



Centennial Challenges

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NASA TECHNOLOGY DAYS 2012
Cleveland, Ohio





Centennial Challenges



[video]



Prize Competitions



- **Stimulate innovation in ways unlike contracts or grants**
 - Reward achievement, not effort. Competitors are not paid until goals are achieved.
- **Achieve returns that outweigh investment**
 - High ratio of private investment to prize value at a fraction of the cost of traditional procurement.
 - Almost all funds go to prize purses
- **Reach new sources of innovation, new talent**
 - Multiple teams & multiple approaches to same problem
- **Stimulate new commercial ventures**
 - New startups, new partners, more commercial competition
- **Educate, inspire and motivate the public**
 - Train the future workforce; Inclusion, not exclusion
 - Increase awareness of science & engineering

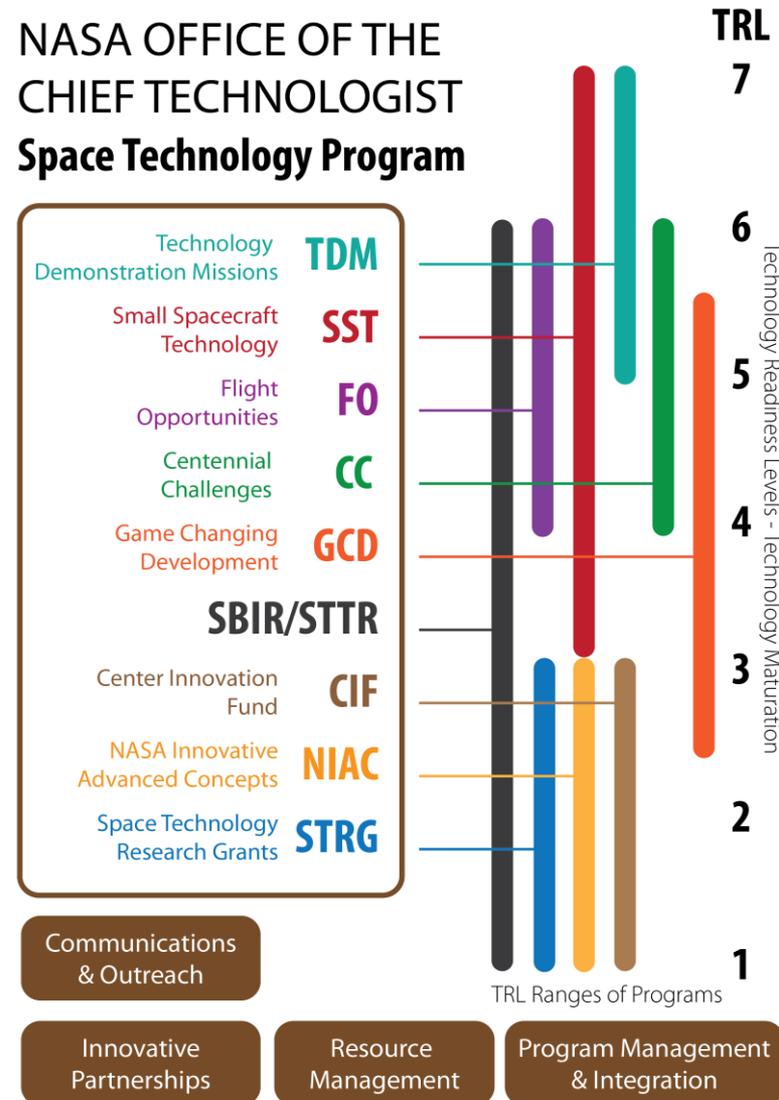


Centennial Challenges



- Centennial Challenges Program is unique in Space Technology Program:
 - Offers cash prize competitions to stimulate development of innovative solutions for technical problems that are impeding growth in areas of interest to NASA.
 - Prize funds can only go to US citizens, permanent residents, or US entities.
 - Primarily TRL 4-6
 - Competitors can retain the Intellectual Property
 - Minimal reporting and government oversight
- Solutions to difficult problems often exist beyond the reach of typical government solicitations. We need your participation.

