



EXPLORESPACE TECH



NASA Technology Portfolio Management System

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TechPort

<https://techport.nasa.gov>

Technology is developed by thousands of people in diverse organizations with challenging goals.

TechPort is a web-based system that brings these technologies together, providing key insights on past and current investments.



TechPort Background

2010

Authorization Act calls for NASA to maintain an Agency space technology database that helps align mission directorate investments.

2011

NASA Performance Goal to develop a database to track technology investments.

2012

TechPort 1.0 deployed. NRC requests that technology data made public.

2014

TechPort 2.0 and public interface deployed. NASA independent review.

2015

Public comments solicited. 2015 Technology roadmaps released.

2016

NASA independent review. TechPort ownership transferred from OCT to STMD.

2018

TechPort 3.0 deployed.

2019

Strategic Technology Integration Framework module deployed.

2020

2020 NASA Technology Taxonomy released via TechPort.



Feedback
Incorporation



Pause
and Learn



Feedback
Incorporation

Key TechPort Users and Benefits

➤ NASA Leadership

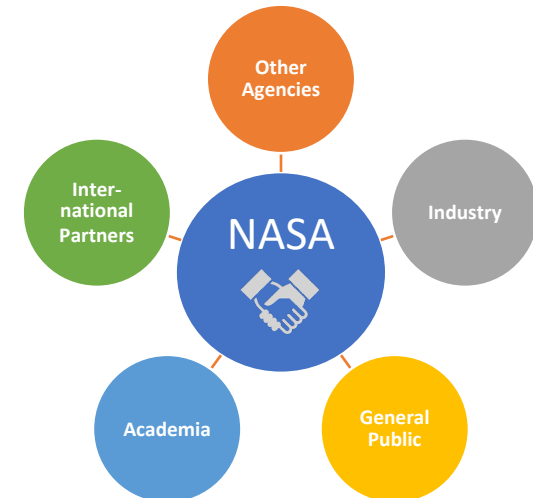
- Discover insights about NASA's technology portfolio across fiscal years.
- Quickly assess technology investments by mission destination, technology area, organization, and more.
- Create specialized analyses and understand trends.
- Quickly respond to inquiries and data requests (e.g. OMB, Congress).

➤ Technology Innovators and Collaborators

- Discover the technologies being developed at NASA.
- Create new technologies and evolve existing technologies by building off prior work.
- Build partnerships between NASA, industry, academia, other agencies, and international partners.
- Identify and contact potential partners with common challenges and complementary expertise.
- Identify similar efforts during proposal preparation and review cycles.

➤ General Public

- Engage on “what's new” with NASA technology.
- Visualize the results from the use of public funds.
- Realize the benefits of the Open Data policy for Federal Agencies.



TechPort Overview

TechPort is a comprehensive resource for information about technology development activities.

FIND IT. BUILD IT. SHARE IT.

Search

Search Options

Sort Order: Relevance

Words and Phrases: Items containing all search terms, Items containing any of the search terms

Status: All, None

Release Status: All, None

Active Date: Active after, Active before, Active between

Share

Recently Completed

Interferometric Star Tracker - Phase II, Phase II

New on TechPort

RESEARCH and TECHNOLOGY DEVELOPMENT PROGRAM

Spontaneous Concepts

Next Generation Active/Passive Sensors for Observing...

Explore

High-Power Tunable Seed Laser for Methane LIDAR Transmitter, Phase II

This is a project within the SBIR/STTR Program

Released Active

Graph: Course spectral position tuning of high power seed laser

Responsible Mission Directorate: Space Technology Mission Directorate (STMD)

Program Director: Therese Griebel

Lead Organization: Goddard Space Flight Center

Primary Technology Area: TA 8.1 Remote Sensing Sensors

Program Manager: Carlos Torrez

Partner

Solar Electric Propulsion (SEP)

Active Technology Project Approved for Release

Edited 01/10/2018 02:28 PM CST

Data Permissions: Delete, Revert to Draft, Validate, PDF, Excel

Project Introduction

Project Library

Share this Project: Like 2, Tweet, Share 1, Browse to site

Organizational Responsibility

Responsible Mission Directorate: Space Technology Mission Directorate (STMD)

Lead Center / Facility: Glenn Research Center (GRC)

Responsible Program: Technology Demonstration Missions

Project Management

Program Director: [Name]

Anticipated Benefits

Primary U.S. Work Locations and Key Partners

Analyze

187 Active Technology Missions

Technology Areas (TAs)

Technology Maturity

States with Work

Lead and Supporting Organizations

Responsible Mission Directorates and Offices

Responsible Program

Co-Funding Partners

<https://techport.nasa.gov>

The Power of TechPort – Communication to the Public, OGA, Academia, and Industry

TechPort serves as both an internal analysis tool *and* a public communication tool.

