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Commentary

Desirable Properties of Swarm Robotics Systems

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DESCRIPTION

Swarm robotics is a branch of multi-robotics that involves the coordination of a large number of robots in a distributed and decentralized manner. It is inspired by social insects and is based on the usage of local rules and basic robots in comparison to the complexity of the task at hand. A large number of basic robots may do difficult tasks more efficiently than a single robot, providing the group with robustness and flexibility. This article provides an overview of swarm robotics, detailing its key aspects and characteristics and contrasting it with typical multi-robotic systems [1]. This work is completed by a study of several research works and experimental results, as well as a discussion on the future of swarm robots in real-world applications [2].

Swarm robots can be quite beneficial in search tasks, particularly when the spatial pattern of the source is complex, as in the case of sound or odour. The odour localisation problem is investigated in, where robots use a distributed approach to locate the source of the odour. Experiments are carried out both in simulation and with actual robots.

DESIRABLE PROPERTIES OF SWARM ROBOTICS SYSTEMS

The aforementioned swarm robotics properties are thought to enhance the implementation of fault-tolerant, scalable, and flexible systems. Swarm robotics encourages the creation of systems that can handle the failure of one or more of their constituent robots: the loss of individual robots does not indicate the failure of the entire swarm [3]. The swarm's great redundancy enables fault tolerance: the swarm does not rely on any centralised control unit, leaders, or any individual robot playing a specified role.

Swarm robotics also enables the construction of systems that can cope effectively with changes in group size: ideally, the addition or removal of individuals does not cause a significant change in the swarm's performance. Scalability is supported *via* local sensing and communication: as long as the addition and removal of robots does not significantly alter the density of the swarm, each individual robot will continue to interact with about the same number of peers, those within its sensing and communication range [4].

Finally, swarm robotics encourages the creation of systems that can operate in a variety of habitats and operational circumstances. The distributed and self-organized nature of a robot swarm enables flexibility: in a swarm, robots dynamically allocate themselves to different tasks to match the requirements of the specific environment and operating conditions; additionally, robots operate on the basis of local sensing and communication and do not rely on pre-existing infrastructure or any form of global information [5].

Swarm robots holds great promise for tackling the challenge of item transportation. The usage of many robots can be advantageous due to the cooperative handling of a single object. Furthermore, the possibility of dealing with diverse things by multiple robots at the same time may boost performance.

Swarm robots can carry out activities in which the primary purpose is to cover a large area. The robots can disseminate and undertake monitoring jobs in places like forests and lakes. It can be extremely valuable for detecting potentially hazardous situations, such as a chemical material leak. The fundamental advantage of a swarm over a sensor network is that it can move and focus on the problem while also acting to avert the consequences of that problem.

REFERENCES

1. Vadakkepat P, Peng X, Quek BK, Lee TH. Evolution of fuzzy behaviors for multi-robotic system. Rob Auton Syst. 2007;55(2): 146-161.
2. Sarker IH. Machine learning: Algorithms, real-world applications and research directions. SN Comput Sci. 2021;2(3):1-21.
3. Dorigo M, Birattari M, Brambilla M. Swarm robotics. Scholarpedia. 2014;9(1):1463.
4. Campion M, Ranganathan P, Faruque S. UAV swarm communication and control architectures: a review. J Unmanned Veh Syst. 2018;7(2):93-106.
5. Stirling T, Wischmann S, Floreano D. Energy-efficient indoor search by swarms of simulated flying robots without global information. Swarm Intell. 2010;4(2):117-143.

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