NASA OFFICE OF THE CHIEF TECHNOLOGIST Space Technology Program





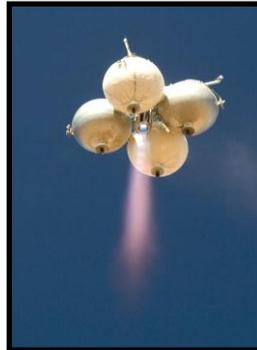
Centennial Challenges



Since 2005, 22 competitions held in 8 Challenges
~\$6.0M in prizes awarded to 15 different teams



Regolith Excavation – \$750K



Lunar Lander – \$2M



Astronaut Glove – \$550K



Power Beaming - \$900K



Personal Air Vehicle - \$250K



Green Flight – \$1470K

Three Challenges underway



Current Challenges



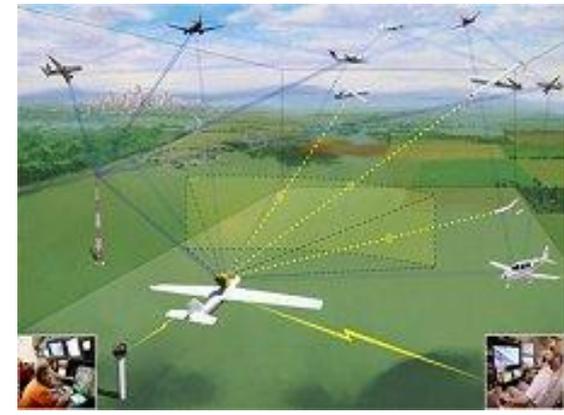
Sample Return Robot Challenge June 4-8, 2013:



Other challenges:



Night Rover Challenge



UAS Airspace Operations Challenge

Sample Return Robot Challenge

managed by Worcester Polytechnic University



To encourage innovations in robotic navigation and sample manipulation technologies -- demonstrate a robot that can locate and retrieve geologic samples from a wide and varied terrain without human control.

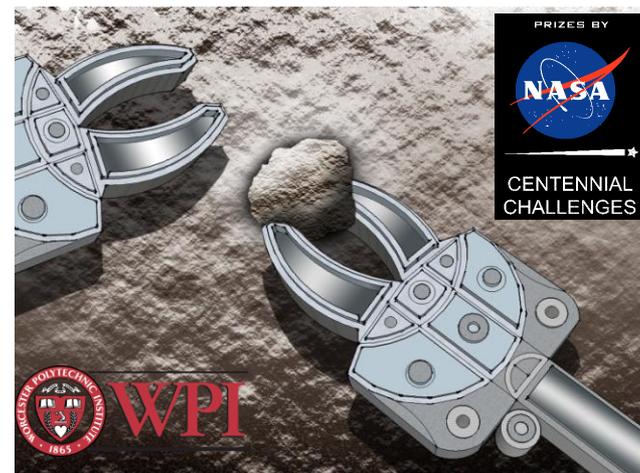
Goal: Demonstrate a fully autonomous robot that can locate and retrieve several identified samples with no use of GPS or other terrestrial navigation aids.

PRIZE PURSE: \$1.5 Million

Status

- Competition June 4-8, 2013 in Worcester, MA.
- Registration is open.

<http://wp.wpi.edu/challenge/>



Night Rover Challenge

managed by CleanTech Open



To stimulate innovations in energy storage technologies of value in extreme space environments and in renewable energy systems on Earth-- demonstrate a high energy density storage systems that will enable a rover to operate throughout lunar darkness cycle

Goal:

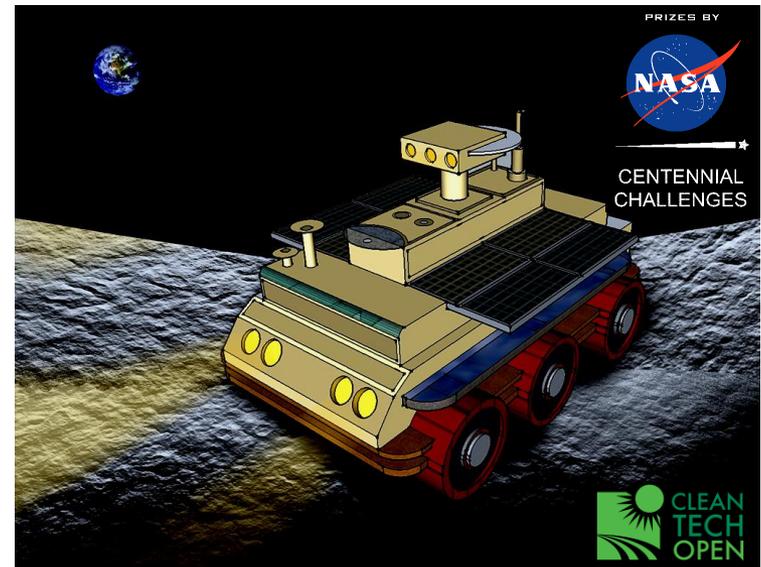
Demonstrate storage system with energy density of at least 300w-hr/kg.

