

National Aeronautics and Space Administration



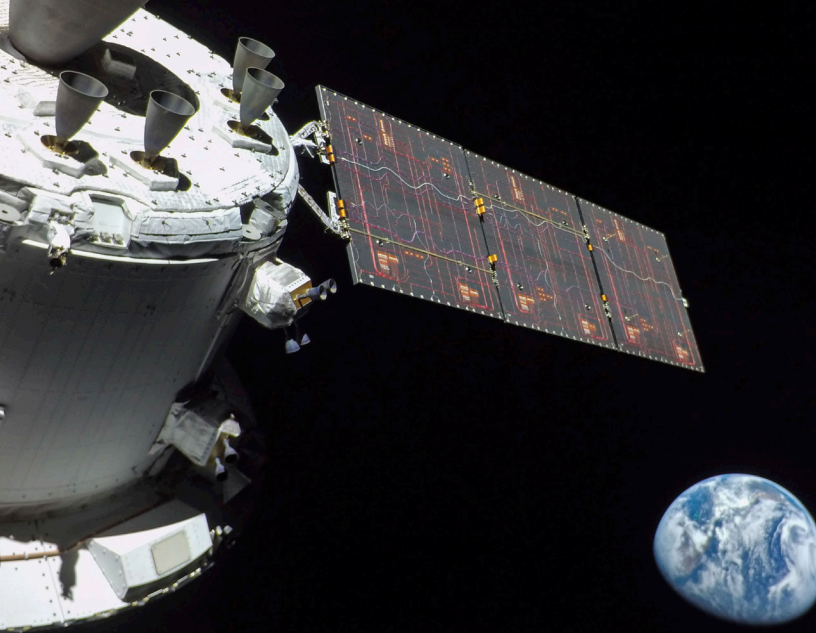
SPINOFF

2024



National Aeronautics and Space Administration
Technology Transfer Program
NASA Headquarters
Washington, DC 20546

www.nasa.gov



SPINOFF 2024

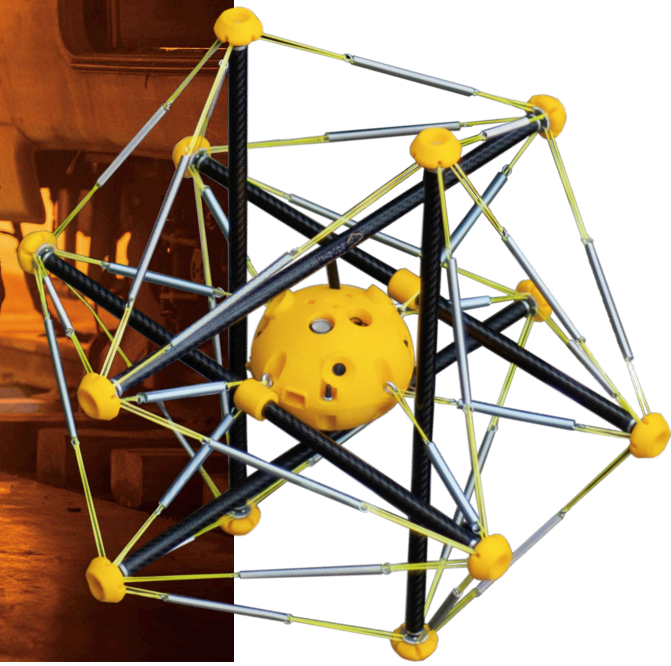
From bouncing “squishy” rescue robots to better sunscreen additives and space-saving campers, multitudes of day-to-day products here on Earth have incorporated technology originally developed to help NASA explore our solar system and learn about the universe. Here are several examples of these spinoff technologies now improving life for everyone.

Spherical Robots to the Rescue

Scouting robots designed for space warn first responders of gas leaks, other dangers



