

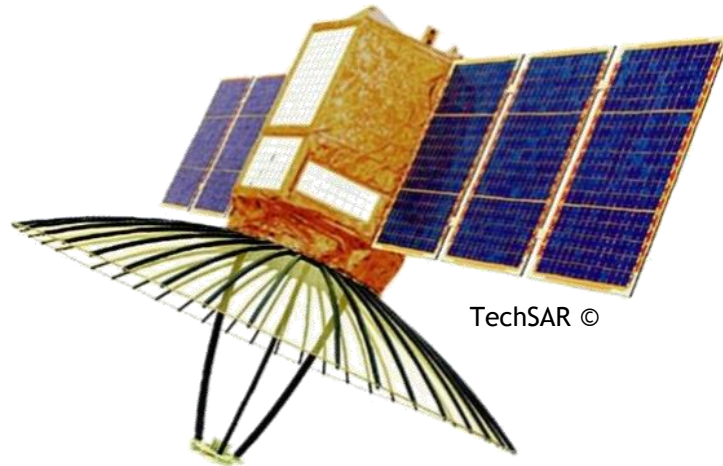
**SINGAPORE
SPACE
CHALLENGE
2018/19**

**CHALLENGE
STATEMENT**

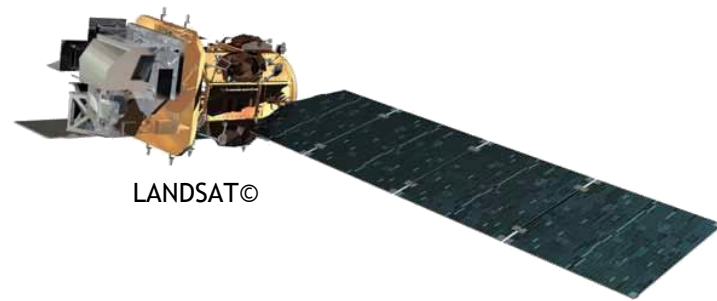


CHALLENGE STATEMENT

DESIGN A EARTH OBSERVATION SATELLITE SYSTEM THAT CAN BE USED TO SUPPORT DISASTER MANAGEMENT IN THE EQUATORIAL REGION



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CHALLENGE STATEMENT

(1) Background

Equatorial regions are located in a band around the Equator and cover about 6% of the Earth's surface. They are often in lowland areas and have a climate that is hot and wet all year round.

Cloud cover is a major problem for optical and most passive sensors. These sensors generally require an external light source to illuminate the ground. They usually need to view the earth clearly to produce images of ground level events.

Overcrowding of wireless devices signals interfere with cosmic radio signals for Earth Observation data.

Other problems include varying sun angles, thermal control, low re-visit frequency, moving targets and etc.

In the event of disasters such as violent storms, landslides, earthquakes, tsunamis, volcanic eruptions, flooding or forest fires, interference with capturing EO data could affect rescue efforts.

CHALLENGE STATEMENT

(2) Mission Specifications

- a. Design a new satellite system that can overcome current problems faced by EO satellites for capturing data in the equatorial region
- b. The equatorial region are delimited in latitude by the Tropic of Cancer in the Northern Hemisphere at $23^{\circ}26'12.8''$ (or 23.4369°) N and the Tropic of Capricorn in the Southern Hemisphere at $23^{\circ}26'12.8''$ (or 23.4369°) S
- c. The satellites described in the proposed satellite system should weigh less than 50kg each
- d. The proposed satellite system should clearly illustrate how the current problems of EO data capturing is resolved or improved

CHALLENGE STATEMENT

(2) Mission Specifications

- e. Other factors to be considered (but not limited to) in the design includes
 - ▶ Orbital Altitude of Operation
 - ▶ Power Management
 - ▶ Attitude and Orbital Control Systems
 - ▶ Data Downlink
 - ▶ On Board Computer
- f. Teams will need to identify and list the limitations of their design. Proposals on how these limitations might be overcome will be given bonus points
- g. Approximate finance and costing analysis of the proposed design will be given bonus points
- h. Teams who can cite **ADDITIONAL** viable applications for use of their proposed design will be given bonus points

CHALLENGE STATEMENT

(3) Submission Criteria

a. Mission Report (Mandatory)

Completed and final entries must include a mission report not exceeding 30 pages, including all illustrations, graphics and schematics. A complete bibliography is required. This should be in softcopy (pdf) and emailed to the organizer before the deadline of the competition. Font size 11 or 12, Arial or Times New Roman.

b. Presentation (Mandatory)

In order for the judges to better assess the concept students must submit a video recording of themselves presenting their report. The presentation recording should be 5 to 10 minutes long. It is recommended that all members of the team are involved in the presentation. The team may elect to show their simulation video during this presentation. However, it is highly recommended that students focus more time on explaining their project submission to the judges.

CHALLENGE STATEMENT

(3) Submission Criteria

c. Computer Simulation (Mandatory)

Teams must produce a computer simulation video showing their proposed projects in action. The video must be of good quality and on a commonly-played format such as wmv, mov, avi, mpeg or mp4. Please check with the organizers for other allowable formats. The recommended length of the computer simulation is between 2 and 3 minutes.

d. Mock-Up (Optional)

Students can consider constructing a mock-up to visually illustrate the key aspects of their concept. Images of the mock-up must be submitted before the deadline. However, the actual mock-up needs to be delivered to the designated grading venue. Please do not submit the actual mock up to the organizer.

CHALLENGE STATEMENT

(4) Grading

a. Technical Characteristics - 30%

- ▶ Technical accuracy
- ▶ Accurate calculations, illustrations and graphics
- ▶ Viability of concept
- ▶ Countermeasures of design limitation (BONUS)
- ▶ Finance & costing analysis (BONUS)

b. Creativity - 35%

- ▶ Idea, concept and design creativity
- ▶ Novelty and utility of design

c. Concept Relevance - 20%

- ▶ Relevance to challenge statement
- ▶ Possible issues during use
- ▶ Additional viable applications (BONUS)

d. Entry Submission - 15%

- ▶ Clarity of report & presentation
- ▶ Content & structure
- ▶ Relevance & accuracy of simulation video
- ▶ Referencing/bibliography

Good Luck
&
May the Best Team Win!

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