TopCoder Announces $30,000 ISS Longeron Shadowing Optimization Challenge

Competition for NASA Seeks Mathematicians and Creative Computer Scientists Worldwide to Improve Solar Power Collection on International Space Station

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GLASTONBURY, Conn., Jan. 17, 2013 /PRNewswire/ -- TopCoder®, Inc., the world's largest competitive Community of digital creators, today announced the Longeron Shadowing Optimization Challenge, a $30,000, open to the public competition to make the energy-gathering solar arrays of the International Space Station (ISS) more efficient by eliminating the shadows it casts upon itself at different points during orbit.


Competition video: http://youtu.be/q1B_KmAdPro

Solar arrays and longerons video: http://archive.org/details/EarthIlluminated

Registration for the three week long competition is now open with competition ending Wednesday, February 6th at 18:00 GMT. Contestants must be TopCoder members in good standing. Community membership and challenge registration are free. Top prizes include $10,000 for the best solution with second and third placed solutions earning $5,000 and $3,000 respectively. Bonus prizes of mission stickers which have actually orbited the Earth on Space Shuttle Endeavour will be awarded to the top 5 finishers. Complete challenge rules and more information are available at www.topcoder.com/iss.

The challenge is sponsored by NASA through the TopCoder Community-built and powered NASA
Tournament Lab (NTL), an online virtual facility that harnesses the capabilities of the TopCoder Community to create innovative, efficient solutions for specific, real-world challenges being faced by the space agency's researchers.

"These are the types of complex low risk/high reward problems that get our Community of creators excited," said Rob Hughes, President and COO of TopCoder, Inc. "The solutions brought forth for this problem can move the needle for NASA and provide a roadmap for other agencies to tackle stubborn challenges."

**ISS Longeron Shadowing Optimization Challenge**

The TopCoder Community has been tasked by the Vehicle Integrated Performance, Environments and Resources (VIPER) office of NASA, at Johnson Space Center, Houston, Texas to come up with a method of optimizing the ISS solar array positions for the period of time that the ISS is in solar beta angles greater than +/- 70 degrees. The optimization will allow for increased power generation on the ISS while minimizing the shadowing on the ISS longerons. These beta angles represent the most difficult geometry to generate power on the solar arrays. This power is essential to continue to perform the science activities on this world class orbiting laboratory.

The energy used to power the ISS is generated by 8 solar arrays. Each solar array consists of two blankets with 41 strings evenly spaced along the length of the blanket. The orientation of the solar arrays is controlled in two axes using the Solar Alpha Rotary Joint (SARJ) and the Beta Gimbal Assembly (BGA) to face the solar cells directly at the sun. Portions of the solar array mast (called longerons) are very sensitive to temperature changes. These longerons, if partially shadowed, expand when they are hot, and contract when they are cold. When one or three (out of four) of these longerons are shadowed, it can cause the solar array mast to buckle and create a hazard to the space station. The goal of this challenge is to control the ISS during a single orbit which is 92 minutes so that no longerons fail; the minimum limits on power produced by each solar array are maintained; the total amount of energy produced by the station is as large as possible; and the total rotation of BGA axes is not too big.

Competitors can completely solve the task online on the NTL platform testing servers, but as the challenge has no data, it is also possible to solve the problem offline on a home computer and then plug in the result into code submitted for evaluation on the NTL servers. A tester/visualizer will be provided to perform all 3D power and shadow calculations and can produce images and animations of solutions.

**TopCoder: Community+ Process + Platform**

Groundbreaking results are being achieved by the TopCoder Community in a fraction of the time and cost traditionally associated with difficult or unusual scientific and business challenges. In many cases community-generated solutions reach a theoretical maximum. While TopCoder members are not always fully versed in domain-specific knowledge, abstracting a problem into general algorithmic and mathematical terms allows the full power of non-domain experts in the Community to address extremely complex problems. TopCoder's global members bring their existing expertise or newly found skills to problems, yielding a far more diverse range of technical approaches than would be available to organizations internally. Accessing such diversity is a powerful attribute of the community based approach to problem solving.

The TopCoder Open Innovation process allows U.S. government agencies to conduct challenges in an open and transparent environment with predictable cost, measurable outcomes-based results and the potential to move quickly into unanticipated directions and new areas of software technology.
The TopCoder platform supports the entire end-to-end digital creation lifecycle – from idea conception to implementation and support through a true collaborative open innovation model. Almost any type of content, application, algorithm or digital asset can be built entirely through the platform – whether a standalone mobile app through to enhancements or additions to large, existing enterprise systems to the development of entirely new cloud based offerings for customers to testing and support through small enhancements and bug fixes. All areas of digital creation are covered through one easy to use cloud based Innovation as a Platform (IaaP) offering accessing TopCoder’s renowned community of over 445,000 members – from business analysis to creative asset creation, analytics and sophisticated processes for API, software design and development as well as digital content.

About NASA Tournament Lab

NASA and Harvard University have established the NASA Tournament Lab (NTL), which with the enabling capabilities of the TopCoder community allow for competitions to create the most innovative, most efficient, and most optimized solutions for specific, real-world challenges being faced by NASA researchers. The NTL provides an online virtual facility for NASA researchers with a computational or complex data processing challenge to "order" a solution, just like they would order laboratory tests or supplies. Learn more at the official NTL Website.

About TopCoder, Inc.

TopCoder is the world's largest competitive community of digital creators with more than 440,000 members representing algorithmists, software developers and creative artists from over 200 countries. The TopCoder Community creates digital assets including analytics, software and creative designs and solutions for a wide-ranging client base through a competitive, rigorous, standards based methodology. Combined with our extremely talented community this groundbreaking methodology results in superior outcomes for our clients. For more information about sponsoring TopCoder events and utilizing TopCoder's software services and platforms, visit www.topcoder.com.

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