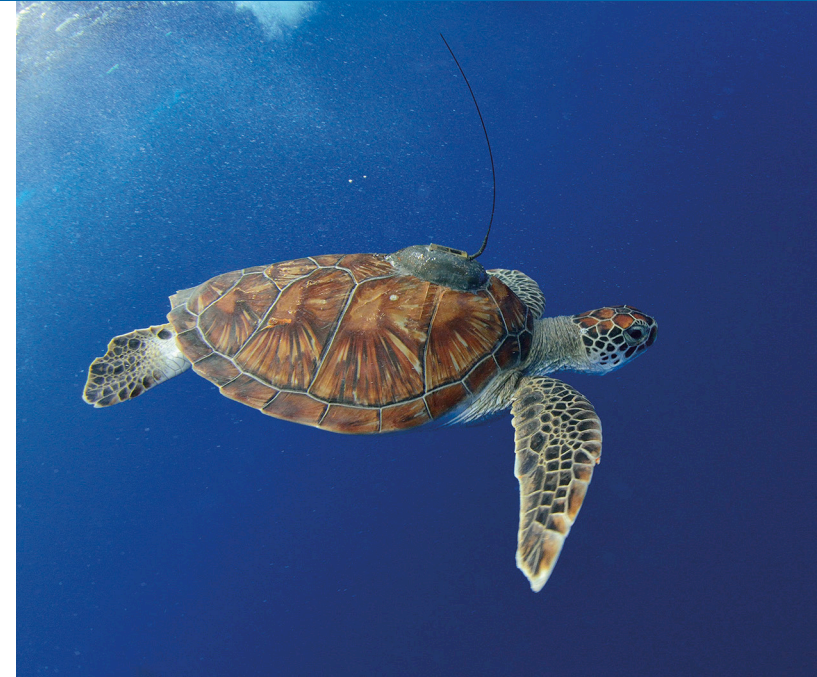
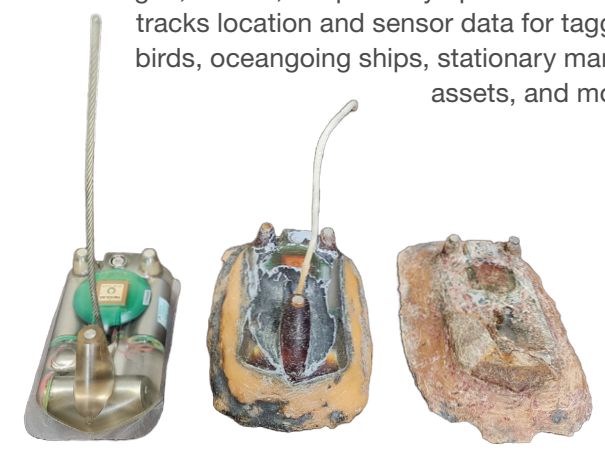
Alice Agogino cofounded Berkeley, California-based Squishy Robotics after realizing spherical robots she was designing with NASA Early Stage Innovations funding to comb planetary and lunar surfaces could help first responders assess disaster scenes on Earth.



Satellites ‘See’ Sea Turtles, Ocean Threats

A tracking system in low-Earth orbit locates turtles, boats, birds, oil slicks, and more

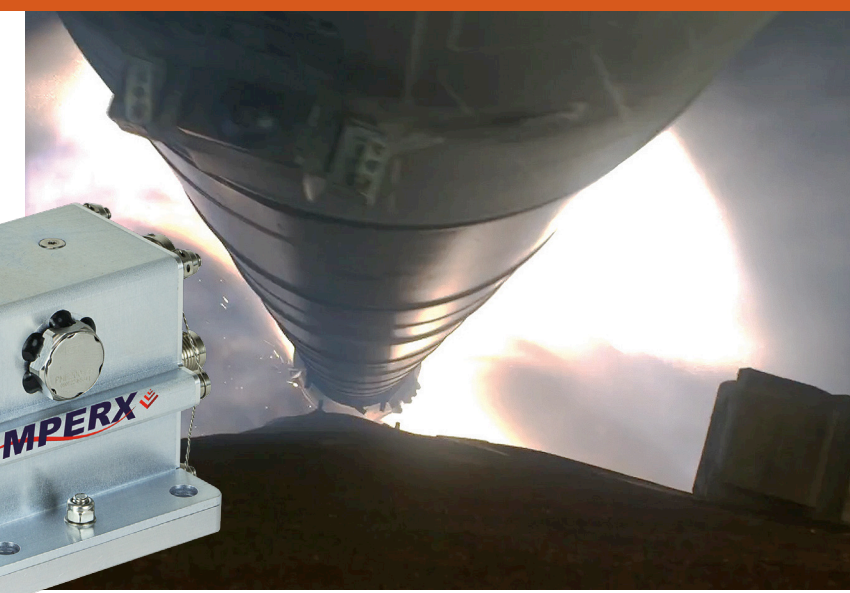
Created under a former international partnership with NASA, Argos satellite technology is used for wildlife tracking. Now operated by CLS Group of Ramonville-Saint-Agne, France, the privately operated service tracks location and sensor data for tagged birds, oceangoing ships, stationary marine assets, and more.



Redefining the ‘Rugged’ Video Camera

A new rocket-riding camera is tough enough for Earth

A ruggedized video camera that captured footage of the Space Launch System rocket during launch and in the extreme temperatures of space is available in a commercial version, created by Boca Raton, Florida-based Imperx with a NASA license and expertise.

