



Space Technology Mission Directorate Game Changing Development

NASA Space Technology Mission Directorate's Game Changing Development (GCD) Program investigates innovative ideas and approaches that have the potential to revolutionize future space missions and provide solutions to significant national needs.

GCD takes a high-risk, high-payoff approach to technology development, with the goal of creating disruptive and transformative technologies. GCD doesn't aim to incrementally improve a current technology, but rather revolutionize that technology.

To accomplish this, GCD incorporates a principal technologist-led investment strategy in specific technology areas, collaborates with outside agencies, industry and academia and takes an informed risk posture—recognizing that without failure there isn't progress.

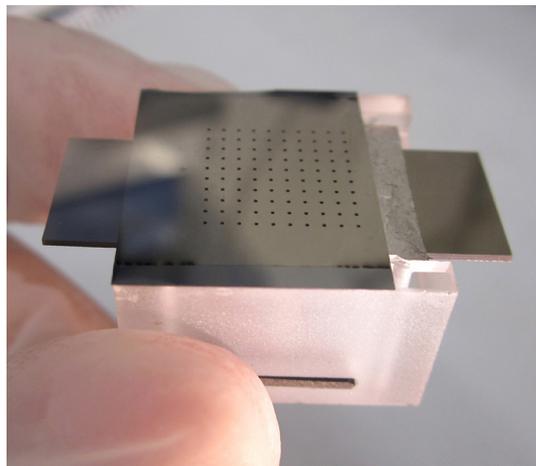
The GCD Program funds more than 40 technology development projects across five technology themes, which are:

- **Lightweight Materials and Advanced Manufacturing**
- **Revolutionary Robotics and Autonomous Systems**
- **Future Propulsion and Energy Systems**
- **Affordable Destination Systems and Instruments**
- **Advanced Entry, Descent and Landing**

GCD focuses its efforts on the mid technological readiness level (TRL) range between 3 and 6. The general life cycle of a project within GCD begins with proof-of-concept (TRL-3) and usually ends with system testing in a relevant environment (TRL 5/6). These projects are typically 2 to 3 years long.



The Low Cost Upper Stage-Class Propulsion project was first to manufacture out of copper alloy a rocket engine component using an additive manufacturing process.



The Microfluidic Electro spray Propulsion thruster's most desirable feature is its potential to scale the thruster system to significantly higher thrust levels.

NASAfacts

GCD's successful technologies will transition to other STMD programs, such as the Technology Demonstration Mission (TDM) Program or directly to flight missions under NASA's Mission Directorates. The technologies can also transfer to other governmental agencies or support national needs.

With a focus on game changing technologies, in a high-payoff, high-risk environment, success is not expected with each investment. However, over time, dramatic advances in space technologies will enable entirely new NASA missions and provide potential solutions for a wide variety of our society's grand technological challenges.

The Game Changing Development Program is located at NASA's Langley Research Center in Hampton, Va., and employs more than 340 employees across 9 centers.

For more information, visit <http://gameon.nasa.gov>

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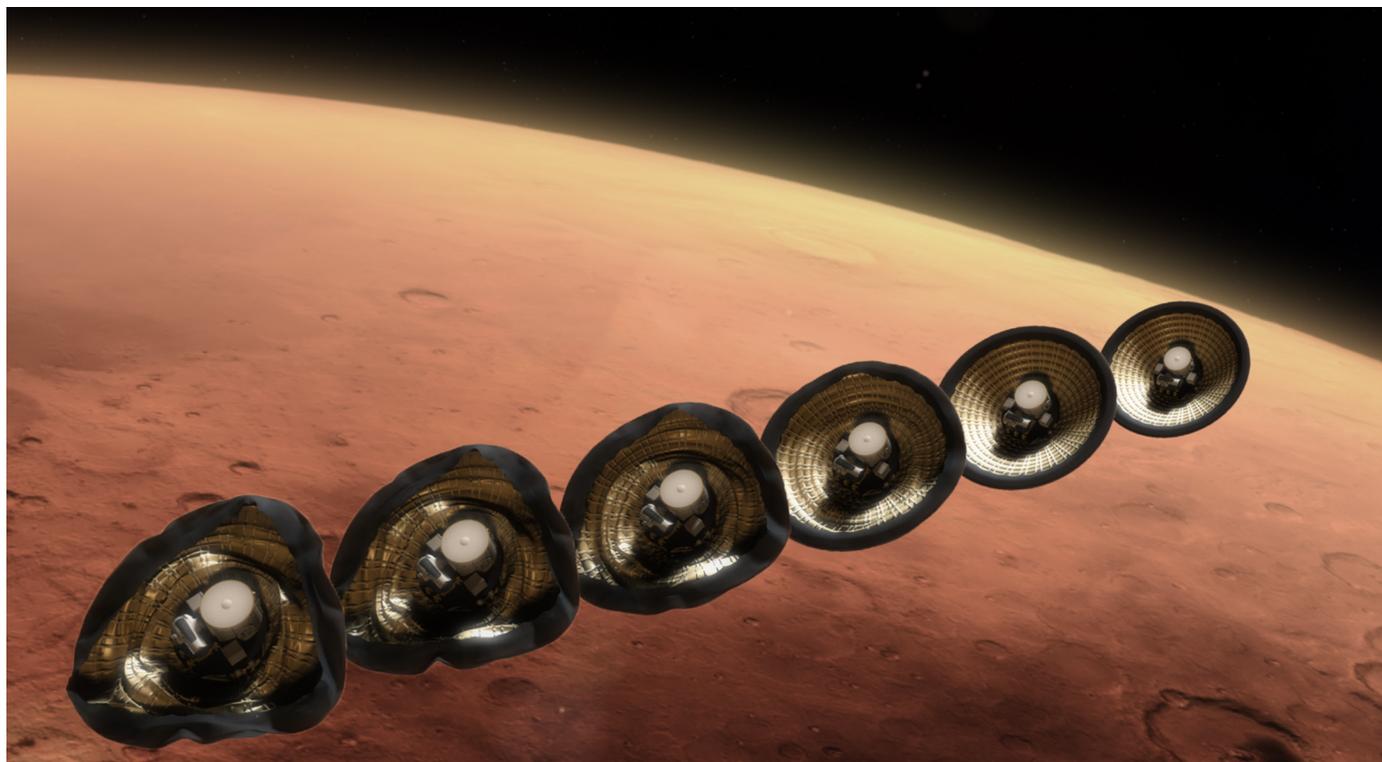
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The Pop-Up Flat Folding Explorer Robot (PUFFER) is a “pop-up” robot that folds into a small, smartphone-sized weight and volume. This compactness allows a large number of PUFFERS to be packed into a larger “parent” spacecraft at low payload cost. PUFFERS are then used by a parent spacecraft to provide increased surface mobility.



The Hypersonic Inflatable Aerodynamic Decelerator (HIAD) will accommodate the atmospheric entry of heavy payloads to planetary bodies such as Mars. HIAD overcomes size and weight limitations of current rigid systems by utilizing inflatable soft-goods materials that can be packed into a small volume and deployed to form a large aeroshell before atmospheric entry.

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