants around the world. In 2019, the university was mentioned more than 330 times in foreign media: articles were published in English, Chinese, Arabic, Spanish and other languages.

Within the framework of the Digital Ural concept, 24 articles were published in the federal media. The publications reflected on such topics as the world-class Ural Research and Education Centre, the Digital Economy national project, the Smart City project, which are being implemented in cooperation with the administration of the Chelyabinsk, Sverdlovsk and Kurgan regions, as well as in collaboration with industrial scientific partners.

As for the regional media, the indicators of monthly regional media outreach increased from 10 million to

14 million people. Particular attention was paid to the analysis of such indicator as the "tone of mentions of SUSU" in the media. Today, there are more than 34% positive references to the university in the mass media, and 65% neutral ones.

In 2019, specialists of the Marketing and Strategic Communications Department created and posted more than 2400 publications about the education, research and innovation activities of the university on the website. Prompt preparation of information and video materials for the English and Chinese versions of the website was organized. A test website page in Arabic was created. The geography expanded, and the number of site users from foreign countries increased by 21% (USA, Germany, Iraq, China, Uzbekistan, Kyrgyzstan, Tajikistan, etc.). In the ranking of English-language websites of Russian universities, SUSU is ranked 25th out of 65 universities (Russian International Affairs Council, 2018–2019).

UNIVERSITY MASS MEDIA

SUSU-TV Television and Radio Company

During the 2018–2019 academic year, SUSU-TV Television and Radio Company prepared and presented relevant and useful information about the scientific, innovative, educational, cultural, sports and social activities of South Ural State University. The work of the editorial staff was carried out according to the working schedule. Great attention in the work of the TV company was paid to international cooperation, career guidance, admissions campaign and, of course, Project 5-100. 600 news stories about the activities of SUSU aired, more than 30 interviews with leading world-class scientists were recorded, a new "Golden Section" educational program was launched, more than 40 videos about the structural divisions of the university and 15 advertising videos

about the best students of the university were shot.

Throughout the year, the SUSU-TV Television and Radio Company provided information support to all major events of the university, among which are scientific forums, conferences, sports and cultural events, and following which video diaries or full video versions were created.

The SUSU-TV Television and Radio Company took part in many professional competitions and festivals. So, for example, the company's video program "Tabula Rasa" won the competition of the World Journalism Education Congress in Paris (WJEC-5), and the plots of the program "Avenue of the Young" became the best ones at the Media Challenge 2019 All-Russian Competition.

SUSU Radio Station Teaching Studio

The radio studio of South Ural State University actively covers the fulfillment of Project 5-100.

Over the past year, the radio studio has created more than 300 materials under such headlines as "Our Memorable Day", "Among the Best of the Best" – an event in the life of the institute, "Science at SUSU", "Professor's Hall", "Great Inventions", "From SUSU's Chronicle", and others. Students who are fluent in English work in the Inoveschanie editorial office and create programs in foreign languages.

All radio programs can be listened to in the elevate version of the radio station (radio in the elevator). To promote the university's image, SUSU Radio Station actively uses accounts in social networks: Vkontakte, and Instagram.

Smart University Newspaper

The newspaper has been a corporate university publication for half a century now, working in the educational space, efficiently and objectively covering university life, and preserving the system of moral values and the best professional traditions.

SUSU students take an active part in preparing the materials. Over the 2018/19 academic year, the SUSU newspaper published 24 materials (in printed and electronic form) prepared by students of the Department of Journalism and Mass Communication. For example: "Assembly of Employers" by O. Zubareva, "The Night before the Exam" by M. Dudnik, etc.

Production Photo Studio Laboratory

In 2019, about 200 videos were recorded and more than 11500 photographs were taken in the Production Photo Studio Laboratory. The laboratory created a photobank with the purpose of the production of

popular science programs, educational and training programs, advertising and PR media texts for the university media; as well as to familiarize students with the principles and methods of formatting a media text, techniques of artistic design and editing; to form students' fundamental complex of knowledge and skills necessary for the development of a creative concept and artistic embodiment of photo support for all types of media texts.