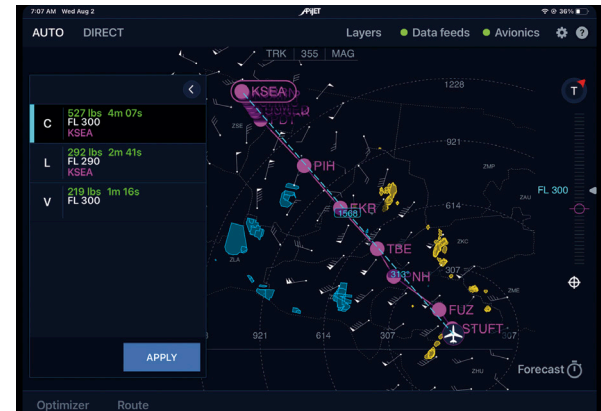


'Digital Winglets' for Real-Time Flight Paths

NASA-developed routing technology leads to fuel savings and smoother flights



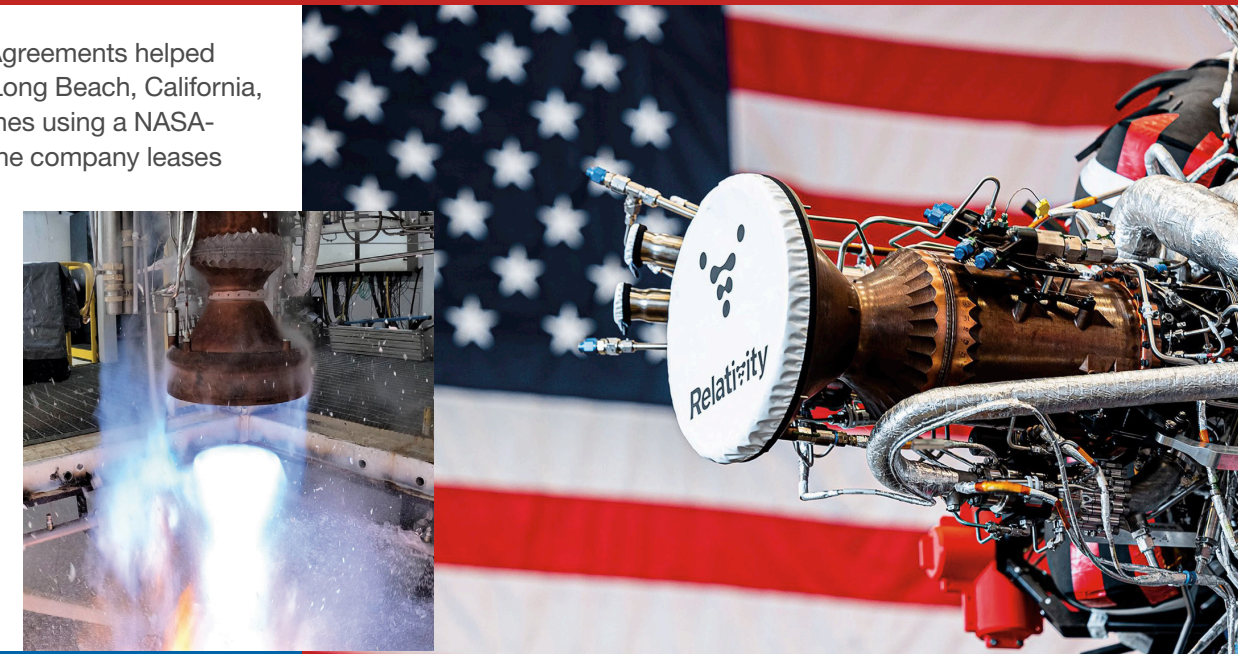
Through a NASA licensing agreement, APiJET of Seattle developed the Traffic Aware Strategic Aircrew Requests (TASAR) software into a commercial plane-routing technology that helps airlines save both time and fuel.



Additive Manufacturing Subtracts from Rocket Build Time

NASA teamwork on 3D printing, testing engines makes company's launch services more affordable

Several Space Act Agreements helped Relativity Space of Long Beach, California, 3D print rocket engines using a NASA-invented alloy, and the company leases agency facilities to test the engines.



From Space to Your Face

Radiation-resistant microbe studied in space leads to fewer wrinkles, less sun damage on Earth



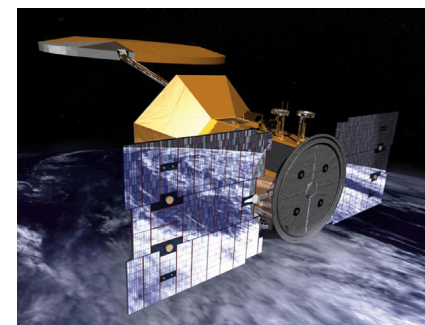
A bacterium that survived NASA sanitization efforts as well as 18 months in space is now the basis for an SPF-boosting sunscreen additive developed by Delavie Sciences of Worcester, Massachusetts, which licensed the organism patented by NASA researchers.



New Energy Source Powers Subsea Robots Indefinitely

Power modules driven by ocean temperatures save money, reduce pollution by living forever

Seatrec of Vista, California, licenses technology its founder developed at NASA. Its modules generate energy to power robotic ocean floats when material inside them melts and expands as they rise into warmer waters.



Concentrating on Microbes

Space station germ testing improves wastewater monitoring



SBIR requirements and funding for testing water and air on the space station helped InnoVaPrep of Drexel, Missouri, improve its commercial kits for testing water and air quality on Earth.



