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# Development of intelligent control systems for mobile robots as part of the "Smart Home"

COUNTRY OF ORIGIN	IDENTIFIER	PUBLISHED	LAST UPDATE	DEADLINE
Belarus	BO5414	2022-08-10	2022-08-10	

## Linked profile in other language

[Разработка интеллектуальных систем управления мобильными роботами в составе "Умного дома"](#)

## Responsible

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## Summary

The United Institute of Informatics Problems offers interested parties services for the development of intelligent control systems for mobile robots as part of the "Smart Home" under an outsourcing agreement.

## Description

The Joint Institute for Informatics Problems (UIPI) of the National Academy of Sciences of Belarus has developed a software and hardware complex for integration into the "Smart House" systems. It consists of a residential monitoring robot with air temperature and humidity sensors, a gas analyzer for hazardous gas concentrations, a radiation sensor, a magnetic field level sensor, an IP camera, and a transport robot with the ability to install a manipulator.

The complex is designed to improve fire safety and detect unauthorized entry, monitor the situation inside the premises, perform "give-bring" operations within the house. The robots of the complex use a two-way wireless interface based on Wi-Fi technology, which is designed to exchange measurement and control information between robots and a remote user. The developed intelligent control system for mobile robots will allow solving the following tasks:

- \* Monitoring of premises to detect facts of illegal entry, fire, leakage of domestic gas, smoke in the premises, malfunction of the heating system, flooding of the premises, lack of electricity in the house.
- \* Ensuring "remote presence" and performing "give-bring" operations by the transport robot using a manipulator.

The development is a software and hardware complex containing the following functional elements:

- \* a technical vision system (TVS), consisting of one or more cameras and a video information processing device, which is designed for spatial orientation of the robot and detection of unauthorized entry in a protected area;
- \* control system for a movable platform and a manipulator equipped with a TVS and various specialized sensors;
- \* a wireless communication module for two-way communication of the robot using the Wi-Fi protocol with a remote user, capable of transmitting telemetric (graphic, measuring and command) information.

A new level of security and fire safety and service for the Smart Home user is to patrol and monitor residential premises with the help of a group of small-sized mobile robots equipped with specialized sensors. The functions of mobile robots are purposeful movements in autonomous or automatic (under the control of the operator) mode in order to systematically collect information about the state of the controlled object.

The "Robotics" sector of the laboratory for modeling self-organizing systems of the UIPI of the National Academy of Sciences of Belarus is interested in establishing direct partnerships with companies ready to implement and research robotics technologies in "Smart Home" systems. It is proposed to develop both software and hardware components of new neural network architectures designed to process external information and generate control signals for mobile robots.

### **Advantages and Innovations**

- \* Reduction in the number of cameras, sensors and information displays required for effective room monitoring
- \* Complete absence of "blind zones"
- \* Wider range of functions performed compared to existing permanently installed sensor systems.

### **Stage of development**

Prototype available for demonstration (TRL7)

### **Comments regarding stage of development**

The technology is being tested on several layouts, a number of neural network algorithms have been developed and implemented in software.

### **Funding source**

State budgeted  
Internal

### **IPR status**

Secret know-how

### **Sector group**

ICT Industry & Services

## CLIENT INFORMATION

### **Type and size of client**

R&D institution

### **Year established**

1965

### **NACE keywords**

J.62.0 - Computer programming, consultancy and related activities

J.62.02 - Computer consultancy activities

J.62.09 - Other information technology and computer service activities

M.72.19 - Other research and experimental development on natural sciences and engineering

## **Turnover (in EUR)**

10-20M

## **Already engaged in transnational cooperation**

Yes

## **Additional comments**

The United Institute of Informatics Problems of the National Academy of Sciences of Belarus is the leading organization in Belarus in fundamental and applied research on information technologies: CAD/CAM/CAE systems, applied mathematics, high performance parallel computing, bioinformatics and medical informatics, geoinformation systems, digital cartographic systems, Space informatics, GRID technologies. The institute is the provider of scientific and educational Internet networks in Belarus. It takes part in state recommendations on information technologies implementation, scientific support of informatization processes, prognosis in related science and technology fields in Belarus, high skill specialists training.

Main directions of research:

- Computer aided design, manufacturing and engineering (CAD/CAM/CAE)
- Processing and recognition of signals, images and speech
- Space and remote sensing data processing, geoinformation systems
- Input-output of video and graphical information
- Operations research and discrete optimization
- Information security
- Decision making support systems
- Bio- and medical informatics
- Computer networks and telematics applications
- Supercomputer systems and applications, parallel computing, GRID technologies
- Information retrieval systems.

The Institute cooperates with foreign universities, research centers and organizations in the field of informatics, actively participates in the implementation of joint international projects and programs.

## **Languages spoken**

Russian

## INFORMATION ABOUT PARTNERSHIP

### **Type of partnership considered**

Outsourcing agreement

### **Type and role of partner sought**

Partners interested in services for the development of intelligent control systems for mobile robots as part of the "Smart Home" under an outsourcing agreement.

### **Type and size of partner sought**

University

## ATTACHMENTS

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