



# Sample Return Robot Challenge

The Sample Return Robot Challenge is part of NASA's Centennial Challenges prize program that directly engages the public to help advance technology needed by the agency that also benefits the nation.

## Objective

An autonomous capability to locate and retrieve specific sample types from various locations over a wide and varied terrain and return those samples to a designated zone in a specified amount of time with limited mapping data.

## Description

Demonstrate a robotic system to locate and collect a set of specific sample types from a large planetary analog area and return the samples to the starting zone. The analog roving area could include rolling terrain, granular medium, soft soils, and a variety of rocks. A pre-cached sample and several other samples will be located in smaller sampling zones within the larger roving area.

Teams will be given aerial/geological/topographic maps with appropriate orbital resolution including the location of the starting position and a pre-cached sample. The samples should be easily distinguished from other materials present at the site since the need for sophisticated scientific instrumentation for sample identification is not an objective of this challenge. The robot systems in this challenge are envisioned to have a mass on the order of 80kg and require multiple hours to complete the task. Robots are free to use whatever method of mobility, manipulation, and navigation they choose, but are limited to resources available on a planet other than Earth.

**In order to win a Level 1 prize**, a robot has 30 minutes to autonomously navigate and retrieve a pre-cached sample. Robots should be autonomous but periodic intervention with tele-operation would be permitted with penalties imposed for its use.



**In order to win a Level 2 prize**, a team must autonomously navigate at all times and must retrieve the pre-cached sample and several additional sample types from separate large regions of the roving area that will be of different terrain types. Additional limits may be imposed for mass, power, etc. The winning criteria may include the shortest time to complete the task and lowest system mass.

## Prize Purse

\$1.5 million is available from the Centennial Challenges Program. For more information about Sample Return Robot, visit [www.nasa.gov/robot](http://www.nasa.gov/robot).

## Educational Opportunities

In conjunction with the challenge, Worcester Polytechnic Institute will host TouchTomorrow, a festival of science, technology and robots. The event will feature displays, interactive exhibits, educational panels, games and more, with a special preview day for educators. For more, visit [touchtomorrow.wpi.edu](http://touchtomorrow.wpi.edu).

NASA's Marshall Space Flight Center in Huntsville, Alabama manages the Centennial Challenges program for NASA's Space Technology Mission Directorate in Washington, D.C.

For more information, visit [www.nasa.gov/challenges](http://www.nasa.gov/challenges).