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Authors

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	Nicholas Ceccarelli	1715231			SUNY University at Buffalo, USA	njceccar@buffalo.edu	USA		
	Paulo Regis	1197891			University of Nevada Reno & CAPES, USA	pregis@nevada.unr.edu	USA		
	Shamik Sengupta	269139			University of Nevada, Reno, USA	ssengupta@unr.edu	USA		
	David Feil-Seifer	1417725			University of Nevada, Reno, USA	dave@cse.unr.edu	USA		

Title

Optimal UAV Positioning for a Temporary Network Using an Iterative Genetic Algorithm

Abstract

Efficient arrangement of UAVs in a swarm formation is essential to the functioning of the swarm as a temporary communication network. Such a network could assist in search and rescue efforts by providing first responders with a means of communication. We propose a user-friendly and effective system for calculating and visualizing an optimal layout of UAVs. An initial calculation to gather parameter information is followed by the proposed algorithm that generates an optimal solution. A visualization is displayed in an easy-to-comprehend manner after the proposed iterative genetic algorithm finds an optimal solution. The proposed system runs iteratively, adding UAV at each intermediate conclusion, until a solution is found. Information is passed between runs of the iterative genetic algorithm to reduce runtime and complexity. The results from testing show that the proposed algorithm yields optimal solutions more frequently than the k-means clustering algorithm. This system finds an optimal solution 80% of the time while k-means clustering is unable to find a solution when presented with a complex problem.

Keywords

UAV Network; genetic algorithm; positioning

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