

CONTRIBUTION OF THE RUSSIAN FEDERATION TO THE CAPACITY BUILDING IN GNSS AND SKILLS TRAINING PROGRAMS IN SPACE SCIENCES AND TECHNOLOGY

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ROSCOSMOS ACADEMY IN RAFU







In 2023, during a visit to Zimbabwe, the Russian-African Network University (RAfU) team proposed a joint project to deploy ground infrastructure and launch a Russian-Zimbabwean satellite for the economic development of the African region

ROSCOSMOS ACADEMY IN CSSTEEAAR. EVALUATION MISSION







Tour of the BMSTU's laboratory centre in Orevo, Dmitrov district, Russia

Evaluation mission's experts, BMSTU team, ROSCOSMOS and Roscosmos Academy representatives in the Youth Space Centre of the BMSTU, Moscow

ROSCOSMOS ACADEMY IN CSSTEEAAR. EVALUATION MISSION





Space Research Institute of the Russian Academy of Sciences, Moscow



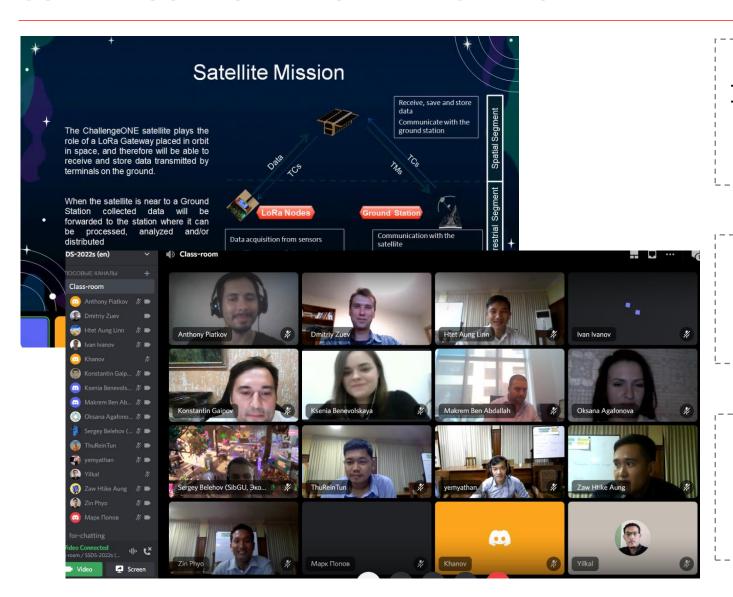
Campus of Samara University, Samara, Volga Region



Evaluation mission's experts (left to right): Mr. HADDADIN, Mr. WADA, Mr. ALYIEV

SOME EDUCATIONAL ACTIVITIES IN 2022





«Space Law and Policy: International and National Aspects»

Advanced theme-oriented course (72 academic hours)

«Siberian Satellite Design School»

Summer / winter school (108 academic hours)



Advanced theme-oriented course (72 academic hours)



UPCOMING COURSE



Name: "Global Navigation Satellite Systems Receivers, Hardware and Software"

Core Discipline: GNSS

Co-organizer: Samara University (in person)

Study Period: October 2022 – June 2023



	Modules
1.	Mathematical Methods in Positioning Tasks
2.	Basics of GNSS Theory
3.	Radio Receivers' Theory
4.	Digital Signal Processing Algorithms
5.	Design and Applications with FPGA
6.	Receiver Technology (SDR)
7.	Altium Designer and PCB Development
8.	Algorithms of Acquisition and Tracking
9.	Position Computations
10.	Introduction to the Aerospace Navigation
11.	DSPs and Hardware

SPACE EXPLORATION THROUGH THE AGES



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PART 1 ALL THE NEWS

ALL THE TIME

SATURDAY MORNING, OCTOBER 5, 1957

DAILY 10e

Polish Capital Swept by Riots

WARSAW, Oct. 4 (4):9 — An estimated 20,000 Poles attitled club-swinging police and militiamen tonight in Central Warsaw, Many of the piotiers shouted for the downfall of Communist Party Chief Wakayaka Garulla.

Two separate clashes left uses and catcalls against the promoting process injuried, government, agread.

Officeholder to

Kuchel Gives Support to Russia Launches First Earth Swept by Riots 20,000 Battle Police and Militio, Shouting 'Down With Gomulka' First Major GOP Satellite 560 Miles Into Sky



by Multiple Rocket;

'Moon' Carried Up



BioFabrication Facility Return to Space

The BioFabrication Facility (BFF) is a steppingstone in a long-term plan to manufacture whole human organs in space. It arrived at the space station in 2019, where it successfully printed a partial human knee meniscus and a large volume of human heart cells. It returned to Earth in 2020. for maintenance and upgrades, including new temperature-controlled printheads that will allow the use of bioink formulations that were not possible in the previous BFF configuration. The BFF is scheduled to arrive back at the space station aboard NG-18 in the fall of 2022. Designed and manufactured by Techshot, a Redwire company, it will continue testing the in-orbit manufacture of cardiac and orthopedic tissue and start a new program aimed at testing the manufacturing of vasculature in space.

Microgravity may hold the key to being able to print human organs successfully. Printing tiny. complex organ structures has proven difficult in Earth's gravity. The BFF aims to print organ-like tissues in microgravity, acting as a steppingstone in a long-term plan to manufacture whole human organs in space.