Space-Saving Exploration

Space habitat expertise drives recreational vehicle design

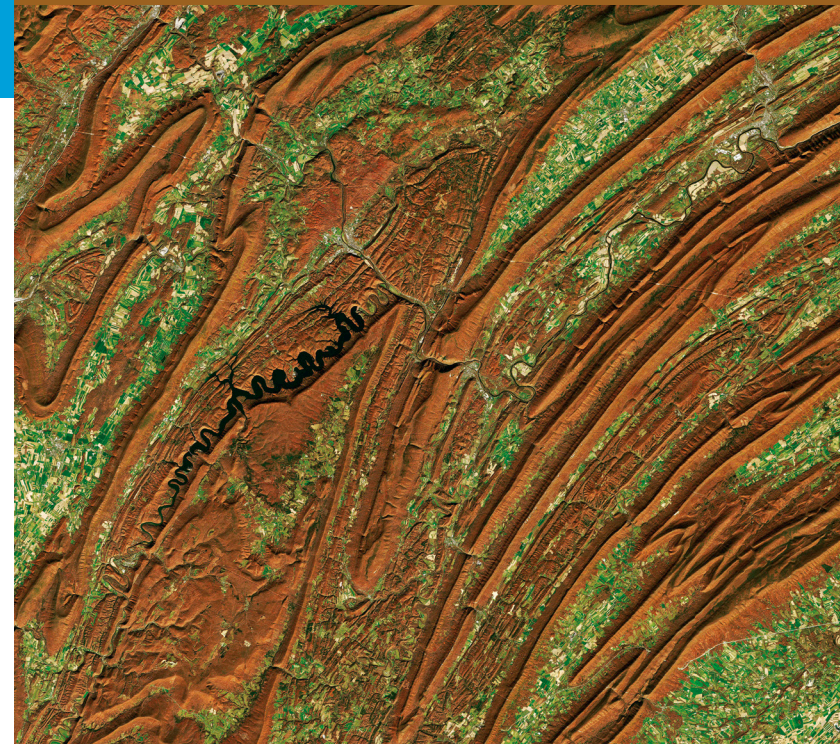


Putting the “fun” into functional campers is what Taxa Outdoors of Houston does using the know-how of a former NASA employee. Design principles developed for living quarters in space helped the company design five trailers that maximize space to include everything a camper could need.



Taking the Pulse of Earth

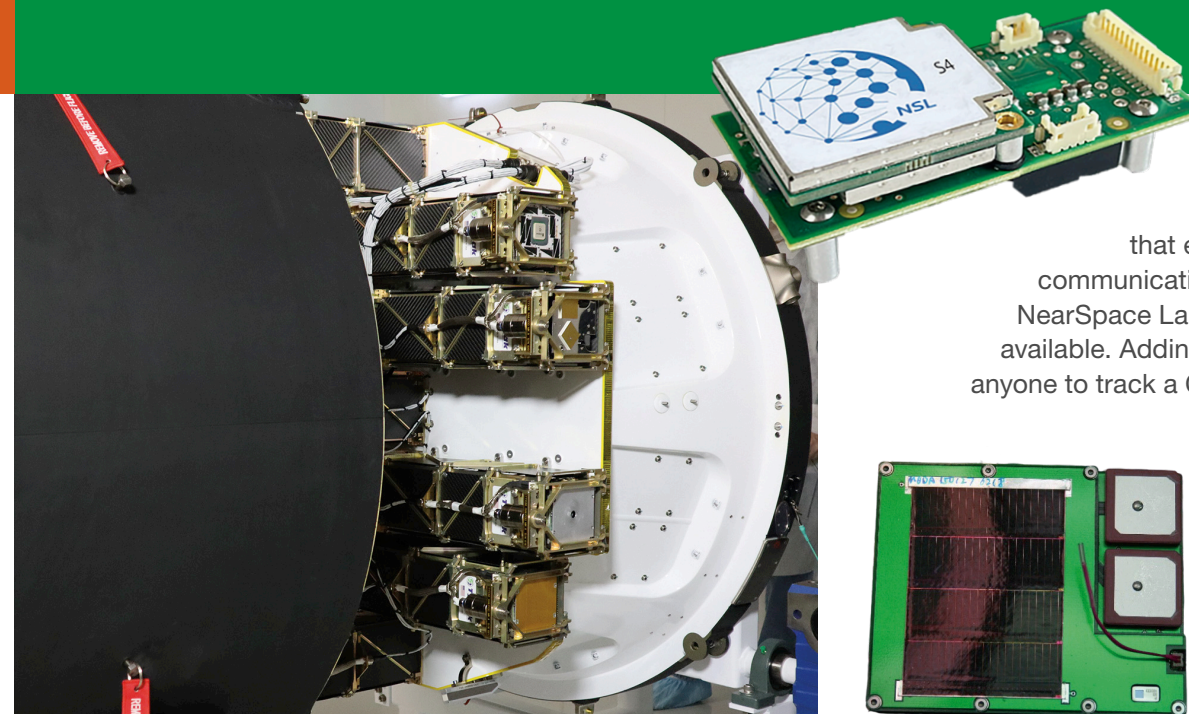
Applying AI to Earth data reveals sustainable options for farming, reforestation, land management



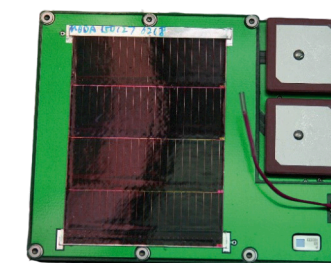
NASA satellite data and imagery combined with artificial intelligence developed by terraPulse enables customers of the North Potomac, Maryland-based company to monitor changes to the Earth's surface now and over the past 40 years.

Keeping the Connection

NASA-proven radio enables satellite-to-satellite communication



After a NASA test-flight program proved the capability of a tiny radio that enables satellite-to-satellite communication, Upland, Indiana-based NearSpace Launch made it commercially available. Adding GPS made it possible for anyone to track a CubeSat in low-Earth orbit.

