Title: Using UAV-Based Systems to Monitor Air Pollution in Areas with Poor Accessibility

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Review:

They showed several options to monitor air pollution in urban scenarios, being crowd sensing an emerging approach arousing great interest, finding an adequate approach for industrial or rural areas remains a pending task. According to them, Recently, Unmanned Aerial Systems have experienced unprecedented growth, offering a platform for the fast development of solutions due to their flexibility and relatively low cost; in fact, they can be good options to solve the previous requirements, allowing monitoring remote areas that are difficult to access.

In this paper, They propose a solution where they equipped an UAV with off-the-shelf sensors for monitoring tasks, using a Pix hawk Autopilot for UAV control, and a Raspberry Pi for sensing and storing environmental pollution data. To automatically analyze pollution values within a target area, they also proposed an adaptive algorithm for autonomous navigation called Pollution-based UAV Control system (PdUC). This algorithm allows an UAV to autonomously monitor a specific area by prioritizing the most polluted zones. In particular, PdUC combines different concepts including a chemo taxis meta heuristic, a local particle swarm optimization (PSO), and an Adaptive Spiraling technique, to create an algorithm able to quickly search for hotspots having high pollution values, and to cover the surrounding area as well, thereby obtaining a complete and detailed pollution map of the target region. To validate their proposal, we compared the proposed PdUC solution against the Billiard and Spiral mobility models through simulations implemented in OMNeT++. Simulation experiments show that PdUC offers significantly better performance at reducing prediction errors, especially regarding the accuracy achieved for the high-values range.