



Announcement

BSUIR will take part in the exhibition of scientific and technological achievements, dedicated to the Belarusian Science Day of 2025

January 23, 2025

Presidium of the National Academy of Sciences of Belarus

On the occasion of the Belarusian Science Day, on January 23, 2025, the Presidium of the National Academy of Sciences of Belarus will host a republican meeting of the scientific community and an exhibition of scientific and technical achievements of universities and scientific organizations of the Republic of Belarus.

Scientific and technical developments of the Belarusian State University of Informatics and Radioelectronics will be introduced at the exhibition in three sections.

Section 1: "Industry 4.0, microelectronics, artificial intelligence":

High-frequency signal generator G4-MVM-37.

BSUIR produces a line of signal generators in the operating frequency ranges: 0.01...18 (20) GHz / 18 (20)...25.95 GHz / 25.95...37.5 GHz / 37.5...53.57 GHz / 53.57...78.33 GHz / 78.33...118.1 GHz / 118.1...178.4 GHz. The generators are used to check and adjust microwave equipment, including as part of automated measuring systems. They are included in the national standards of power and attenuation of electromagnetic oscillations.

Advantages:

- low installation error and frequency instability;
- formation of a short radio pulse;
- original software;
- modern component base.

The generators are included in the Belarusian and Russian registers of measuring instruments. The Eurasian patent for the invention "Wide-range signal generator", the design scheme of which is used in these generators, took the 3rd place in the competition "The Best Patent of Belarus – 2024".

All-weather long-range vehicle radar.

Designed to prevent collisions of large vehicles (MAZ, KAMZ, BelAZ) with a maximum detection range of at least 250 m.

Advantages:

- high level of localization;
- a unique manufacturing technology and tuning method for a digital radar antenna array;

– the design of the radar was developed taking into account the features of integration into various types of large-sized vehicles;

– open software and hardware level.

Developed and manufactured within the framework of the State Program “High-tech and Engineering” for 2021-2025. The prototype radar has successfully passed tests. A set of working design documentation of the letter “O1” has been developed for the manufacture of an installation batch. The development of a domestic automobile collision avoidance radar in production will allow for the import substitution of devices of this class.

A training complex for studying programming of embedded systems based on the STM32 microcontroller, it allows you to independently master programming skills in conditions close to real production, using the “from simple to complex” principle.

Finalist of the national project “100 Ideas for Belarus 2024”. Used in practical classes on the subject “Embedded systems”.

Potential consumers: institutions of higher and secondary education.

Section 2: “Medicine and Pharmaceutics”:

The software for automatic calculation of orbit parameters is designed to automate the process of diagnostics and preparation for surgery to replace damaged orbital bones in clinical hospitals in Minsk. The program is based on a unique method of automated calculation of orbital dystopia levels using artificial convolutional neural networks.

The tasks to be solved: automation of quantitative analysis of orbital CT scans to eliminate manual measurements and increase standardization of orbital metrics; support for preoperative planning in ophthalmic and maxillofacial surgery.

Potential users: ophthalmological departments of clinics, hospitals, medical research and educational institutions.

The offset printing quality control system is a hardware and software complex built into an offset printing machine without making any changes to its design. It is designed to detect and indicate the presence of defects in offset printing products (for example, on paper packaging for medicines). It allows to reduce the number of defective products by automating quality control operations.

Tasks to be solved: automation of detection of printing defects (1 mm) using machine learning technologies, which eliminates the need for manual control.

Potential consumers: publishing houses, packaging production companies, quality control departments.

Section 3: “Ecology and Biotechnology”:

Photonic sensors operating on the SERS effect.

They are designed to increase the sensitivity of the Raman scattering spectroscopy method used for molecular analysis, up to the detection of single molecules and cellular structures in the fields of biomedicine, pharmaceuticals, sanitary and epidemiological control, ecology, forensics and others.

Activation and a sharp increase in the sensitivity of the sensor is achieved by express self-formation of silver nanoparticles as a result of slight heating immediately before applying the liquid under study and conducting its analysis using Raman spectroscopy. This approach prevents degradation of the morphological parameters and optical properties of the sensor and increases its shelf life.

This development took 1st place and received a gold medal at the Competition of the best innovative projects of the International Innovation Exhibition "HI-TECH 2024" (Russia).

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