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

Ms Kseniia BENEVOLSKAIA  
Center for International Cooperation, ROSCOSMOS Academy

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October, 2022



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



**Satellite Mission**

The ChallengeONE satellite plays the role of a LoRa Gateway placed in orbit in space, and therefore will be able to receive and store data transmitted by terminals on the ground.

When the satellite is near a Ground Station collected data will be forwarded to the station where it can be processed, analyzed and/or distributed

**LoRa Nodes** → Data → Satellite → TCs → Ground Station → TCs → TMs → Satellite

Receive, save and store data  
Communicate with the ground station

Data acquisition from sensors  
Communication with the satellite

Spatial Segment  
restrial Segment

Class-room

Participants: Anthony Piatkov, Dmitriy Zuev, Htet Aung Linn, Ivan Ivanov, Khanov, Konstantin Gaipov, Ksenia Benevolskaya, Makrem Ben Abdallah, Oksana Agafonova, Sergey Belehov (SibGU, Эко...), ThuRein Tun, yemyathan, Zin Phyo, Mark Ponoov, Khanov, Yilkal.

## «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)



## «Peaceful Aspects of Space Exploration»

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




	<b>Modules</b>
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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**Los Angeles Times**

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**ALL THE TIME**

VOL. LXXVI      IN FOUR PARTS      CC ★      SATURDAY MORNING, OCTOBER 5, 1957      44 PAGES      DAILY 10¢

## Polish Capital Swept by Riots

### 20,000 Battle Police and Militia, Shouting 'Down With Gomulka'

WARSAW, Oct. 4 (AP) — An estimated 20,000 Poles, armed club-wielding police and militiamen tonight in Central Warsaw. Many of the rioters shouted for the downfall of Communist Party Chief Wladyslaw Gomulka.

Two separate clashes left a number of persons injured, including some women. It was the second straight night of rioting in the ten-year-old Polish capital.

**Police Fire Tear Gas**  
 An estimated 1000 steel-belted police and workers' militia charged with clubs and fired tear gas bombs to try to break up the rioting. The mobs fought back with their bats, rocks and paving blocks.

A United Press correspondent said members of the workers' militia pulled sledgehammers from streetcars and beat them. He said he saw as many as 2000 rioters. Rioting flared viciously for hours and was still in progress way late tonight. Students surged into the streets and were joined by adults.

**Pent-up Fury Breaks**  
 Pent-up fury burst after rioters moved to break up a silent protest rally called by the "Polysthetic High School." The rally was called in part, against the closing of the anti-Soviet student newspaper "By the Sword." Police charged with clubs and beat off the demonstration, but another crowd of 1000 formed and marched to the central committee headquarters in the Polish Communist Party Government House. They were trying to stop the march. At 8:15 p.m. the march broke up. Whistle-blasted.

## Furks Challenge Russia to Drop Mideast Policy

### Firmly Deny Plotting to Attack Syria; Suggest Moscow Stop Sending Arms

ANKARA, Oct. 5 (Star)—Countries is desired, as you (7) — Turkey today in your message "The Turkey project is not a 'demonstration' of planned aggression of a policy pursued in the Middle East, and especially in Syria, would present the text of a letter on Premier Bulganin's Sept. 13, accusing Turkey of threatening to provoke a third world war by making claims on the Syrian border.

The Turkish note said: "On this occasion we wish to state once again and most firmly, we do not have the slightest aggressive intentions toward any of our neighbors."

Other Mideast news on Page 5, Part 1.

## Kuchel Gives Support to Knowland

### First Major GOP Officeholder to Take Sides in Battle

BY ROBERT BLANCHARD  
 U.S. Sen. Kuchel, a 20-year-veteran of California political warfare, yesterday threw his unqualified support behind U.S. Sen. Knowland in his coming campaign for the Governorship.

In doing so, he became the first major officeholder to take sides in the approaching battle with the liberal Knowland and Gov. Knight for the GOP nomination.

**Action Defended**  
 Police cordoned the Polytechnic High School and arrested students were caught inside the school building. The Communist Party in Poland, he said, had been faithfully presented the economic and political situation in the country, propagating a false picture of the situation.

**Keenly Expected**  
 He pointed out that he has known the senior Senator for more than 20 years and has served with him in both the State Legislature and the U.S. Senate.

**Send From Home**  
 The telegram, sent from Kuchel's home in Anaheim, reads: "I have just read your (Thursday) announcing your candidacy for Governor."

