

National Aeronautics and Space Administration



NASA TECHNOLOGY TRANSFER PROGRAM

BRINGING NASA TECHNOLOGY DOWN TO EARTH

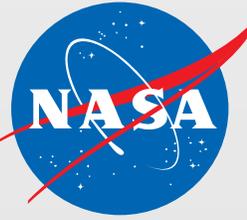
UAS Tech Forum

NASA Armstrong Flight Research Center

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Software Release Authority and New Technology Representative

September 13, 2018



Armstrong Flight Research Center

- Edwards AFB, California, main campus:
- Year-round flying weather
- 301,000 acres remote area
- Varied topography
- 350 testable days per year
- Extensive range airspace
- 29,000 feet of concrete runways
- 68 miles of lakebed runways
- Supersonic corridor
- U.S. Air Force Alliance



Digital Portfolio

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Patent Portfolio

The NASA patent portfolio is available to benefit US citizens. Through partnerships and licensing agreements with industry, these patents ensure that NASA investments in pioneering research find secondary uses that benefit the economy, create jobs, and improve quality of life. Click on each of the category icons for a list of patents in that category or use the search below to explore NASA's patent portfolio.

- **Centralized**

Offering the full agency portfolio of active patents and patents pending from 10 field centers to the public through the NASA Technology Transfer Portal at

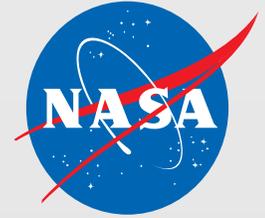
<http://technology.nasa.gov>

- **Categorized**

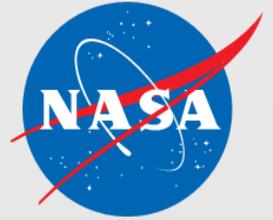
Entire patent portfolio sorted into 15 technology categories, ranging from robotics to manufacturing, and assessed for maturity and commercial potential.

- **Integrated**

Integrated with the NASA Technology Transfer System to automatically publish new patents daily. Integrated with the NASA Patent Portfolio iPad App to publish portfolio across various digital media.



Patent Summary





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NETMARK

An advanced XML database integration technique for managing unstructured documents

NASAs Ames Research Center offers for license its NETMARK software, a unique innovation designed to seamlessly integrate structured, semi-structured, and unstructured data and documents across enterprise organizations. Originally developed to integrate the vast quantities of complex, heterogeneous documents existing within NASA, this schema-less integration technique and framework offers a highly scalable, open enterprise database architecture that eliminates or reduces the need for database design and administration, and converts information from a wide range of data types into a single, universal data type for storage, retrieval, and content and context-sensitive query and search. A production-ready, enterprise-level application, NETMARK rapidly assimilates and retrieves gigabytes of disparate information and can be easily integrated with existing applications as well as accommodate new data formats fitting into the legacy data network while growing with evolving technologies and business practices.



 [Apply Now to License This Technology!](#)

- **Detailed Summary**

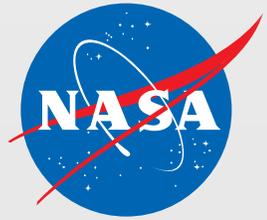
Learn more about the patented technology through a detailed summary that includes: Technology Description, Suggested Applications, Potential Benefits and Publications.

Simply click the “Apply Now to License This Technology!” to begin the application process.

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For free access to over 1,000 NASA software programs, visit <http://software.nasa.gov>
Subject to export control



business systems and project management



data servers processing and handling



materials and processes



system testing



propulsion



electronics and electrical power



operations



structures and mechanisms



environmental science



design and integration tools



crew and life support



autonomous systems



vehicle management

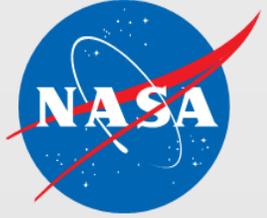


data and image processing



aeronautics

Real-Time, High-Resolution Terrain Information in Computing-Constrained Environments



- **Data adaptive algorithms are the critically enabling technology for automatic collision avoidance system at NASA's Armstrong Flight Research Center.**

- **Features include:**

Efficient: Provides very high encoding process ratios (5,000:1 in some configurations) and rapid, high-performance down sampling in ultrafast, real-time, constrained-computing environments

Powerful: Integrates more than 250 billion separate pieces of terrain information into a single terrain map

