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Robot Enlisted to Spot Rare Woodpecker

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March 5, 2007 — Scientists have enlisted the most intrepid of bird watchers in an attempt to prove that a majestic woodpecker, believed extinct for more than 60 years, still exists.

The sentry is sharp-eyed robot that has been mounted to a power line high above the bayou in eastern Arkansas where what is believed to be an ivory-billed woodpecker was sighted in 2004.

With cameras that can read a credit card number from across a room and software to analyze high-flying objects, the robot has been on the job for about four months. So far it has captured video of a flock of geese and a blue heron, but scientists are hopeful it will one day image what has become the holy grail of bird-watching, the sight of a ivory-billed woodpecker.

The bird, which stands nearly 20 inches in length and has a wingspan of about 30 inches, was once the largest woodpecker in North America. It made its home in the swampy forests of the southeastern United States, where beetle larvae, its mainstay food, could be found in abundance in dead and dying trees.

With the rise of the timber industry after the Civil War, the forests were felled, driving the bird to extinction — or so it was believed.

In 2004, a lone kayaker in Arkansas' Cache River National Wildlife Refuge reported seeing an ivory-billed woodpecker. Wildlife experts with Cornell University's Laboratory of Ornithology in New York and The Nature Conservancy were able to confirm the sighting. The best evidence is a fuzzy videotape of what appears to be an ivory-bill in flight.

Not everyone is convinced, however. Critics says the video, which was taken by David Luneau, an associate professor of electronics at the University of Arkansas at Little Rock, is of a pileated woodpecker, which resembles the ivory-bill.

Researcher Ken Goldberg, with the University of California at Berkeley, read about the hunt for the long lost bird and decided he had something that could help. Before the 2004 sightings, the last time an ivory-billed woodpecker was seen was in the 1940s.

Goldberg, an electrical engineer, computer scientist and professor of industrial engineering and operations research, had been working with colleagues under a National Science Foundation grant to develop robotic systems that can observe animals in their natural environments and Webcast the images to scientists' computers.

The project is called the Collaborative Observatories for Natural Environments, or CONE.

Hunting the ivory-billed woodpecker posed some special challenges for the software engineers. For starters, infrared motion sensors, which were used to detect the presence of other animals tracked in the CONE programs, would not be effective in the hunt for a quick-moving bird in flight.

Instead, researchers needed to develop a way for the software alone to recognize when animals are present. The system created by Goldberg and his colleagues can analyze high-resolution video images on the fly.

"The program knows, for instance, that the ivory-billed woodpecker flies 20 to 40 mph, so anything outside that range is deleted," said Dezhen Song, an assistant professor at Texas A&M's computer sciences department.

The robotic bird-watcher, known as ACONE — an acronym for Automated Collaborative Observatory for Natural Environments — shoots 22 frames per second and each image is 2- to 3 megapixels, creating a huge data deluge that could quickly overload the computer's memory.

"The challenge is to develop software that can ... throw out anything that is not a bird image," Goldberg said at a science conference last month where ACONE's first video was unveiled.

ACONE's twin cameras are set up to only film birds in flight, filtering out clouds, reflections and false readings from other objects.

"It still has a fairly high false positive rate," Goldberg said. "We get triggered by leaves blowing by."

Software refinements are ongoing to try to tweak the robot's vision.

"If the system can catch any kind of bird, that's a success for us," said Song. "But if it catches an ivory-bill, that's a bonus."

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