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Robo-swans add a touch of elegance to water quality testing

Singapore's pollution-monitoring avians trade in webbed feet for propellers.

By: Matt Hickman
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Don't worry, this swan won't bite. Just mind its propellers. Video screenscrab: Channel NewsAsia/YouTube

Ahhh, the swan: royal and regal, elegant and enchanting, a symbol of fidelity, grace and self-transformation; a lawn ornament, a pool toy, a Disney resort, a red carpet spectacle, a long-necked aquatic bird not to be messed with.

And then there are the swans of Singapore.

For those who happen to chance upon one of these members of the family Anatidae floating placidly along a reservoir in the island-bound Southeast Asian city-state, a word of advice: it's best not to disturb them. They're busy — very busy — and if you decide to toss a piece of stale bread in the direction of one of these beautiful birds (an ill-advised idea to begin with, particularly in Singapore), don't expect them to pursue it. If they *do*, we're all in trouble.

You see, a new breed of swans, NUSwans, have been deployed for testing in a Singaporean reservoir by researchers at the National University of Singapore. And while these good-looking waterfowl might appear to be the real deal from a distance, they're actually battery-powered autonomous robots on an important mission: to test water quality levels and wirelessly report their findings (pH, dissolved oxygen, chlorophyll and turbidity are all monitored) back to their "keepers" at the NUS Environmental Research Institute.

Testing for water pollution in Singapore has traditionally been an arduous and inefficient process performed by humans in boats. For researchers, delegating the responsibility to GPS-equipped robo-swans — just think of them as smart vacuums with wings given that the birds automatically return to their onshore charging stations when the juice in their built-in battery packs start to dwindle — was a no-(bird) brainer.

Aside from their brisk data-collecting/reporting benefits, there's the aesthetic appeal — there's nothing quite as pleasing to the eye as a swan gliding across a body of water. At the very least, robot swans cruising around a reservoir are certainly more naturalistic, and less alarming, than rubber duckies or large reptiles zipping around like mad. "We started with a number of smaller bird models, before we decided on the swan. It's just the right size," lead researcher Mandar Chitre explains to Channel NewsAsia. "If you look at it in the environment, it just looks like a swan swimming around."

https://www.youtube.com/watch?t=110&v;=gGRs0V215YI

More nuts and bolts via the NUSwan project page:

Maintaining water quality, especially in urbanized landscapes, is highly challenging since water bodies are exposed to varying sources of pollutants from urban run-offs and industries. Simultaneously, active recreational use of these water bodies promotes urban livability in the cities that requires maintenance of clean water and aesthetically pleasing surroundings. Several methods and protocols in monitoring pollutants are already in place. However, the boundaries of extensive assessment for the water bodies are limited by labour intensive and resource exhaustive methods. To ensure good

quality, large coverage and safety of the water bodies, NUS researchers have developed an innovative system for monitoring pollutants is required for better management and sustainability.

NUSwan - New Smart Water Assessment Network is an innovative concept on spatial-temporal water quality monitoring. Building upon aesthetics and recreation, NUSwan is a comprehensive solution to maximize use of resources and cost effectiveness. It is a simple yet powerful tool to observe the water environment. Its ability to collect data according to directed mission in real-time allow interactive sampling at any location of interest. It has the capability of performing simultaneous multi-node, high speed sensing for observing concentration gradients for better characterization and detection of time varying hotspots.

New NUSwan technology is currently under development, including models equipped with freshwater phosphate sensors, which will be deployed specifically to curb the often devastating impact of cyanobacteria — better known as blue-green algae — blooms. And while the range of NUSwans is currently limited to Singapore — specifically the Pandan Reservoir, a popular spot amongst remote-controlled boat enthusiasts — researchers plan to eventually introduce them to the polluted waterways of China following further testing.

The NUSwan 'bots are also apparently quite tough and are built to withstand the numerous bumps, bangs and collisions that they might experience while on the job.

Data-transmitting swans aren't the only robots taking on jobs once performed by humans in tech-obsessed Singapore. At one popular eatery, drones have partially replaced the sentient waitstaff. Check please.

Read more: http://www.mnn.com/green-tech/research-innovations/blogs/robo-swans-add-touch-elegance-water-quality-testing-singapore#ixzz3h9Sy4OzB