



The International Space Solar Power Student Competition

Overview

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Overview

- An annual faculty-advised, student-conducted international research and engineering research/paper competition on the topic of Space Solar Power has been established
- SPACE Canada is sponsoring the program, in cooperation with the
 - International Astronautical Federation (IAF) Power Committee
 - Global Space Solar Power Working Group (GSSP-WG) of the International Academy of Astronautics (IAA)
 - National Space Society (NSS) International Space Development Conference (ISDC) SSP Track
 - IAF Space Generation Advisory Council (SGAC)
- SPACE Canada is a non-profit, non-governmental organization based in Canada; the purpose of the organization is to promote international dialogue on and understanding of the topic of Space Solar Power
- 2017 is the first year of this new competition



Purposes

- The purposes of the competition are...
 - to engender new, meaningful and credible student research projects in the broad field of *Space Solar Power*, and
 - to support the presentation of the best of the various projects in an international forum including explicit recognition of the best research with a formal prize.



Eligibility

- The International Space Solar Power Student Competition is open to participation by faculty-coached, student-implemented project teams, including
 - A faculty advisor
 - A team including not fewer than two undergraduate students or
 - Two or more undergraduate and graduate students
 - *The above may be from any accredited international college or university*
- Note that a given project team may involve more than a single university in an integrated team



Description of the "Prize"

- The International Space Solar Power Student Competition Prize will have four parts:
 - a) Travel and registration support for selected semi-finalist teams to attend the annual NSS International Space Development Conference (ISDC) and present their project
 - b) A formal certificate of recognition for selected semi-finalist teams (as a team, and for each team member, including the faculty advisor)
 - c) Travel and registration support for one or two selected finalist team(s) to attend the annual IAC SSP Symposium
 - d) A formal certificate and a plaque for the selected winning team(s) (the plaque for the team, and a certificate for each participant, including the faculty advisor)



Technical Framework for 2017 (1 of 2)

- The competition will encompass multiple disciplines, but will be focused each year around a particular Solar Power Satellite concept.
- During 2017-2018, the focus will be on highly-modular microwave wireless power transmission (WPT) Solar Power Satellite concepts as embodied in the “SPS-ALPHA” concept (Solar Power Satellite by means of Arbitrarily Large Phased Array) and related SPS architectural concepts
- The SPS-ALPHA concept was presented earlier during the ISDC 2017 SSP Track; details are available upon request.



Technical Framework for 2017 (2 of 2)

- The acceptable disciplines/fields for research projects in 2017 include
 - a) architecture level studies
 - b) end-to-end energy concepts & technology (including wireless power transmission (WPT), solar power generation, etc.)
 - c) structural systems, controls and dynamics technology
 - d) space transportation technology and engineering for SPS (including Earth-to-orbit or in-space transportation and/or propulsion)
 - e) space resources utilization for SPS
 - f) ground systems and integration
 - g) near-term SPS system and technology demonstration concepts; and
 - h) space policy, legal and regulatory considerations across all of the above (including international cooperation, spectrum management, space debris, etc., etc.).



This Year's Semi-Finalist Projects (1 of 4)

- During 2017, the first year of this new competition, 16 projects were proposed from 5 different countries, including China, the US, Japan, the Netherlands, and India) and involving some 14 academic institutions, 8 faculty advisors and 49 graduate and undergraduate students.
- From the submitted proposals, 7 have been selected as semi-finalists and have been invited to present (with support from SPACE Canada) at the upcoming NSS [International Space Development Conference](#)®, ISDC® 2017 (May 25-29) in St. Louis, Missouri USA during the Space Solar Power Track.
- This is that session...



This Year's Semi-Finalist Projects (2 of 4)

- The semi-finalist teams include students from the following institutions:
 - Dalian University of Technology (China),
 - Delft University of Technology (The Netherlands),
 - Hampton University (USA),
 - Harbin Institute of Technology (China),
 - Hosei University (Japan),
 - Indiana University (USA),
 - Kitawato University (Japan),
 - Princeton University (USA),
 - Purdue University / Indianapolis (USA),
 - Purdue University / Indianapolis (USA),
 - Shizuoka University (Japan),
 - The Graduate University of Advanced Studies (Japan),
 - Tokai University (Japan),
 - Tokyo University of Science (Japan),
 - University of Colorado / Boulder (USA), and the
 - University of Maryland (Baltimore County and College Park Campuses, USA).



This Year's Semi-Finalist Projects (3 of 4)

- Presentation 1: Impact of Emerging PV Technologies on SSP Viability (US, AUT)
- Presentation 2: Comparative Study of Power Generation Methods for Mars Mission: Potential of Space Solar Power (SSP) System (US, AUT)
- Presentation 3: The Feasibility of Space Solar Power for Forward Operating Bases (US, AUT)
- Presentation 4: SACULA Project (Japan)
- Presentation 5: SPS-ALPHA – IUPUI JAGS (US, IUPUI)
- Presentation 6 (SKYPE): Orbital station keeping control for SPS-ALPHA via electric propulsion and solar pressure (China, Dalian / DUT)
- Presentation 7 (SKYPE): Flexible Adjustment Model for SPS-ALPHA: Optical Solution (China, Harbin / HIT)



Closing

- Each student presentation
 - Scheduled for 20 minutes duration, plus 5 minutes for Q&A
 - Time must be strictly kept
 - Two presentations are being made from China via SKYPE
 - Judging will be completed off-line over the next 7-10 days
 - Finalists will be announced following the completion of judging