



SAMARA STATE AEROSPACE UNIVERSITY
(NATIONAL RESEARCH UNIVERSITY)

**SAMARA STATE AEROSPACE UNIVERSITY:
THE POTENTIAL FOR COOPERATION
WITH SCIENTIFIC AND EDUCATIONAL CENTERS
IN DEVELOPING COUNTRIES**

Rector of SSAU Shakhmatov Evgeniy

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LEADING POSITION OF SSAU AMONG TECHNICAL UNIVERSITIES IN RUSSIA



- ❑ One of the first among 28 innovative universities, which were approved to enter national project “Innovative programs of the institutes of higher education in Russia” in 2006-2007.
- ❑ One of the main object of government investments in project “Development of nanoindustry infrastructure in Russia” in 2008-2010.
- ❑ One of the 29 national research universities in Russia. The status was approved in 2009.
- ❑ One of the 15 universities in Russia, which were approved to enter project “5-100” . SSAU got annual mega-grant from 2013 till 2020 for realization of its Roadmap. Main aim of this project is to enter top-100 in the world university rankings such as QS or ARWU.

SSAU PRIORITY AREA FOR RESEARCH AND EDUCATION



Strategic goal

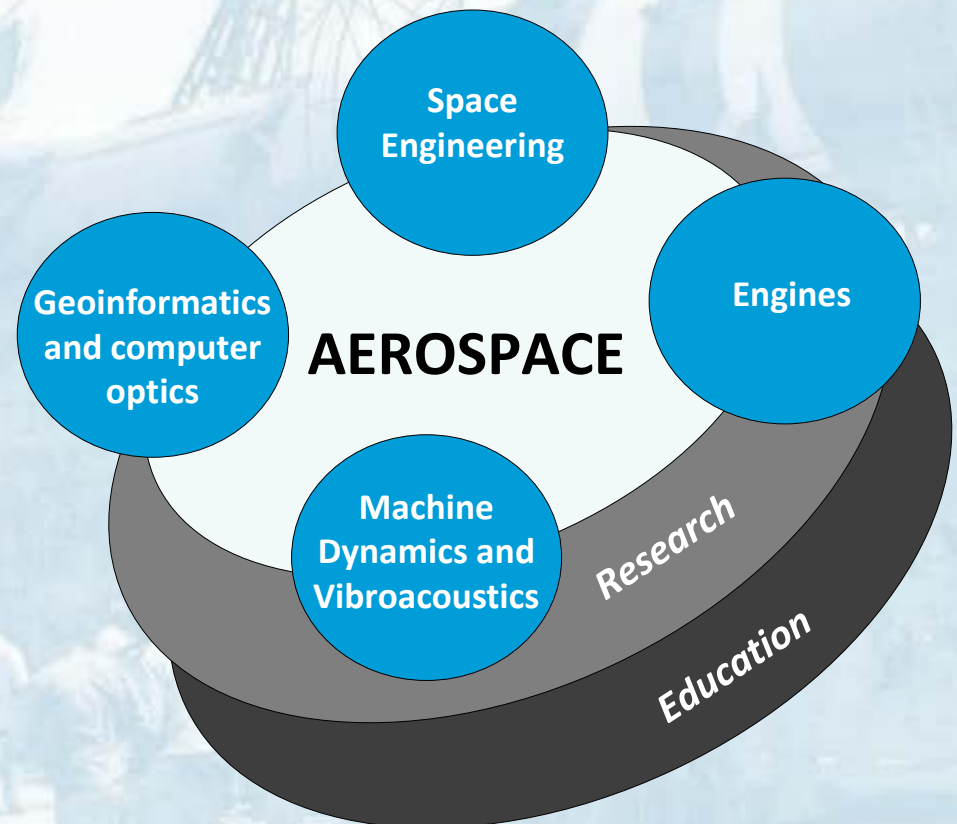
To become one of the world's leading scientific and educational center, and to create an environment in which scientists, designers, innovators and industry leaders will be raised

