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ENVIRONMENTAL SENSING, ROBOTICS, SCIENCE, TECHNOLOGY

# WATERFLY UAV SWARM FOR ENVIRONMENTAL MONITORING

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As everyone knows, UAV technology is widely available to practically anyone, and quite a few people have ideas for what to do with them. Many of the ideas are socially destructive, others are purely frivolous. (Snooping on your neighbor is equally frivolous and socially destructive.)

Military drones have shown the value of UAVs for surveillance, as they are supplanting satellite and crewed aircraft in many situations. Given this experience, it is easy to see that small drones should be useful for remote sensing and environmental monitoring—important and beneficial civilian surveillance tasks.

The WaterFly project from M.I.T. Senseable City Lab and the University of Toronto shows the basic idea in the UAE Drones for Good contest entry.

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Impossibile eseguire Javascript.

The basic idea is to use a swarm of inexpensive drones to observe and sample fresh water bodies, looking for bacterial blooms and other problems.

Current techniques include satellite and aircraft born sensors, buoys and boats. Discovering and tracking small, quickly developing phenomena requires much more intensive observation than is feasible with these rare and expensive resources.

Their demo shows two kinds of data collection, hyperspectral imaging of the surface, and sampling of surface water. The “swarm” flies together, the imager identifying targets in real time, and dispatching samplers to dip up samples for immediate analysis.

The swarm flies search patterns over the surveillance area, feeding data back to analysis and archiving software. (I assume the aircraft are remotely guided, though they are surely partly autonomous.) Observers can obtain data and reports from the datasytem. (The system appears to depend on wireless networking – which may be a challenge in the wild.)

This all looks really nice in the demo video, but how real is it?

Of course, this concept is limited to the water surface. Even if the imaging can detect aspects of the underwater environment, the dipper drones have no ability to sample beyond a few centimeters.

The imaging probably requires sunlight and calm waters. A big storm is going to sweep these little guys away, for sure. Actually, even moderate winds will be a huge problem.

I'm not sure how much a given drone can cover per hour, I would guess that covering a significant body of water will require literally swarms. These systems are cheap enough that that is possible, but I have to wonder if their software is really prepared to handle 10,000 sampling droids at once, or a million. (There may also be issues with thousands of drones skimming over scenic and heavily used waterways.)

These limitations don't mean that this isn't a reasonable idea. This team has done a lot of good work to demonstrate all the key pieces from end to end. All I'm saying is that there is a lot of work to do to make this work for real.

*Robot Wednesday*