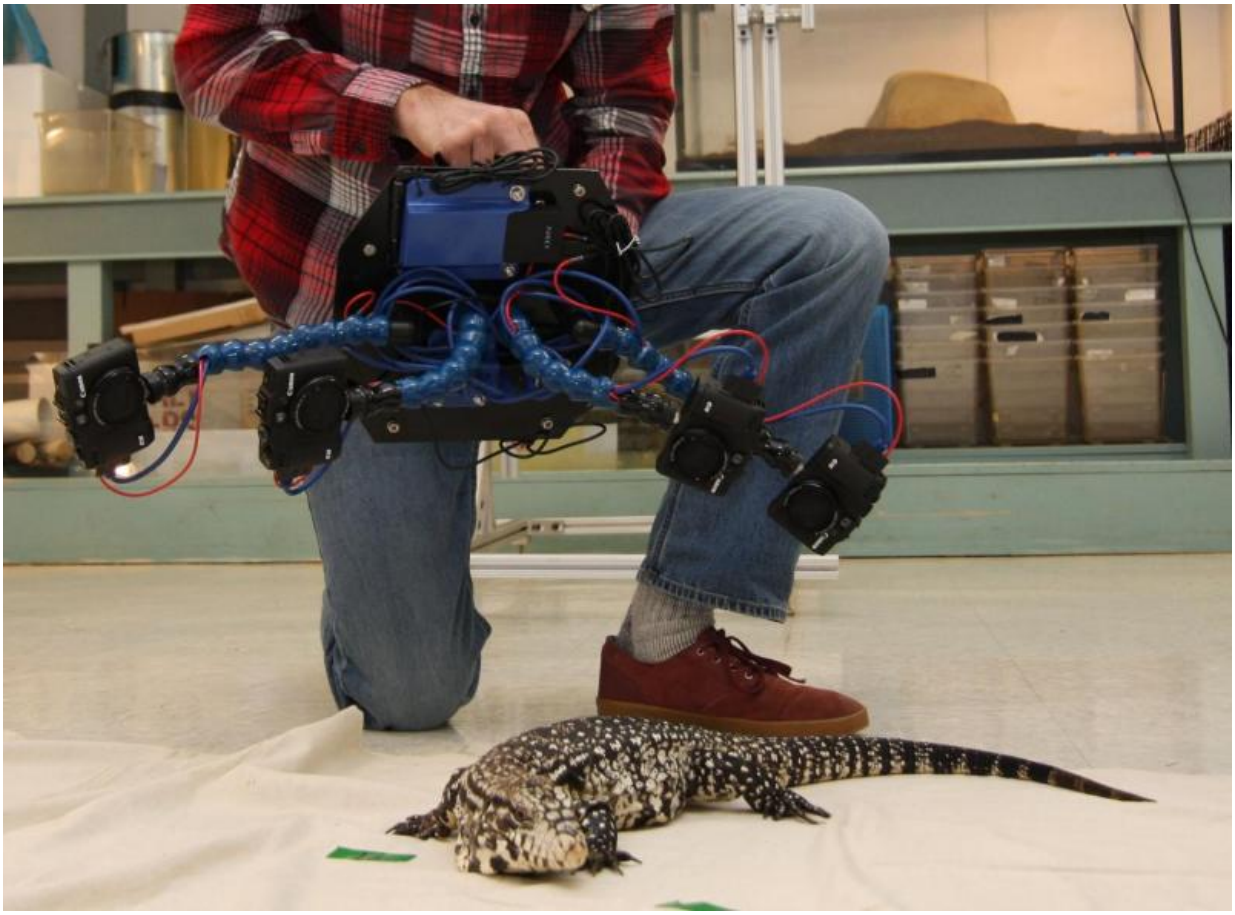
Shark research leads biologists to create 'Beastcam'

January 12 2016, by Janet Lathrop



Using off-the-shelf materials, UMass Amherst functional biologists made a portable, fast, easy-to-use, high quality and low-cost system they call Beastcam to rapidly and easily create 3-D models of living animals and other objects. Credit: UMass Amherst

When University of Massachusetts Amherst biologist Duncan J. Irschick was working with sharks in Florida last spring to better understand their body shapes, he longed for a simple, quick tool for creating 3-dimensional (3D) models of them, which would allow him to compare complex shark body shapes among different species. He soon realized that such a device would be useful for creating 3D models of the living geckos he studies, as well.

Now, he and colleagues have developed just such a tool, a multi-armed platform that integrates several cameras plus a computer system, which they call the "Beastcam" because it can rapidly and easily create 3D models of living animals and other objects.

Irschick explains, "Once you make a 3D model of an object, you can modify it, conduct experiments with it, animate it or even send it to a 3D printer for testing different designs." He says over the past decade, there has been increasing interest in developing new ways of capturing 3D models of everyday objects and settings such as crime scenes, historical reconstruction, museum specimens, landscapes and archaeological digs, among others.

He adds, "The technique of creating 3D models from multiple photographic stills, known as photogrammetry, is not new, but it is rapidly emerging as a low-cost and accurate way to create 3D models. Current scanning systems, such as laser scanners or CT scanners, are typically slow, and often require bulky and expensive machinery. Faster and less expensive alternatives typically are not of a sufficiently high resolution to create detailed models, especially over a short time span. So we created the Beastcam using off-the-shelf materials to provide a portable, fast, easy-to-use, high quality and low-cost system."

Irschick says a key advantage of the Beastcam technology lies in its ability to scale up to a range of sizes, which opens up new opportunities

for creating 3D models from a range of subjects. "We are continuing to research new ways to make this technology applicable to a wide range of uses beyond living animals," he notes. The functional morphologist is one of several co-inventors with UMass Amherst polymer scientist Al Crosby of Geckskin technologies in 2012.

Beastcam's cameras are mounted on flexible, adjustable arms placed in a favorable arrangement for rapidly scanning objects. The lightweight system, under 10 pounds, includes a small computer tablet, a battery and several other features that allow users to take the Beastcam outside the home, studio or laboratory. Images captured can be easily uploaded to various widely available software programs, such as Autodesk 123D Catch that quickly creates a 3D model.

Kasey Smart, an undergraduate in the Irschick lab and co-inventor with fellow undergrad Dylan Briggs, says, "One of the advantages to our system is that cameras and mounting arms can be easily added and subtracted to customize it for many different uses and at different scales." Briggs adds, "We have been able to create accurate 3D models of a range of objects, including human-sized objects in less than 30 seconds, and car-sized objects in about 45 seconds."

Beastcam is portable and easily packed into a carrying case. Irschick is currently using the the device to model body shapes of various gecko species in his laboratory, and hopes to return to Florida next spring to use it to fulfill his dream of creating 3D shark models. He says the Beastcam work was supported in part by the Human Frontiers Science Program and was created as part of the Center for Evolutionary Materials at UMass Amherst.

Provided by University of Massachusetts Amherst