The external home page highlights:

- Most Viewed Projects
- Recently Completed Projects
- New Projects
- Featured Project of the Week
- Announcements
- Technology Solicitations

External users can search the database and run reports as well.

TechPort has been visited by agencies, industry, and academia around the world such as DoD, DHS, Princeton, Stanford, ESA, CSA, and many more...

TechPort

Home Taxonomy About Us Help

Search Projects Options Search

Home

Most Viewed Projects

Advanced Modular Power Systems Project

3101 Views Like 3

The Advanced Modular Power Systems (AMPS) project will infuse new technology into power systems and components and prove their capabilities through exploration-based ground demonstrations. AMPS will explore...

« Previous # 1 of 10 Next »

Recently Completed

SmallSat Common Electronics Board (SCEB)

New on TechPort

Terabyte Infrared Delivery (TBIRD) 200Gb/sec Laser Communications System for...

Featured Project

In-Situ Resource Utilization: Oxygen Production

The leading option for extracting oxygen from the Mars atmospheric carbon dioxide is to use a solid oxide electrolyzer, which removes one oxygen atom from the CO₂ molecule, ionizes it, and pulls it through a solid electrolyte by...

View more information about this project

Collaborators

NASA TECHNOLOGY TRANSFER PROGRAM

NASA technologies for your business.

View all collaborators

Center Stage: Goddard Space Flight Center

A monthly feature of Center Independent R&D projects

Solicitations

Smallsat Technology Partnerships Solicitation...

View all solicitations

Announcements

Introducing the updated 2020 NASA Technology Taxonomy!

View all announcements

Tell Us What You Think!

Click the feedback link at the top of any page to send us your comments about TechPort.

FEATURED PROGRAM ★★★★★ EXPLORE

SPACE TECHNOLOGY MISSION DIRECTORATE SBIR/STTR

SBIR/STTR

Help: Using TechPort

FEATURED ARTICLE Getting Started with Reports

If you know how to search, you also know how to create a report. Read More >

More articles and downloads

The Power of TechPort – Faceted Search

The TechPort search mechanism allows users to focus on their own area(s) of interest.

User can search based on:

- Status (Active, Completed, or Canceled)
- Active Date (e.g. Between Oct 2015 and Sep 2018)
- Technology Area
- Technology Maturity (TRL 1-9)
- Target Destination (Earth, Moon, Mars, etc.)
- Responsible Mission Directorate
- Lead Center
- Responsible Program
- Work Location

The screenshot displays the TechPort search interface with several filter sections:

- Active Date:** Includes radio buttons for "Active after", "Active before", and "Active between" (selected). Below are dropdown menus for Start Month (October), Start Year (2017), End Month (September), and End Year (2020). A "Filter" radio button is selected.
- Technology Area (Taxonomies):** A "Filter" radio button is selected.
- Technology Maturity:** Includes checkboxes for "Start TRL", "Current TRL", and "End TRL" (all checked). Each has a range slider from 1 to 9. "Current TRL" and "End TRL" are currently set to 3 to 9.
- Target Destinations:** Includes "All" and "None" buttons. A note states: "Leaving all options unchecked is the same as selecting 'Ignore'". The list includes: The Sun, Earth, The Moon, Mars (checked), Others Inside the Solar System, Outside the Solar System, and Foundational Knowledge.
- Mission Directorates and Offices:** A "Filter" radio button is selected.
- NASA Centers and Facilities:** A "Filter" radio button is selected.
- Programs:** A "Filter" radio button is selected.
- Locations Where Work is Performed:** A "Filter" radio button is selected.

The Power of TechPort –Instant Reports

After searching, an instant rollup is provided with key statistics about matching search results. Detailed rollup reports are also available with an additional click.