Liquid Behavior

As we design space systems such as lunar rovers, life support systems, and fuel tanks to support future exploration missions, it is critical to understand and be able to predict how liquids behave in low gravity environments. The Liquid Behavior investigation will study how liquids move in a container in simulated lunar gravity to generate data that can be used to improve lunar rover designs.

The experiment will use the Cell Biology Experiment Facility (CBEF), which can create artificial gravity environments simulating the Moon (1/6 g) and Mars (1/3 g) in the Japanese Experiment Module (JEM) of the International Space Station. A camera will capture video images of liquid behavior under these various gravity environments.

On Earth, liquid and gas with different densities are easily separated, however it has been observed that bubbles form and remain in the liquid in a low gravity environment, which can impact the performance of things such as fuel cells.

Numerical simulation models are compared and correlated with the images recorded in this investigation to improve accuracy of the numerical simulation technology that is used for designing lunar rovers and other space systems

Project EAGLE

Heart disease is the number one cause of death in the United States. Heart stem cells could provide a sustainable source of cells to treat heart disease, and to act as a cel source for drug discovery and safety testing back on Earth. Microgravity may hold the key to increasing stem cell production, improving cell viability, and accelerating the maturation of heart stem cells. The Project EAGLE investigation will study how spaceflight affects properties of heart muscle cells derived from stem cells in an aim to establish a functional heart tissue model that mimics heart disease and can be used to test new drugs.

In microgravity, cardiac cells can grow into 3D cultures that have better structural maturation. compared with 2D cultures grown on Earth.

Heart cells derived from human induced pluripotent stem cells (hiPSC-CMs) exhibit key physiological responses to pharmaceuticals being tested on them and can overcome the limitations of animal models being currently used.

However, these cells resemble heart cells at an immature stage, which limits their use in modeling cardiac diseases and other applications. Developing strategies to accelerate the heart stem cell maturation could have a significant impact on research capabilities.

This investigation is a follow-on study to the 2020 investigation, MVP Cell-03

CARDIORREATH

Keeping astronauts' hearts and lungs strong and healthy during long-duration space missions is critical for successful exploration. The CARDIOBREATH investigation from the Canadian Space Agency studies how the cardiorespiratory system deconditions and affects the control of blood pressure in a weightless environment and aims to help researchers develop ways to keep astronauts

A custom-fitted Bio-Monitor shirt will track crew members' heart rate, blood pressure. breathing rate, and activity level while they perform cycling exercise sessions in orbit, as well as during brief resting periods before and after the activity. Results will be compared to measurements taken before and after the astronauts' missions

The changes that occur in space flight are similar to those seen in humans as they age on Earth. What we learn from CARDIOBREATH could also be used to improve the health of elderly patients on our home planet.

CARDIOBREATH is a Canadian Space Agency investigation that uses the Canadian-made Bio-Monitor smart shirt system that is designed to monitor astronauts' vital signs in space



Crew Dragon Mission 5 (Crew-5) **Patch Description**

A fire-breathing, five-shaped dragon propels NASA Crew-5's Crew Dragon beyond the confines of a pentagon's outline and into low Earth orbit. As the spacecraft ascends above the Earth's atmosphere and its crew of courageous explorers embarks on their expedition aboard the International Space Station, the dragon's fire transitions to the colors of NASA's Commercial Crew Program representing the unrelenting efforts of the many teams who have met this challenge with unparalleled determination. The sun shines its light on this international team as they bravely pursue scientific advancement and international collaboration for the future of humanity.

CENTRE FOR SPACE SCIENCE AND TECHNOLOGY EDUCATION FOR THE EURASIAN REGION

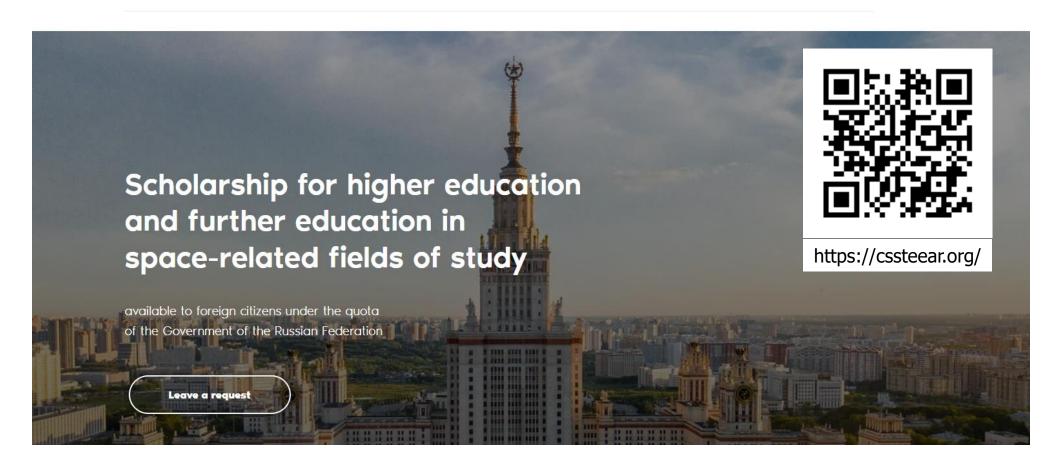




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EDUCATIONAL ACTIVITIES . OPEN COURCES . CONTACTS







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