Space as an Arena for Innovation, Integration, and Investment

High Level Forum
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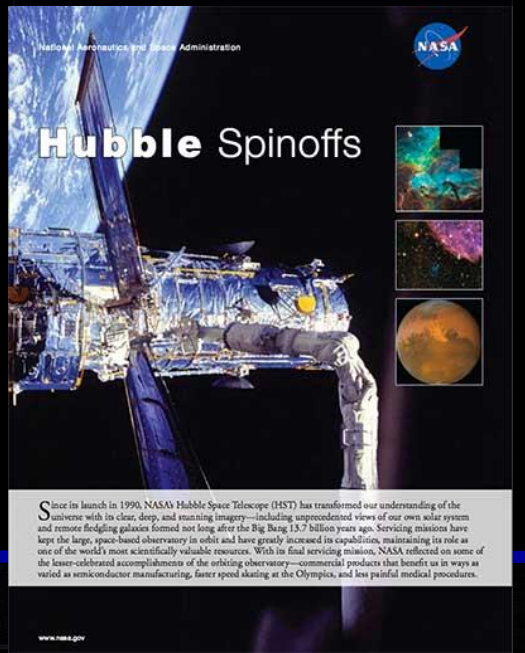
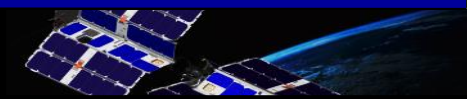
Spinoffs

https://spinoff.nasa.gov/resources.html





NASA Spinoffs Solar Stove

A **solar cooker** is a device which uses the energy of direct sunlight to heat or cook

Because they use no fuel and cost nothing to operate, they can be used world-wide in order to help reduce fuel costs and air pollution

Nasa Spinoffs Water Purifier

Volunteers help install and test a water purification system in Kendala, Iraq.

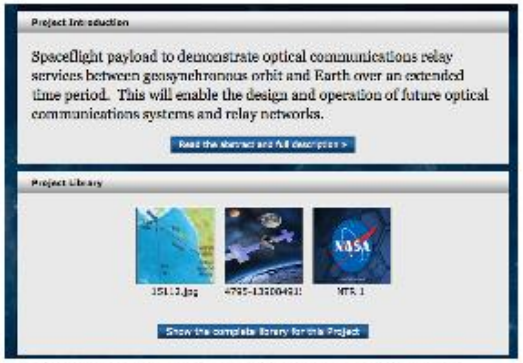
TechPort Library

National Aeronautics and Space Administration

Technology Transfer

TechPort provides a library of images, links, and document files for NASA Programs and Projects in TechPort. NASA technology Programs and Projects have the option of using the library to store documentation related to their work, including conference papers, academic articles, test results, presentations, and much more.

Today, most technology Programs and Projects have only a few documents in the library. This is because TechPort is a new system. Over the lifetime of a technology Program and Project additional items will be added.



Example of Library section located on a Project page

Very small or new technology Programs and Projects will have fewer items overall, due to the size and scope of their work.

What's in the Library?

The TechPort Library contains a variety of different items. It provides the technology Programs and Projects the opportunity to showcase some of their accomplishments and benefits. Below is a list of those items a technology Program or Project might post in the library. When certain items that document a "Realized Benefit" are posted in the library, a blue ribbon is also posted on the technology Program and Project's page. The ribbon appears when there are entries in any one of the fields listed below as "Realized Benefits."

Library Item	Definition	Realized Benefits	Contains Link
Conference papers	Papers related to this Program/Project written for technical and professional conferences	Yes	Yes
Educational downloads	Downloadable education materials created to improve understanding of the technology related to this Project	Yes	Yes
Images	Images of technologies or systems related to this Program/Project	No	Yes
Licenses	Indicates that the Program/Project has a legal document granting intellectual property rights to NASA patents	Yes	No

JUST UPDATED! NASA's Technology Innovation

The newest edition of NASA's Technology Innovation, Issue 17.3 on Small Spacecraft
Is now available for download.

Each issue of our digital publication *Technology Innovation* features space technology innovators and project developments across NASA, highlighting the American inventors, entrepreneurs, and application engineers who have transformed space exploration technologies into products that benefit the Nation.

The newest edition of the digital publication is now available in the **iTunes store** as an iPhone or iPad app as well as in the **Google Play store** as an Android app. A desktop viewer is also available.

