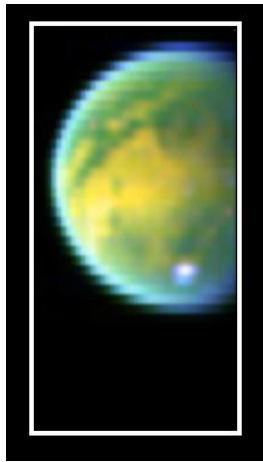


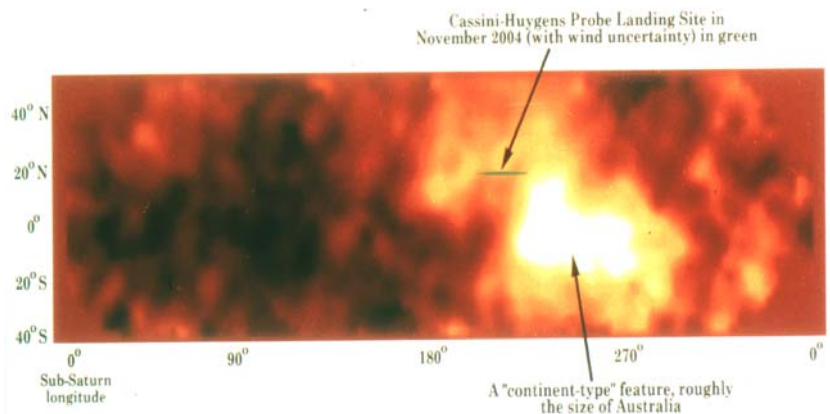
STUDENT SPACE DESIGN COMPETITION
Project Statement



Titan Traveler

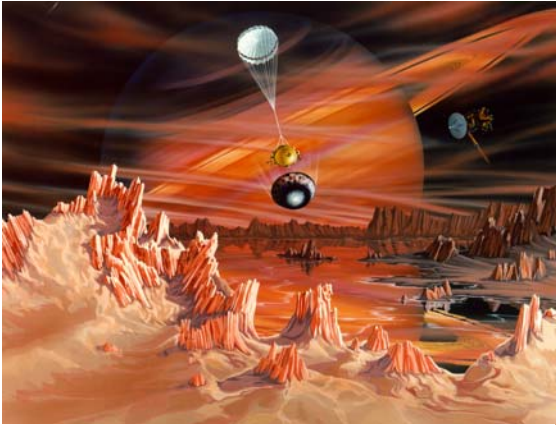
On July 1st, 2004, the Cassini Spacecraft fired its main engines and successfully entered orbit around Saturn. This marked the beginning of a four-year scientific tour to explore and investigate Saturn and its moons. One of the more interesting moons of Saturn is Titan. Until recently, images of Titan have been unrevealing, showing only a thick photochemical haze that effectively obscured the surface of the moon. More recent images, however, have revealed that the surface of Titan is complex, with varying geometry and regions of significantly different chemical composition.

Analysis of Titan's atmosphere and other available data has suggested that the surface of Titan may consist of oceans or lakes of frozen ethane and methane, fed by a rain cycle that involves hydrocarbons rather than the water based rain cycle on Earth. Potentially, Titan is one of the most interesting and "alien" planets in the solar system. Additionally, many scientists believe that the chemical conditions on Titan may hold clues about the formation of life on Earth.



“Map” of the surface of Titan captured by the Hubble Space Telescope.

On December 25th, 2004, the Huygens probe will separate from the Cassini spacecraft and begin its 21 day cruise towards Titan. At the end of the cruise, on January 14th, 2005, Huygens will enter Titan's atmosphere and begin a descent to the surface of the enigmatic moon. Slowed by two parachutes, Huygens will analyze Titan's atmosphere and capture more the 1100 images. These images and data will be transmitted to the Cassini



Artist's conception of the Huygens probe descending to the surface of Titan.

spacecraft for retransmission to Earth. The descent is expected to take approximately 3 hours. Before its batteries run out, the probe may find itself bobbing in a sea of liquid methane.

During the next four years, Cassini will pass close to Titan 45 times, returning a wealth of images and scientific data. Based on this data, a logical follow-up mission will be a robotic explorer that can navigate the surface of Titan, investigating sites of particular interest revealed by Cassini-Huygens.

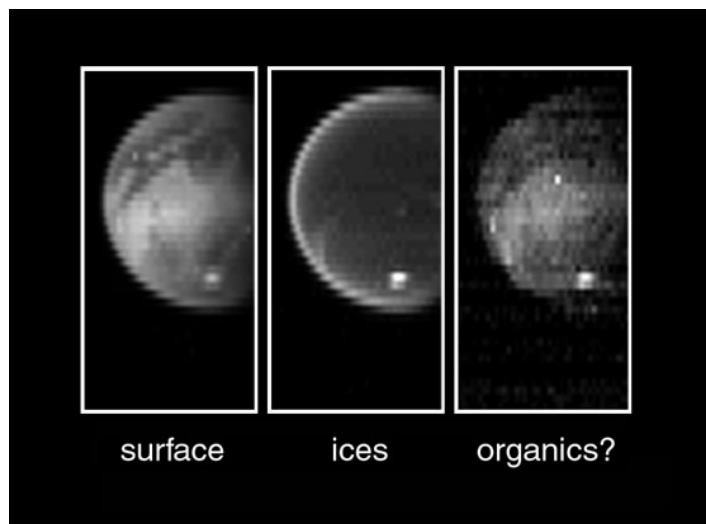
MISSION STATEMENT

Design a robotic mission to explore the varied surfaces of Titan, based on the most current data returned by the Cassini-Huygens mission.

PROJECT REQUIREMENTS

The project design should satisfy the following mission requirements:

1. The mission should be launched using a commercially available launch vehicle.
2. The mission should include provisions for:
 - Descending to the surface of Titan
 - Navigating the surface terrain of Titan
 - Obtaining images and relevant chemical data
 - Transmitting data back to Earth
3. Details of the flight to Titan prior to the landing phase will be handled by other engineers and are outside the scope of this project.
4. The design and planning of the mission should incorporate the best available data from the Cassini-Huygens mission. The design should be refined as data becomes available prior to the contest.



Three views of Titan, obtained by the Cassini spacecraft using different wavelength filters to look for ice and possible organic materials.

5. The mission should be as cost effective as possible.