Vision 2020

- ✓ World's leading research university in aerospace and complimentary breakthrough technologies, included in QS "Engineering and Technology" Top-100 rating
- ✓ International interdisciplinary scientific and educational hub
- ✓ Balance between main competences in aerospace and diversification of scientific and educational activities
- ✓ High concentration of world's leading scientists in breakthrough directions
- ✓ One of the leading positions on the scientific and educational market in segment of high-tech technologies

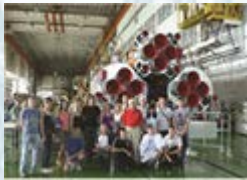
Mission

Generation of new ideas and engineering solutions on the basis of fundamental sciences; transfer of technologies in aerospace and other high-tech economy directions



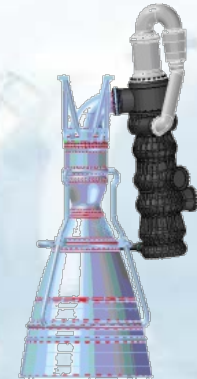
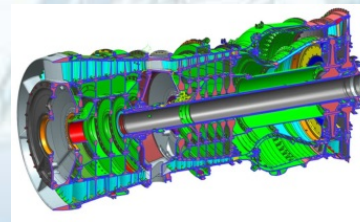
1. Aerospace engineering, technology and materials

- Space engineering
- Space instrumentation
- Materials science and materials technology
- Aeronautical engineering



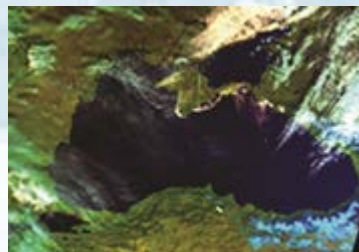
2. Engine engineering, machine dynamics and vibroacoustics

- Engine engineering
- System and process dynamics
- Machine vibroacoustics



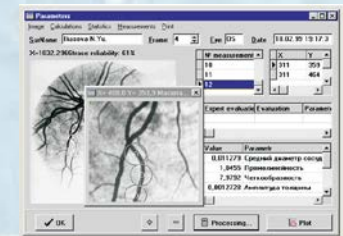
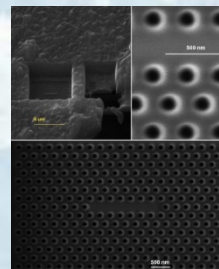
3. Information technology - photonics

- Image processing and computer optics
- Geofomation technology
- Nanoengineering
- Data science
- Applied and computational mathematic



