



Space Jam

Monitoring Earth's Busy Orbital Highways

Satellites orbiting Earth transmit information from one point to another. Currently, over 8000 satellites orbit Earth. That number is expected to rise to over 60,000 by 2030. As Earth's orbital highways get busier, so does the chance of collisions. Satellites are not the only objects orbiting our planet. It is estimated that over 50,000 pieces of space junk are also circling Earth.

What if your favorite video game or app stopped working because a piece of space junk hit a satellite? The choices that we make on Earth can help prevent that from happening! Astrodynamicist and space environmentalist Dr. Moriba Jah is on a mission to spread awareness about the threat posed to humanity by space debris.

"The orbital highways are getting crowded and the services and capabilities that we are dependent upon are in jeopardy of being lost from collisions from orbiting space debris," Jah says.

The majority of satellites are in low-Earth orbit (LEO), which is between 160 and 2000 km above Earth's surface. It takes LEO satellites 90–120 minutes to orbit Earth. Satellites at this altitude are typically used for remote sensing, Earth observation, and reconnaissance. Geosynchronous Earth orbit (GEO) satellites orbit at an altitude of about 35,786 km. GEO satellites orbit Earth in one day, matching Earth's rotation. Most satellites at this altitude orbit directly above Earth's equator. These satellites are commonly used for communications, broadcasting, and weather forecasting.