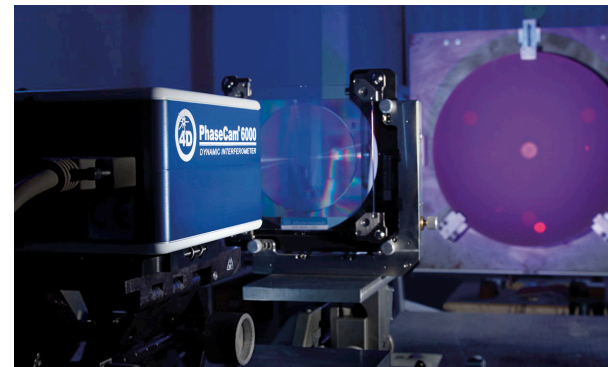


Making the Most of Meticulous Measurements

Better space telescope testing makes waves in optics industry



4D Technology of Tucson, Arizona, was contracted to develop measuring instruments that could ensure the James Webb Space Telescope could see distant galaxies. This equipment is now used to test precision optics of all kinds, from camera lenses to virtual reality headsets.



Medical-Grade Smartwatch Can Monitor Astronauts, Patients

NASA-backed consortium helped develop device for clinical trials, research, outpatient monitoring

ID	STATUS	MONITORING PERIOD	LAST DATA TIME	LAST DATA VALUE
S-003	MONITORING	May 04, 2022	10:13 AM	10:13
S-004	MONITORING	May 04, 2022	15:30 AM	15:30
S-005	MONITORING	May 05, 2022	4:45 AM	4:45
S-006	MONITORING	May 01, 2022	9:20 AM	9:20
S-007	WAITING	Not started	-	-
S-008	WAITING	Not started	-	-
S-009	EARLY TERM	Apr 02, 2021	-	-
S-001	FULL TERM	Apr 03, 2021	-	-

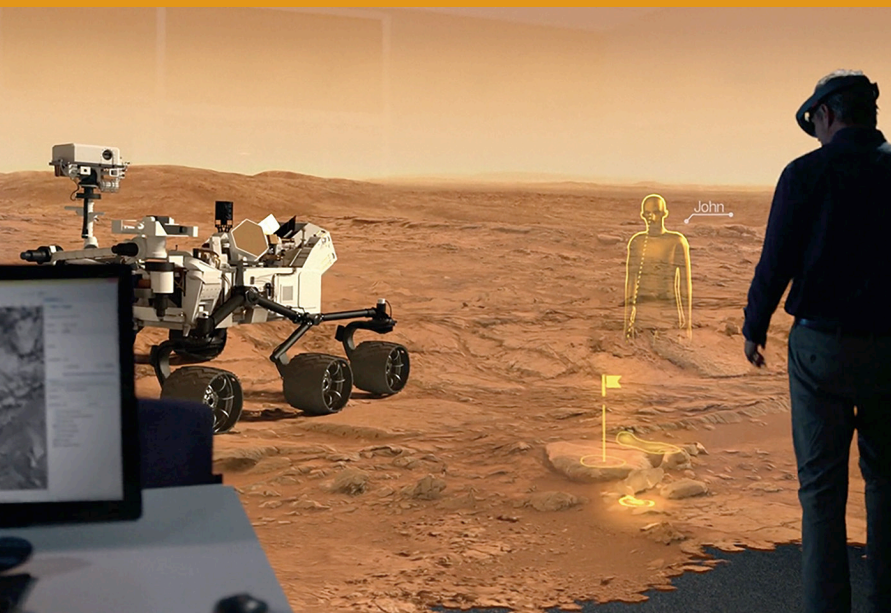
Care is working correctly
Everything is ok

Wearing time
Since midnight 6h 52min

Empatica of Cambridge, Massachusetts, developed its EmbracePlus wearable device with funding from a NASA-backed research consortium. The smartwatch can monitor astronauts' physiology, but it's also being used in clinical trials and to observe outpatients.

A Virtual World of Data

NASA developments, experience, and patents lead to a new method of exploring and visualizing data in virtual reality



Using patented NASA technology, as well as the founders' experience creating data visualization systems for the space agency, Virtualitics of Pasadena, California, developed software that analysts can use to examine statistics in three dimensions, from a spreadsheet to thousands of data points.

Where the Wildfires Are

Simulation, prediction, and response software helps businesses and communities cope with disaster



San Diego-based Technosylva's wildfire monitoring service employs NASA Earth-observation data along with other wildfire resources, artificial intelligence, and machine learning to predict, monitor, and support post-fire recovery.