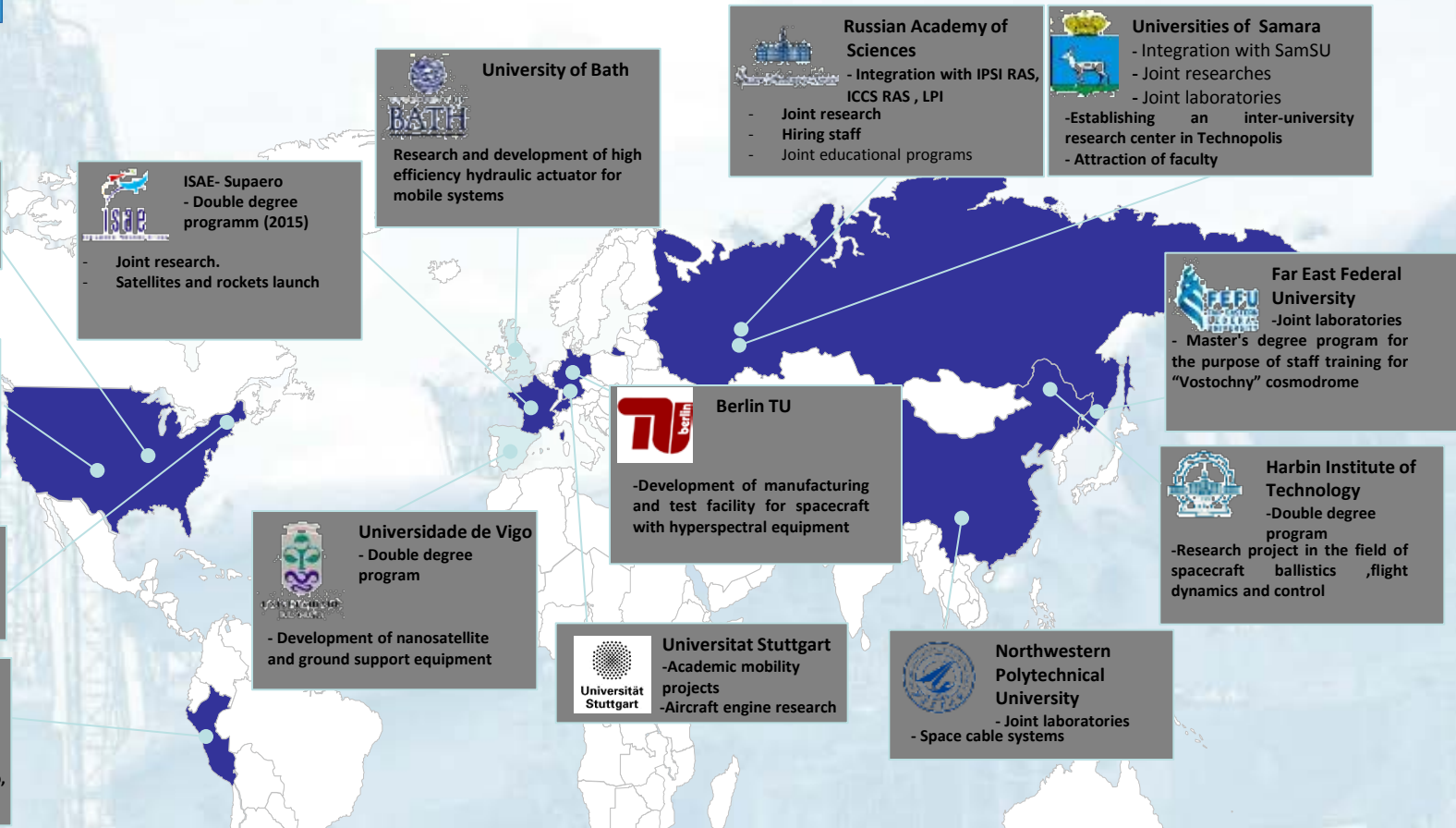
4. Fundamental research for advanced technology

- Fundamentals of engineering
- Fundamentals of physics and mathematics
- Fundamentals of chemistry and biology
- Microelectronics
- Biotechnical and biomedical systems





GLOBAL COOPERATION



▶ Joint researches

▶ Internships

▶ Joint laboratories

▶ Double diploma programs

At the moment we have students from 52 countries

DEVELOPMENT OF TECHNOPOLIS



SSAU organizes the construction process of a new campus and together with the other Samara higher educational institutes it also organizes the construction process of other laboratories and base departments on the basis of Technopolis which is being created by Samara Region Government in the urban district of Samara and providing for the following objects (see Figure below):

- world-class laboratories;
- dormitories for students including postgraduate students, accommodation for lecturing staff,
- social and cultural objects (cultural center, a cinema-concert hall),
- sports facilities (gyms, tennis courts, swimming pool),
- Convention and Exhibition Centre,
- hotel with 250 rooms.