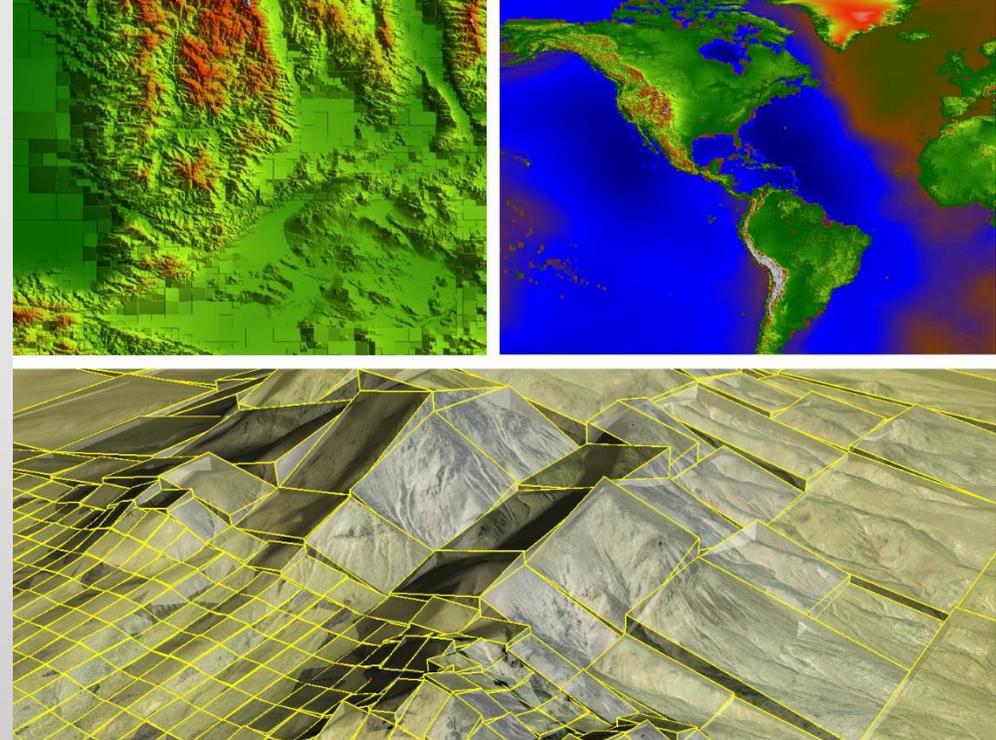
Improved Imaging: Features images that are 1,000 times more detailed with 2 to 3 times more fidelity when compared with current aircraft mapping systems

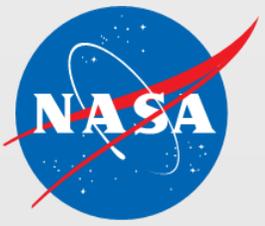
Highly configurable: Merges any number of DTM products to create the best available global DTM at any desired resolution with easily defined geo-referenced variable fidelity that requires a minimum file size

Accurate: Features spatially controlled allowable-error induction (vertical and horizontal) in several independent regions

Portable: Works on mobile devices or EFB applications, making it usable for the general aviation community

Affordable and accessible: Enables implementation on existing aircraft systems, offering industry standard C, C code base and map formats





Improved Ground Collision Avoidance System

- **Researchers at NASA's Armstrong Flight Research Center have dramatically improved upon existing ground collision avoidance technology for aircraft. NASA's system leverages leading-edge fighter safety technology, adapting it to civil aviation use as an advanced warning system.**

- **Features include:**

High-fidelity terrain mapping: Uses digital terrain mapping technology with fidelity that is 2 to 3 orders of magnitude better than existing systems

Nuisance-free warnings: Triggers alarms only in the event of an impending collision, reducing the risk of false alarms that may cause pilots to ignore the safety system

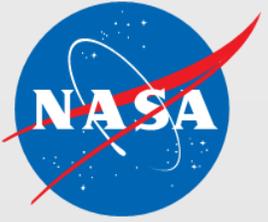
Multidirectional maneuvers: Unlike existing systems that only recommend vertical climbs, this innovation can recommend multidirectional turns, making it more appropriate for general aviation aircraft and UAVs.

Flexible platforms: Can be used with a variety of aircraft, including general aviation, helicopters, UAVs, and fighters such as F-16s

Proven technology: Has been tested on UAVs and a Cirrus SR22 and will be integrated into the U.S. Air Force's next generation F-16 fleet as a follow-on system



Automatic Dependent Surveillance Broadcast (ADS-B) Integration Concepts for Unmanned Aircraft Systems



- This technology has been **successfully licensed** to Vigilant Aerospace Systems

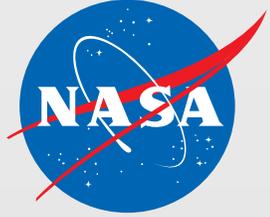
- **Benefits of Technology Transfer**

Safer Air Traffic Control: NASA's technology enables aircraft to remain well clear of—and avoid collisions with—other airborne traffic.

Expanded Use of UAVs: Commercialization of NASA's technology will enable UAVs to fly safely in the national airspace, expanding scientific, government, commercial, and civilian use of these aircraft.

New Jobs for Oklahoma: Vigilant Aerospace is hiring developers, engineering, and sales staff to help bring the NASA technology to market.





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