Unmanned transport of the future: SPbPU has received a grant for joint research with China

Peter the Great St. Petersburg Polytechnic University has won a grant from the Ministry of Science and Higher Education of the Russian Federation to conduct scientific research jointly with Huazhong University of Science and Technology (Wuhan, China).

Vyacheslav Shkodyrev, Director of the Mathematical Modeling and Intelligent Control Systems Scientific and Technological Complex, leads the project «Promising technologies of interactive multi-agent interaction and management for an intelligent cyberphysical system in conditions of uncertainty for transport systems.»

The main goal of the project is to increase the efficiency of coordinated group management of the interaction of distributed industrial unmanned vehicles, as well as their autonomous operation using new methods and models of multi-objective optimization based on the concept of intellectualization of cyber-physical systems with the architecture of interacting cognitive-learning agents to achieve a common strategic management goal.

As technology develops, the use of intelligent cyber-physical systems is becoming more widespread in industries such as smart transportation, industrial automation, and production logistics. However, in complex and unknown conditions, these systems face a number of limitations, including insufficient autonomous intelligence, unbalanced task allocation, low collaboration productivity, and limited reasoning abilities. Scientists will work to solve these and other problems to provide technological support for the effective operation of intelligent cyber-physical systems.

It is planned to use the advantages of the two universities in the research of interactive technologies of multi-criteria search and management, in particular in the research of intelligent cyber-physical systems in conditions of uncertainty. One of their tasks is to optimize large language models using data obtained from jointly developed adequate simulation models combined with real data. This should ensure the generation of effective decompositions into subtasks and more accurate distribution schemes for complex tasks, which, together with cognitive management methods, will lead to the formation of safe and effective autonomous planning and management schemes for performing multiple tasks.

This is important for the intelligent development of vehicle control systems in industrial and other environments. The practical significance of the project also lies in the fact that its results can be used not only in industry, but also to ensure public safety and to eliminate the consequences of natural disasters.

The project is designed for 2.5 years. Consortium of researchers will integrate expertise in artificial intelligence and control systems to develop innovative solutions for autonomous transportation.

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