IOS APP:
https://itunes.apple.com/us/app/nasa-technologyinnovation/id1000795126?mt=8

GOOGLE PLAY STORE:
https://play.google.com/store/apps/details?id=gov.nasa.ti

WEBVIEWER:
https://viewer.aemmobile.adobe.com/index.html#project/20151817-e5ce-4721-aff0-65bc38c9679b/view/topLevelContent/article/NASAmasterEULA

EARTH Observations

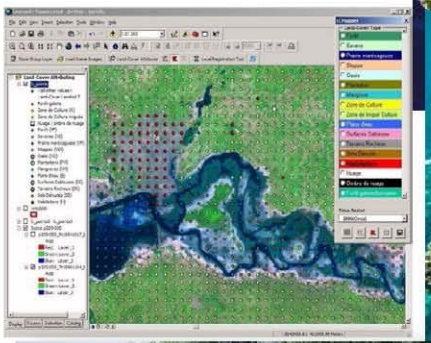
- NASA's Earth Observing System Data and Information System (EOSDIS) provides full and open access to more than 17.5 petabytes of Earth observations data.
  - One petabyte has been described as being equal to roughly 20 million file cabinets filled with text.
  - By 2020 the data archive is estimated to be around 65 petabytes in size; by 2025 this archive may be more than 330 petabytes in size.
- EOSDIS systems allow data users from around the world to easily search the entire EOSDIS data catalog and find relevant data products in less than a second

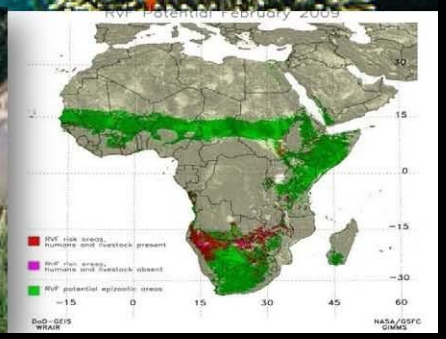
Earth Observations

6. Research and Development

SERVIR

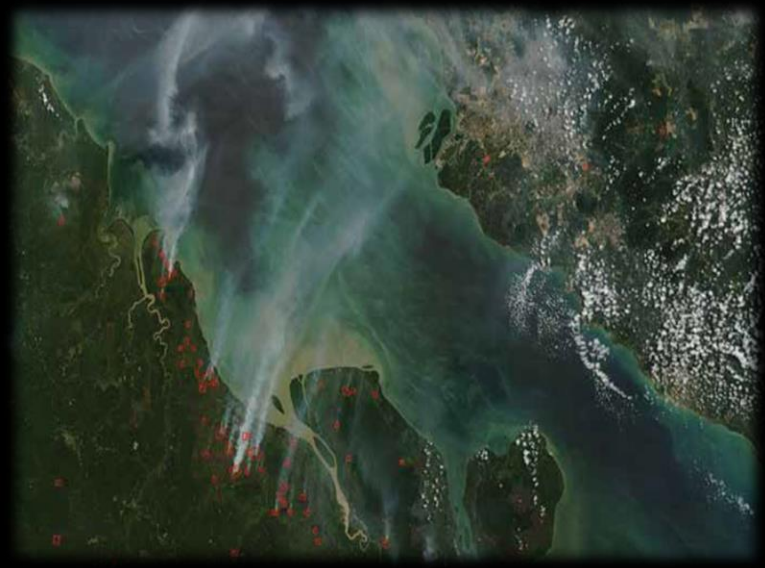
- Rapid Land Cover Mapping
- Crop Yield Estimation
- Water Quality Monitoring
- Rift Valley Fever Forecasting
- Tsetse Spread Prediction
- Coral Reef Bleach Monitoring





Natural Disasters

Earth-observing satellites that spot forest fires and other natural Disasters



EXPANDING HUMAN PRESENCE IN PARTNERSHIP CREATING ECONOMIC OPPORTUNITIES, ADVANCING TECHNOLOGIES, AND ENABLING DISCOVERY

Now

Using the International Space Station

2020s

Operating in the Lunar Vicinity (proving ground)

After 2030

Leaving the Earth-Moon System and Reaching Mars Orbit

Phase 0

Continue research and testing on ISS to solve exploration challenges. Evaluate potential for lunar resources. Develop standards.

Phase 1

Begin missions in cislunar space. Build Deep Space Gateway. Initiate assembly of Deep Space Transport.

Phase 2

Complete Deep Space Transport and conduct yearlong Mars simulation mission.

Phases 3 and 4

Begin sustained crew expeditions to Martian system and surface of Mars.