In 2019, the Head of the Production Photo Studio Laboratory Oleg Igoshin, having presented his photo under the title "Unity", became the winner of the World Photo Contest in Paris (5th World Journalism Education Congress).

360-Degree Multimedia Newsroom

360-Degree Multimedia Newsroom is a modern world-class digital media complex that made it possible to unite the multi-component information

environment of the university in a homogeneous digital format; provide digital opportunities for processing complex multivariate information; ensure reliable and durable storage of large volumes of media materials; and create advanced technical and technological conditions for the training of universal media specialists of the 21st century.

In the 2018-2019 academic year, about 120 materials were published on the student Internet portal called Newsroom Digital. Among those were the winning works of the "World without Fear Social" Advertising Contest and the "History of the Cities and Provinces of Pre-revolutionary Russia" Young Journalists Writing Contest.





09

Extracurricular Activities

С ЮБИЛЕЕМ
УНИВЕРСИТЕТА

Extracurricular Activities

CREATIVE ACTIVITIES

In accordance with the Action Plan for the Implementation of the Competitiveness Enhancement Program (Road Map) of the university, an important part of the development of the values related to education is the harmonious and holistic development of students and the practices of their socialization in different conditions. The university contributes to this by creating conditions for participation in event-packed extracurricular activities. Every year the Extracurricular Activities Department holds more than 500 events: holidays, festivals, forums, conferences and creativity contests.

The main task of the SUSU Extracurricular Activities Department is to create appropriate conditions for the active life of students, their civic self-determination and self-fulfilment, for maximum satisfaction of the needs for intellectual, spiritual, cultural, creative and moral development.

The Extracurricular Activities Department supervises the work of student self-government bodies, what makes it possible to systematically support student initiatives concerning the implementation of projects and events. The structure of the Student Union comprises two main forms: student councils and student associations. Student councils exist in every school and institute and are involved in organizing the work of student government.

Student associations are structural units of the university level: Mass Cultural Events Committee, SUSU KVN League, Association of International Students, Volunteer Centre, Headquarters of Student Labour Unions, Uralsky Sokol (Ural Falcon) Student Sports Club, School of Sound Engineers and DJs, Tourism Club, Predprinimai (Endeavor), Muzkom (Musical Committee), Ufights

Management Fights Club, Poisk Student Scouting Forces, Debate Club, Young Leader School, Presenters School, and Student Mentoring System. Every year, students represent the university in more than 80 regional, national and international competitions, festivals, forums, seminars, and trainings.

Thanks to the work of the Extracurricular Activities Department and its close interaction with the Student Union, as well as the SUSU Trade Union Committee, the program for the development of the activities of student associations of the university won many competitions.

The victories of students in these competitions, in addition to the possibility of implementing their own ideas and projects, allowed the university to attract additional funding: 9,109,000 roubles were received for the implementation of more than 23 projects in 2019.

KEY EVENTS IN CREATIVE LIFE

During the academic year, the staff and creative teams of the Recreation Centre organized and took part in about 200 cultural, theatrical, entertainment, concert events of the university and other organisations of the city of Chelyabinsk. The teams of the Recreation Centre became laureates of regional, all-Russian and international competitions and festivals. Among these were:

- 7th Russian Jazz and Contemporary Dance Festival-Competition "Jazz Sensation", Ekaterinburg;
- All-Russian Choreographic Art Competition "Dance Unity", St. Petersburg;
- Ural Cup "Thirst for Dance", Chelyabinsk;
- International Theatre Youth Festival "Living Faces", Tyumen;
- All-Russian Choreographic Festival-Competition "Kontur", Ekaterinburg;

- 6th International Contemporary Dance Festival "Dot", Omsk;
- International Festival-Competition under the "Planet of Talents" Project, Chelyabinsk;
- 2nd International Choir Festival-Competition "Slavic Spring", St. Petersburg, etc.

