



Synchronized Position Hold Engage Reorient Experimental Satellites



High School 2011 Game Description

Premise: Two SPHERES satellites have the task of extracting Helium-3, a new energy source for Earth, from asteroids. The satellites must find their tools, reach the asteroids, collect the Helium-3, and deposit it in a processing station.

Note: With the exception of the SPHERES satellites, *all other elements of the game are virtual during the ISS competition.*

Starting Conditions

Each player starts with a finite amount of *virtual* fuel allocation (independent of the amount of *real* fuel in the SPHERES satellite). Similarly, the satellites have a finite amount of (virtual) energy to use the tools they collect. The players start at the same position during each match, on opposite sides of a (virtual) start line.

Each player possesses a weak repulsor and a weak tractor which serves to repel and attract the other player, respectively. These can be used to either help or obstruct the progress of the other player, depending on the strategy chosen by each team.

Game Phases

The game consists of three stages of 60 seconds each.

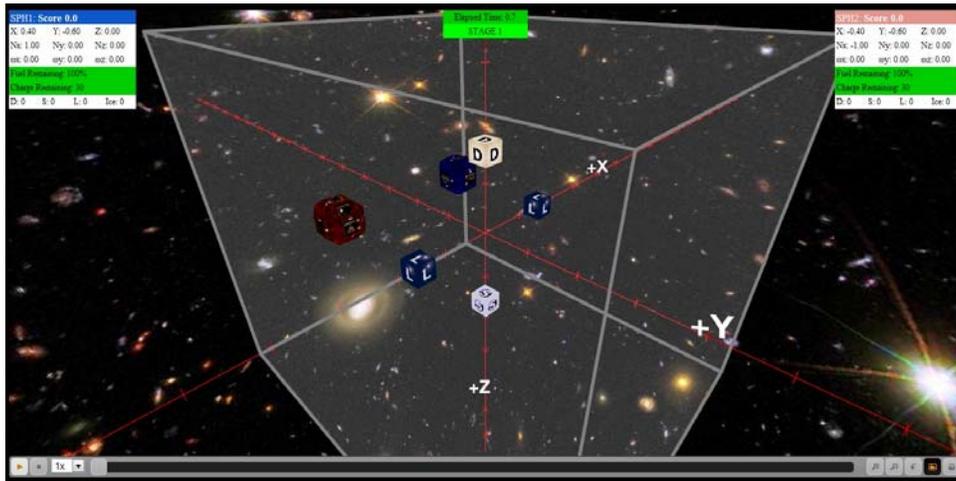
Phase One: Tool collection.

Virtual tools are available to be picked up by the *players*: two lasers, a shield, and a repulsor upgrade. A player can only pick one laser. To pick up the tools a satellite must stop at the tool's pre-specified position for a few seconds.

The laser allows the satellites to access richer deposits of Helium-3 and/or to attack the shield of their opponent. The shield protects the satellite from a repulsor or tractor of the other player. To use any of the items they must be pointed in the direction of the target.

This phase does not earn points. The objective is to obtain the right tools for the strategy of Phase 2 & 3. Items that are not picked up in Phase 1 will no longer be available.





Phase 1 Overview: Two lasers (L), one repulsor upgrade (R), and a shield (S) are available for pick-up. They are positioned symmetrically from the starting position.

Phase Two: Reaching the Asteroids & Collaborating

Two asteroids, called Opluens and Indigenes, will “appear” in the *virtual* world. To extract Helium-3, the players have the option of spinning on the asteroids (drilling) or revolving around the asteroids (surface collection), both of which earns points. If they collaborate on the extraction operation on the same asteroid, such that one spins and one revolves, both SPHERES will earn more points.

Indigenes can be mined immediately, but will earn fewer points as its core is less dense.

Opluens has more enriched ore (worth more points) but has a layer of ice that must be melted by shooting a laser at it before any extraction. If the SPHERES collaborate at melting the ice layer, they will get points (and do it faster). A satellite can start to mine Opluens as soon as the ice melts.

Only one satellite can spin (drill) at an asteroid; both can revolve (surface collection) at the same asteroid.

Phase Three: Finish Mining & go to Mining Station

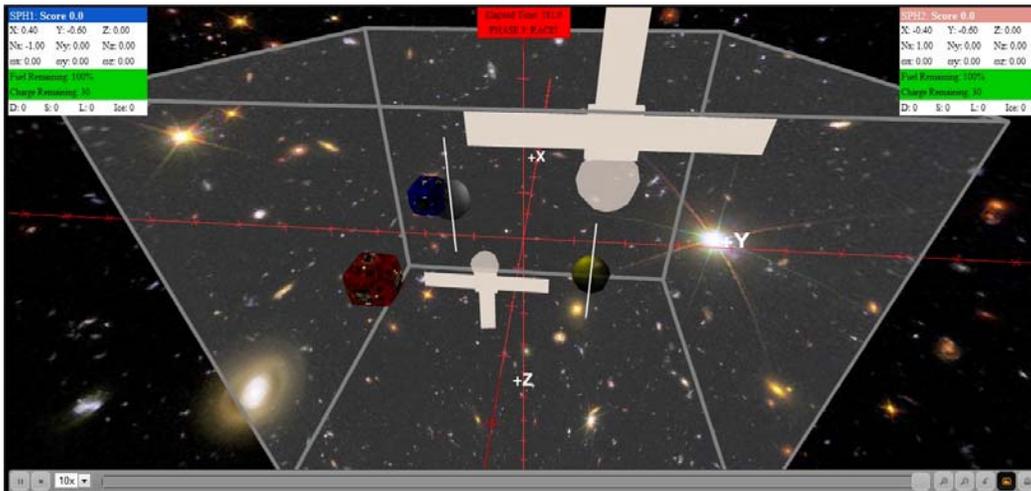
At the start of Phase 3 a star illuminates Opluens and melts the ice, so both asteroids can be mined immediately at the start of this phase. During the first part of this phase the players should continue their mining operations.

