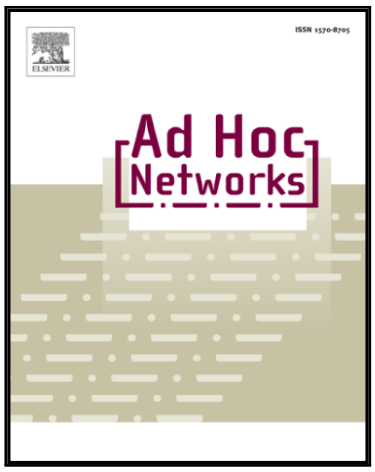

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Design of a force-based controlled mobility on aerial vehicles for pest management

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Abstract

Vespa velutina, also known as the Asian hornet, is considered as an invasive species out of its native zone. In particular, since it preys on honey bees, its recent progression in Europe could soon pose a significant risk to the local apiculture activity. European beekeepers are therefore investigating adapted control strategies, including *V. velutina* nest destruction. Unfortunately, nest location pinpointing generally follows a manual process which can prove tedious, time-consuming and inaccurate. In this article, we propose the use of a network of micro aerial vehicles featuring autonomous and cooperative flight capabilities. We describe an adapted controlled mobility strategy and detail the design of our Virtual Force Protocol (VFP) which allows a swarm of vehicles to track and follow hornets to their nests, while maintaining connectivity through a wireless multi-hop communication route with a remote ground station used to store applicative data such as hornet trajectory and vehicle telemetry. In order to achieve the mission objectives with a minimum of vehicles, we identify through simulations appropriate value for the key parameters of VFP and discuss the obtained network performance.

Keywords: Controlled mobility, UAV networking, physics-based swarm intelligence

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