



NASA's Impact in Tennessee: A Tech Transfer Perspective

You know that NASA studies our planet, our sun, the solar system, and the Universe. But did you know about the space program's economic impact here on Earth?



In 2011, NASA invested over **\$32 million** in the state of Tennessee.

Since 2001, NASA's SBIR/STTR Program has invested over **\$10 million** in **12 Tennessee companies** and more than **\$1.2 billion** nationwide.

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How NASA's SBIR/STTR Program Benefits Tennessee

NASA is committed to moving technologies and innovations into the mainstream of the U.S. economy, and the Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) program helps fulfill this goal.

SBIR/STTR stimulates technological innovation by encouraging small, high-tech companies—particularly minority and disadvantaged businesses—to partner with NASA to help meet its research and development needs in key technology areas. At the same time, this program strengthens small companies by enabling them to bring cutting-edge new products into the U.S. economy.

The list to the right highlights Tennessee businesses that received SBIR/STTR contracts from NASA since 2001. (Visit <http://sbir.nasa.gov> for more information on the SBIR/STTR program.)

NASA SBIR/STTR Companies in Tennessee

Accurate Automation Corporation	Chattanooga
Active Parallel Instrumentation, Inc.	Nashville
Analysis and Measurement Services Corporation.....	Knoxville
Brilliant Technology, Inc.	Brentwood
Dynamic Structures & Materials, LLC.....	Franklin
Ecotera Energy, Inc.	Knoxville
GTL Company.....	Tullahoma
Lytec, LLC.....	Tullahoma
M.D. Perry & Associates.....	Knoxville
Qgenics, Inc.	Knoxville
Raven Research Corporation.....	Lenoir City
Tai-Yang Research Corporation.....	Knoxville

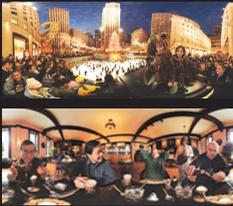


How NASA Spinoffs Benefit Tennessee



Astronaut Crew Training Simulations Now Revitalize Patient Care (Collierville)

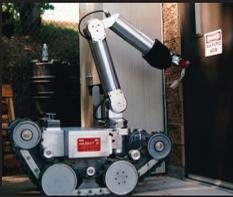
NASA has developed management and communication techniques to keep crew workflows predictable and as error-free as possible. Crews at NASA and other aviation-related companies use these techniques and workflows in NASA's Line Oriented Flight Training (LOFT) simulator while practicing both routine and hazardous missions. Two physician-astronauts and two pilots, all LOFT-trained, founded LifeWings Partners, LLC to help bring these NASA training and simulation techniques into the healthcare field. LifeWings' training and simulations now give healthcare teams the opportunity to rehearse their responses to realistic medical situations. After training, LifeWings notes that healthcare teams show significant progress with operating room turnaround times, a reduction in post-operative infections, and more frequent communication from team members regarding patient safety.



Images courtesy of Jook Leung

Immersive Photography Renders 360-Degree Views (Knoxville)

NASA funding enabled NASA and Interactive Pictures Corporation, now Minds-Eye-View, Inc., to collaborate on two immersive photography technologies: one for video and the other for still images. An immersive photograph combines two or more images into a single, navigable image with a panoramic 360-degree view. NASA uses immersive photography to guide space robots, dock spacecraft, and view objects in cryogenic wind tunnels. Viewers virtually enter the image and interact with the environment by panning, looking in different directions, or zooming in on an area of interest. Commercial uses for the technologies are very broad and include virtual tours and surveillance systems for casinos, airports, parking garages, schools, and amusement parks, to name a few.



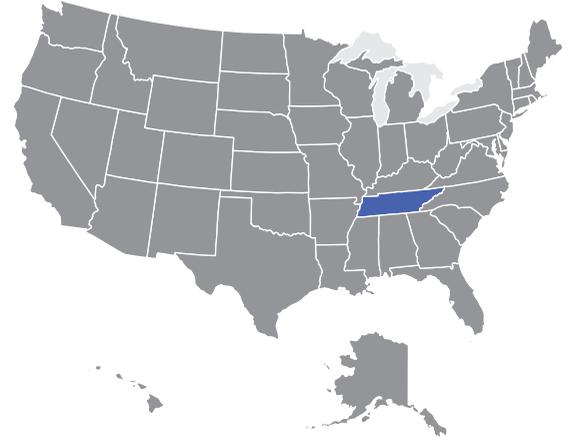
NASA Prototype Promotes Emergency Response Robot Systems (Clinton)

As part of NASA's effort to transfer its extensive robotic knowledge to industry, the agency developed HAZBOT III. This prototype robot is an enhanced version of a commercially available robot manufactured by Remotec (a subsidiary of Northrop Grumman Corporation). Designed to respond to hazardous material emergencies, specifically sensing anhydrous ammonia leaks, the prototype included an operator control station connected via tether to the robot. In addition to adding many features to the robot itself, prototype designers also simplified the robot's control panel to make complex manipulation tasks easier to accomplish using potentiometers that provide directional and velocity controls for each robotic action. Remotec has since adapted several of these novel design concepts into its commercial robotic product line.



Symmetrical Golf Ball Delivers Stable Flight and Unmatched Accuracy and Distance (Humboldt)

Employing a NASA aerodynamics technology, Wilson Sporting Goods Company created a uniquely symmetrical golf ball, with 500 dimples arranged in a pattern of 60 spheric triangles on its surface. Each ball has three sizes, shapes, and depths of dimples, all mathematically positioned to optimize the interaction between the opposing aerodynamic forces of lift and drag. Large dimples reduce drag, enhance lift, and maintain spin for distance. Small dimples prevent excessive lift that would destabilize ball flight. Medium-sized dimples blend small and large dimple characteristics resulting in a more uniform airflow over the spinning surface. NASA technology helped Wilson golf balls deliver maximum distance and maximum durability to the golf enthusiast.



NASA actively seeks partnerships with U.S. companies that can license NASA innovations and create "spinoffs" in areas such as health and medicine, consumer goods, transportation, renewable energy, and manufacturing. When businesses leverage NASA technologies to develop new products, it not only benefits the regional economy, but significantly strengthens the nation's competitiveness in the global marketplace.

NASA's centers across the country have helped 22 Tennessee companies develop revolutionary spinoff technologies.

Learn more about how NASA innovations benefit the public in *Spinoff*, an annual publication that highlights NASA's most significant technology transfer successes. (Available at: <http://www.sti.nasa.gov/tto>)

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