In the last 10 seconds of the phase the mining station will recall the satellites. At this point in the match each player may optionally race to the station. The first satellite to reach its station will earn bonus points. If collision avoidance is activated during this phase, both players will be penalized and lose points. A match ends in four ways:

1. The first satellite to reach its station transmits its “done” command, which ends the match.
2. Both satellites reach their station (which earns points for *both* players).
3. Both satellites run out of fuel without reaching the station.
4. 60 seconds elapse in Phase 3.

The player with more points at the end of the match wins and earns bonus points.





Phase 2 and 3 Overview: The two asteroids, also positioned symmetrically from the starting position, are Opulens (gray, above) and Indigens (yellow, below). The asteroids are mined by drilling in (spinning) or surface collection (rotation) around the asteroids. The two mining (return) stations are opposite of the asteroids.

Tournament Scoring

The High School 2011 Champion will be determined through a series of round robin competitions. The winner of each round robin is determined by adding their points in that round. Three races happen in each round robin:

Player A vs Player B

Player B vs Player C

Player C vs Player A

The winner is the one with the most total points in their two races.

European and USA competitions

Two competitions will take place, one for Europe and one for the USA. The European competition consists of one round robin, with a total of 3 players.

The US competition will require four round robins to declare a champion out of 9 players. The 9 players will be divided into 3 groups of 3 for the first 3 round robins. The winners of each initial round robin will compete in a final “championship” round robin.

Alliances

Each “Player” in the competition represents an “Alliance” of three teams. Therefore, there are a total of 9 European teams (in 3 Alliances) and 27 USA teams (in 9 Alliances) represented in the finals. The teams are listed below.



EUROPE		
Team Name	School Name	Location
(1) Alliance CyberAvo		
CyberAvo	I.T.I.S. Amedeo Avogadro	Turin, Italy
Ultima	Kaethe Kollwitz Oberschule	Berlin, Germany
Lazy	Heinrich Hertz Gymnasium	Berlin, Germany
(2) Alliance QED		
QED	Heinrich Hertz Gymnasium	Berlin, Germany
Why Not	ITIS Pininfarina	Moncalieri, Italy
@-moSphere	Einhard-Gymnasium	Aachen, Germany
(3) Alliance Fermi Team		
Zero Robotics Fermi T.	Liceo Scientifico Statale "E.Fermi"	Padova, Italy
AC One	Berufskolleg für Wirtschaft und Verwaltung	Aachen, Germany
OLI-M24	ITIS Olivetti	Ivrea, Italy

USA		
Team Name	School Name	Location
(1) Alliance Kulschrank		
Team Kuhlschrank	Pope John XXIII HS, Sparta HS, Newton HS	Sparta, NJ
The Cheesy Poofs	Bellarmino College Prep	San Jose, CA
TBD	St. Mark's School of Texas	Dallas, TX
(2) Alliance y0b0tics!		
y0b0tics!	Montclair High School	Montclair, NJ
FMHS Robotics Club	Fayetteville-Manlius Central School District	Manlius, NY
Wafflebots	Harvard-Westlake School	Studio City, CA
(3) Alliance AGHS		
AGHS	Albert Gallatin High School	Uniontown, PA
Starliner	Methacton High School	Eagleville, PA
C-Wolves	Claremont High School	Claremont, CA
(4) Alliance Deviltech		
DevilTech	West Lafayette High School	West Lafayette, IN
Stuy-Naught	Stuyvesant High School	New York, NY
Team Estonia	West Essex High School	North Caldwell, NJ
(5) Alliance LCA ZeroBotX		
LCA Team ZeroBotX	Lexington Christian Academy	Lexington, MA
Delta Falmouth	Falmouth HS	Falmouth, ME
MSJ Robotics	Mount Saint Joseph High School	Baltimore, MD
(6) Alliance Cougar Robotics		
Cougar Robotics	Shawnee Mission Northwest	Shawnee, KS
SPHERES to the Wall	Cocoa Beach Jr/Sr High School	Cocoa Beach, FL
M. Blair Computer Team	Montgomery Blair High School	Silver Spring, MD
(7) Alliance Rocket		
Team Rocket	River Hill High School	Clarksville, MD
Defending Champions	Storming Robots	Branchburg, NJ
SPHEREZ of Influence	Rockledge High School/ Brevard County	Rockledge, FL
(8) Alliance CookieBot		
CookieBot	SpaceCookies/Gunn	Mountain View, CA
Space Devils	Columbus HS / Muscogee County District	Columbus, GA
Zero Gravity Robocubs	University of Detroit Jesuit HS & Academy	Detroit, MI
(9) Alliance SuperNOVA		
SuperNOVA	Prince William County Public School	Manassas, VA
Absolute Zero	Bonnars Ferry High School	Bonnars Ferry, ID
Team Alpha-Tech	Staten Island Technical High School	Staten Island, NY