During the year, the Recreation Centre developed scenarios, prepared and held traditional cultural university events of the SUSU faculties and divisions.

Within the frameworks of the Student Philharmonia, the Recreation Centre organized a concert of the Orchestra of the Magnitogorsk Opera and Ballet Theatre on stage of the SUSU Assembly Hall.

 **>1070**
activists in the Student Union

 **>650**
projects and events

 **28**
student associations



YOUNG LEADER SCHOOL

The Young Leader School is one of the most important projects for SUSU. A complex of unique trainings is being implemented within the school platform bringing together the brightest students of the university.

The main goal of the project is to develop the SUSU students' supra-professional competencies and soft skills. It also solves the following tasks: creation of new student projects; training of personnel for the divisions of extracurricular activities; and motivation of students to participate in educational and extracurricular activities.

Today, the Young Leader School is a multi-level structure built over the years, which is developed by the best students of the university jointly with field experts and professionals of the SUSU TOP 500 Advisory Centre.

In 2019, the following training courses were conducted at the School of Young Leaders:

- Final Level "Project" (February, 2019). Its goal is to develop teamwork skills, train and create projects for extracurricular activities.

- The Second Level "Team Leader" (March, 2019). The goal of the level is to develop team interaction skills.
- The Third Level "Self-improvement" (September, 2019). It is aimed at developing skills in setting goals, forming an active attitude of students, motivating them to participate in the activities of the university (cultural, creative, social ones, etc.).
- Basic Level "Leader for Yourself" (October, 2019). The goal of the level is to familiarize participants with extracurricular activities, help freshmen adapt to university life, and develop supra-professional skills. As part of the Basic Level, the organizing committee was trained, including 20 interns and 30 lecturers.
- Bonus Level "TOP Session" (December, 2019). The goal of the level is to develop leadership competencies. Within the frameworks of the Basic Level, 8 coaches of the organizing committee were trained.

In total, 980 students took training at the Young Leader School in 2019. More than 2000 people filled out the

TOP 500 Portfolio tab page.

Activities of the Young Leader School

 **980**
students became participants of the Young Leader School

 **>35**
lectures and practical lessons were given

 **>50**
lecturers and trainers took training



VOLUNTEER MOVEMENT

Volunteer movement is one of the SUSU priority fields within the university's extracurricular activities. Every year the Volunteer Movement Organisation Office organizes many events and projects aimed at developing the competences required of any volunteer working at international events.

On the occasion of the 2020 international events in the Chelyabinsk Region, there is a need to train a quality volunteer division. Developing event-related volunteering is one of the key tasks for our region. The Volunteer Movement Organisation Office developed a multi-level city school for training volunteers to the 2020 international events in Chelyabinsk.

The activity of the three-level school aims at developing the competences of volunteers, allowing them to become part of the team of volunteers, who will participate in organizing the SCO and BRICS Summits and other international events in 2020.

The first level included lectures and introduction and was held for 3 weeks,

March through April 2019. Its goal was to introduce the attendees to the competences required of volunteers, and to select the best volunteers from among students.

Within the second, project level, the fulfilment of volunteer activities as part of training for the 2020 international events in Chelyabinsk by efforts of the school participants was covered. Over the course of two weeks the participants were developing and fulfilling projects within one of the fields of volunteering activities: social, sporting, cultural (arts, urban activities), ecological, event-related, media, and patriotic.

At the third level, an off-site school of intensive courses was held during the 1st session in Olimp Sports and Recreation Camp and lasted 12 days. Students took part in intensive training of the skills required of volunteers: English language proficiency, stress resistance, leadership, technologies of holding briefings, holding of negotiations, creative thinking, and more.

Among the invited experts were speakers with vast experience in holding such big events as: the 2014 Winter Olympics torch relay; the 2015 All-Russian Meeting of Student Labour Teams; the 2016 Russia-Kazakhstan Interregional Cooperation Forum; and the 2018 Forum of the SCO Regions' Leaders.

Thus, the SUSU Volunteer Movement Organisation Office is making a significant contribution to training of the volunteers, who will participate in fulfilling international events in our region in the future.

