

**Description models and criteria for evaluating the efficiency
of task allocation and planning in swarm robotic systems**

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Annotation. The use of swarm robotic systems (SRS) in conditions of uncertainty actualizes the development of appropriate description models and criteria for evaluating the effectiveness of the task allocation and planning. Uncertainty conditions are understood as incompleteness of information support for SRS agents about the performance of other agents and the status of the tasks assigned to them. Purpose of the research: develop models for describing and criteria for evaluating the effectiveness of the task allocation and planning in the SRS in conditions of uncertainty, taking into account the limited capabilities of SRS agents and the specifics of decentralized management. To achieve the goal, the methods of system analysis, graph theory, and distributed ledger theory were used. Methods: the paper proposes the following new criteria for assessing the effectiveness: the criterion for the proportion of solved tasks, the criterion for the SRS all tasks awareness, the criterion for the formation of control actions frequency. An element of novelty of the presented models of description and criteria for evaluating efficiency is taking into account the general cyber-physical space of the SRS in the process of making a decision on the choice of a particular task for further execution under conditions of uncertainty. Results: the proposed description models and criteria for assessing the effectiveness of the task allocation and planning in the SRS on the basis of a common cyber-physical space provide a more accurate assessment of the effectiveness of a global task when operating under uncertainty conditions in comparison with existing solutions.

Key words: swarm robotic systems, cyber-physical systems, task allocation, task planning, distributed ledger

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