PRIZE PURSE: \$1.5 Million

Status

- Phase I rules under development
- Expect registration to open by January 2013
- Phase I competition in Fall 2013

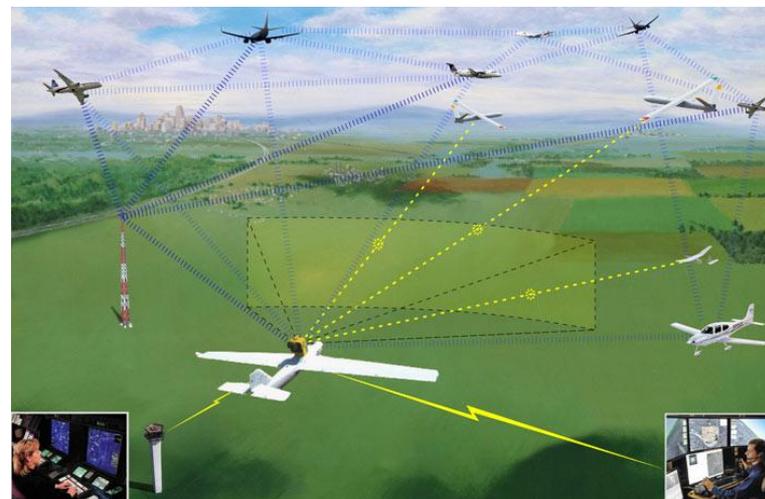
<http://NightRover.org/>



UAS AOC Challenge



- Demonstrate avionics capabilities for operation in the Next Generation (NextGen) Airspace concept.
- Phase 1 Competition (\$500K) -robotic aircraft that can:
 - Fly 4-Dimensional Trajectories (4DT)
 - Employ ADS-B IN
 - Maintain safe separation from cooperative air traffic
 - Operate safely in a number of contingency situations.
- Phase 2 Competition (\$1M) - robotic aircraft that can:
 - Maintain safe separation from uncooperative air traffic
 - Employ ADS-B IN and OUT
 - Have onboard systems capable of communicating verbally with the Air Traffic Control (ATC) system.
- **Status**
 - Phase 1 Rules Under Development
 - Expect Registration to open in Spring 2013
 - Phase 1 Competition in Fall 2013. Phase 2 will be 1 year after Phase 1 success.



Detect, Sense & Avoid for Separation Assurance

<http://go.usa.gov/YHmA>



After the Challenge (2012)



- **Pipistrel USA**, winner of Green Flight Challenge, was one of four nominees for the 2012 Collier Trophy.
- Green Flight Challenge entrant, **Synergy Aircraft**, raised more than \$95,000 through Kickstarter crowd-funding. Plans construction phase of their full-scale Synergy plane within the next year and with further funding, transition to become a kit aircraft company.





2012 Key Successes



Astronaut Glove Challenge, first place winner **Flagsuit LLC** branched out with its latest venture to develop a hyperbaric suit to be used for the treatment of mild-moderate traumatic brain injuries, in particular for frontline soldiers.



After a second-place win in the 2009 Astronaut Glove Challenge, **Final Frontier Design**, continued to pursue commercial spacesuit design. In July 2012, they raised more than \$27,000 on KickStarter to build their next generation spacesuit.



Challenge Plans for 2013



- Sample Return Robot Challenge
 - Registration Open
 - Competition June 4-8, 2013
- Night Rover Challenge
 - Open Registration by January 2013
- Unmanned Autonomous Systems
 - Open Registration by March 2013
- Create 1-2 new Challenges for 2014



How You Can Get Involved



- **Be a Competitor in a Challenge!**
- Be our partner for UAS AOC Challenge (<http://go.usa.gov/grh9>)
 - Provide competition venue
 - Provide competition support hardware and aircraft operations
- SRR competition at Worcester Polytechnic University in June
 - Be an exhibitor at the Touch Tomorrow science and engineering festival



Technology Days



- Centennial Challenge Booth
 - Come see more amazing Challenge videos
 - Chat about future challenges.
 - Pitch your challenge ideas.
 - Get Centennial Challenge materials.
- Times:
9:30 AM-3:00 PM



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