The Power of TechPort – Technology Project Details

Individual projects can also be analyzed for more information.

TechPort
 Home Taxonomy Framework About Us Help
 Admin Permissions Create My TechPort Feedback
 Search Projects [Advanced Search]
 Home > Search Results

Search Results Save Search Options

Sort Order: Relevance > Words and Phrases: No Selection > Workflow Status: Released > Active Date: between Oct 2017 - Sep 2020 > Technology Maturity: Current TRL 3-9, End ... >
 Target Destinations: Mars >

Analysis of your search results

Listing 1 - 20 of 324 Page 1 of 17 Show Hide

Lander Technology: LOX/CH4 Engine Released Active
 This is a project within the Advanced Exploration Systems Division Program

Hotfire testing is being performed of a MSFC-developed 4500-lbf thrust regeneratively cooled LOX/CH4 engine with additively-manufactured thrust chamber. Testing of the 4500-lbf thruster will demonstrate methane-based regenerative cooling, verify performance, and anchor thermal models. The design can be scaled and fabricated for higher thrust levels (e.g. 100 kN / 22 kbf class engine). A parallel effort is underway with a 1000 lbf LOX/CH4 thruster with both additively-manufactured thrust chamber and injector.

Responsible Mission Directorate: Human Exploration and Operations Mission Directorate (HEOMD)
Lead Organization: Marshall Space Flight Center
Primary Technology Area: TA2 In-Space Propulsion Technologies
Start: Oct 2017
End: Sep 2020

Program Director: Christopher Moore
Project Manager: Greg Chavers

A Test-as-You-Fly X-ray Pulsar Navigation Capability for Advanced Exploration Systems Released Active
 This is a project within the Center Independent Research & Development: GSFC IRAD Program

This project will establish a hardware-in-the-loop testing capability for X-ray Pulsar Navigation (XNAV) in the context of the Johnson Space Center (JSC) Orion Optical Navigation (OON) testbed, and to identify a practical XNAV sensor package targeting ds-lunar operations for Orion EM2/3 and lunar habitat modules. This effort will leverage software developments from the Station Explorer for Navigation and Timing Technology (SEXTANT) and hardware concepts from the Neutron-star Interior Composition Explorer (NICER) mission.

Responsible Mission Directorate: Mission Support Directorate (MSD)
Lead Organization: Goddard Space Flight Center
Primary Technology Area: TA5 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
Start: Oct 2017
End: Sep 2020

Program Manager: Peter Hughes
Project Manager: Jason Mitchell Timothy Beach
Principal Investigator: Sean Semper

Advanced Exploration Systems Division
 Near Earth Asteroid Scout (NEA Scout)
 Active Technology Project

Project Introduction

Near-Earth Asteroid Scout, or NEA Scout, is a 6U CubeSat developed jointly between NASA's Marshall Space Flight Center and the Jet Propulsion Laboratory. NASA selected NEA Scout as a candidate secondary payload for Artemis 1, the first integrated (uncrewed) flight test of the Space Launch System and Orion Crewed Spacecraft. The NEA Scout mission is funded by the Advanced Exploration Systems Division of the Human Exploration and Operations Mission Directorate.

NEA Scout is a robotic reconnaissance mission that will fly by and return data from a near Earth asteroid. NEA Scout will deploy its main propulsion system, a solar sail, that will be used in conjunction with its other on-board systems to provide stable pointing for both science and optical navigation as well as for slewing and navigating the spacecraft to its predetermined destination.

Anticipated Benefits

A solar sail will provide the primary propulsion for the NEA Scout mission. Solar sails provide a new capability for delivering science payloads to a variety of planetary bodies, the outer solar system, non-Keplerian orbits (where propulsive acceleration acts in addition to that of the effects of gravity), or high-inclination orbits (e.g., solar polar orbit). Using the continuous low thrust provided by a solar sail, spacecraft can achieve DV's that are impossible to obtain using chemical or even solar electric propulsion. As the technology matures, solar sails will increasingly be used to enable science and exploration missions that are currently impossible or prohibitively expensive using traditional chemical and electric rockets.

The new camera system, avionics, and solar sail designed and developed by the NEA Scout project for a robotic mission to a planetary body can enable future commercial development of CubeSat class payloads. Industry and other government agencies.

