



**Белорусский государственный университет  
информатики и радиоэлектроники**  
Научно-исследовательская часть

## Announcement

### Exhibition-forum of IT-Academgrad "Artificial intelligence in Belarus"

October 13 - 14, 2022 г.  
Minsk, Belarus.  
National Academy of Sciences

#### About the exhibition-forum:

The organizers are the National Academy of Sciences of Belarus and the State Scientific Institution "Joint Institute for Informatics Problems" of the National Academy of Sciences of Belarus.

In the frames of the forum it is planned to arrange an exhibition of significant developments in the field of artificial intelligence and robotics, as well as to ensure thematic sector and round table operation.

#### Thematic:

- theoretical and practical state of AI;
- training of qualified personnel for the development and implementation of AI technologies;
- prospects for the development of AI in Belarus.

#### At the exhibition BSUIR will demonstrate

##### Intelligent metasystem "OSTIS"

It is represented by an intelligent metasystem for new generation intelligent systems design support, the data base of which contains:

- OSTIS technology standard, including models, methods, and design tools for new generation intelligent systems;
- libraries of multiple use components of intelligent systems;
- OSTIS technology education materials;
- description of applied systems examples built on the basis of OSTIS technology.

#### About the developer

## Specialized expert system «EMC-Analyzer»

The equipment is designed for examination and problem solving of intra-system electromagnetic compatibility (EMC) in local air-borne and on-board radioelectronic complex systems.

### Advantages:

- allows to solve EMC problems at the system level;
- it is capable of analyzing complex radioelectronic systems with thousands of parasitic connections in a reasonable time (up to several hours) using a conventional PC;
- it is able to calculate the necessary adjustments of the spectral characteristics and susceptibility characteristics of the equipment to ensure linear EMC;
- it is able to detect sources of non-linear interference in radio receivers;
- takes into account all existing parasitic electromagnetic connections;
- it is suitable for all life cycle stages of radioelectronic systems: preliminary studies, design, system operation technical support, modernization.

## Specialized expert system «E3-Analyzer»

The equipment is designed to analyze and ensure the security of complex on-board and ground based radioelectronic systems from the external electromagnetic environment influence, including intentional and unintentional continuous and pulse electromagnetic effects.

### Advantages:

- automated determination of criteria and system damage level evaluation (interference, degradation, failure);
- automated protective solutions selection;
- ease of analysis and expert evaluation of complex systems electromagnetic security;
- high speed simulation in the frequency and time domains;
- convenient to develop protection from electromagnetic influences;
- wide frequency range of analysis (from 25 Hz to 40 GHz).

## About the developer

### Decision support system for evaluating technical conditions of complex mechanisms and assemblies (devices)

The system is designed to evaluate technical conditions of complex mechanisms and assemblies (devices) based on the vibration parameters. Decision-making system is built on the basis of a universal decision-making element and is represented by a computer measuring and calculating system which consists of the following elements:

1. PC,
2. primary vibration channels,

3. analog filtering unit,
4. typical ADC module with a standard computer bus,
5. mathematics and software.

**Advantages:** it is possible to set up automatic protective shutdown for turbines with the individual vibration parameters of bearing supports.

### About the developer

### Mobile application «ALS Expert»

Mobile application is designed to evaluate the voice function condition in patients with amyotrophic lateral sclerosis

### About the developer

### Student developments

### Targeting, Recognition, and Identification System (T. R. I. S)

It is represented by a software for reception and processing of statistical and actual information at different events, as well as in different facilities to analyze the participants and events. High information report completeness and high precision while operating in real time are ensured. The system is focused on working with customer equipment.

### Software and hardware complex for controlling a robotic arm "Roboruka-P1"

Software for controlling a robotic arm "Roboruka P1" was developed. All its movements are controlled by a layout based on the STM32F4DISCOVERY debug board. The arm is capable of drawing and writing text according to a given template.

Roboruka P1 peculiarities:

- it has four degrees of freedom and several claw-grabs ("RoboClaw X1S", "RoboClaw Z1S");
- arm control based on STM32F4DISCOVERY;
- turntable rotates more than 160 degrees around its axis;
- large arm load capacity (the large base of the robot allows to lift heavy objects without the risk of tripping over);

The complex is used to study the following disciplines:

- "Software-controlled microcontroller devices";
- "Biological program control systems".

## PLD based neural network

The neural network model is implemented on the basis of the ALTERA CYCLONE IV PLD. The combination of digital logic high speed performance and flexibility of neural networks allows to implement a number of universal devices with a significant PLD resource economy. It is used when performing laboratory work at the Department of Information Radiotechnologies of BSUIR.

## Laboratory layouts of an embedded system based on a microcontrollers STM 32 and ESP32

The laboratory layout is designed to study the capabilities of a 32-bit microcontroller and its use in building information systems, organization of interaction of several devices, transmission and display of information in computer systems, as well as when teaching independent software development, testing and debugging real devices.

The development is used in laboratory experiments at the Department of Information Radio Technologies, during which the principles of microcontroller operation, their main periphery, data transfer organization while using them, control of other devices for measuring external indicators, and information display received from external sources adjustment are studied.