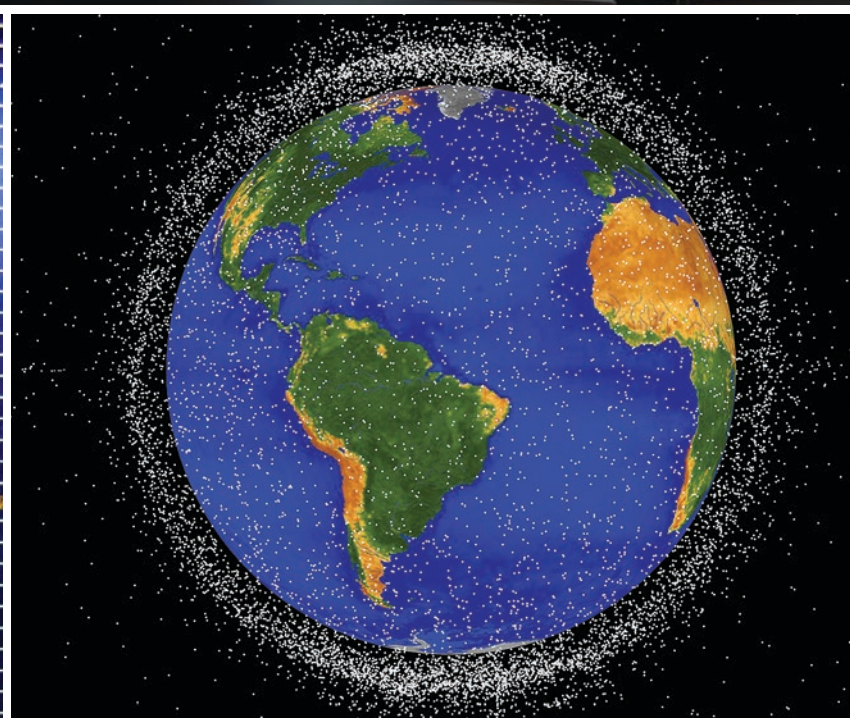
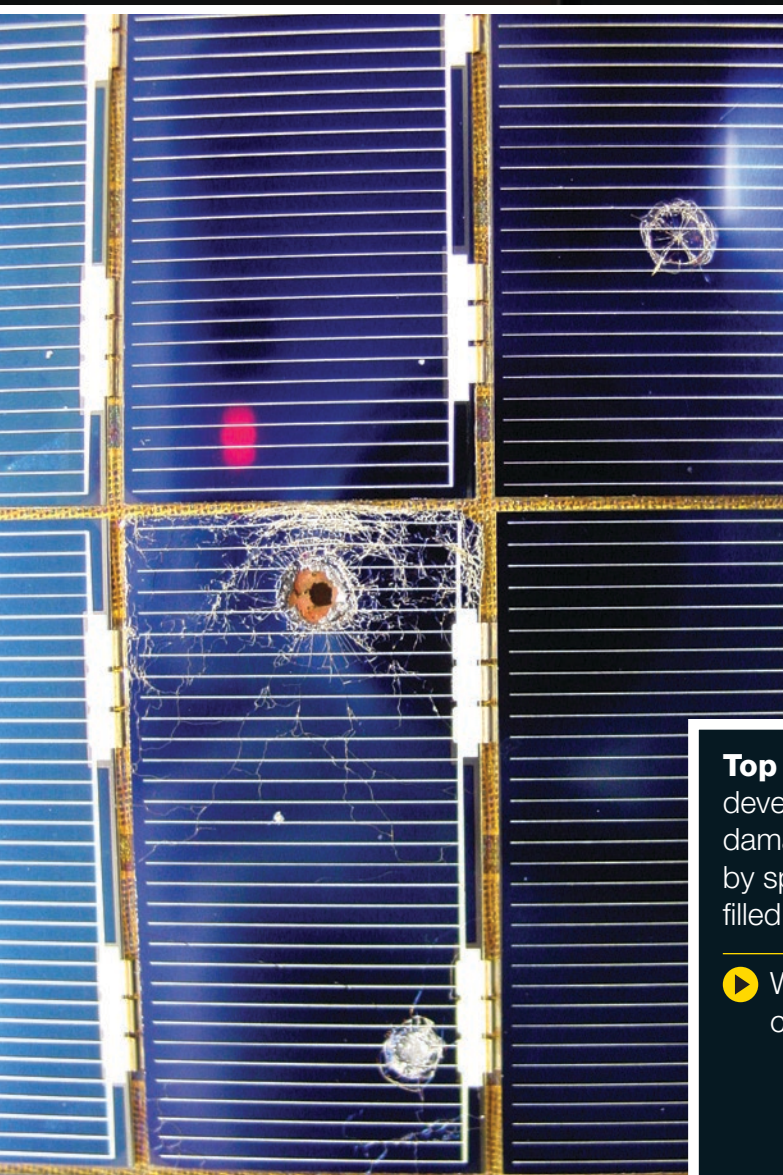
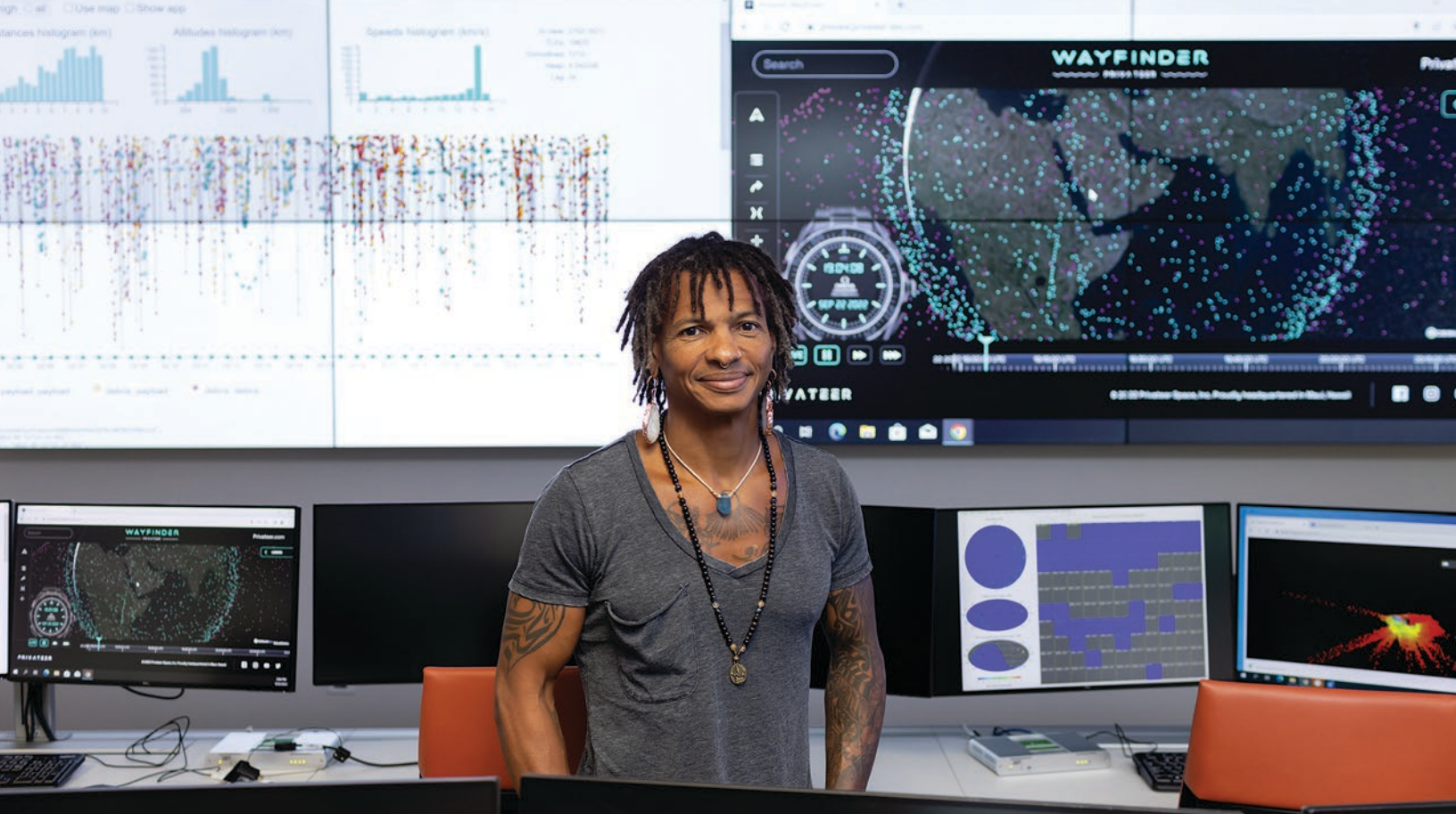
When a satellite is launched into space, it is put on an orbital path that is meant to avoid other satellites. However, as more objects are launched, the likelihood of collisions also increases. Each collision adds even more debris into orbit around Earth.

Jah developed ASTRIAGraph as a solution to this problem. ASTRIAGraph is a web application that uses data from public and private databases to track the approximate positions and speeds of objects in Earth's orbit. Jah also developed the visualization tool Wayfinder. In addition to helping to launch new satellites, this tool could be used to identify objects already in orbit and even to help remove space debris.

The dangers of space debris affect us all in some way. Next time you look up at the sky, think about how you can support initiatives to reduce space debris. ■

Thinking Critically

Science and Society If you were designing a satellite, what strategies could you use to make sure it does not contribute to space debris after its mission?



Top Moriba Jah stands in front of the programs he developed for tracking space debris. | **Bottom Left** This damage to Hubble Space Telescope's solar cells was caused by space debris. | **Bottom Right** The space around Earth is filled with satellites and space debris.

▶ Watch our interview with Jah and learn more about his career and research.