Primary U.S. Work Locations and Key Partners

Organizations Performing Work

| Organizations Performing Work | Role |
|-------------------------------------|-------------------------|
| Marshall Space Flight Center (MSFC) | Lead Organization |
| Goddard Space Flight Center (GSFC) | Supporting Organization |
| Jet Propulsion Laboratory (JPL) | Supporting Organization |
| Johnson Space Center (JSC) | Supporting Organization |
| Langley Research Center (LaRC) | Supporting Organization |

Primary U.S. Work Locations

| | |
|----------|------------|
| Alabama | California |
| Maryland | Texas |

Project Library

Show the complete project library >

Share this Project

Like 1 Tweet 2 Share 2
 Browse to site

Organizational Responsibility

Responsible Mission Directorate: Human Exploration and Operations Mission Directorate (HEOMD)
Lead Center / Facility: Marshall Space Flight Center (MSFC)
Responsible Program: Advanced Exploration Systems Division

Project Management

Program Director: Christopher L Moore
Project Manager: Joseph A Matus

Advanced Solar Electric Propulsion for Planetary Defense
 IEPC 2015 64
 Presented at Joint Conference of 20th International Symposium on Space Technology and Science

Figure 1. Illustration of a gravity tractor (GT) with a displaced non-Keplerian orbit from M:lines [6].

Figure 2. Illustration of Ion Beam Deflection (IBD) from Danabasak, et al. [8].

A. GT, EGT and IBD Assumptions
 To calculate the effectiveness of slow-push planetary defense techniques, we adopt the approximation used by the NSRC [5] in which the deflection distance is approximated by:

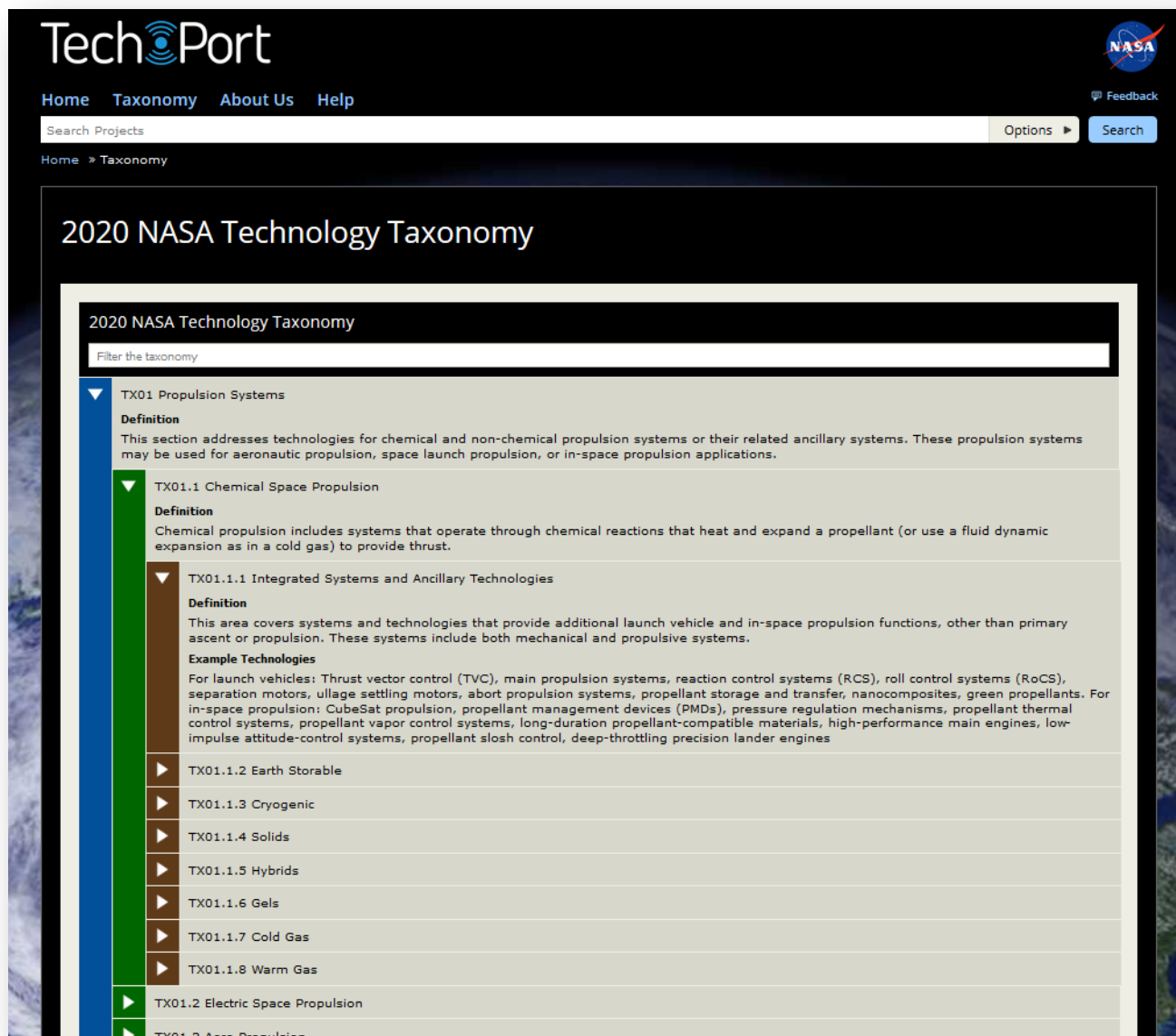
$$\Delta s = \frac{3}{2} a t_d^2 (\epsilon_a + 2\epsilon_c)$$

