Multi-Robot System Based on Swarm Intelligence for Optimal Solution Search

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Abstract

This work presents the results of the Multi-Robot System designing that works on the basis of Swarm Intelligence models and is used to search for optimal solutions. The process of searching for optimal solutions is performed based on a field of gradient vectors that can be generated by ionizing radiation sources, radio-electro-magnetic devices, temperature generating sources, etc. The concept of the operation System is based on the distribution in the search space of a multitude of Mobile Robots that form a Mesh network between them. Each Mobile Robot has a set of ultrasonic sensors for excluding the collisions with obstacles, two sensors for identifying the gradient vector of the analyzed field, resources for wireless storage, processing and communication. The direction of the Mobile Robot movement is determined by the rotational speed of two DC motors which is calculated based on the models of Artificial Neural Networks. Gradient vectors generated by all Mobile Robots in the system structure are used to calculate the movement direction.