Solving Spaceflight Osteopinea

New Mexico
Super Computing Challenge
Final Report
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122
Quemado Schools

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School Name: Quemado High School
Area of Science: Earth and Space Sciences
Project Title: Solving Spaceflight Osteopenia

Problem Definition:
Although being in space can be an alluring thought, I assure you that it has its downsides; especially on long space flights. On long space flights, astronaut's lose up to 1% of their total bone mass per month. This loss is accompanied by muscle loss as well, which is due to the fact that astronauts are living in a zero g environment, and their bodies get rid of the bone and muscle they don't need for support. This condition is called spaceflight osteopenia, and it is the main reason that astronauts are unable to go on very long spaceflights. Another problem with extended spaceflights is that the lack of gravity causes fluids in the body that are usually held down by gravity, to rise freely, making their bodies believe the astronaut does not have enough fluid. The body tries to correct this by producing excess fluids, which gives astronauts the characteristic “puffy face”.

Problem Solution:
We are going to design a ship in the program Kerbal Space Program which when put into Earths orbit will spin and reach a speed high enough to reach a sort of artificial gravity. Artificial gravity is a force that simulates the affects of gravity in the fact that an object gets pulled in a direction. We plan on using centrifugal force to simulate gravity so that the astronaut gets pulled towards the outside of the spinning vehicle. Kerbal Space Program is a program designed with the purpose of a game but due to the fact that it has a physics core we are using it to simulate the pull of earth's gravity while in orbit.

Progress to Date:
Currently we have built several designs of spaceships in order to test out how well each design would be more efficient in achieving that one g of centrifugal force. Upon finishing each design we sat down as a team and discussed the pro's and con's of each design and whether they contain any unneeded inefficiencies. We have ran into one problem at the moment though, Kerbal Space Program has the g-force measured when it comes to forwards momentum, but when we spin our ship in orbit the g-force meter doesn't display any amount of g-forces are being enacted on the outside pods.

Results:
We expect to design a ship that will be able to be launched into space in one piece and will be able to efficiently spin and create artificial gravity by the use of centrifugal force. This design will have to be almost self sustaining in order to not need to be serviced too often. We intend to build a design that uses engines that rely mostly on solar panels that way we could use the sun's energy to basically power the rotation of the station. We think that if we are able to design a ship to these specifications NASA would be able to use the design in order to enact long spaceflights and remove the worry of spaceflight osteopenia from space travel. We hope that we will earn the opportunity to show an engineer employed by NASA our design, and have it considered, or improved upon by them.

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Sponsoring Teacher: Tim Angelus

Citations:
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