where a is the asteroid acceleration during time t_d , when the deflecting force is applied, and ϵ_c is the time spent coasting after completion of the force application. In addition, we adopt the required deflection distance used in the NSRC report of 15,000 km. The total deflection time is the sum of t_d and ϵ_c . To minimize the total deflection time we set the coasting time, ϵ_c , to zero and solve for the required acceleration that minimizes t_d within the constraints of the propulsion system. Note, this approach is restricted to the assumption of a deflection distance much less than the distance to the target.

The Power of TechPort – Technology Taxonomy

TechPort houses the 2020 NASA Technology Taxonomy, a tool used by the Agency to identify, organize, and communicate technology areas relevant to advancing the Agency's mission.

The Taxonomy is comprised of 17 distinct technical discipline-based taxonomy elements. It uses a three-level hierarchy for grouping technologies.



The screenshot displays the TechPort website interface. At the top, the TechPort logo is on the left, and the NASA logo is on the right. Below the logo is a navigation menu with links for Home, Taxonomy, About Us, and Help. A search bar labeled "Search Projects" is positioned below the menu, with an "Options" dropdown and a "Search" button. The main content area is titled "2020 NASA Technology Taxonomy" and features a search filter labeled "Filter the taxonomy". The taxonomy is presented as a hierarchical tree structure. The top-level category is "TX01 Propulsion Systems", which is expanded to show its sub-categories: "TX01.1 Chemical Space Propulsion", "TX01.2 Electric Space Propulsion", and "TX01.3 Aero Propulsion". The "TX01.1 Chemical Space Propulsion" category is further expanded to show its sub-categories: "TX01.1.1 Integrated Systems and Ancillary Technologies", "TX01.1.2 Earth Storable", "TX01.1.3 Cryogenic", "TX01.1.4 Solids", "TX01.1.5 Hybrids", "TX01.1.6 Gels", "TX01.1.7 Cold Gas", and "TX01.1.8 Warm Gas". Each category includes a "Definition" and, in some cases, "Example Technologies".

2020 NASA Technology Taxonomy

Filter the taxonomy

- TX01 Propulsion Systems
 - Definition**

This section addresses technologies for chemical and non-chemical propulsion systems or their related ancillary systems. These propulsion systems may be used for aeronautic propulsion, space launch propulsion, or in-space propulsion applications.
 - TX01.1 Chemical Space Propulsion
 - Definition**

