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Opinion Article

Real-World Applications of Swarm Robotics

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DESCRIPTION

Swarm robotics is an approach for coordinating multiple robots into a system consisting mostly of a large number of simple physical robots. It is supposed that a desired collective behavior emerges from the interactions between the robots and interactions of robots with the environment. This approach has its roots in the field of artificial swarm intelligence and biological studies in natural insects, ants and other areas where swarm behavior occurs.

In swarm robotics, multiple robots work together to solve problems by forming favorable structures and the movements similar to those observed in natural systems such as bees, birds, and schools of fish. However, the steps to industrial applications have not yet been successful. Normally, only some of the swarm algorithms are used. This is called the basic swarm operation. This article collects these behaviors and categorizes them into a spatial composition, navigation, decision making, and more. Then apply this taxonomy to classify the number of existing swarm robot applications from the research and industrial disciplines. In addition to classification, it provides a comprehensive overview of research platforms, systems already on the market, and projects targeted to specific markets that can be used to test and assess herd behavior.

Many industrial projects still rely on central control and use multi-robot solutions, but the basic idea of swarm robotics in decentralized decision making is ignored. We have identified the following main reasons: First, it is difficult to predict swarm behavior due to local interactions, and it is difficult to provide proof of suitability for applications in the industrial context. Second, current communication architectures often do not meet the communication requirements of herds, often resulting in a centralized system of communication infrastructure.

Finally, testing herds in real industrial applications is a problem. This is because using herds in a production environment is usually too risky and the simulation of the target system may not be accurate enough. In contrast, research platforms represent a means of transforming swarm robotics solutions from theory to typical industrial systems.

Agriculture

By using this technique we can easily sow the seed, harvest, and store the grains in the warehouse, thus the work load of farmers gets decreased and they will be able give their time to think how the production can be increased.

Military applications

This is very useful for bomb detection, which is the most dangerous task for humans. For these applications, the need for security is probably self-evident. Currently, intensive research is being conducted on the military use of robots. Useful for traffic patterns in the transportation system.

Medical fields

The use of nanorobots that move through human veins and arteries that they fight against certain types of cancer. It is useful for disaster relief that people cannot go to. Swarm robots are easy to deploy, so you can use them wherever you need help to find your target. It can also be used for distributed agent deployment and area coverage. Swarm of mobs it is the best choice compared to humans to control robots. The herd was able to respond as quickly as possible to the emergency at hand.

Robots may be used to perform tasks that are too dangerous or difficult for humans to implement directly (e.g. nuclear waste cleanup) or may be used to automate repetitive tasks that can be performed more cheaply by a robot than by the employment of a human (e.g. manufacturing, shopping malls, hotels, etc.) or may be used to automate mindless repetitive tasks that should be performed with more precision by a robot than by a human.

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