From Shark Searches to Space Tours

Experience gained with NASA helps one company engineer a variety of aviation resources

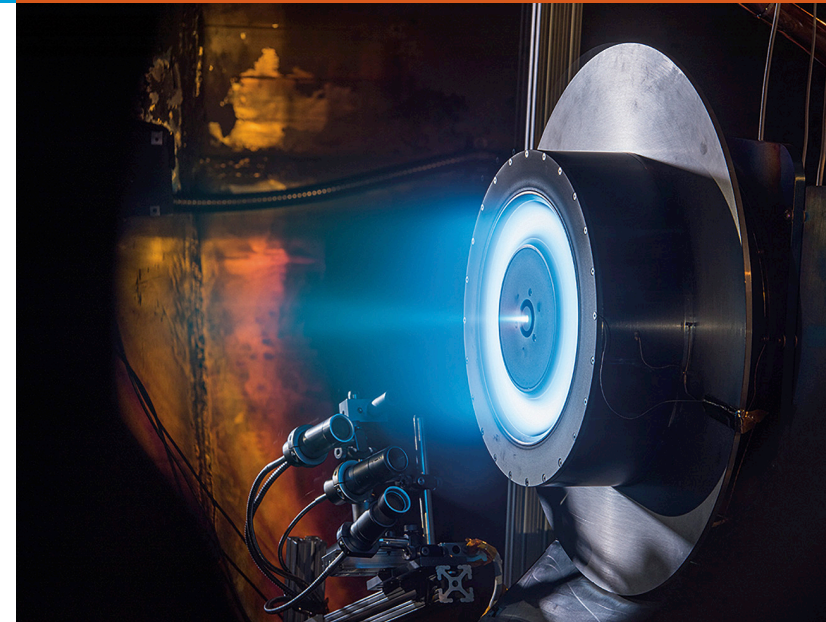


Aurora Flight Sciences incorporates NASA expertise gained through multiple SBIR contracts to develop technology that enables remote piloting of conventional small planes. The Manassas, Virginia-based company also designs and tests remotely piloted vehicles, in addition to fabricating parts for drones and airplanes.



Ion Thrusters Keep Satellites Going and Going

NASA electric thruster expertise, data keep commercial satellites on the clock

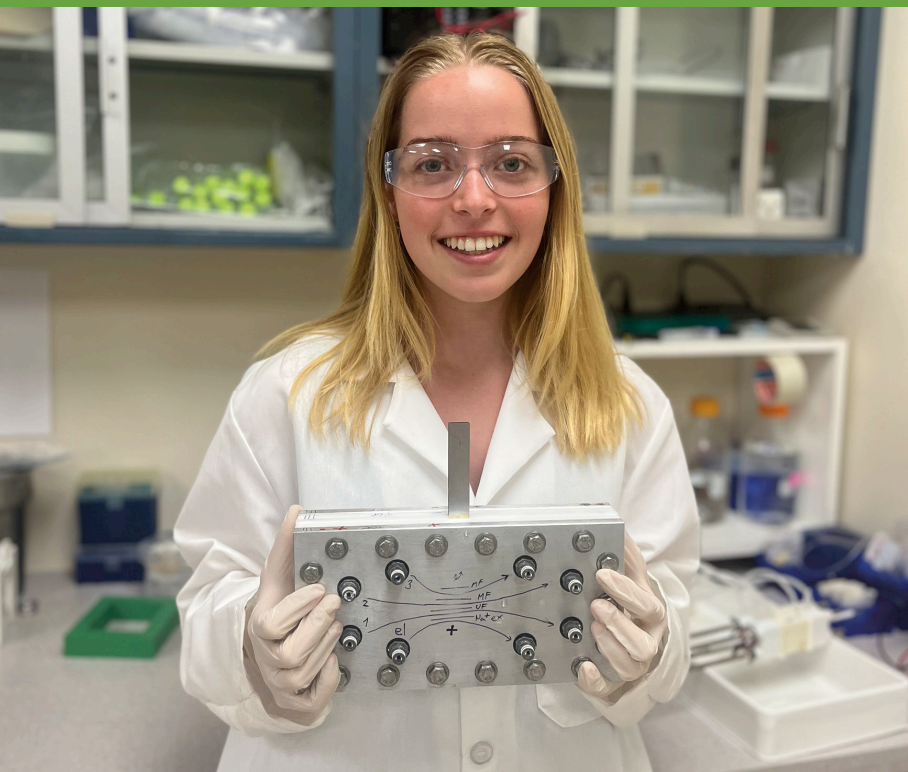


When Orbion Space Technology of Houghton, Michigan, wanted to bring high-efficiency ion thrusters to the commercial satellite industry, the company entered into agreements with NASA to receive guidance and data about how to build the perfect thrusters for small satellites.



Synthetic DNA Diagnoses COVID, Cancer

NASA-funded molecular research enables better disease detection



Synthetic DNA used to diagnose diseases such as COVID, hepatitis, and cancer was developed by Firebird Diagnostics of Alachua, Florida, with research funded in part by the NASA Astrobiology Program. The technology could also help find life on other planets or moons by identifying DNA characteristics that might be Earth-specific and looking beyond them.