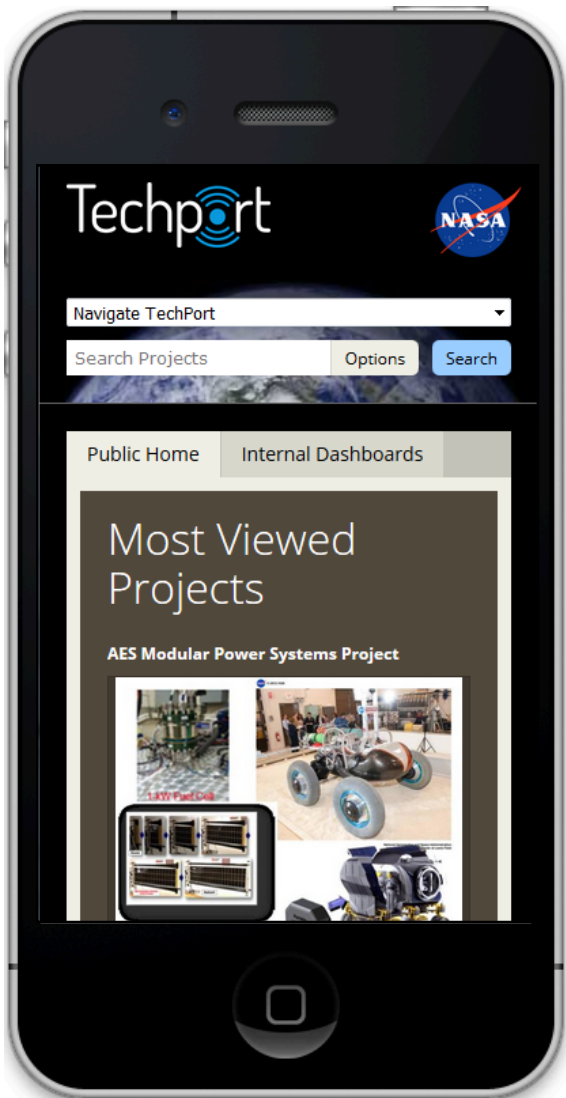
Chemical propulsion includes systems that operate through chemical reactions that heat and expand a propellant (or use a fluid dynamic expansion as in a cold gas) to provide thrust.
 - TX01.1.1 Integrated Systems and Ancillary Technologies
 - Definition**

This area covers systems and technologies that provide additional launch vehicle and in-space propulsion functions, other than primary ascent or propulsion. These systems include both mechanical and propulsive systems.
 - Example Technologies**

For launch vehicles: Thrust vector control (TVC), main propulsion systems, reaction control systems (RCS), roll control systems (RoCS), separation motors, ullage settling motors, abort propulsion systems, propellant storage and transfer, nanocomposites, green propellants. For in-space propulsion: CubeSat propulsion, propellant management devices (PMDs), pressure regulation mechanisms, propellant thermal control systems, propellant vapor control systems, long-duration propellant-compatible materials, high-performance main engines, low-impulse attitude-control systems, propellant slosh control, deep-throttling precision lander engines
 - TX01.1.2 Earth Storable
 - TX01.1.3 Cryogenic
 - TX01.1.4 Solids
 - TX01.1.5 Hybrids
 - TX01.1.6 Gels
 - TX01.1.7 Cold Gas
 - TX01.1.8 Warm Gas
 - TX01.2 Electric Space Propulsion
 - TX01.3 Aero Propulsion

The Power of TechPort – Available Anywhere, Anytime

TechPort can be accessed anywhere! – <https://techport.nasa.gov>



TechPort is *reliable* and *secure*. TechPort was one of the first Agency cloud-based systems, and the OCIO has benchmarked our documentation and security posture.

The Power of TechPort – Open Data

The Techport Application Programming Interface (API) provides a machine-readable endpoint for data mining and the use of local business intelligence and analytics tools.

Many academic organizations and other agencies around the world currently harvest NASA TechPort public data *monthly*. The data are used in their own systems for various types of analyses.

The TechPort dataset is also available through <https://data.nasa.gov>.



