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Thème

Collective Motion within a Mobile Robots Swarm System

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Abstract

Swarm Robotics is an emerging field driven mainly by new inspirational ideas coming from nature and natural beings living in nature. The concept its self is an attempt to mimic the behaviour of certain animals that live within groups, such as ants and bees. The field has brought attention to itself lately because of the simple but powerful concepts and notions it holds which could be applied to many areas of human and industrial life at low costs. The low costs attribute is explained by the fact that a member of a given swarm can not survive on its own because of its simple design and lack of capabilities, however, when these simply designed individuals get together and unit their effort, remarkable achievements can be made. This exactly what we explored and implemented in this paper.

The core concept of our thesis is to develop and implement a model that would allow a swarm of robots to mimic a natural swarm and mimic certain behaviours of theirs. The model we propose is inspired from what is called the *Kelvin-Voight* model that is heavily used in physics. We introduce, develop, implement and analyze the proposed model in an attempt to achieve the behaviours mentioned above.

Other module that we develop in this paper is fault detection where we propose an offline method based on neural networks to detect anomalies that could forbid a swarm of robots from working as team.