General Technopolis scheme



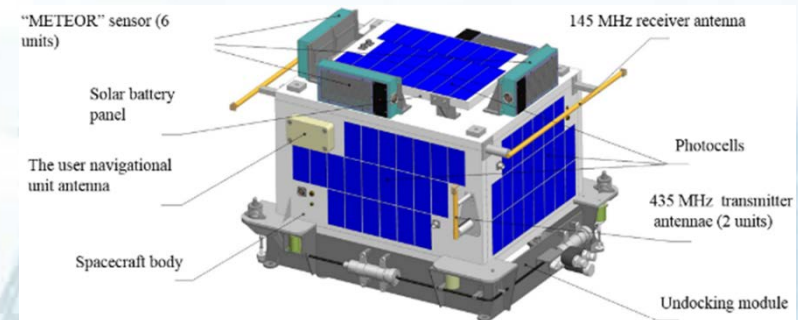
Institute of biomechanics, robotics and nanoelectronics

"AIST" SMALL SATELLITES

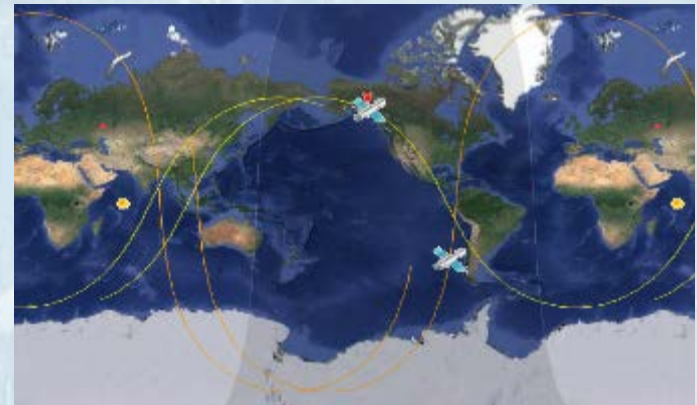


Application:

- development of a unified compact space platform with weight up to 100kg for long-term (up to 3 years) research, technological experimentation and implementation of modern educational programs;
- creation of an information link in the amateur frequency bands for communication of educational and scientific nature from the universities of Samara region to another Russian and foreign universities;
- monitoring the Earth's magnetic field and study of the problems of microgravity. ("MAGCOM" scientific equipment);
- study of the behavior of high-speed mechanical particles of natural and artificial origin, interacting with the surface of the ionization sensor and the estimation of their parameters - mass and velocity ("METEOR" scientific equipment);
- development of the technology of associated launch of a small satellite into a working orbit with a heavy research spacecraft-carrier.



Two "AIST" SMALL SATELLITES were launched in 2013



DEVELOPMENT OF THE PROJECT



In 2013-2015 in cooperation with OJSC PROGRESS SSAU **engineered and manufactured multi-functional small spacecraft for Earth remote sensing "AIST-2"**. The launch of the small spacecraft from the Vostochny Cosmodrome is planned for 2016.



Small spacecraft "AIST-2"



ISO 8,5 cleanroom

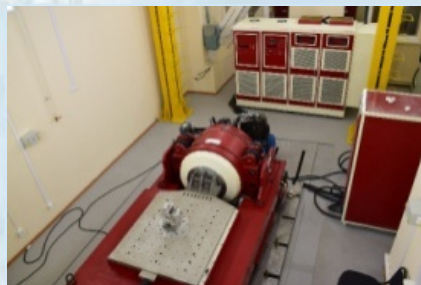


Electric radio testing of "AIST-2"

SSAU has developed manufacturing and testing facility for high-tech manufacturing of small spacecraft which can be equipped with systems for various purposes (electro-optical, hyper-spectral, radiolocation, infrared). The facility is equipped with advanced testing and manufacturing systems.



Verification and checkout equipment for the spacecraft systems



Vibration testing systems



Vibro-dynamic testing of "AIST-2"



Servo-hydraulic test machine



Coordinate-measuring machine

Application

1. precise digital elevation models;
2. agricultural detailed mapping, species composition and forest monitoring;
3. seismic hazard estimation;
4. Prediction of large engineering structure destruction;
5. updating topographic maps (up to the scale 1:10 000);
6. land registry;
7. updating maps of forest exploitation;
8. condition monitoring for hydraulic structures ;
9. thematic mapping (plants distribution, monitoring the condition of the soil resource, accident risk mapping etc.);
10. environmental impact assessment;
11. illegal fishing monitoring.

