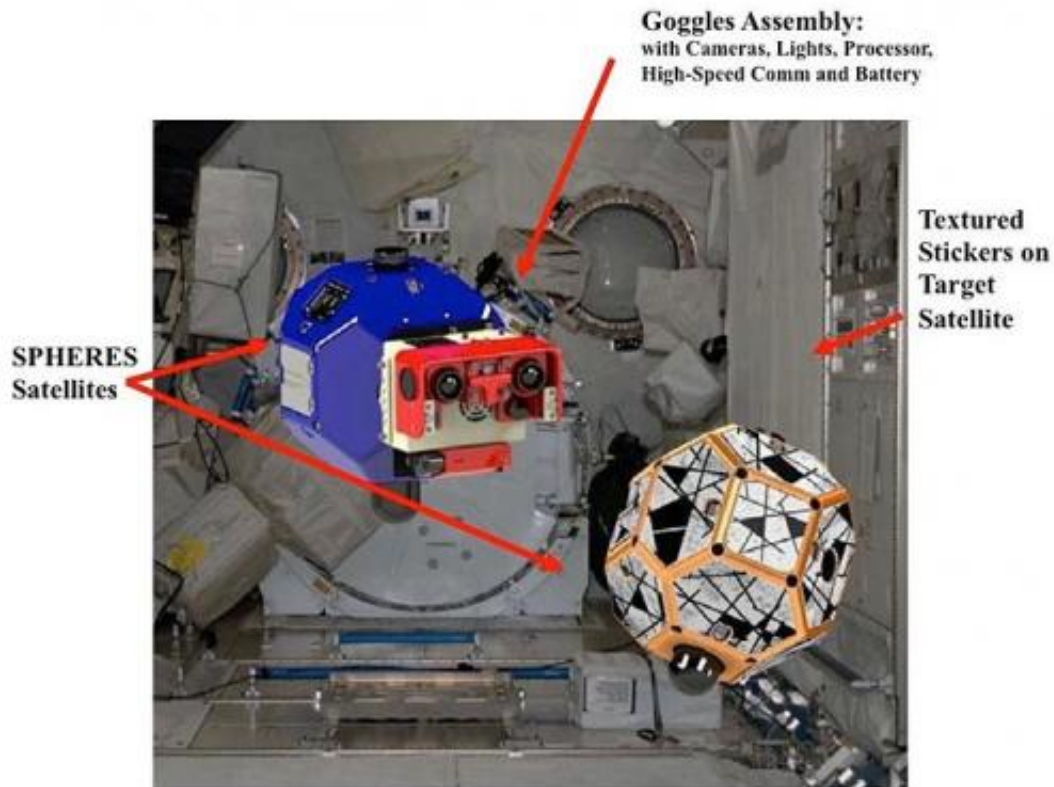


# The SPHERES have eyes

April 24 2013, by Lori Keith



The SPHERES-VERTIGO investigation setup showing tracking (with goggles) and target SPHERES. Each satellite is an 18-sided polyhedron that is 0.2 meter in diameter and weighs 3.5 kilograms. Credit: MIT Development Team

(Phys.org) —It looks like something out of a sci-fi movie...free-formation-flying robotic spheres hovering around the [International Space Station](#) with goggles on. The Visual Estimation and Relative Tracking for Inspection of Generic Objects ([VERTIGO](#)) study, a part of the

Synchronized Position, Hold, Engage and Reorient Experimental Satellites ([SPHERES](#)) investigation explores the use of small satellites equipped to analyze and capture data from specified objects, producing a 3-D model of those objects.

The 1.6 kilogram VERTIGO [goggles](#) designed for each SPHERES satellite are similar to a small [computer tablet](#)—with 1.2 gigahertz data processor, camera, Wi-Fi device and batteries—allowing the satellite to see what it is navigating around. This technology could result in techniques for [space](#) recycling of old aperture satellites or mapping of an asteroid for exploration, among other missions.



NASA astronaut Tom Marshburn conducts the SPHERES-VERTIGO investigation aboard the International Space Station to study the ability to create a three-dimensional model of an unknown object in space using only one or two small satellites. Credit: NASA

In a March 26 [interview](#) on NASA Television, Brent Tweddle, a doctoral candidate at the Space Systems Laboratory at the Massachusetts Institute of Technology in Cambridge, Mass., said the goggles allow for each satellite to, "see, perceive and understand its world visually. We use that ... to communicate that information to the SPHERES satellites using a package called the VERTIGO goggles. [The goggles] are their own little intelligence block that sticks on the front-end of the SPHERES [satellite](#) and allows it to see the rest of the world that it wants to navigate through."

Tweddle talked about a variety of topics related to the SPHERES and VERTIGO during the interview, including the different teams interested in this research. He described how the SHPERES are commanded by algorithms. Tweddle also spoke on the February 2012 test run and future SPHERES tests.

The VERTIGO addition to the SPHERES satellites is part of the Defense Advanced Research Projects Agency-funded [International Space Station SPHERES](#) Integrated Research Experiments (InSPIRE) program that leverages the human presence in space for rapid, iterative experimentation and design of space capabilities. It is providing the next generation of scientists and engineers (through the ZERO Robotics Competition) with exposure and experience in carrying out meaningful space experimentation economically and over reasonable time scales.

Provided by NASA

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