It Starts with the International Space Station




Center for the Advancement of Science in Space

- Cooperative agreement with NASA to manage ISS National Laboratory
- Mission is to maximize use of space for innovations which can benefit all humankind - focus on Earth
- NASA provides seed funding and CASIS seeks non-governmental complementary funding
- Examples
  - Eli Lily researching freeze drying development to improve chemical and physical stability
  - Research Institute growing lung tissues looking for therapies to repair damaged organs

Center for the Advancement of Science in Space (CASIS)

- Examples:
  - Michael J. Fox Foundation teams up with CASIS to research Parkinson's disease
  - Cotton sustainability challenge - to reduce cotton footprint
    - to produce one kilogram of cotton requires thousands of liters of water
  - Collaboration with Merck Pharmaceutical to conduct therapeutic research that could ultimately lead to the development of new drugs and therapies to treat human immunological disease
    - More efficient drug delivery

Perhaps this is a model that could be considered by others who provide access to space

National Aeronautics and Space Administration

NASACITY

Trace Space Back to You.

COASTAL	HOUSEHOLD	AIR TRAVEL	SPORTS & RECREATION	MANUFACTURING	AUTOMOTIVE	PUBLIC SAFETY	MEDICAL	GROCERY
Search and Rescue at Sea	Infrared Ear Thermometers	Collision Avoidance Systems	Shock-Absorbing Athletic Shoes	Powdered Lubricants	Improved Radial Tires	Fire-Resistant Reinforcement	Light-Emitting Diodes (LEDs)	Food Safety Systems
Flood Monitoring	Ingestible Toothpaste	Clean-Burning Engines	Stadium Material	Improved Welding	Cleaner Burning Cars	Video Enhancing and Analysis Systems	ER Infrared Ear Thermometers	Ethylene Removal System
Environmentally Safe Ship Cleaning	Cosmetics	Nitrogen Oxide Reduction	Plasma Displays	Quick Fasteners	Advanced Lubricants	Fire Sensors	Automatic Insulin Pumps	Hyperspectral Imaging of Chicken
Environmentally Safe Sewage Treatment	Memory Metal Alloys	Anti-Icing Systems	Protective Padding	Power Plant Design	Car Chassis and Brake Systems	Face Masks and Fire Suits	Artificial Limbs	Refrigeration Showcase
Oceanic Monitoring	Environmentally Safe Sewage Treatment	Optics for High-Speed Ticket Processing	Golf Equipment	Smokestack Monitors	Crash Analysis	Land Mine Removal	Clean Room Apparel	Packaging and Freeze-Drying
Pollution Remediation	Polished Brass Finish	Virtual Biofeedback Training	Helmets	Rapid Prototyping	Structural Analysis	Anthrax Detection	Precision Dialysis Pumps and Filters	Enriched Baby Food
Dam Corrosion Control and Bridge Support	Bacteriostatic Water Softeners	Jet Lag Prevention	Ingestible Thermometers	Chemical Detection	Highway Safety	Radio and Breathing Systems	Invisible Braces	
	Liquid Metal and Sports Equipment	Cabin Pressure Devices	Protective Cool Vests	Improved Mine Safety	Truck Design	LifeShears	Diamond Coatings: Artificial Hip Joints	
	Temper Foam	Parachute Systems	Heart Rate Monitors	Protective Cool Vests		Flame-Retardant Materials	Corneal Refractive Therapy	
	Phase-Change Materials	Voltage Controllers	Tennis Rackets			Self-Illuminating Materials	Dental Waterline Purification Cartridge	
	Improved Footwear		Phase-Change Materials				Ventricular Assist Device	
							Gait Analysis System	

NASACITY

Trace Space Back to You.

COASTAL

NASA's remote sensors and satellites tell us a lot about what's going on in our world; flood and ocean monitoring are just two of their functions. And NASA does more than just look at things! A robot developed with the benefit of NASA funding and technology can remove paint from ships without damaging the environment. A former head of NASA's Environmental Research Laboratory at Stennis Space Center, along with his team, has developed a new, environmentally safe system for treating sewage. And who wouldn't want safer bridges and dams? An electromigration technique developed by NASA helps prevent corrosion in bridges, dams, and other structures. If you're spending time at the shore, NASA's there with you. Learn more about NASA's coastal technology at *http://www.nasa.gov/city.*