Ballooning Business for Shrinking Cameras

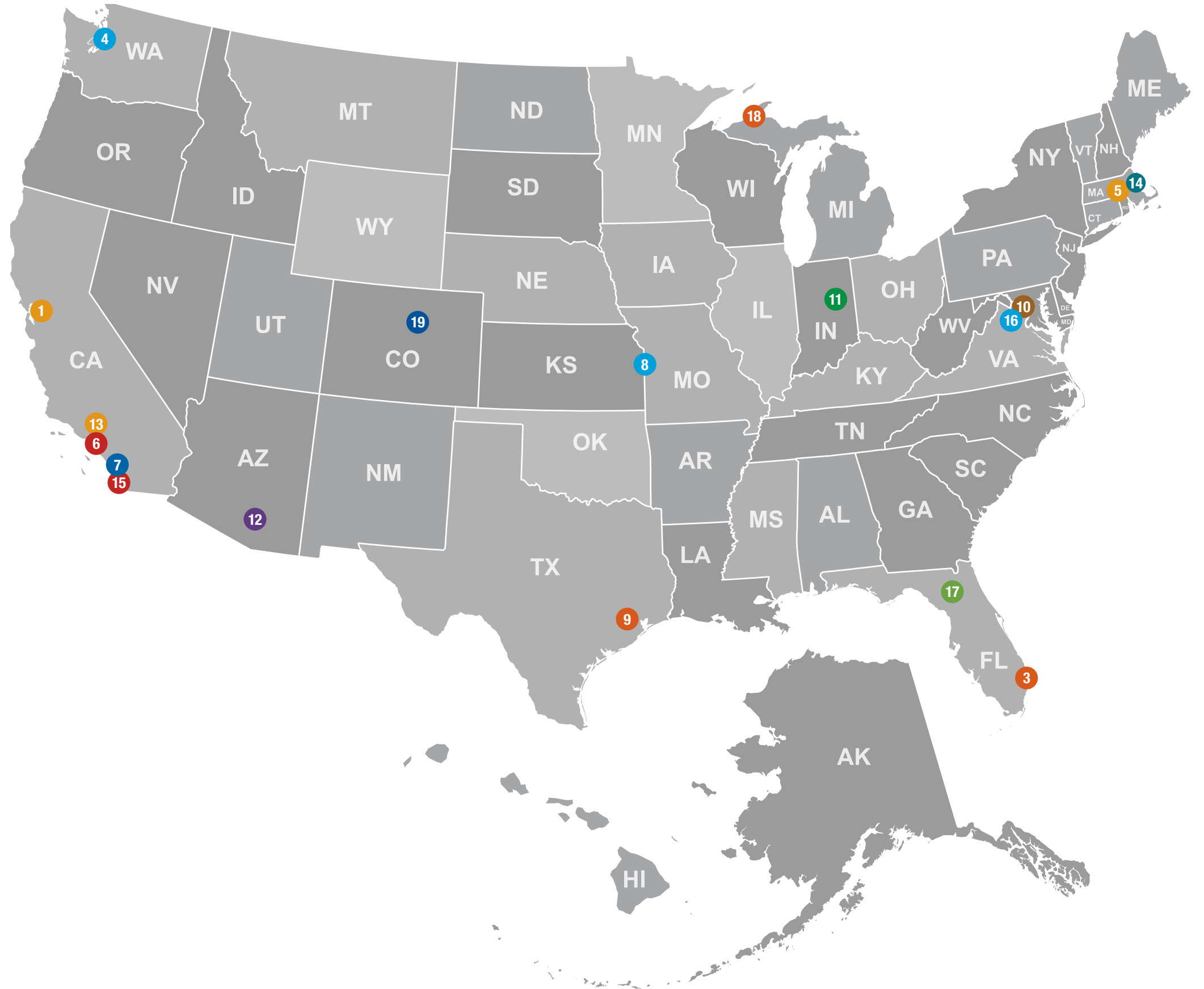
NASA-funded miniaturized technology offers better imagery than a satellite



Miniaturized sensors that fly on a zero-pressure balloon collect data and take pictures that are as expansive as satellite images but are more precise. Denver-based Urban Sky leveraged SBIR funding from NASA to create sensors lighter than off-the-shelf options.



NASA SPACE TECH WHERE YOU LIVE



	Article/NASA Center	Company, Location
1	Spherical Robots to the Rescue Ames Research Center	Squishy Robotics, Berkeley, CA
2	Satellites 'See' Sea Turtles, Ocean Threats Goddard Space Flight Center	CLS, Ramonville Saint-Agne, France
3	Redefining the 'Rugged' Video Camera Marshall Space Flight Center	Imperx, Boca Raton, FL
4	'Digital Winglets' for Real-Time Flight Paths Langley Research Center	APIJET, Seattle, WA
5	From Space to Your Face Jet Propulsion Laboratory	Delavie Sciences, Worcester, MA
6	Additive Manufacturing Subtracts from Rocket Build Time Marshall Space Flight Center, Stennis Space Center	Relativity Space, Long Beach, CA
7	New Energy Source Powers Subsea Robots Indefinitely Jet Propulsion Laboratory	Seatrec, Vista, CA
8	Concentrating on Microbes Johnson Space Center	InnovaPrep, Drexel, MO
9	Space-Saving Exploration Johnson Space Center	Taxa Outdoors, Houston, TX
10	Taking the Pulse of Earth Goddard Space Flight Center	terraPulse, North Potomac, MD
11	Keeping the Connection Kennedy Space Center	NearSpace Launch, Upland, IN
12	Making the Most of Meticulous Measurements Goddard Space Flight Center	4D Vision, Tucson, AZ
13	A Virtual World of Data Jet Propulsion Laboratory	Virtualitics, Pasadena, CA
14	Medical-Grade Smartwatch Can Monitor Astronauts, Patients Johnson Space Center	Empatica, Cambridge, MA
15	Where the Wildfires Are Ames Research Center	Technosylva, San Diego, CA
16	From Shark Searches to Space Tours Armstrong Flight Research Center	Aurora Flight Sciences, Manassas, VA
17	Synthetic DNA Diagnoses COVID, Cancer NASA Headquarters	Firebird Diagnostics, Alachua, FL
18	Ion Thrusters Keep Satellites Going and Going Glenn Research Center	Orbion Space Technology, Houghton, MI
19	Ballooning Business for Shrinking Cameras Goddard Space Flight Center	Urban Sky, Denver, CO

Spinoffs of Tomorrow

NASA maintains a patent portfolio with more than 1,100 technologies and a software catalog with hundreds of codes, making many of the aeronautic and aerospace technologies that are solving problems for the agency available to anyone.