The basic properties and features of Samara regional databank of space images:

1. continuous addition of the new data,
2. multiscale, multitime and multispectral data,
3. full coverings of region by space images,
4. accuracy of the geometrical matching and geographical binding of images,
5. effective storage and fast access to the data,
6. conducting base of the metadata,
7. connection to the Samara regional geoportal



Space image: Samara region,
Terra satellite



SSAU campus
View from space



Estimation of burned surface area (greenfield area of Tolyatti)

NANOSATELLITE PROGRAMS



In **2016** SSAU is starting Master's degree program
«**Advanced Space Technologies and Nanosatellites**».
Program supervisor – **Prof. Igor Belokonov**



International summer schools

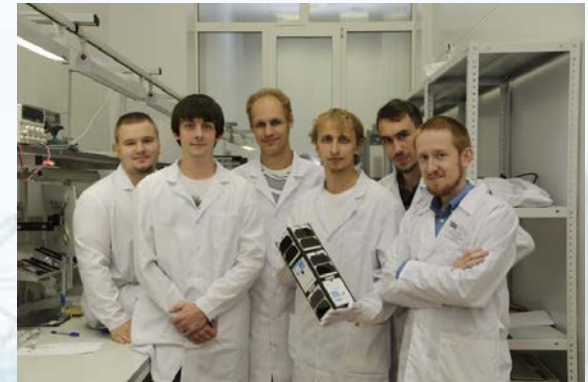
- The school is held annually with the support from OJSC Progress, Volga branch of Russian Academy of Cosmonautics and under the auspices of IAF Space Universities Administrative Committee.
- **Since 2004** the School attracted **200** participants from **Europe, North and South America, Japan**.
- SSAU has developed two-weeks training course in English to promote nanosatellite technology and applications for developing countries. The course will be presented and tested in Ecuador, 2016.
- The XII School will be held under the slogan “From the mission idea to the satellite project”, June 19 – July 07, 2016»



FIRST RUSSIAN NANOSATELLITE CUBESAT3U



SSAU has already engineered first Russian nanosatellite CubeSat3U, which is going to be sent to the orbit during the first launch from the Vostochny Cosmodrome.



SSAU is engineering the second nanosatellite is within the project QB50.

The coordinator of the QB50 project is The von Karman Institute for Fluid Dynamics, Belgium.





1. Enrolling students from developing countries to study the majors in GNSS and nanosatellite technology (Master's Degree and PhD delivered in English).
2. Development of joint projects in nanosatellite technology, consulting in engineering and testing of the nanosatellite onboard systems.
3. Development and delivery of education modules in GNSS and nanosatellite technology in the Regional Centres for Space Science and Technology Education affiliated to the United Nations.
4. Participation of youth from developing countries in SSAU international summer schools.
5. Organizing in 2017 a joint UN/Russian Federation meeting to commemorate the 60th anniversary of space era as well as to serve as an international forum for preparation for the UNISPACE+50 conference.
6. Implementation of "Factory of nanosatellites" international project.



Project “Factory of nanosatellites” (one year program)

First Stage :

Summer Space School “From Mission Idea to Nanosatellite Project”
(establishing student teams, PDR, experts review proposals)

Second Stage:

Autumn Session “ From Nanosatellite project to Construction”
(consulting and help for NS construction, scientific payloads)

Third Stage :

Winter Session “ From Construction to Nanosatellite”
(NS assembly)

Fourth Stage:

Spring Session “Nanosatellite Testing“
(testing on test benches, certificate for launch on carrier rocket Soyuz)



THANK YOU!

Samara

Samara



Samara

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