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3-29-2017

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USU College of Engineering, "Bear Lake Telescope Helps USU Researchers Track Orbital Debris | College of Engineering" (2017). *College of Engineering News*. 240.

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# Bear Lake Telescope Helps USU Researchers Track Orbital Debris | College of Engineering

03/29/2017

**News Release** – March 29, 2017 – Researchers at Utah State University recently completed the installation of a specially-constructed telescope designed to monitor space debris. The project is part of a growing international effort to keep closer tabs on the space junk that poses serious risk to defense, communication and weather satellites orbiting our planet.

## Quick Read

- USU aerospace engineering researchers built a telescope near Garden City, Utah, to track space debris.
- An estimated 20,000 items in space are tracked for the purpose of collision avoidance.

The Utah State University Space Situational Awareness Telescope for Astrodynamics Research, or USU-STAR, is an astrograph-type 10-inch aperture telescope built specifically for spotting space debris only a few inches in diameter. The telescope's new home – near the western shores of Bear Lake in Rich County, Utah, provides an ideal setting. The location features high elevation, limited light pollution and low humidity.

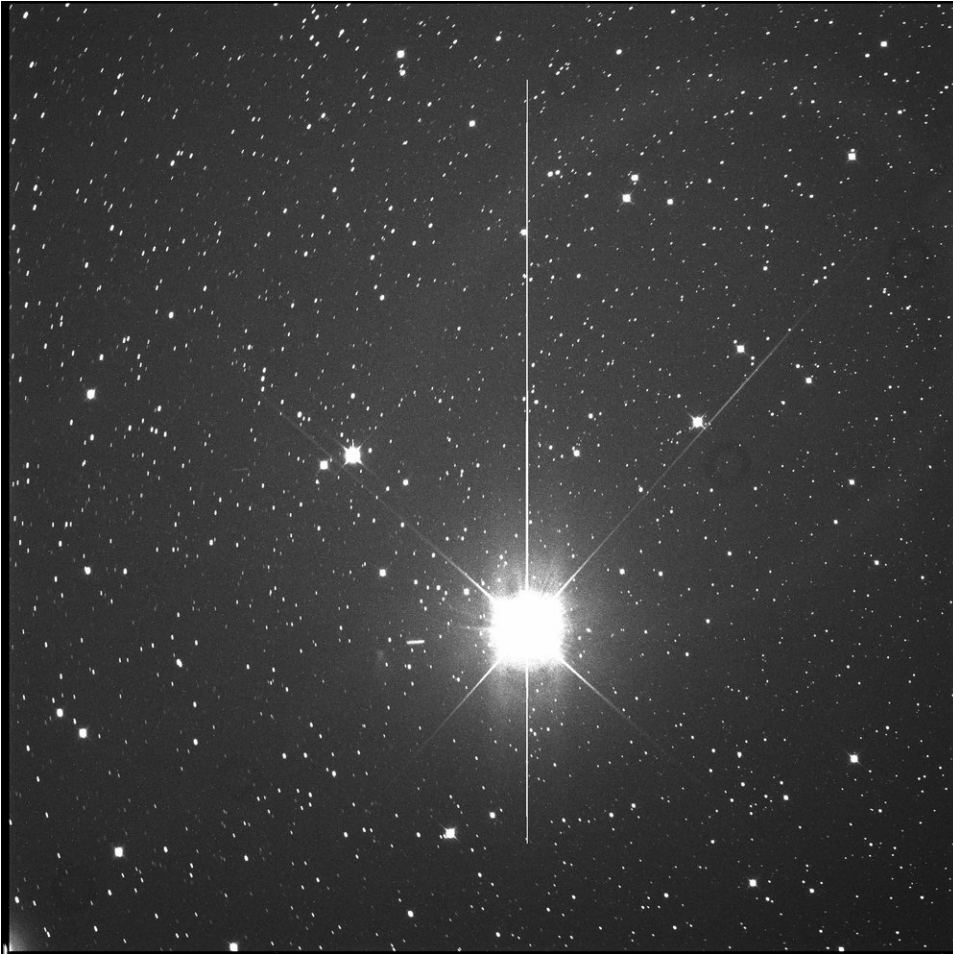


*The telescope will be used to improve the theory and practice of tracking orbital space debris.*

The telescope will serve two key functions: first, to track and catalog known objects; and, second, to help USU aerospace engineering researchers validate and improve the scientific theories and technologies that have been developed for space surveillance.

Dr. David Geller, an associate professor of mechanical and aerospace engineering at USU and lead investigator, says data obtained from USU-STAR will help researchers around the globe improve the methods used to track space debris. He says a better understanding of space surveillance is key to preserving near-earth space as an important and functional resource.

Each week, researchers send the telescope a list of objects to be tracked. The telescope captures about 100 images per night, and Geller plans to take up to 1,000 each night in the coming weeks. Each image records data about an object's position and velocity. Knowing an object's location and trajectory in space is key to avoiding catastrophic collisions.



*The telescope achieved first light in fall 2016. This image of Polaris was taken with a KAF-16801 CCD camera with a 60-second exposure.*

USU-STAR is the second telescope dedicated to this task at a civilian university in the United States, and the first west of the Mississippi. The telescope will also provide hands-on experience for USU aerospace engineering students.

"There are tens of thousands of objects out there and someone has to maintain a catalog of position and velocity of all those items," said Geller. "Knowing an object's position and velocity is the first step. And if we don't do that first step well enough, we can't do any of the additional steps that tell us where that piece of debris will be at some future time."

###

*Initial construction of USU-STAR was supported by a research agreement with IHI Corporation (Tokyo, Japan), in addition to faculty startup funds from USU. The optical properties of the USU-STAR system were optimized to attain maximum limiting magnitude for the aperture size. detailed specifications are available below:*

**Optics:** AG Optical Systems Imaging Dall-Kirkham (idk) 10", f/6.7

**Camera:** Finger Lakes Imaging Proline PL16801 4K4K CCD (KAF-16801)

**Mount:** Astrosysteme Austria DDM-85 Basic German Equatorial w/ custom bent pier

**Structure:** Astro Haven Enterprises 7 ft. dome

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