 **1600**
volunteers took part in various projects



SPORTING ACTIVITIES

Sports is one of the main directions of the SUSU extracurricular activities, and the university strives to provide the most comfortable conditions so that students could successfully fulfil themselves in sports.

SUSU TRAINING AND SPORTS RESOURCES

Today, the university's training and sports resources are among the best ones in our country. The unique complex of sporting facilities includes: SUSU training and sports complex (with the area of 12288 sq. m):

- Olympic-class swimming pool (with the area of 1250 sq. m);
- indoor athletic stadium;
- 2 tennis courts;
- group workout gym;
- 18 gyms;
- Olimpiya fitness centre;
- climbing wall;
- Olimpik children's sports club;
- Medical Centre;
- food services facility;
- massage rooms.

■ SUSU training and sports complex is a recognized sports centre of a nationwide level.

Sporting competitions of the city-wide, regional and nationwide levels are regularly held there.

In addition, it offers specialized training for different population categories. For instance, the Olimpik children's sports club was created to improve the health of children and develop them, as well as programs on choreography, rhythmic, capoeira, a complex health-promoting program with the use of training equipment for children, and a program for children of 1 to 3 years of age.

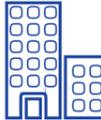
Students are welcome to use the university's sporting infrastructure, allowing them to do any type of sport. Thus, today SUSU offers over 25 sporting directions, including:

- track-and-field,
- ski races,
- orienteering, kickboxing,
- boxing,
- wrestling,
- weightlifting,

- volleyball,
- basketball,
- badminton, and more.

The educational and training processes are being conducted by the highly qualified specialists of the SUSU Institute of Sport, Tourism and Service: doctors and candidates of sciences, honoured workers of physical culture of the Russian Federation, high achievers of physical culture and sports, honoured coaches, and masters of sports of Russia.

 **>25**
sporting directions

 **>12 тыс.**
thous. sq. m is the area of the SUSU Training and Sports Complex



SPORTING ACTIVITY ACHIEVEMENTS

SUSU student Anton Bulaev won the gold medal in compound bow mixed teams at the 2nd European Games 2019 held in Minsk, Belarus, as well as the gold medal at the Napoli Summer Universiade in Italy.

SUSU student Kirill Vorobiev became the winner of the XXIV Best Fighter Kickboxing World Cup in, and also took the first place in the Russian kickboxing championship and competition held in Samara.

SUSU student Iana Rusakova took the first place in the 48 kg weight category (in the Full Contact section) at the X Kickboxing World Cup Diamond in Anapa.

SUSU student Semen Vorobiev also became the winner of the X Kickboxing World Cup Diamond by taking the first place in the 79 kg weight category (in the Light Contact section among men of 19-40 years of age).

SUSU Master's degree student Alevtina Gaitova won the gold medal in the

2019 Open International Judo Tournament in the Memory of V.N. Gulidov held in Krasnoyarsk. The 2019 SUSU graduate Artem Maltsev won the first place in cross-country skiing in the World Cup relay in Lahti, Finland.

SUSU student Kristina Novitskaia won the bronze medal in the 55 kg weight category at the European Weightlifting Championships in Batumi, Georgia. SUSU student Semen Ezhov became the winner of the silver medal in the Standard program at an international tournament in competitive ballroom dancing in Poland.

SUSU students won the basketball tournament at the V Festival of Youth and Student Sports Moscow Games – 2019.

SUSU basketball team won the World InterUniversities Championships in Pula, Croatia.

SUSU academic and administrative staff took part in the traditional 55th Druzhba (Friendship) Spartakiad competition and took the first place

among the Russian universities. For the first time since 1972, SUSU team won the Traditional City-wide Relay Race. The students became the winners of the mixed race and were awarded the Bronze Runner, which is the highest award of the relay. Also, the SUSU team took the first place the men race.

 **7**
gold medals at international Universiades and tournaments

 **2**
silver and bronze medals at international Universiades and tournaments