Here are two examples that are ready to find a new home on Earth.

To learn more about – and get started licensing – these or any of the others in our extensive portfolio, please visit technology.nasa.gov.

Remote Sensing Toolkit

Online portal offers easy access to [NASA Earth-observation data](https://technology.nasa.gov)

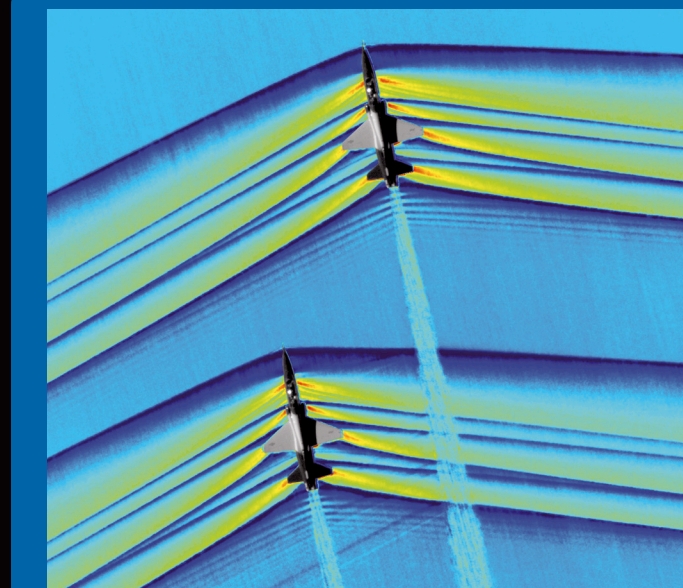
NASA's Technology Transfer program created an online resource to promote wider use of the agency's freely available remote sensing data and the software to work with it. Through its constellation of Earth-observation satellites, NASA collects petabytes of data each year. The Remote Sensing Toolkit lets users find, analyze, and use the most relevant data for their projects. The toolkit's simple system quickly identifies relevant sources based on user input.



System to Capture Shockwave Images

High-speed Schlieren imaging technology

Innovators at NASA's Armstrong Flight Research Center have developed a novel system for capturing images of shockwaves created by supersonic aircraft. The Background Oriented Schlieren Using Celestial Objects technology uses a celestial object, such as the Sun, as a background to secure measurable shockwave images of full-scale aircraft. The patented image-processing technology captures hundreds of observations with each shockwave and also has potential uses for visualizing air density gradients in the construction and renewable energy industries.



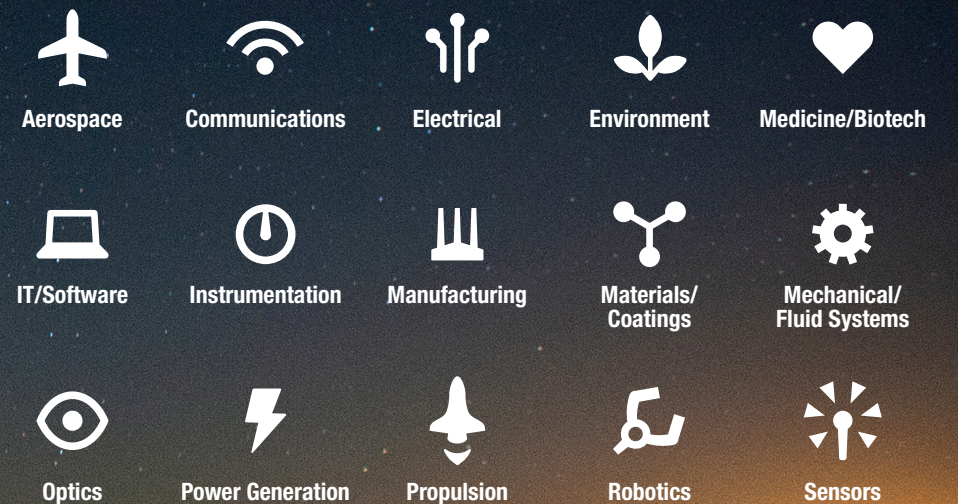
Will the next spinoff be yours?

Our technology is ready for you at technology.nasa.gov

Our portfolio includes:

- More than 1,100 patented technologies
- Hundreds of innovations now in the public domain
- More than 700 software codes

Whether you're looking to start a new company using NASA technology, enhance an existing product, or create a new product line, you can gain a competitive edge in the marketplace by putting NASA technology to work for you.



BRINGING NASA TECHNOLOGY DOWN TO EARTH