

Partnership

Successes

NASA cultivates partnerships with private industry, academia, and other government agencies to address the challenges that face our Nation. By contributing time, facilities, and technical expertise, NASA brings the benefits of space down to Earth where it enriches the lives of the American public. The following pages are illustrative of the wealth of NASA success stories generated each year.

Partnership Successes

Each year, NASA research and development efforts contribute to a variety of successes. Through partnerships with industry and academia, NASA's space-age technology improves all aspects of society. While not every technology transfer activity results in commercialization, these partnerships offer far-reaching benefits to U.S. citizens. The following examples are just a few of the ways NASA is applying its technology and resources to improve the quality of life on Earth.

Traffic Safety

This year, NASA and the National Highway Traffic Safety Administration (NHTSA) joined forces to, literally, take vehicles out for a spin. The NHTSA currently employs a consumer rating system that uses an engineering formula to determine rollover resistance, but wanted to research new methods through NASA. Goddard Space Flight Center's High Capacity Centrifuge, used to test spacecraft before they are sent into space, was exactly what was needed to spin up some unique and original vehicle testing. Vehicles were positioned on the High Capacity Centrifuge's test platform, and spun until inertia and centrifugal force caused them to tip. A crash-test dummy was along for the ride in each vehicle to increase the realism and accuracy of the test results. The High Capacity Centrifuge is a big machine, more than 150 feet in diameter, filling an entire circular building. With two powerful motors running at full tilt, the outer edge of the test arm can reach speeds of more than 200 miles per hour, producing a force 30 times Earth's gravity. At rest, the giant multi-ton arm sits on bearings so smooth just two or three people can push it around the room. NASA and the NHTSA expect this first-of-its-kind test will

enable them to gain valuable safety information about vehicles that move millions of Americans every day.

Environmental Conservation

In an effort to preserve Earth's natural resources, Goddard is the first Federal facility to heat its buildings with landfill gas. By harnessing methane gas from a nearby landfill and utilizing it to fire steam-producing boilers, Goddard is reducing emissions equivalent to taking 35,000 cars off the road per year, or planting 47,000 acres of trees, according to Barry Green, the Center's Energy Manager. On top of this, officials claim NASA will save taxpayers more than \$3.5 million over the next decade in fuel costs. A few years ago, Dallas-based Toro Energy, Inc., approached NASA, offering landfill gas as a way to reduce fuel costs while helping to protect the environment. At no cost to the government, Toro Energy built a purification plant and a 5-mile pipeline from the Prince George's County, Maryland-based Sandy Hill Landfill to Goddard, and modified two boilers at the Center. The Sandy Hill Landfill has collected about 5.2 million tons of trash and is expected to generate landfill gas for at least 30 years; NASA plans to use the gas for 10 to 20 years. The Environmental Landfill Agency's Landfill Methane Outreach Program also provided expertise to help complete this project.

Earth Science

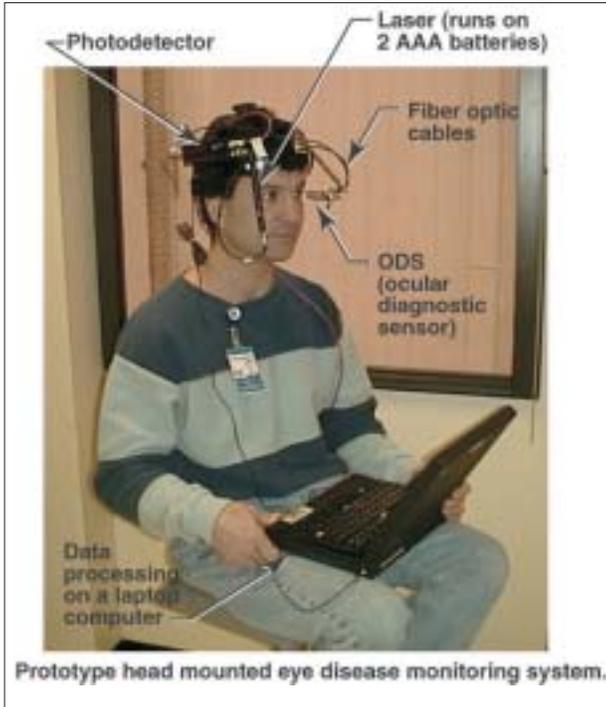
Scientists at Goddard, the Jet Propulsion Laboratory (JPL), and Ames Research Center are working in conjunction with several universities to develop an advanced earthquake modeling system. QuakeSim will give researchers new insight into the physics of earthquakes using state-of-the-art modeling, data manipulation, and pattern recognition technologies when it is completed in 2004. Consisting of several simulation tools, QuakeSim will generate new quake models that researchers anticipate will vastly improve future earthquake forecasting. According to QuakeSim principal investigator Dr. Andrea Donnellan, from JPL, the forecasts can be used by a variety of Federal and State agencies to develop decision support tools and help mitigate losses from large earthquakes.