**BY FRANK FINCH**  
 Times Staff Representative  
 MILWAUKEE, Oct. 4 — New York's world champion retained his title as World Series warzone here today, as the Yankees and the Red Sox battled in the seventh inning.

## Cool Weather Continues as High Hits 75

Cool weather continued yesterday as temperatures in the Midwest fell to 75 to 76 degrees at 12:30 p.m. There will be little change in the weather through the week.

Scattered clouds are present, but no rain is expected. A cold front is moving toward us from the northwest.

Relative humidity yesterday ranged from 86% at 10 a.m. to 45% at 12:30 p.m.

## Russia Launches First Earth Satellite 560 Miles into Sky

MOSCOW, Oct. 5 (Saturday) (AP) — The Soviet Union announced today it has the world's first artificial moon streaking around the globe 560 miles out in space. A multiple-stage rocket launched the earth satellite yesterday, the Russians said, shooting it upward at about five miles a second.

They said the satellite, a globe described as 23 inches in diameter and weighing 185 pounds, can be seen in its orbit with glasses and followed by radio through instruments in cars.

**Victory for Russia**  
 In thus announcing the launching of the first earth satellite ever put in a globe-girdling orbit under man's control, the Soviet Union claimed a victory over the United States. The two big powers had been in a hot, but mainly secret race to be first to probe space with spheres laden with instruments.

**Space Travel Predicted**  
 "Artificial earth satellites will pave the way for space travel and it seems that the present generation will witness how the freest and conscious labor of the people of the new Socialist society turns even the most daring of man's dreams into reality."

**TEAMSTERS ELECT HOFFA PRESIDENT**  
 Defiant Delegates Run Over Opposition, Dare AFL-CIO to Fulfill Expulsion Threat

MIAMI BEACH, Oct. 4 — The International Brotherhood of Teamsters defiantly elected controversial James R. Hoffa its president here today over the weak opposition of two reform candidates.

Results of the first poll call vote — 1208 for Hoffa, 312 for William A. Lee, Chicago, seventh-ranking vice president, and 140 for Thomas J. Haggerty, secretary-treasurer of a Chicago milk wagon drivers' local — gave Hoffa a 2-to-1 margin and justified his victory prediction. He needed only a plain majority of the 1524 eligible delegates.

## State of Siege Proclaimed in Buenos Aires

BUENOS AIRES, Oct. 4 — The Argentine government, troubled by labor unrest, announced tonight it has declared a state of siege in Greater Buenos Aires.

Hurdling in one jump the gap between ninth, vice president in the 150-member state of siege was declared today that is expected to help the right-handed bid for the election result as a mandate to dare the AFL-CIO sabotage in connection with the military guard around the Trainers until Oct. 24 increased tonight.

The AFL-CIO had given planes are on strike, was to dump Hoffa, retiring President Dave Hoek, Vice (that about 150 labor leaders had been arrested under the

## 'Moon' Carried Up by Multiple Rocket; Radio Signals Heard

In New York radio signals on the wave length of the Soviet moon — sounding as a deep "beep, beep, beep" — were picked up by electronic engineers of the National Broadcasting Co. The British Broadcasting Corp. in London reported similar reception.

**Will Launch More**  
 The observatory is the central point for collection of data on satellite observation by teams of "moon-watchers" in many parts of the world.

The Russian broadcast said the Soviet Union plans to launch several more earth satellites in the next year. It declared the development will open a way for travel to the planets.

Moscow said the satellite is fitted with steel rod transmitters continuously sending signals earthward on the 15- and 7.5-meter wave lengths and easily received by a broad range of amateur sets. Its announced weight of about 185 pounds is more than eight times the weight of a projected U.S. earth satellite.

Moscow described the signals as of about 3/10 of a second long with a pause of the same length. The two frequencies alternate in signaling, Moscow radio said. The broadcast said Soviet satellites planned later will



Josh Cassada      Nicole Mann      Anna Kikina      Koichi Wakata

## BioFabrication Facility Return to Space

The BioFabrication Facility (BFF) is a stepping-stone 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 pinheads that will allow the use of biotink 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 stepping-stone in a long-term plan to manufacture whole human organs in space.

## 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 cell 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

## CARDIOBREATH

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 healthier in space.

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 five 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 intrepid team as they bravely pursue scientific advancement and international collaboration for the future of humanity.





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Email: [international@rcacademy.ru](mailto:international@rcacademy.ru)

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