

# On Formal Specification of Emergent Behaviours in Swarm Robotic Systems

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## **Abstract**

It is a characteristic of swarm robotics that specifying overall emergent swarm behaviours in terms of the low-level behaviours of individual robots are very difficult. Yet if swarm robotics is to make the transition from the laboratory to real-world engineering realisation we need such specifications. This paper explores the use of temporal logic to formally specify, and possibly also prove, the emergent behaviours of a robotic swarm. The paper makes use of a simplified wireless connected swarm as a case study with which to illustrate the approach. Such a formal approach could be an important step toward a disciplined design methodology for swarm robotics.

**Keywords:** swarm robotics, formal specification, temporal logic.