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        ]
      }
    }
  }
}
```

Recent Usage Statistics

Internal Site Highlights

(Since March 2015)

- Over 51k visits by over 41k unique visitors
- What did they do on our site?
Visitors have generated
 - 📄 24,797 reports
 - 🔍 66,725 searches
 - and on average stayed for
 - 🕒 32 minutes

Public Site Highlights

(Since March 2015)

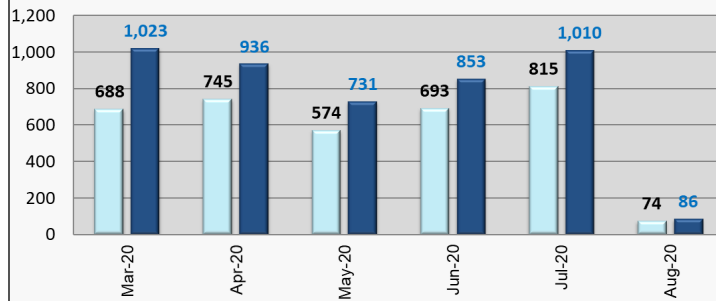
- Over 429k visits by over 334k unique visitors
- What did they do on our site?
Visitors have generated
 - 📄 144,178 reports
 - 🔍 38,787 searches
 - and on average stayed for
 - 🕒 5 minutes

TechPort has been visited by industry and academia from across the globe. Recent examples include:

- Arizona University Network
- Aerospace Corporation
- European Space Agency
- Japan Aerospace Exploration Agency
- University of Illinois
- Johns Hopkins University Applied Physics Laboratory
- Korea Atomic Energy Research Institute
- Massachusetts Institute of Technology
- University of Leicester (UK)

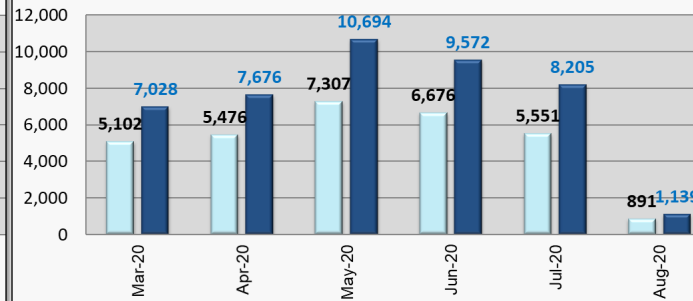
TechPort Internal Traffic

Unique Visitors Visits



TechPort Public Traffic

Unique Visitors Visits



Recent uses of TechPort:

- Monthly OMB requests for reports related to the Industries of the Future initiative.
- Cross-Agency team developing technology portfolio management system requirements (DHS, AFRL, AFC, DTRA, DOE).
- Senior leadership requests for historical partnership information with organizations such as APL and OAI.



TechPort was recently featured on the NASA Small Steps, Giant Leaps Podcast

<https://appel.nasa.gov/podcast/episode-24-techport/>

Live Demo

1. *Search + Reports Scenario (Small Satellite Technologies)*
2. *Project Library*



Backup and Reference

The TechPort Community

The TechPort community consists of technology managers, developers, and innovators across the Agency.

The TechPort community:

- ✓ Meets quarterly as part of the “Community of Practice” to discuss updates, brainstorm, and provide feedback.
- ✓ Provides data updates twice per year in April and October.
- ✓ Identifies new automated data transfer connections from other NASA IT systems.
- ✓ Vets the system data quality.
- ✓ Participates in quarterly user acceptance tests, training, and feedback sessions.
- ✓ Support outreach activities across the NASA Centers and Facilities.

The TechPort Team maintains an open line of communication with key stakeholders such as the NASA Technology Executive Council and the Office of the Chief Technologist.



TechPort data is provided by NASA technology managers directly involved with the work.

Technology Readiness Levels

TRL 9

•Actual system “flight proven” through successful mission operations

TRL 8

•Actual system completed and “flight qualified” through test and demonstration (ground or space)

TRL 7

•System prototype demonstration in a space environment

TRL 6

•System/subsystem model or prototype demonstration in a relevant environment (ground or space)

TRL 5

•Component and/or breadboard validation in relevant environment

TRL 4

•Component and/or breadboard validation in laboratory environment

TRL 3

•Analytical and experimental critical function and/or characteristic proof-of-concept

TRL 2

•Technology concept and/or application formulated

TRL 1

•Basic principles observed and reported

Definition of Technology

What belongs in TechPort – What is a technology project?



NASA Technology Definition:

A solution that arises from applying the disciplines of engineering science to synthesize a device, process, or subsystem to enable a specific capability.

Government-Wide

Office of Management and Budget Circular No. A-11

Conduct of Research and Development**

| | |
|--|---|
| 6.1 Basic Research: | A study directed toward fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward processes or products. |
|  6.2 Applied Research: | Systematic study to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met. |
|  6.3 Development: | Is directed toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements. |

** http://www.whitehouse.gov/omb/circulars_a11_current_year_a11_toc