Emergency Management

A new emergency communication system that aids first responders to natural or

A sports utility vehicle harnessed to NASA's High Capacity Centrifuge is being prepared for a spin to simulate the kinds of forces that might cause the vehicle to lose its stability and roll over.





Glenn Research Center's Dr. Rafat Ansari developed this prototype head-mounted eye disease monitoring system to detect eye cataracts and other eye diseases at the molecular level.

cars into clearer, stable images. NASA scientists Dr. David Hathaway and Paul Meyer, who study violent explosions on the Sun and examine hazardous weather conditions on Earth, created VISAR to aid in their space program research. VISAR has been licensed commercially by Intergraph Corp., of Huntsville, Alabama, and incorporated into Video Analyst™, a workstation that can stabilize and enhance video, brighten dark pictures and enlarge small sections of pictures to reveal clues about crimes. In a recent application, ABC News asked Intergraph to analyze video clips that aired on Iraqi television on March 20, 2003, apparently showing Saddam Hussein. Officials wanted to verify if Hussein survived a U.S. air strike the previous day, or whether the video was that of a body double. Using Video Analyst with VISAR, it took about 90 minutes to compare the ABC footage to prior Iraqi television images of Hussein and determine—with 99 percent certainty—it was Hussein, according to Intergraph officials. Columbia accident investigators also relied on VISAR to enhance video images of the Space Shuttle's external tank as it shed insulation during liftoff.

Health

In the medical field, technology originally developed to study the behavior of fluids in microgravity is now being used to detect various eye problems earlier and more accurately. Dr. Rafat Ansari, biofluid sensor systems scientist at NASA's Glenn Research Center, utilized the "built-for-space" fiber-optic probe, based on a technique called dynamic light scattering, to detect cataracts and other eye diseases at the molecular level. The probe's value in early cataract detection has already been demonstrated in clinical trials at the National Eye Institute of the National Institutes of Health. Detecting cataracts at an early stage can help doctors find non-surgical cures for the disease. With the help of renowned eye researchers around the world, Ansari is testing the probe as a noninvasive diagnostic measurement device for other eye diseases such as glaucoma and macular degeneration. Ansari also uses the probe in tests to monitor diabetes and Alzheimer's disease.

From public safety and health to environmental conservation, NASA outreach efforts are keeping Americans in step with a world constantly affected by change, while helping to unravel the mysteries of the universe and worlds beyond. The intertwining of Earth and space sciences and the continuance of successful partnership relationships with industry and academia will yield infinite benefits for many years to come.

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man-made disasters is currently being field tested by the Maryland Emergency Management Agency. Developed by Aeptec Microsystems, Inc., through funding from Goddard's **Small Business Innovation Research** program and the U.S. Federal Emergency Management Agency (FEMA), Earth Alert will make it easier for FEMA, fire departments, and other organizations to track and communicate with emergency vehicles and staff responding to disasters. Earth Alert combines global positioning satellite communications with personal digital assistants and cellular phone technology to effectively integrate, analyze, and disseminate information for emergency management. The technology employs seamless moveable maps and decision-making notification software while providing dispatchers with a real-time location of personnel from the field. It is envisioned that Earth Alert-equipped pagers and fixed receivers located in schools, hospitals, businesses, and other facilities will be able to receive critical notifications of tornadoes, floods, chemical spills, and other disasters. NASA holds the rights to distribute Earth Alerts to first responders, while Aeptec is pursuing commercial applications.

Public Safety

From bombings and other homeland security threats, to child abductions and verifying the "real" Saddam Hussein, a video enhancement system developed at Marshall Space Flight Center is proving to be a valuable law enforcement tool. The technology known as VISAR (short for Video Image Stabilization and Registration) can turn dark, jittery images captured by home video, security systems, and video cameras mounted in police