HOUSEHOLD

In many ways, living in space is similar to living on Earth. Thanks to NASA's contributions and industry partnerships, families all over are taking advantage of cutting-edge technologies originally used in space. Are you? Sure! Look around your house and you're bound to see how NASA contributes to your daily routine. It could be something as simple as the wireless headset through which you communicate as you roam the house or as complex as the Internet-connected combination refrigerator–wall oven that keeps food cold until you remotely tell it to start cooking. It doesn't stop there—there's more NASA to explore in your home. From the memory foam in your mattresses and pillows to the memory metal alloys in your faucets, water purification systems throughout your house, and much more, it's safe to say that wherever you go in your house, NASA is there, bringing aerospace technology to improve your life on Earth. Learn more about NASA in your home at *http://www.nasa.gov/city.*

AIR TRAVEL

It's no surprise that NASA is with you when you fly—after all, the first *A* in "NASA" stands for "Aeronautics"! NASA's advances in aviation include reducing noise and nitrogen oxide production, deicing planes, monitoring cabin pressure, countering jet lag, and even speeding up the processing of your tickets. Everywhere you look in aeronautics, NASA will have youwalking on air! To learn more about NASA technology at work in the world of aviation, visit *http://www.nasa.gov/city.*

SPORTS & RECREATION

What you wear, what you see, where you sit—NASA is with you in your sporting and recreational activities. Shock-absorbing athletic shoes that use spacesuit technology cushion athletes' feet. The knowledge and techniques gained from developing protective foam padding for aircraft seats have been adapted for helmets and other safety equipment. The National Football League's first retractable roof at Reliant Stadium, which is supported by a network of cables and pylons, was made possible by technology developed by NASA in the creation of fabric for its spacesuits. And the large-venue plasma display that shows you the instant replay might contain a NASA-recommended approach in using nondistorting, nondiscoloring, and multicontour microspheres. For more information on NASA's presence in sports and recreation, visit *http://www.nasa.gov/city.*

MANUFACTURING

Need to assemble something in a hurry? Thanks to NASA, there's a faster fastener for you! A quick-connect nut developed for in-space assembly can be pushed onto a standard bolt and locked into place with a quarter turn to the right. That's just one of NASA's innovations that benefit terrestrial manufacturing. Others include powdered lubricants, optimal power plant designs, smokestack monitors, sensors to detect chemicals, monitors to improve mine safety, and suits that protect against hazardous materials and extremes in temperature. Learn more details about NASA's industrial advances at *http://www.nasa.gov/city.*

AUTOMOTIVE

You may not be a Space Shuttle pilot, but if you drive a car, truck, or bus, you may have encountered NASA! Stronger tires, advanced lubricants, rugged school bus chassis, and aerodynamic truck designs are just a few of the places where you'll find NASA on the road. You may even find NASA in the road itself—safety grooving in concrete, a technique that originated at NASA Langley Research Center, reduces skidding, decreases stopping time, and enhances a vehicle's cornering ability. Learn more about NASA on the road at *http://www.nasa.gov/city.*

PUBLIC SAFETY

Everyone loves a good campfire, but unwanted fires are another matter. NASA's technology helps detect, resist, and extinguish fires. NASA's airborne system for imaging forest fires delivers information about fire locations quickly. Technology used in the development of the heat shield for the Apollo spacecraft has been adapted into various fire-retardant materials to prevent the spread of fire and protect people inside burning buildings. Breathing equipment based both on NASA's design expertise and on lightweight materials used in space helps protect firefighters from smoke-inhalation injury. To learn more about NASA's contributions to fire safety and other areas of safety and security, visit *http://www.nasa.gov/city.*

MEDICAL

NASA is helping to improve your health and well-being! From light-emitting diodes (LEDs) that grow plants in space and heal humans on Earth, to microminiaturization techniques used in automatic insulin pumps, to water purification systems based on those used in space, NASA's work is making important contributions to health. Robotics work done for NASA is being adapted to create more functionally dynamic artificial limbs, and technology originally created for use in sounding rocket assemblies and robotics has been incorporated into a gait analysis system. Individuals using these products are doing their own kind of "space-walking"! Check out more of NASA's contributions to health and medicine at *http://www.nasa.gov/city.*

GROCERY

What does NASA have to do with food? Well, astronauts have to eat, too! And when NASA fulfills the stringent requirements for safe dining in space, diners on Earth benefit as well. When you go shopping for groceries, NASA is there with you. Food lasts longer thanks to techniques for freeze-drying and packaging it and to refrigerators designed to meet higher standards for preserving it. Even some commercially available infant formulas now contain a nutritional, algae-based enrichment ingredient that traces its existence to NASA-sponsored research. To learn more about how NASA's work benefits food safety and nutrition, visit *http://www.nasa.gov/city.*

www.nasa.gov

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